Applied Research on English Language

V. 5 N. 1 2016
pp:17-32
http://uijs.ui.ac.ir/are

The Effect of Mnemonic and Mapping Techniques on L2 Vocabulary Learning

Abbas Ali Zarei [1*], Flora Keysan [2]

[1 & 2] *Imam Khomeini International University, Faculty of Humanities, Department of English, Qazvin, Iran*

Abstract: The purpose of the present study was to investigate the effects of selected presentation techniques including the keyword method, the peg word method, the loci method, argument mapping, concept mapping and mind mapping on L2 vocabulary comprehension and production. To this end, a sample of 151 Iranian female students from a public pre-university school was selected on the basis of availability. They were assigned to six groups. Each group was randomly assigned to one of the afore-mentioned treatment conditions. After the experimental period, two post-tests in multiple choice and fill-in-the-blanks formats were administered to assess the participants vocabulary comprehension and production. Two independent One-Way ANOVA procedures were used to analyze the obtained data. The results showed that the differences among the effects of the above-mentioned techniques were statistically significant in both vocabulary comprehension and production. These findings can have implications for learners, teachers, and materials developers.

Keywords: Keyword Method; Peg word Method; Loci Method; Argument Mapping; Concept Mapping; Mind Mapping; Vocabulary Learning

1. Introduction

Vocabulary learning is an essential ingredient in English learning because vocabulary constitutes a fundamental basis of English sentences. Learning English encompasses memorization, practice, repetition and recall of large-scale word lists; learners have to pay closer attention to vocabulary because without vocabulary knowledge, meaning cannot be understood (Chen & Chung, 2008). One of the major responsibilities of language instructors

* **Corresponding Author.**

Authors' Email Address:
[1] **Abbas Ali Zarei** (a.zarei@hum.ikiu.ac.ir), [2] **Flora Keysan** (f.keysan@gmail.com),

ISSN (Online): 2322-5343**, ISSN (Print):** 2252-0198

is to improve the learning conditions, and to use more effective activities to facilitate students vocabulary learning.

One of the most important areas in ESL/EFL research pivots round the issue of the most effective techniques of vocabulary teaching. There has been considerable research on the ways to help students to retain vocabulary items (Khosravizadeh & Mollaei, 2011). Many studies offer strategies for English vocabulary learning to improve students learning. Although many studies have been conducted on the effects of the keyword method, the peg word method, the loci method, argument mapping, concept mapping and mind mapping (Bakken & Simpson, 2011; Pishghadam, & Ghanizadeh, 2006; Richmond, Cummings, & Klapp, 2008), these techniques have rarely been compared together. There is controversy about the relative effectiveness of each of these techniques in comparison with the others (Hoffmann, 2010). There seems to be a paucity of research on this issue, and this study attempts to bridge part of this gap by investigating the effect of mnemonic and mapping techniques on L2 vocabulary comprehension and production.

2. Review of literature

Over the past few decades, a massive amount of research has been conducted on numerous aspects of vocabulary learning strategies (Asgari & Ghazali Bin, 2011; Khosravizadeh, & Mollaei, 2011). Bakken and Simpson (2011) hold that different vocabulary learning strategies have superiority over traditional instructions in terms of increasing word consciousness and word analysis. Some of the common vocabulary learning strategies include semantic mapping, Picture Word Inductive Model (PWIM), synonyms and antonyms, incidental vocabulary learning, word part analysis, memorization strategies, cognitive strategies, semantic field theory, meta-linguistic strategies, using monolingual and bilingual dictionaries, social strategies, using English language media, and using songs and music (Asgari & Ghazali Bin, 2011; Sedita, 2005).

2.1. Mnemonic techniques

The mnemonic techniques investigated in the present study included the keyword method, the peg word method, and the loci method. Raugh and Atkinson (1974) define the keyword method as associations between an acoustic similarity of an English keyword to a foreign word and the visual association of the English keyword to the English definition of the foreign word. Vocabulary learning through the keyword method is divided into two stages. In the first stage, the student creates an English word (keyword) that is somehow similar to the foreign word; in the second stage, the student visualizes the keyword (English word)

interacting with the English definition of the foreign word (Atkinson & Raugh, 1974; Griffith, 1980; Raugh & Atkinson, 1974; Raugh, Schupbach, & Atkinson, 1975). According to Masteropieri and Scruggs (1998), the keyword method is a mnemonic strategy to help students learn new words.

The process of using the peg word method starts with learning a set of concrete words (pegs) associated with the first 20 or so whole numbers. The same sound words or pegs are such as 1 is a bun, 2 is a shoe, and 3 is a tree,.. (Bower & Reitman, 1972, p. 8). To learn any new list of items, an individual must visualize the referent of the respective new words in explicit interaction with the referent of the peg words in question.

Lindenberger, Kliegl and Baltes (1992) define the loci method as a method in which new words are connected to locations, using visual imagery. When it is necessary to recall the respective words, the locations are mentally imagined. According to Baltes and Kliegl (1992), The key component of the method of loci is the forgoing of mental images or thought linking words to be remembered in order of appearance to an invariant series of mental landmarks. At recall, one mentally revisits the mental locations in order, retrieves the associated mental image or thought, and decodes from these mental images the words to be remembered (p. 121).

According to Cornoldi and De Beni (1991), the loci mnemonic method facilitates the memorization of separated items and remembering passages. According to Nemati (2009), to use this technique, imagine a familiar location such as a room, then mentally place items to be remembered there, to recall take an imaginary walk along the landmarks in the room and retrieve the items in it (p. 124). Bakken and Simpson (2011) also note that the loci method or mental walk can be performed through imaginations and pictures to organize and remember information.

2.2. Mapping techniques

Since the present study has focused on three mapping techniques including argument mapping, concept mapping and mind mapping, a brief introduction of each technique is given below.

An argument consists of a set of claims with well-structured associations between them to support or reject claims and opinions (Patterson, 2007). An argument is composed of a set of statements that involve a claim and some reasons, and these reasons support each other for the claim. Arguments are presented to support each of the reasons and the reasons of

supporting arguments. An argumentation represents the structure of an argument map in such a manner that includes a set of arguments (Hoffmann, 2010).

Novak and Canas (2006) define concept mapping as a graphical tool for knowledge organization and presentation. Pishghadam and Ghanizadeh (2006) hold that in creating concept maps, concepts, words or phrases are placed as nodes in boxes. Links are presented to connect structures between nodes. Labels or arrows represent these links. A fixed link also connects two concepts or propositions. Novak and Canas (2006) believe that concept maps are composed of linking words with lines that indicate important and useful relationships, statements, and propositions.

Mind mapping is a new technique developed by learning researchers in 1960s. Tony Buzan is the initiator of mind mapping (Murley, 2007). Jelger and Haefeli (2007) define mind map as a diagram to indicate associated ideas, words, and tasks. According to Douma, Ligierko and Romano (2009), mind mapping is a productive way for the visual presentation of complex issues and graphical teaching of difficult topics.

Although several studies have been conducted on each of the above-mentioned techniques, there is a relative dearth of research on the comparative effectiveness of these techniques on L2 vocabulary comprehension and production. It is the aim of the present study to address this issue. More specifically, the present study addresses the following research questions:

(1). Are there any significant differences among the effects of the mnemonic and mapping techniques on L2 vocabulary comprehension?

(2). Are there any significant differences among the effects of the mnemonic and mapping techniques on L2 vocabulary production?

3. Method

3.1. Participants

The participants of the present study were 151 Iranian female students from a public pre-university school in Islamshahr. They were in the pre-intermediate level of language proficiency. They were assigned to six groups and each group randomly received one of the selected presentation techniques. Group A (n=20), group B (n=23), group C (n=22), group D (n=28), group E (n=30) and group F (n=28) received the keyword method, the peg word method, the loci method, argument mapping, concept mapping and mind mapping techniques, respectively.

3.2. Materials and Instruments

The materials and data collection instruments used in this study were as follows:

A standard language proficiency test (KET or Key English Test) including 30 items in multiple choice format was administered as a pre-test to homogenize the participants as well as to determine their language proficiency level. Although KET is a fairly established test with established psychometric characteristics, to check the reliability of the test in the context of the present study, the KR-21 formula for estimating reliability was used, and the reliability index of the test turned out to be .84.

A lexical knowledge pre-test was also used; it included 180 vocabulary items chosen from the Pocket Persian-English Dictionary contextualized in 130 sentences. The target words were bolded and underlined in each sentence, and the students were asked to write the meaning of the words in Persian. The aim of this test was to elicit unknown words for the two post-tests.

At the end of the experimental period, two post-tests were used in two formats. The multiple choice format test, including 30 items, was used as a vocabulary comprehension post-test to assess the effects of the selected presentation techniques on vocabulary comprehension. To check the reliability of the test in the context of the present study, the KR-21 formula for estimating reliability was used, and the reliability index of the test turned out to be .81. Another 30-itemtest in the fill-in-the-blanks format was used as a vocabulary production post-test to measure vocabulary production.

3.3. Procedure

Before introducing the instructional treatment, a standard 30-minutes pre-test (a KET test) including 30 items in multiple-choice format was administered to homogenize the participants and to determine their proficiency level. The mean and standard deviation of the scores were computed (Mean = 14.31, SD = 3.17). To homogenize the participants, those participants whose score was more than one standard deviation above or below the mean were excluded from all subsequent analyses. The results of the pre-test revealed that 151 students were homogenous; they constituted the participants of the study.

Then, the word knowledge pre-test was administered to ensure that the students had no prior knowledge of the target words. It included 180 bolded and underlined vocabulary items which were contextualized in 130 sentences. The words were chosen from the Pocket Persian-English Dictionary. Most of the sentences were selected from Oxford dictionary and some were teacher-made. The time allocated for the pre-test was 40 minutes. As a result of

this test, of the total of 180 vocabulary items, 60 words were eliminated because they were familiar for the participants. The remaining 120 unknown words were selected for inclusion in the post-tests.

Subsequently, the students were assigned to six groups and each group was randomly assigned to one of the treatment conditions. In the first session, a full explanation of the selected techniques (the keyword method, the peg word method, the loci method, argument mapping, concept mapping and mind mapping) was presented to each group of participants. The instructional treatment lasted for 9 sessions, and one more session was allocated to administering the post-tests. Learning sessions were held twice a week, each session lasting 45 minutes. The words were divided into nine successive lists of 20 words. Every session, 20 new words were taught according to the selected technique to each group and a brief review regarding the respective technique was given to improve the quality of the learning treatment. Each group of students was required to work on the new words at home and bring back their works to the class. The teacher s job was to correct students rors.

3.4. Data Analysis

Two separate one-way ANOVA procedures were used to analyze the obtained data and to answer the research questions. One examined the effects of the keyword method, the peg word method, the loci method, argument mapping, concept mapping and mind mapping on vocabulary comprehension, and the other one investigated the effects of the same techniques on vocabulary production.

4. Results and Discussions

4.1. Investigation of the first research question

The first research question aimed to investigate the effects of the selected presentation techniques on L2 vocabulary comprehension. To this end, a one-way ANOVA procedure was used. Table 1 contains the descriptive statistics.

As it is shown in Table 1, the peg word method group has the highest mean, followed closely by the loci method group, the keyword method group, the mind mapping group and the concept mapping group. The participants of argument mapping technique have the lowest mean.

Table 1. Descriptive Statistics for the ANOVA on Vocabulary Comprehension

Groups	N	Mean	Std. Deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Keyword	20	19.40	3.18	17.90	20.89
Peg word	23	21.95	3.18	20.57	23.33
Concept mapping	30	17.90	3.55	16.57	19.22
Loci method	22	20.86	2.67	19.67	22.05
Argument mapping	28	15.64	3.88	14.13	17.15
Mind mapping	28	18.07	3.53	16.69	19.44
Total	**151**	**18.76**	**3.93**	**18.12**	**19.39**

In order to see whether the observed mean differences among the groups are statistically significant, the one-way ANOVA procedure was used. Table 2 shows the results of the ANOVA procedure.

Table 2. The Results of the ANOVA on Vocabulary Comprehension

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	648.08	5	129.617	11.19	.000
Within Groups	1679.33	145	11.582		
Total	**2327.41**	**150**		η^2 **= .15**	

Based on Table 2, the observed F value and the significance level ($F_{(5,145)} = 11.192$, $P < 0.05$) show that there are statistically significant differences among the six groups. At the same time, the index of the strength of association shows that 15% of the total variance among groups can be attributed to the effect of the independent variable; namely, presentation techniques. To locate the differences between the means, the post-Hoc Scheffe test was utilized. The results are given in Table 3.

As it can be seen in Table 3, the difference between the keyword method group and the argument mapping group is statistically significant, indicating that the keyword method group performed better than the argument mapping group. Similarly, the mean differences between the peg word group and the concept mapping group, the peg word group and the argument mapping group and finally the peg word group and the mind mapping group are statistically significant, suggesting that the participants of the peg word group have outperformed their counterparts in the other three groups.

Table 3. Post-Hoc Multiple Comparisons of Means for Vocabulary Comprehension

(I) group	(J) group	Mean Difference (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Keyword method	*Peg word*	-2.55	.309	-6.06	.95
	Concept mapping	1.50	.801	-1.81	4.81
	Loci method	-1.46	.857	-5.01	2.08
	Argument mapping	3.75*	.018	.39	7.11
	Mind mapping	1.32	.878	-2.03	4.69
Peg word	*Concept mapping*	4.05*	.004	.87	7.23
	Loci method	1.09	.948	-2.33	4.51
	Argument mapping	6.31*	.000	3.08	9.54
	Mind mapping	3.88*	.008	.65	7.11
Concept mapping	*Loci method*	-2.96	.094	-6.18	.25
	Argument mapping	2.25	.278	-.75	5.27
	Mind mapping	-.17	1.00	-3.18	2.84
Loci method	*Argument mapping*	5.22*	.000	1.94	8.49
	Mind mapping	2.79	.148	-.47	6.06
Argument mapping	*Mind mapping*	-2.42	.218	-5.49	.64

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

In addition, the difference between the peg word method group and the loci method group is statistically insignificant. Furthermore, although there is a difference between the means of the concept mapping group and the loci method group, the difference is statistically insignificant. Although the loci group performed better than the concept mapping group, there is only a trend towards a meaningful difference. Based on the obtained results, there are no statistically significant differences between the concept mapping and the mind mapping groups. The implication is that the participants performance was more or less similar.

The results further indicate that the difference between the means of the loci method group and the argument mapping group is significant. The loci method group members outperformed their counterparts who received argument mapping.

As it can be observed in Table 3, the differences among the effects of the other techniques are not statistically significant, indicating that the participants performance in those groups was almost similar on the vocabulary comprehension test.

4.2. Investigation of the second research question

The second research question aimed to investigate the effects of the selected presentation techniques on L2 vocabulary production. To this end, another one-way ANOVA procedure was used. Table 4 displays the descriptive statistics on vocabulary production.

Table 4. Descriptive Statistics for the ANOVA on Vocabulary Production

Groups	N	Mean	Std. Deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Key word	20	16.60	2.74	15.31	17.88
Peg word	23	20.65	3.54	19.11	22.18
Concept mapping	30	12.86	2.50	11.93	13.80
Loci method	22	20.22	3.90	18.49	21.95
Argument mapping	28	19.32	3.99	17.77	20.86
Mind mapping	28	16.64	3.87	15.14	18.14
Total	**151**	**17.51**	**4.41**	**16.80**	**18.22**

Based on the above results, it can be observed that the peg word method group has the highest mean, followed closely by the loci method group, the argument mapping group, the mind mapping group and the keyword method group. It can be seen that the concept mapping group has the lowest mean in comparison with other groups.

In order to see whether or not the observed mean differences among the groups are statistically significant, another one-way ANOVA was used. Table 5 presents the results of the ANOVA procedure.

Table 5. The Results of the ANOVA on Vocabulary Production

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1165.82	5	233.16	19.25	.000
Within Groups	1755.88	145	12.11		
Total	**2921.70**	**150**		η^2 **= .13**	

As it can be seen in Table 5, the observed F value and the significance level ($F_{(5,145)}$ = 19.25, P < .05) are indicative of statistically significant differences among the effects of the six techniques. Meanwhile, the index of the strength of association shows that 13% of the

total variance among groups is due to the effect of the presentation techniques. Another Post-Hoc Sheffee test was used to locate the differences among the groups. Table 6 summarizes the results.

Table 6. Post-Hoc Multiple Comparisons of Means for Vocabulary Production

(I) group	(J) group	Mean Dif (I-J)	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Keyword	*Peg word*	-4.05*	.016	-7.64	-.46
	Concept mapping	3.73*	.020	.3441	7.12
	Loci method	-3.62	.050	-7.25	.00
	Argument mapping	-2.72	.218	-6.15	.71
	Mind mapping	-.04	1.00	-3.48	3.39
Peg word	*Concept mapping*	7.78*	.000	4.53	11.03
	Loci method	.42	.999	-3.07	3.92
	Argument mapping	1.33	.869	-1.97	4.63
	Mind mapping	4.00*	.007	.70	7.31
Concept mapping	*Loci method*	-7.36*	.000	-10.65	-4.06
	Argument mapping	-6.45*	.000	-9.53	-3.36
	Mind mapping	-3.77*	.006	-6.86	-.69
Loci method	*Argument mapping*	.905	.974	-2.43	4.25
	Mind mapping	3.58*	.027	.23	6.92
Argument mapping	*Mind mapping*	2.67	.148	-.45	5.81

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

Based on Table 6, there are statistically significant differences between the keyword method and the peg word method groups. It can be concluded that the peg word group performed better than the keyword group. Similarly, the difference between the keyword and the concept mapping groups is statistically significant with the keyword group outperforming the concept mapping group. In addition, the results also revealed that the difference between the keyword and the loci method groups is statistically significant. It is worth noting that there are no statistically significant differences between the keyword method and the mind mapping groups as well as between the keyword method and the argument mapping groups.

Moreover, the results show that the mean differences between the peg word and the concept mapping groups as well as the peg word and the mind mapping groups are statistically significant. The participants of the peg word method performed better than their counterparts who received concept mapping and mind mapping techniques. A close look at Table 6 shows that although there is a difference between the means of the peg word group and the loci group, the difference is not statistically significant. Meanwhile, the mean differences between the concept mapping group and the loci, argument mapping and mind mapping groups are statistically meaningful. It may be concluded that concept mapping is less effective than the loci method, argument mapping and mind mapping techniques on l2 vocabulary production.

Likewise, the difference between the loci method and the mind mapping groups is statistically significant, indicating that the loci group performed better than the mind mapping group. The observed mean differences among the effects of other techniques are statistically insignificant.

4.3. Discussion

Based on the findings of the present study, the peg word method group had the highest mean of all groups on both vocabulary comprehension and production tests. The loci method group had the second highest mean on both tests. This indicates that the peg word method and the loci method groups functioned better than the keyword mnemonic and mapping techniques on L2 vocabulary comprehension and production. The obtained results also indicated that the differences between the means of the peg word method group and the loci method group were not statistically significant on either posttest. The findings of Bower and Reitman (1972), similar to the findings of this study, indicated that the loci group and the peg word group had similar effects on learners recall. Moreover, this finding is in line with the findings of Roediger (1980), who reported that the peg word and the loci method learners had the same recall levels. They recalled more words than the other mnemonic subjects such as the link and imagery conditions. In Roediger s study, the peg word and the loci methods provided good retrieval cues through rhyme process and a set of locations, respectively. In addition, the peg word method and the loci method equally enabled the learners to recall words. However, the peg word learners were more successful at recalling particular numbered items. Unlike the finding of this study, in which the peg word method group performed slightly better than the loci method group on vocabulary comprehension and production, Roediger (1980) found that the participants of the peg word group were a bit

poorer than the participants of the loci method on both instant and delayed tests. This finding is also similar to that of Wang and Thomas (2000), who found that the peg word method and the loci method groups performed similarly.

The findings of the present study also showed that the keyword method group had the third highest mean after the peg word method and the loci method groups on vocabulary comprehension, but a low mean on vocabulary production test. The keyword method group had a poor performance on both tests. This finding indicates that the peg word method and the loci method groups outperformed the participants who received the keyword method. This finding is in contrast with the results of the study by Richmond, Cummings and Klapp (2008), who found that the keyword mnemonic learners were more successful than the loci, the peg word and the free study learners.

Like this study, in which there was no significant difference between the peg word method and the loci method groups on vocabulary comprehension and production, Richmond, Cummings and Klapp (2008) showed that there were no differences between the loci method, the peg word method and the free study conditions in recognizing the uses of specific and general transfer tasks.

The findings of this study also show that the keyword method is more effective than concept mapping on vocabulary production. Moreover, the keyword method is more effective than argument mapping on vocabulary comprehension. It is worth noting that the performance of the keyword mnemonic group was slightly better than the mind mapping group on vocabulary comprehension. Conversely, the mind mapping group performed a bit better than the keyword mnemonic group on vocabulary production test.

Based on the obtained results of the present study, the concept mapping group had a low mean on vocabulary comprehension, and the lowest mean of all on vocabulary production, suggesting that concept mapping is one of the least effective techniques on L2 vocabulary comprehension and production. Similarly, the mind mapping group had the fourth lowest mean on both vocabulary comprehension and production tests. Thus, mind mapping technique is not very effective on L2 vocabulary comprehension and production. This finding is different from that of Douma, Ligierko and Romano (2009), who found that online mind maps and concept maps are productive instructional tools to draw students attention and interest, and to teach sophisticated concepts and topics. They held that these maps help students take notes, study before an exam, and organize sophisticated research.

There are various factors accounting for such findings as well as the differences between the findings of this study and those of other similar studies. One possible reason

which may account for such meaningful differences may be partially due to the fact that in the present study, each selected technique was compared with other techniques, whereas other studies have usually compared each of the techniques only with a control group.

The results of this study confirm that the peg word method and the loci method are very effective and successful visual instructional tools to improve L2 vocabulary comprehension and production. One possible reason for this may be due to satisfaction or positive beliefs of the participants for using the peg word and the loci method procedures. It needs to be noted that the effect of the above-mentioned techniques on vocabulary learning may also be largely influenced by the cultural setting.

The findings of the study also indicate that the argument mapping group has the lowest mean among all groups on vocabulary comprehension, but the third highest mean after the peg word method and the loci method groups on vocabulary production. This indicates that argument mapping is one of the least effective techniques on L2 vocabulary comprehension and not very effective on production either. It is worth noting that the argument mapping technique needs higher educational knowledge and must be applied for complex issues (Sedita, 2005). Therefore, it may be concluded that argument mapping should be utilized for higher levels to show the structure of complicated debates. This could explain why it did not turn out to be effective on a lower level of lexical learning.

Another reason may be that the selected mapping techniques including argument mapping, concept mapping and mind mapping require more training time, helpful examples, and instructions on how to utilize the respective mapping technique in educational settings properly. This accounts for the lower level of achievement of the participants of these groups.

Still another factor is that the participants of the present study were at pre-intermediate proficiency level, whereas the demand of the selected mapping techniques may have been higher than the level of the participants. They usually require participants with higher educational knowledge or proficiency level.

One other factor contributing to the obtained results may have been the participants familiarity with the implemented techniques. In fact, the selected mapping techniques were not very familiar in our educational system in comparison with other methods. This novelty could have generated either enthusiasm or confusion.

5. Conclusion

The results of this study suggest that the peg word group achieved the highest mean among all the groups on both vocabulary comprehension and production tests. The participants who received the loci method had the second highest mean on both tests. The keyword group had the third highest mean on vocabulary comprehension; they had poor performance on vocabulary production. With respect to the results, the argument mapping group had the lowest mean on vocabulary comprehension. The concept mapping group had a low mean on vocabulary comprehension, and the lowest mean on vocabulary production. The participants who received mind mapping had a better performance in comparison with the concept mapping group on both tests. From an educational perspective, mnemonic instructional methods such as the peg word method and the loci method are very effective and valuable visual training tools. The results of this study corroborate the viability of mnemonic instructions in different languages and various fields. The findings of the present study also showed that despite significant advantages of mapping techniques such as argument, concept and mind mappings as successful visual educational tools, they failed to help students to achieve good results in comparison with the other three techniques. Such failure may be partly due to the fact that they are not very common and accepted in our educational system.

Based on the findings of the present study, it may be concluded that different techniques of vocabulary presentation have differential effects on second language vocabulary learning. This implies that careful and informed selection of the teaching techniques can facilitate learners vocabulary learning. This may also have theoretical and pedagogical implications for teachers, learners, researchers and syllabus designers. The findings of the present study may have theoretical implications for researchers in the findings may shed light on some of the less explored and more controversial aspects of vocabulary learning.

The findings may also have pedagogical implications for teachers; a clearer understanding of the nature of the causal relationship between presentation techniques and L2 vocabulary learning may help teachers make more informed decisions about their choice of teaching activities. These findings may also encourage learners to make use of the more effective and productive techniques and lexical associations in their self-study.

Materials developers may also find the findings of this study useful and relevant to their profession because the knowledge of how the different mnemonic and mapping techniques influence vocabulary learning can help syllabus designers develop materials and design activities that require the use of the more productive and useful techniques. This way,

materials developers can act as agents of change, encouraging the use of more effective techniques and discouraging the use of less effective ones.

References

Asgari, A., & Ghazali Bin, M. (2011). The type of vocabulary learning strategies used by ESL students in university Putra Malaysia. *English Language Teaching, 4* (2), 84-90.

Atkinson, R. C., & Raugh, M. R. (1974). An application of the mnemonic keyword method to the acquisition of a Russian vocabulary. *Journal of Experimental Psychology: Human Learning and Memory, 1*, 126-133.

Baltes, P. B., & Kliegl, R. (1992). Further testing of limits of cognitive plasticity: Negative age differences in a mnemonic skill are robust. *Developmental Psychology, 28*(1), 121-125.

Bakken, J.P., & Simpson, C. G. (2011). Mnemonic strategies: Success for the young-adult learner. *The Journal of Human Resource and Adult Learning, 17*(2), 79-85.

Bower, G. H., & Reitman, J. S. (1972). Mnemonic elaboration in multi-list learning**.** *Journal of Verbal Learning and Verbal Behavior, 11,* 478-485.

Chen, C. M., & Chung, C. J (2008). Personalized mobile English vocabulary learning system based on item response theory and learning memory cycle. *Computers & Education, 51,* 624˚645.

Cornoldi, C., & De Beni, R. (1991). Memory for discourse: Loci mnemonics and the oral presentation effect. *Applied Cognitive Psychology, 5,* 511-518.

Douma, M., Ligierko, C., & Romano, J. (2009). *Creating online mind maps and concept maps.* 25th Annua Conference on Distance Teaching and Learning. Madison: Wisconsin.

Griffith, D. (1980)**.** The keyword method of vocabulary acquisition: An experimental evaluation. *Army Research Institute for the Behavioral and Social Sciences, 439,* 1-41.

Hoffmann, M. (2010). *Visualizing ethical controversies and positions by logical argument mapping (LAM).* Georgia: Georgia Institute of Technology.

Jelger, C. & Haefeli, O. (2007). *Mind mapping in scientific writing.* Paper presented at the Scientific Writing Seminar, Bernoullistrasse.

Khosravizadeh, P., & Mollaei, S. (2011). Incidental vocabulary learning: A semantic field approach. *Broad Research in Artificial Intelligence and Neuroscience (BRAIN), 2* (3), 20-28.

Lindenberger, U., Kliegl, R., &. Baltes, P. B. (1992). Professional expertise does not eliminate age differences in imagery-based memory performance during adulthood. *Psychology and Aging, 7*(4), 585-593.

Masteropieri, M. A., & Scruggs, T.E. (1998). Enhancing school success with mnemonic Strategies. *Intervention in School and Clinic, 33*(4), 201-208.

Murley, D. (2007). [Technology for everyone¢] Mind mapping complex information. *Law Library Journal, 99*(1), 175-183.

Nemati, A. (2009). Memory vocabulary learning strategies and long-term Retention. *International Journal of Vocational and Technical Education, 1*(2), 014-024.

Novak, J. D., & Cañas, A. J. (2006). The origins of the concept mapping tool and the continuing evolution of the tool. *Information Visualization Journal, 5*(3), 175-184.

Patterson, F. (2007). Provoking students into thinking. *COMPAKlegal studies*, *1*, 79-83.

Pishghadam, R., & Ghanizadeh, A. (2006). On the impact of concept mapping as a prewriting activity on EFL learners writing ability. *IJAL, 9*(2), 1-26.

Raugh, M. R., & Atkinson, R. C. (1974). A mnemonic method for the acquisition of a second- language vocabulary. *Psychology & Education Series, 224,* 1-88.

Raugh, M. R., Schupbach, R. D., & Atkinson, R. C. (1975). *Teaching a large Russian language vocabulary by the mnemonic keyword method* (Tech. Rep. 256). California, Stanford University: Institute for Mathematical Studies in the Social Sciences.

Richmond, A. S., Cummings, R., & Klapp, M. (2008). Transfer of the method of loci, pegword, and keyword mnemonics in the eighth grade classroom. *Researcher, 21*(2), 1-13.

Roediger, H. L. (1980). The effectiveness of four mnemonics in ordering recall. *Journal of Experimental Psychology: Human Learning and Memory, 6*(5), 558-567.

Sedita, J. (2005). Effective vocabulary instruction. *Insights on Learning Disabilities*, *2*(1), 33-45.

Wang, A. Y., & Thomas, M. H. (2000). Looking for long-term mnemonic effects on serial recall: The legacy of simonides. *The American Journal of Psychology*, *113*(3), 331-340.