



The effect of teaching lexical collocations through concept mapping on receptive and productive knowledge of collocations among Iranian high school EFL learners

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ABSTRACT

The present study is an attempt to explore the effect of concept mapping, as a learning strategy, on the receptive and productive knowledge of lexical collocations of Iranian high school EFL learners. It also explores whether teaching lexical collocations through concept mapping will be effective in terms of retention of lexical collocations or not. Sixty female Iranian third-grade high school students participated in this study. They were randomly divided into two homogeneous groups; control and experimental. In the experimental group, lexical collocations were taught through concept mapping, and in the control one, Persian translations of the same lexical collocations were provided. Both groups received 12 sessions of instruction by the researcher. Data analysis indicated a statistically significant difference between the receptive and productive knowledge of collocation of those learners who are taught lexical collocation through concept mapping and those who were taught traditionally. In other words, in terms of both receptive and productive knowledge, concept mapping strategy outweighed the traditional one in learning English collocations. However, there was no statistically significant difference between retention of receptive and productive collocational knowledge in the experimental group.

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Introduction

Scholars have restated that lexicon study plays a significant role in language learning. McCarthy [35] stated that no matter how skilled learners are at grammar, communication will not be established without the words to convey meaning.

The significance of lexical combinations, known as formulaic language, has been stressed by several researchers in the field of vocabulary. Erman and Warren [17], for example, analyzed written and spoken discourses of native speakers and proposed that 58.6% of the spoken English discourse and 52.3% of the written discourse are represented by formulaic expressions. Being familiar with such formulaic expressions can make the process of language learning easier for learners. Conklin and Schmitt [12] show that word combinations are so common in language discourse and distinguish native and non-native speakers' speech.

During the last few decades, collocation, as a subcategory of formulaic language, has received noticeable attention in the field of second language acquisition (SLA) [19]. Scholars have attempted to turn the learners' attention to multi-word expressions, like collocations. Learning collocations plays a significant and vital role in L2 learning since the meaning of a word is largely dependent on other words which are combined with it. "Not only do these associations assist the learner in committing these words to memory, they also aid in defining the semantic area of a word" (p. 68) [39].

Several research findings indicated that the learners' general collocational knowledge, particularly among EFL learners, was inadequate and that learning collocations is helpful for EFL learners [24]. Moreover, collocation's importance can be understood when evaluating the speech and writing of EFL

learners who are often incapable of producing collocations in the correct form. This indicates how significant the collocational knowledge is [10]. According to Koosha and Jafarpour [30], most Iranian EFL Learners have little problems with grammar and vocabulary, but serious problems with the production of English collocations.

Learning collocations has always been challenging for EFL learners who 'look for a high degree of competence' [54] for improving both fluency and accuracy. Therefore, teachers and instructors should put the same emphasis on collocations in their methodology as other language aspects like pronunciation, intonation, stress, and grammar [22].

So far, many studies have attempted to define and describe English collocations. Zhang [55], for instance, defined collocations as "conventionalized and prefabricated combinations of two or more words" (p. 13). Collocations have been paid less attention than other aspects of language such as grammar and vocabulary although their number "amounts to tens of thousands" (p. 5) [46]. Still, they have not received sufficient attention in linguistics [33], and there are "too many fixed expressions for us to simply disregard them as phenomena on the margin of language (p. 156) [26]. Benson, Benson and Ilson [5] state that collocation refers to the natural occurrence of a set of fixed, identifiable, idiomatic phrases, for instance: heavy rain, strong wind, and heavy drink.

Concept map is one of the new learning strategies which is related to constructivist learning theory [15] and meaningful learning [3]. Concept map is visualized through a graphical representation. "Concepts are usually depicted by circles or boxes, forming the nodes of the new work by labeled links" (p. 61) [9]. Based on Ausubel [3], meaningful learning takes place

when the learners are capable of connecting the new information to the previous knowledge in their cognitive structure. Novak [41] believes concept maps is "a tool for organizing and presenting knowledge" (p. 74). Such knowledge is mainly semantic [2], so it has to be organized and presented hierarchically from the most general concept to the most specific one.

In spite of the significance of collocations, researchers have displayed that collocations are still a serious problem for EFL learners and are one of the demanding aspects of vocabulary learning for EFL or ESL learners including advanced learners and professional translators ([51]; [36]; [53]; [4]). Even though it is generally accepted that collocations are both essential and problematic for EFL learners and they therefore play a significant role in SLA, learners' difficulties with collocations have not been explored in detail by EFL practitioners so far [40].

The current study, specifically investigates the effect of concept mapping, as a learning strategy, on the receptive and productive knowledge of lexical collocations of Iranian high school EFL learners. It also explores whether teaching lexical collocations through concept mapping will be effective in terms of retention of lexical collocations or not.

The study, therefore, seeks answers to the following questions:

Q₁. Is there any statistically significant difference between the receptive knowledge of lexical collocations of those learners who are taught through concept mapping and those who are taught traditionally?

Q₂. Is there any statistically significant difference between the productive knowledge of lexical collocations of those learners who are taught through concept mapping and those who are taught traditionally?

Q₃. Is there any statistically significant difference between retention of receptive and productive collocational knowledge of those participants who are taught lexical collocations through concept mapping?

Review of Literature

Huckin, Haynes, and Coady [25] demonstrate that vocabulary knowledge is one of the most significant components of performance in SLA. Vocabulary is a basis of language without which any language could not exist. Wilkins [52] contends that "Without grammar very little can be conveyed, without vocabulary nothing can be conveyed" (p. 111).

However, lexical knowledge needs more than just knowing a group of words in isolation or knowing their meanings. That means that learning isolated words does not necessarily assist EFL/ESL learners in becoming successful communicators, because many parts of language are composed of prefabricated chunks; therefore, learners ought to learn not only the new vocabulary but also their collocations. In the field of vocabulary, collocation has considerable significance in second language (L2) learning in general and word knowledge in particular. Kim [29] states that "truly knowing a word means not only knowing the meaning of the word but also knowing the words with which it frequently co-occurs" (p. 1).

Having been one of the first advocates to put emphasis on the significance of collocations in language learning and their inclusion in the English classroom, Brown [8] believes that expanding learners' collocational knowledge assists in enhancing learners' oral proficiency, listening comprehension, and reading speed. In addition, she contends that learning collocation makes learners capable of observing language

chunks in native speakers' speech and writing and as a result employing such word combinations in their own speech.

Durrant [16] states making use of collocations might be the most significant part of turning passive words into active ones; thus, collocation is a main component in the acquisition of a creative language system. In addition, several researchers have put forward that collocational knowledge can aid L2 learners to speak more fluently and they would be capable of processing and producing language at a faster rate ([8]; [38]; [44]; [23]).

Since the 1950s, several studies have tried to explore English collocations (e.g., [21]; [13]; [37]; [20]). Such studies have concentrated on three different trends: the lexical composition trend, the semantic trend, and the structural pattern trend. In this study, the lexical composition trend has been investigated.

The lexical composition trend is founded on the concept that words get their meanings from the co-occurring words. As the father of lexical composition trend, and the first scholar who introduced the term "collocation", Firth [18] considers collocation as a component separated from grammar. In his idea, collocation is a "mode of meaning" (p. 192).

Most studies regarding collocation have been worked on the relationship between collocation competence and overall language proficiency ([7]; [32]; [50]). For instance, Keshavarz and Salimi [28] asserted that there is a significantly positive relationship between collocation competence and language proficiency. In contrast, Tang [49] found no significant relationship between collocation and language proficiency.

As a learning and educational instrument in various scientific areas, concept maps are useful tools to present and organize knowledge. They make the meaningful and long-life learning knowledge easier via presenting a pattern and a framework [43]. Even though concept maps have been employed as a helpful educational instrument widely and successfully in various educational areas, they have been mainly employed in the field of technical sciences, particularly in first language (L1) and there exist a few investigations on L2.

English collocations have also been problematic for many Iranian students. Despite starting studying English from sixth grade and continuing to the last year of high school, Iranian students make very little use of the meaningful learning techniques and the results of institutes exams, final exams, and national entrance exam indicate that the students are weak in English language [27].

In the recent years, the concept maps have widely been the research basis in various scientific fields, and studies have shown the positive impact of concept maps on meaningful learning ([43]; [42]). A few studies have been done on concept maps in second language, especially on collocational learning .

Kalhor and Shakibaei [27] aimed at investigating the effect of teaching English reading comprehension to Iranian students through concept mapping. In doing so, a pre-test and a post test were used. First 38 third grade high school female students in Karaj city were selected systematically and then they were divided into control and experimental groups randomly. The experimental group was thought using concept mapping, while control group was not exposed to such kind of teaching technique and the students in this group were thought in common way of reading comprehension teaching. The exam was made by a teacher which covered knowledge and meaningful learning in English reading comprehension. The high cognitive questions (analysis, combining, evaluating) were used to evaluate meaningful learning. A t-test was used to verify or reject the hypotheses. Data analysis shows that concept

mapping technique has a significant effect on English reading comprehension.

Liu, Chen, and Chang [34] investigated the effect of creating concept maps with the help of computer on English reading comprehension of English bachelor students in Taiwan in which English was L2. The findings of the study showed that not only concept map strategy improves reading comprehension, but also it improves the application of other reading comprehension strategies.

Dias [14] used concept maps for improving English reading comprehension of bachelor students in which English was their L2. The results of the study showed that concept map is an effective strategy to improve reading comprehension. The students not only learned how to use tools to create Cm, but also increased their independence in application of knowledge organizing methods.

Another study by Lee and Cho [31] was conducted to investigate the application of group concept map on writing skill of Korean university students. The results suggested that the concept map improves the students writing skill incredibly in general and improves organizing, language usage and vocabulary in particular.

Abu Nada [1] aimed to investigate the effect of using concept maps on achieving English grammar among the ninth graders in Gaza governorate. The sample of the study consisted of 113 male students from AL-Zaitun prep (A) school. The concept maps strategy was used in teaching the experimental group, while the traditional method was used with the control one in the first term of the school year (2007 – 2008). An achievement test of five scopes with 49 items was designed and validated to be used as a pre and post test. The study indicated that there are statistically significant differences in the ninth grades' achievement of English grammar due to the method in favor of concept maps strategy .

In this research, Şahin [45] sought to determine the effect of concept maps on the reading comprehension skills of 6 grade elementary school students ($f=31$) working outdoors. The Pre- and post-tests designed with experimental and control groups through experimental research methods were adopted for this aim. The participants were divided into two groups, such as experimental ($f=16$) and control ($f=15$) groups, according to their pre-test scores. The courses in the experimental group were conducted with concept maps, but those in the control group were conducted with a traditional teacher-centered education approach. In order to determine the success levels of each group-in terms of their reading comprehension-a Quiz of Reading Comprehension Skill (QRCS) was adopted as a pre-and post-test, of which its reliability and validity were maintained. The activities that were related to reading comprehension skills were practiced by the researcher with two groups for two hours a week for a total of four weeks. The results demonstrate that the activities with concept maps in the experimental group have a preponderant effect on the reading comprehension of participants.

Smith and Dwyer [47] studied the effectiveness of two concept mapping strategies (instructor-prepared and learner-generated) in facilitating student achievement of different types of educational objectives. They randomly assigned 81 college-level students to the three instructional treatment groups. Subjects were required to interact with their respective treatment and to take individual criterion tests. Results revealed insignificant results between the instructor-prepared concept map treatment and the learner-generated concept map treatment. Implications are that even though concept mapping strategies

are physically and procedurally different, they may be functionally identical in terms of facilitating achievement.

Even though the studies display the positive impacts of concept map on meaningful learning as an effective technique, influential steps have not been taken to apply this technique in English classrooms. Moreover, in spite of the importance of collocations and also the significance of concept mapping in language teaching and learning, few studies worldwide and nationwide have been conducted in order to highlight these important aspects of language pedagogy. In addition, few studies investigated the effectiveness of concept map on receptive and productive knowledge of lexical collocations. The present study is an attempt to investigate the effect of concept map on the receptive and productive knowledge of lexical collocations of Iranian high school EFL learners.

Method

Participants

The participants of this study were 60 female Iranian third-grade high school students in Sarbishe, located in Southern Khorasan, Iran. They were studying English for two hours a week. Thirty students were selected as the experimental group and the same number as the control group randomly. The sampling process was based on convenience, due to availability reasons.

Instruments

The data collection instruments adopted for this study include the following:

English Test - Beginner (Proficiency test)

In order to feel certain that all the learners were at the same level of language proficiency, "–English Test – Beginner" Proficiency Test developed by Bertrand [6] was administered at the very beginning. The test contains 100 multiple choice items on vocabulary, grammar, pronunciation, and reading. The participants were given enough time to answer the questions.

The English language proficiency test used in the present study was adopted from Taghvaei [48]. KR-21 formula was used for the computation of the internal consistency of the test. The reliability coefficient of this proficiency test was 0.76, which is considered an acceptable reliability [48].

Regarding the content validity of the test, the comments of some experts were sought. All of them strongly confirmed that the test is appropriate regarding the general objective of measuring beginners' English proficiency.

Vocabulary Test

It was a teacher-made test which consisted of 90 vocabularies. It was developed to identify the vocabularies that have a highest degree of familiarity to the students.

Lexical Test of Collocations

The lexical test of collocation was a teacher-made test which was developed to check the receptive and productive knowledge of the students' lexical collocations. It included underlined and matching items to check the receptive knowledge of lexical collocations and fill in the blanks items to check the productive knowledge of lexical collocations. The test consisted of 30 receptive and 30 productive items. The test was used as pre-, post-, and delayed tests.

In order to estimate how reliable the lexical test of collocations is, the researcher administered the test to a pilot group of 30 high school students. Cronbach's Alpha was used for the computation of the internal consistency of the test. The reliability index for the test was found to be 0.84.

To ensure the content and face validity of the test, the comments of three experts were sought. All of them confirmed

the suitability of the test in regard to the general objective of evaluating collocational knowledge of high school students.

It is worth mentioning that the researcher took advantage of the students' and their teachers' comments and suggestions about the test and applied some slight modifications in the final version.

Procedure

To carry out the research, 60 female students of grade 3 from two high schools in Sarbishe, located in Southern Khorasan, were selected. They were randomly assigned into two groups. One class was served as the control group (N=30) and the other as the experimental group (N=30). To ensure the homogeneity of the two groups, English Test - Beginner (Proficiency test) was applied at the very beginning in one session.

In the subsequent session, a test consisting of 90 words adopted from the students' previous English books were given to both experimental and control groups. In this test, the students were asked to write the meaning of the given vocabularies. Based on the results of the test, 48 words that have the highest percentage of familiarity to the students were selected for the instruction.

Receptive and productive knowledge of collocations in both experimental and control groups were checked by a pre-test, before applying treatment i.e. concept map. Receptive knowledge was checked through underlined and matching items, i.e. some sentences were given to the learners with underlined collocations. If the collocation did not match the correct collocation, the students should circle the number of the sentence. The number of items in receptive test was 30. For testing productive knowledge, 30 fill in the blank items were included. These items were included in the pre-test, post-test, and delayed post-test, it means that each test consisted of both receptive and productive items and they were administered to our two groups. It is worth noting that the pre-test, post-test, and delayed post-test were exactly the same.

In the experimental group, lexical collocations were taught through concept mapping in which the key words were written in a circle in the center of the paper, and their collocations, especially those that are most frequent, were written around the key word and connected to it through lines. In the control group, Persian translations of lexical collocations were provided. The instruction lasted for 12 sessions; therefore, in each session 4 collocations were covered. The lexical collocations were provided based on online dictionary of collocations. During the experiment, the necessary explanations were offered to the students.

At the end of the instruction, a post-test was used in order to find out whether the effect of concept mapping on receptive and productive knowledge of lexical collocations was significant or not. Three weeks later, a delayed post-test was given to the students, to find out whether implementing concept mapping was influential regarding retention of receptive and productive knowledge of lexical collocations.

Results

The homogeneity of the two groups

In order to make sure that all the participants are at the same level of language proficiency, "English Test – Beginner" Proficiency Test was administered at the very beginning to both of the groups. After gathering the data, the descriptive statistics were produced by SPSS program. The descriptive statistics of proficiency test for both groups are shown in Table 1.

As given in Table 1, for the experimental group, the mean score was 56.19 and the SD was 7.59 and for the control group, the mean score was 51.24 and the SD was 8.13. Since the means cannot show the actual difference between the groups, an independent-samples *t*-test was used as presented in Table 2.

As Table 2 displays, there was no statistical difference between groups, $t(77) = 0.61$, $p = 0.54$. As a result, no significant difference was detected between the learners' mean scores in the proficiency test within the experimental ($M = 56.19$, $SD = 7.59$) and control group ($M = 51.24$, $SD = 8.13$); therefore, the participants of the experimental and control groups were most probably homogeneous.

The Homogeneity of the Groups in Terms of Collocational Background Knowledge

The descriptive statistics and the results of *t*-test are presented in this regard. The descriptive statistics (the mean and the standard deviation) of the pre-test scores of experimental and control groups in regard with receptive and productive knowledge is shown in Table 3.

As it is seen in table 3, in the experimental group, the mean scores for receptive ($M = 2.23$, $SD = 1.28$) and productive ($M = 1.20$, $SD = .76$) knowledge seemed to be higher than the mean scores for receptive ($M = 2.10$, $SD = .80$) and productive ($M = 1.10$, $SD = .76$) knowledge in the control group.

In order to find out whether the difference between the mean scores of the experimental and control groups' pre-test was significant, i.e., to see the groups were homogeneous in terms of background knowledge regarding the subject under investigation, an independent samples *t*-test was run. Table 4 shows the result of the independent samples *t*-test.

As it is shown in Table 4, there is no statistically significant difference between the two groups in terms of receptive; $t(48.81) = .48$, $p = 0.63$, and productive; $t(58) = .51$, $p = 0.61$, knowledge. It can be claimed that there is no significant difference between the experimental and control groups' pre-test scores; therefore, the two groups are considered homogeneous in terms of collocational background knowledge.

The descriptive statistics (mean, standard deviation) of the post-test scores of both groups regarding receptive knowledge is shown in Table 5.

As it is indicated in Table 5, for the experimental group, the mean score was 9.10 and the SD was 3.19 and for the control group, the mean score was 3.80 and the SD was 1.90. Apparently, the experimental group outperformed the control in terms of receptive knowledge of lexical collocations.

To answer the first research question and to make sure if the difference between the mean scores of the experimental and control group is significant, the researcher ran an independent samples *t*-test. Table 6 shows the results of the independent samples *t*-test.

As it is shown in Table 6, there is a statistically significant difference between the two groups, $t(47.3) = 7.82$, $p = 0.00$. Therefore, it can be concluded that there is a statistically significant difference between the receptive knowledge of collocation of those learners who are taught lexical collocation through concept mapping ($M = 9.10$, $SD = 3.19$) and those who are taught traditionally ($M = 3.80$, $SD = 1.90$). So, regarding receptive knowledge, concept mapping strategy outweighed the traditional one in learning English collocations.

Table 7 indicates the descriptive statistics (mean, standard deviation) of the post-test scores of both control and experimental groups in terms of their productive knowledge of collocation.

Table 1. Descriptive Statistics for Proficiency Test of Control and Experimental Groups

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Experimental group	30	39.00	25.00	64.00	56.19	7.59
Control group	30	36.00	23.00	59.00	51.24	8.13

Table 2. Independent Samples T-test: Experimental Group Proficiency Test Vs. Control Group Proficiency Test

		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
proficiency	Equal variances assumed	7.11	.01	.60	79	.55	.81	1.34	-1.85	3.47
	Equal variances not assumed			.61	77	.54	.81	1.33	-1.83	3.45

Table 3. Descriptive Statistics for Control and Experimental Groups Pre-test

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest Receptive Knowledge	Experimental Group	30	2.23	1.28	.233
	Control Group	30	2.10	.80	.147
Pretest Productive Knowledge	Experimental Group	30	1.20	.76	.139
	Control Group	30	1.10	.76	.139

Table 4. Independent Samples t-test: Control Group's Pre-test vs. Experimental Group's Pre-test

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig.	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Pretest Receptive Knowledge	Equal variances assumed	5.57	0.02	0.48	58	0.63	0.13	-0	0.68
	Equal variances not assumed			0.48	48.81	0.63	0.13	-0	0.69
Pretest Productive Knowledge	Equal variances assumed	0	1	0.51	58	0.61	0.1	-0	0.49
	Equal variances not assumed			0.51	58	0.612	0.1	-0	0.49

Table 5. Descriptive Statistics for Control and Experimental Groups' Post-test Scores Regarding Receptive Knowledge

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest Receptive Knowledge	Experimental Group	30	9.10	3.19	.58
	Control Group	30	3.80	1.90	.38

Table 6. Independent Samples t-test: Control Group's Post-test vs. Experimental Group's Post-test Regarding Receptive Knowledge

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest Receptive Knowledge	Equal variances assumed	6.47	.014	7.82	58	.00	5.30	.68	3.94	6.66
	Equal variances not assumed			7.82	47.3	.00	5.30	.68	3.94	6.66

Table 7. Descriptive Statistics for Control and Experimental Groups' Post-test Scores Regarding Productive Knowledge

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest Productive Knowledge	Experimental Group	30	8.57	3.81	.70
	Control Group	30	2.33	1.35	.25

Table 8. Independent Samples t-test: Control Group's Post-Test vs. Experimental Group's Post-Test Regarding Productive Knowledge

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest Productive Knowledge	Equal variances assumed	21.71	.00	8.44	58	.00	6.23	.74	4.76	7.71
	Equal variances not assumed			8.44	36.1	.00	6.23	.74	4.74	7.73

Table 9. Descriptive Statistics for Experimental Group's Delayed Post-Test Regarding Receptive and Productive Knowledge

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Delayed Post Test Receptive Know.	8.73	30	3.08	.563
Delayed Post Test Productive Know.	8.33	30	3.65	.667

Table 10. Paired Samples Correlations

Paired Samples Correlations			
	N	Correlation	Sig.
Delayed Post Test Receptive Know. & Delayed Post Test Productive Know.	30	.87	.00

Table 11. Paired Samples T-Test: The Comparison between the Experimental Group's Delayed Post-Test Regarding Receptive and Productive Knowledge

Paired Samples Test								
	Paired Differences					t	df	Sig.
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Delayed Post Test Receptive Know. Vs. Delayed Post Test Productive Know.	.400	1.812	.331	-.277	1.077	1.21	29	.24

As it is seen in Table 7, for the experimental group, the mean score was 8.57 and the SD was 3.81 and for the control group, the mean score was 2.33 and the SD was 1.35. Probably, concept mapping has been more effective in improving productive knowledge of lexical collocations than the traditional method.

To provide answer to the second research question and to make certain whether the difference between the mean scores of the experimental and control groups is significant, an independent samples *t*-test was run. Table 8 demonstrates the results of the independent samples *t*-test.

As it is displayed in Table 8, there is a significant difference between the experimental and control groups, $t(36.1) = 8.44$, $p = 0.00$. So, it can be concluded that there is a statistically significant difference between the productive knowledge of collocation of those learners who are taught lexical collocation through concept mapping ($M = 8.57$, $SD = 3.81$) and those who are taught traditionally ($M = 2.33$, $SD = 1.35$). Therefore, regarding productive knowledge, concept mapping strategy outweighed the traditional one in learning English collocations.

Table 9 depicts the descriptive statistics (mean, standard deviation) of the delayed post-test scores of experimental group in terms of receptive and productive knowledge.

As shown in Table 9, in the case of receptive knowledge, the mean score was 8.73 and the SD was 3.08 and regarding productive knowledge, the mean score was 8.33 and the SD was 3.65.

To find out whether the difference between the mean scores of delayed post test for receptive and productive knowledge is significant, a paired samples *t*-test was conducted. Before running the test, we had to make sure that there was a high correlation between the two sets of data.

Since paired samples *t*-test was conducted on two sets of data in one group, it was expected that the two sets had high correlation with one another. Table 10 displays the correlation between delayed post test for receptive and productive knowledge.

As it can be seen in table 10, there is a strong, positive correlation between the delayed post- test for receptive knowledge and delayed post test for productive knowledge., $r = 0.87$, $p = 0.00$. Therefore, it can be concluded that the two sets of data are highly correlated and belong to one group and paired samples *t*-test can safely be conducted. The results are shown in table 11.

As it is indicated in Table 11, there is no significant difference between the delayed post test for receptive knowledge and delayed post test for productive knowledge in the experimental group, $t(29) = 1.21$, $p = 0.24$. Therefore, there is no statistically significant difference between retention of receptive ($M = 8.73$, $SD = 3.08$) and productive ($M = 8.33$, $SD = 3.65$) collocational knowledge of those participants who are taught lexical collocations through concept mapping.

Discussion of the Findings

Based on the obtained results, participants' performance in the experimental group showed a significant collocational development of the participants. In other words, the results showed a statistically significant difference between the receptive and productive knowledge of collocation of those learners who are taught lexical collocation through concept mapping and those who are taught traditionally. Therefore, in terms of both receptive and productive knowledge, concept mapping strategy outweighed the traditional one in learning English collocations.

The above findings regarding the effects of concept map strategy are consistent with the results of some previous studies. Kalhor and Shakibaei [27] aimed at investigating the effect of teaching English reading comprehension to Iranian students through concept mapping, showed that concept mapping technique has a significant effect on English reading comprehension. This study's findings is also compatible with the study of Liu, Chen, and Chang [34] who investigated the effect of creating concept maps with the help of computer on English reading comprehension of English bachelor students in Taiwan. Moreover, the result of this study is in line with a study by Lee and Cho [31] who investigated the application of group concept map on writing skill of Korean university students. Abu Nada [1] aimed to investigate the effect of using concept maps on achieving English grammar among the ninth graders in Gaza governorate. The study indicated that there are statistically significant differences in the ninth grades' achievement of English grammar due to the method in favor of concept maps strategy, which is consistent with the findings of the present study.

However, the findings of the present study do not support the study conducted by Smith and Dwyer [47] who studied the effectiveness of two concept mapping strategies (instructor-prepared and learner-generated) in facilitating student achievement of different types of educational objectives..

There might be some reasons to explain this study's results. One reason might be owing to the fact that concepts activate learners in the process of learning. Based on Ausubel's [3] meaningful learning theory, concept map plays the role of an advance organizer. The advance organizer presented by teacher activates the mind of the students through connecting the prior knowledge to new information. Another reason might be due to the fact that concept map works as a cognitive tool. Presenting the concept map in the class as a cognitive tool causes reviewing and organizing of materials and on the basis of information processing theory, the reviewing, expanding and organizing not only causes information transfer, but also improves the mind status [27].

In the case of third research question, as it is evident in tables 9, 10, and 11, there is no statistically significant difference between retention of receptive and productive collocational knowledge of those participants who are taught lexical collocations through concept mapping.

As far as the researcher knows, since no studies regarding the difference between retention of receptive and productive collocational knowledge of those participants who are taught lexical collocations through concept mapping have been carried out, the findings of the present study could not be compared with the relevant previous studies.

Conclusion

The present study supports the idea that making use of concept mapping strategy can heighten and improve students' L2 learning and would be very helpful in EFL classrooms as a learning tool. In addition, it has been broadly suggested and used in various ways in L2 learning in developed countries, however, it is still a new method and not employed by EFL teachers in Iran. Thus, teachers should have an increasing amount of interest in using concept mapping as an instructional tool.

A significant implication for EFL teachers is that working with concept maps in the classroom is practical and timesaving since in the process of creating concept maps most of the linguistic redundancies are removed through nods, links, and cross-links.

Students' learning may be improved by adopting concept mapping as a learning strategy. Since concept mapping is a learner-oriented strategy which does not depend on teacher involvement or other complicated technological supports, it is easily adopted by users. Moreover, concept mapping is flexible enough to be useful in various learning contexts.

There are many schools in Iran where English collocations aren't taught communicatively. Therefore, learners don't learn enough skill in using collocations in their English speaking. In this regard, students prefer to translate every English word into their first language and this is the problem that learners encounter in speaking fluently. So, encouraging learners to extract words formatted in some figures like circles or rectangles and connecting these words to their collocations by some lines, communicatively, direct them to use concept mapping as a learning strategy.

According to the limitations identified in this study, the following recommendations are made for future research on concept mapping strategies. First, the participants of the study can be chosen from different English proficiency levels and also from different English institutes in different cities which might enhance the validity of the results of the research. Second, concept mapping strategy can be applied to teach other language skills and sub-skills to Iranian EFL learners. Finally, it is also recommended that future research should specify more time for training and more practice opportunities to the learners before carrying out the study since concept mapping is a very demanding learning strategy that needs sustained attempts and good mapping skills in order for being used efficiently.

In conclusion, as Chularut and DeBecker [11] have stated, learners might enhance their learning by employing concept mapping as a learning strategy. It provides learners with a better learning environment and makes them play various roles as, thinkers, problem solvers, and researchers. Such roles help them learn and make use of English language in various situations more easily. Thus, for being strategic and aware of their strategies in order to be able to handle the linguistic barriers to communicate effectively, L2 learners need to be instructed on how to take advantage of concept mapping strategy and how to construct concept maps. However, developing efficient concept maps needs much time, practice, and patience on the part of both the teachers and the students.

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