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Original article

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Posted Date: October 23rd, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-95374/v1>

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Abstract

The present study attempted to investigate the impact of concept mapping strategy which is based on the theory of meaningful learning on retention of collocations. Moreover, the difference between the male and female learners exposed to the experimental condition was also examined. For this purpose, 90 EFL learners studying general English course at Urmia University were selected out of 115 learners according to their level of proficiency (PET test). Participants were assigned into two classes (class 1 (control group) = 48, class 2 (experimental group) = 42). Both groups received pre-test and post-test; however, they did get different instructions. Concept-mapping teaching strategy was used with experimental group participants while conventional instruction was employed in the control group. The results of this study support the fact that the use of concept mapping as a component of the instructional lesson can be an efficient model for fostering the collocation learning performance of learners with intermediate level of proficiency. However, there was not any statistically significant effect for gender.

Keywords: vocabulary learning, concept mapping, conventional instruction, collocation learning, gender

Introduction

Traditionally, vocabulary teaching included the activity of looking up a word in the dictionary, writing down the definition of the word, comprehending the definition, and then writing a correct and sensible sentence using the word (Bryant, Goodwin, Bryant, & Higgins, 2003). This process can be difficult for language learners with lower linguistic capabilities, time-consuming, and a very frustrating activity and might present an inappropriate approach to vocabulary instruction (Nagy & Stahl, 2000). Regardless of these drawbacks, it is still not uncommon to find language classrooms using this strategy very frequently to teach the target language words (Hairrell, Simmons, Rupley, & Vaughn, 2011). Therefore, for foreign language teachers, providing explicit vocabulary teaching activities seems to be crucial in helping to enhance learners' vocabulary development as well as their reading success (Biemiller, 2003).

Vocabulary consists of numerous components and dimensions such as nouns, verbs, adjectives, adverbs and also multiword expressions like idioms, collocations and phrasal verbs (Moon, 1997). Collocations are perceived as a significant component of language use and communication and can be discriminators of native speakers from non-native speakers (Nation, 2001). In recent years, studies on collocations in the field of second language acquisition (SLA) have ended up receiving progressive attention and importance (Fernández, Prahlad, Rubstsova, & Sabitov, 2009; Martyńska, 2004; Ramos, 2006). It is generally realized that the lexical aspect of language learning has drawn the consideration of the educators to their role in language through lexical elements, including collocations (Lewis 2000, as cited in Ramos, 2006). A collocation is an expression comprising two or more words that follow some customary method for saying things (Ramos, 2006). The words together can carry a richer meaning compared to their aggregate of parts (Fernández, et al., 2009). This term was initially presented by Firth (1957) to characterize a blend of words connected with one another.

Learners use a very much low number of collocations when compared to native speakers of a target language (Granger 1998; Howarth 1996; Kaszubski 2000) with the exception of the little number of recurring ones which are highly used (Kasuzbki, 2000). Other intermittent discoveries have been that learners are not mindful of limitations (Howarth, 1996), yet they are at the same time not acquainted with the full combinatory capability of words they know (Granger 1998). Studies have shown that learners are not confident in the use of collocations (Burgschmidt & Perkins, 1985, as cited in Howarth, 1996) and that the collocation challenge is more critical than general vocabulary

problems (Bahns&Eldaw, 1993). Martyńska (2004) highlighted the role of collocation in language development and considered collocations as an area that pose challenges to the learners and are an error-provoking area in vocabulary learning. This assumption, according to Martyńska (2004), is particularly true for foreign language learners since there is no intensive and unique definition or classification of collocation. In order to help learners cope with these challenges in learning difficult aspects of language such as collocations, researchers have turned attention to the effect of learner-learner interaction since 1980s (Donato, 2014). One such approach is the use of concept-maps as strategies for the presentation of new words.

Literature Review

Fortunately, there is consistent research that explores a number of promising attempts that can be implemented for vocabulary enhancement in language classrooms (e.g., Bryant et al., 2003; Jitendra, Edwards, Sacks, & Jacobson, 2004). One such strategy is identified as concept mapping which presents learners with a conceptual model for comprehending a semantic network of lexical items (Jitendra et al., 2004). A semantic modeling activity, which often consists of a concept map, had provided evidence supporting vocabulary acquisition (Ebbers & Denton, 2008). When learners are encouraged to use concept mapping in reading, they need to approve the concept of a topic, analyzing its lettering to words, to sentences, and paragraphs, and to organize the concepts according to a major idea. Afterwards, learners must connect and bring into line the relationship of some concepts, and then understand the entire text. This process is known as the bottom-up reading process. Furthermore, while mapping, learners use individual schema knowledge to arrange the new meaning so that they would be able to create a new schema actively (Ruddell & Boyle, 1989). After mapping, learners would be able to evaluate the relationships between concepts. This process of the reader's use of previous schema to build meaning exerts an influential impact on a top-down reading process. In summary, the concept mapping process mingles the bottom-up and top-down approaches to comprehension, trying to benefit from their complementary role (Kintsch & Van Dijk, 1978). Concept mapping gives learners the opportunity to remember and arrange the meanings they obtain from texts; as a result, it can fortify the integration of competence. From another perspective, concept mapping has the potential of declining the inclination of less capable readers to forget the meaning they have gained from reading as a result of frequently checking vocabulary meaning.

Over the past two decades there has been a surge in interest among scholars with respect to the instructional use of concept maps.

Fore, Boon, and Lowrie (2007) considered the impacts of a concept map versus a dictionary approach on the learning of mathematical words for six learners with learning disabilities at the middle school level. This study investigated the impacts of utilizing concept mapping to encourage the learning of a list of vocabulary items, a commonly practices approach in vocabulary instruction (Hairrell et al., 2011; Rupley & Nichols, 2005). In the concept mapping condition, the learners completed a concept map to improve recall and understanding of new vocabulary items in math instruction, while in the dictionary approach, the participants looked up the word, interpreted the definition, and composed a sentence utilizing the word. After the completion of each instructional condition, the learners were given a comprehension test to evaluate their learning of the new words. Results uncovered that the concept mapping model was better than the dictionary approach for all the learners to learn new mathematical words. The findings of this study confirm the discoveries of the previously mentioned studies accepting that learners who receive semantic map vocabulary technique learn more novel words than those utilizing conventional dictionary approaches.

Liu, Chen and Chang (2010) conducted a study on the impacts of a computer-assisted concept mapping learning system on EFL learners' English reading comprehension performance. 194 first year learners who were assigned into low-level and high-level groups as indicated by their English capability were chosen for this study. The results of this study showed that the concept mapping strategy helped participants to process the organization of an article by relating its concepts. By means of the concept mapping strategy, learners could construct effective monitoring strategies and remember the content of an article which was forgotten due to checking the words. It was also found that poor readers who regarded concept mapping as a metacognitive strategy reflected significant enhancement in their English reading performance; however, there was no continuous positive effect observed for good readers.

Palmer, Boon and Spencer (2014) replicated their earlier attempts to compare the effectiveness of a dictionary approach and a concept mapping approach on the word learning of 4 learners with mental disabilities. In the dictionary approach, learners looked up the words in the dictionary, defined the word and used it in a sentence. On the other hand, in the concept mapping approach,

learners completed a concept map to show the word's definition, used the word in a sentence and explained what the word reminded them according to the prior knowledge. The findings indicated significant developments in all the participants in content area vocabulary learning using the concept mapping approach over the dictionary approach. The researchers recommended the use of concept mapping strategy in vocabulary instruction as an easy and simple technique to employ as a part of daily language instruction in the classroom.

It seems evident that there are more successful approaches to instruct vocabulary to foreign language learners beyond the more conventional technique for characterizing words and utilizing them in a sentence. As already discussed, studies have illustrated the viability of concept mapping strategy contrasted with conventional dictionary approach. However, given the restricted number of experimental studies on efficient vocabulary teaching, especially for adult learners (Scammacca, Roberts, Vaughn, Edmonds, Wexler, Reutebuch, & Torgesen 2007), and the time that has passed since the greater number of these studies were carried out, it is essential that researchers proceed to develop this prior work to further investigate more particular strategies that may be utilized for EFL and different populations of learners.

Method

Although there are numerous studies examining the effect of concept-mapping strategy on language learners' vocabulary acquisition, the effect of this strategy on collocation aspect of vocabulary knowledge has rarely been investigated. Regarding the challenging nature of collocations for language learners, the purpose of this research was to shed light into the possible effect of concept-mapping on Iranian EFL learners' improvements in their collocation knowledge. For this purpose, the following research questions were proposed:

1. Does concept mapping strategy have any significant effect on promoting Iranian learners' knowledge of English collocations?
2. Is there any significant difference between males and females with regard to their collocation achievement in the post-test?

Based on the research questions the following null hypotheses were utilized:

H01. Concept mapping strategy has no significant effect on promoting Iranian learners' knowledge of English collocations.

H02. There is no significant difference between males and females with regard to their collocation achievement in the post-test

Participants

The participants were 90 EFL learners studying general English course at Urmia University who were selected out of 115 learners according to their level of proficiency. All the students in two classes (class 1 (control group) = 48, class 2 (experimental group) = 42) were invited and agreed to participate in the study. The participants in each class were considered to constitute a fairly homogeneous group in terms of their learning background and English proficiency as measured by the pre-test. The learners whose level of proficiency was not in the intermediate category were excluded from the study. They were between 19 and 25 years old. The total sample was composed of both male (N = 41) and female (N = 49) learners. The participants of this study had learned their English more or less entirely in an instructed setting. None had ever been to an English-speaking country, and they had had little opportunity to use English for communicative purposes outside the classroom. As university students, they had 3 hours of English per week, focusing on more the academic skills of reading and writing, with a larger amount of time devoted to vocabulary and reading activities.

Both groups received pre-test and post-test; however, they did get different instructions. Concept-mapping teaching strategy was used with experimental group participants while conventional instruction was employed in the control group. Participants were told that the test was for purposes of research only and they accepted this. They were not told the exact objective of the study and were ascertained that the information collected would not influence their course grades. No participant withdrew from the study.

Instruments

The following materials were used in this study to elicit data on learners' collocation vocabulary performance.

The Pre-test/Post-test

The pre-test and post-test were the same in the present study and developed by the researcher based on the collocations students learned during the treatment. The test had four parts (parts A, B, C, and D). Part A had multiple-choice items and included sixteen items. In part B, students were asked to find the mistake in the use of collocations in each test item and to write the correct forms (numbers 17-21). Students were supposed to complete the sentences with the given words in part C (numbers 22-31). The last part (part D) was a productive part in which students completed the sentences with appropriate prepositions to make correct collocations (numbers 32-40). For obtaining the content validity of the test, the researcher got the help of an experienced EFL teacher majored in Teaching English as a Foreign Language (TEFL), and two professors with ten years' experience in TEFL. The reliability of pre-test and post-test was computed using the Cronbach's Alpha method. The Cronbach-alpha coefficient value for the reliability analysis was found as .92 and .86, respectively which shows satisfying levels of reliability.

The learners in both the control and experimental groups took the pre-test before receiving the treatment (session two). After ten sessions of learning collocations they took the post-test (session thirteen), and the results underwent data analysis to find out whether concept-mapping strategy had any significant effect on learners' collocation learning or not.

Collocations

A total number of seventy English collocations were used for the instruction (that is 7 collocations for each session). Some of them were selected from the learners' textbook, Select Readings, and some others from Oxford Collocations Dictionary. The collocations selected from the dictionary contained the words used in the textbook and were based on the content of the instruction. They were taught to both control and experimental groups in ten sessions. Each collocation was proposed with an example, and the examples were mostly taken from Longman Dictionary of Contemporary English, Longman Exams Coach, Oxford Collocations Dictionary, Oxford Advanced Dictionary, and Oxford Students Dictionary.

Procedure

Prior to the experiment, the PET, collocations pre and post-tests were standardized by piloting them among a group of 30 students with almost similar characteristics of the representative sample. The psychometric properties of the instruments were estimated before the treatment. An already piloted PET was given to university students were chosen. All of the students answered the collocation pretest in order to make sure that there were no significant difference among the learners before the treatment and to make sure that the participants were not familiar with the target collocations. All the participants were taught using the same material and they received the same amount of instruction. The course book was the Select Readings book (Lee & Gunderson, 2011). This textbook is taught in the general English classes at the university level and covers the mastery of all language skills. Particularly, there are pre-reading tasks such as brainstorming activities and vocabulary activities that are well suited to the objective of this study. All the classes were instructed by the same teacher (the researcher). They received the instructions for concept mapping strategy. The strategy was according to Harris and Graham (1996) procedure of strategy instruction. The procedure includes five steps as follows:

- (1) Strategy description;
- (2) Discussion of goals and purposes;
- (3) Modeling of the strategy;
- (4) Student mastery of strategy; &
- (5) Guided practice and feedback.

It should be noted that regarding the learners' first encounter with the strategy of concept mapping, in the first sessions the teacher attempted to employ the approach of 'Expert-Constructed Concept Maps' through which she described complete forms of concept maps. Afterwards, she provided learners with uncompleted forms of concept mapping while the learners completed them using 'Fill in the Map Model'. Lastly, the learners were required to develop concept maps according to the 'Hierarchy Model of Concept Mapping' and the above-mentioned stages. All of the concept maps were based on the collocations of the texts in the Select Readings Book. After the completion of the treatment, the posttest was administered to the participants to evaluate their level of achievement.

Results

First, the assumptions for the conduction of Analysis of Covariance (ANCOVA) were tested. The first assumption is that the control and experimental groups are the same. The results of Table 1 confirm the null hypothesis that there are not statistically significant differences between the control and experimental groups.

Table 1.

Tests of between Subjects' Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.016 ^a	1	5.016	.116	.735
Intercept	81804.172	1	81804.172	1885.785	.000
Groups	5.016	1	5.016	.116	.735
Error	3817.384	88	43.379		
Total	85906.000	90			
Corrected Total	3822.400	89			

a. R Squared = .001 (Adjusted R Squared = -.010)

The next assumption, which is known as the homogeneity of regression, was also tested, the results of which are shown in Table 2. According to Table 2, the assumption of homogeneity of regression was met ($p > 0.05$)

Table 2.

The Homogeneity of Regression

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2241.784 ^a	3	747.261	48.694	.000
Intercept	426.772	1	426.772	27.810	.000
Groups	104.984	1	104.984	6.841	.011
Pretest	1988.354	1	1988.354	129.567	.000
Groups * Pretest	55.289	1	55.289	3.603	.061
Error	1319.771	86	15.346		
Total	97006.000	90			

Corrected Total	3561.556	89
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a. R Squared = .629 (Adjusted R Squared = .617)

Having ascertained the assumptions of ANCOVA, the next step was to conduct ANCOVA to provide an answer to the first research question of the study which is concerned with the differences between control and experimental groups with regard to collocation learning. First, the results of descriptive statistics are exhibited in Table 3.

Table 3.

Descriptive Statistics of Collocation Learning across Groups

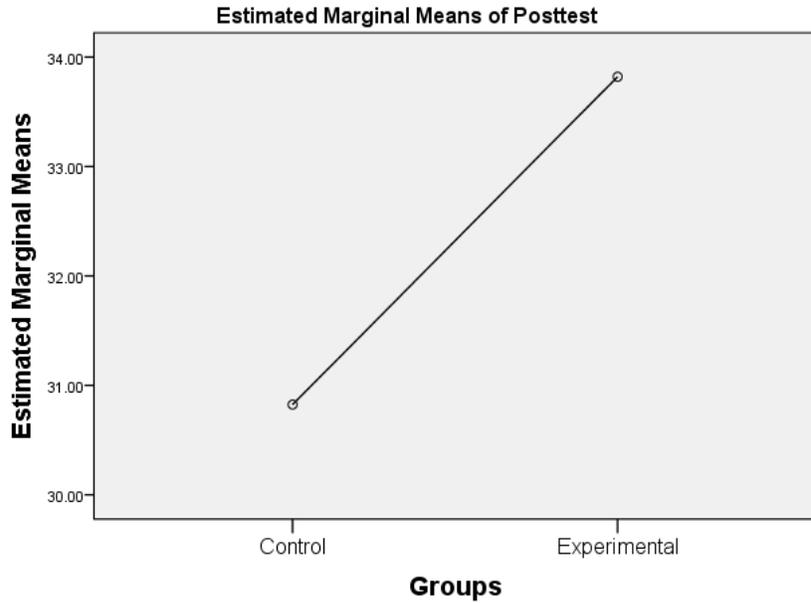
Groups	Mean	Std. Deviation	N
Control	30.66	6.08	48
Experimental	34.00	6.18	42
Total	32.22	6.32	90

As the mean and standard deviation scores in Table 3 show, there are differences between the experimental ($M = 34.00$, $SD = 6.18$) and control ($M = 30.66$, $SD = 6.08$) group learners' performance in the post-test. However, in order to get more accurate and reliable results, an ANCOVA test was run, the results of which are displayed in Table 4.

Table 4.

ANCOVA Results of Group Differences in the Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2186.495 ^a	2	1093.248	69.170	.000	.614
Intercept	466.495	1	466.495	29.515	.000	.253
Pretest	1937.606	1	1937.606	122.592	.000	.585
Groups	200.825	1	200.825	12.706	.001	.127



Covariates appearing in the model are evaluated at the following values: Pretest = 30.2000

Error	1375.060	87	15.805
Total	97006.000	90	
Corrected	3561.556	89	
Total			

a. R Squared = .614 (Adjusted R Squared = .605)

The results of ANCOVA indicate statistically significant main effects for the post-test performance [$F(1, 90) = 12.70, p < .05$]. Results of the above table indicate the effect of treatment on participants' collocation learning with the control of pre-test scores. Also, the adjusted R squared value shows that the groups could estimate 60% of the variance in the dependent variable which is post-test in this study.

The descriptive statistics, too, point to the same finding showing that learners in the experimental group ($M = 34.00, SD = 6.18$) outperform those in the control group ($M = 30.66, SD = 6.08$). The eta squared showed a large effect size for the analysis (0.12). Eta-squared as the effect size measure describes the ratio of variance explained in the dependent variable according to the predictors.

In order to investigate the difference between male and female learners in terms of collocation learning, an ANCOVA was carried out. First, the assumptions for the conduction of Analysis of Covariance (ANCOVA) were tested. Both the first assumption (i.e., group non-variance) and the second assumption (i.e., the homogeneity of regression) were met. The results are presented in Tables 5 and 6 respectively.

Table 5.

Tests of between Subjects' Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	93.971 ^a	1	93.971	2.218	.140
Intercept	81927.571	1	81927.571	1933.690	.000
Gender	93.971	1	93.971	2.218	.140
Error	3728.429	88	42.369		
Total	85906.000	90			
Corrected Total	3822.400	89			

a. R Squared = .025 (Adjusted R Squared = .014)

Table 6.

The Homogeneity of Regression

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2000.909 ^a	3	666.970	36.754	.000
Intercept	358.441	1	358.441	19.752	.000
Gender	7.810	1	7.810	.430	.514
Pretest	1930.945	1	1930.945	106.405	.000
Gender * Pretest	4.738	1	4.738	.261	.611
Error	1560.646	86	18.147		
Total	97006.000	90			
Corrected Total	3561.556	89			

a. R Squared = .562 (Adjusted R Squared = .547)

After ascertaining the assumptions of ANCOVA, the test was run. First, the results of descriptive statistics are presented in Table 7.

Table 7.

Descriptive Statistics of Collocation Learning across Gender

Gender	Mean	Std. Deviation	N
Female	31.85	6.87	49
Male	32.65	5.65	41
Total	32.22	6.32	90

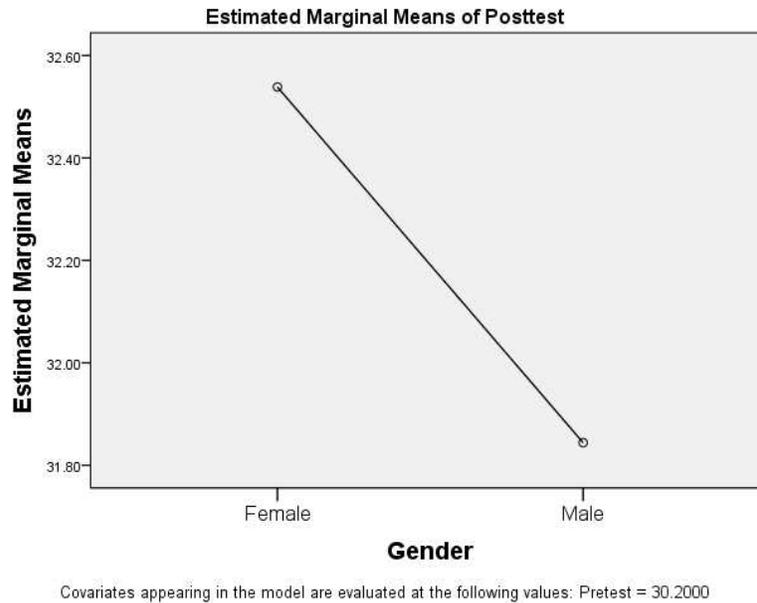
Table 8.

ANCOVA Results of Gender Differences in the Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1996.172 ^a	2	998.086	55.471	.000	.560
Intercept	402.248	1	402.248	22.356	.000	.204
Pretest	1981.836	1	1981.836	110.145	.000	.559
Gender	10.502	1	10.502	.584	.447	.007
Error	1565.384	87	17.993			
Total	97006.000	90				
Corrected Total	3561.556	89				

a. R Squared = .560 (Adjusted R Squared = .550)

The results of ANCOVA indicate statistically non-significant effects for gender [$F(1, 90) = 10.50$, $p > .05$]. Also, the adjusted R squared value shows that the groups could estimate 55% of the variance in the dependent variable which is post-test in this study.



The descriptive statistics, too, point to the same finding showing that female ($M = 31.85$, $SD = 6.87$) and male ($M = 32.65$, $SD = 5.65$) learners had similar values. The eta squared showed a small effect size for the analysis (0.007).

Discussion

The results of this study support the fact that the use of concept mapping as a component of the instructional lesson can be an efficient model for fostering the collocation learning performance of learners with intermediate level of proficiency (Anderson & Nagy, 1993; Fore et al., 2007; Monroe & Pendergrass, 1997; Rupley, Logan, & Nichols, 1998). The results from the study reported by Fore et al. (2007) and those from the present study indicate that concept mapping can be more of an advantageous strategy to learning new and difficult words than simply using a dictionary approach. Moreover, this study highlights the fact that in a relatively short period of time, the use of concept mapping has the potential to make an important influence on learners' learning of collocation words. The concept mapping strategy offers learners numerous modalities to strengthen the learning of new words by defining the word, writing the word in its context, developing a word connection according to the learners' prior knowledge, conceptualizing a mental image of the word, and drawing a picture related to the word. As a result, the use of this

model can be beneficial to teachers working with students in classes with large number of participants as an aid in teaching vocabulary instruction since it encourages the use of group based language learning.

In addition, the results of the second research question demonstrated that the gender of the participants was not a determining factor in their collocation learning performance since there was not any statistically significant effect for gender. This finding encourages language teachers to focus on the best interactive strategy that fits to their language classroom for both the male and female learners.

Conclusion

The present study was an attempt to examine the effect of concept mapping strategy on Iranian EFL learners' learning of collocations. For this purpose, 90 language learners took part in the study and were exposed to the use of concept mapping strategy in the experimental group whereas those in the control group did not received the concept mapping strategy practice. The results of the statistical analysis confirmed the effectiveness of concept mapping strategy which is consistent with those of previous research (Ebbers & Denton, 2008; Fore, Boon, &Lowrie, 2007; Hairrell, Simmons, Rupley, & Vaughn, 2011; Palmer, Boon & Spencer, 2014). In other words, this study advocated the effectiveness of using a concept mapping model versus a dictionary instructional approach to enhance the collocation knowledge and development of Iranian intermediate level language learners. Overall, the use of the concept mapping strategy resulted in an increase in the learning of collocation words by the majority of experimental group learners compared to traditional dictionary instruction. As measured by the percentage of vocabulary questions answered correctly on the pre- and post- tests, the participants showed noticeable improvements in learning collocations when using a concept mapping model as opposed to a dictionary approach. Findings indicate that the application of the concept mapping strategy led to better learner performance in terms of the number of collocation questions answered correctly compared to the dictionary approach.

Although the findings of the present study are similar to those of previous research such as Fore et al. (2007), numerous novel implications for the classroom are suggested. First, the use of concept mapping in vocabulary instruction including collocation learning is an easy and simple

strategy to apply as part of everyday language teaching in the classroom. Second, although this study was conducted with intermediate level EFL learners, the procedures for using the concept mapping strategy can easily be adapted for use in classroom settings with learners of other language proficiency levels with other backgrounds. Third, the use of concepts maps would enable learners to improve their vocabulary knowledge, which in turn might improve their reading comprehension skills in the content areas. Finally, concept maps provide a conceptual framework that can help struggling readers in creating associations between their background knowledge and new words, which is essential to reading development for all learners.

In recent years, researchers working in the area of concept-mapping have recommended the use of this strategy specifically in interactive software contexts (Cañas et al., 2003; Novak, 1998, 2002). Computer-assisted delivery of concept mapping strategy can decrease the majority of the mechanical barriers to editing complicated maps, give feedback on the accuracy of learner-created maps (Chang, Sung, & Chen, 2002), and provide maps in learner-controlled, animated types that direct learners through visually complex structures (Nesbit & Adesope, 2005).

Abbreviations:

EFL: English as foreign language

PET: preliminary English Test

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Acknowledgements

We would like to thank the reviewers of Asian-Pacific Journal of Second and Foreign Language Education for their helpful comments on the earlier version of the paper.

Funding

No grant or fund has been received by the authors.

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Contributions

Dr. Rezvani was the supervisor and guided the project. Ms. Masome conducted the research, collected, analyzed, and interpreted the data. She produced the paper and revised it according to Dr. Rezvani's valuable comments. Then, the authors read and approved the final manuscript.

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Ethics declarations

Competing interests

There is no competing interest.

Declaration:

We would like to declare that all participants in our study have been given the consent form and we observe ethics of any research and we were liable to conduct the research in the region to finalize it in due time. The data can be reproduced and made use of by other researchers. Analysis of Covariance (ANCOVA) was used as data analysis.

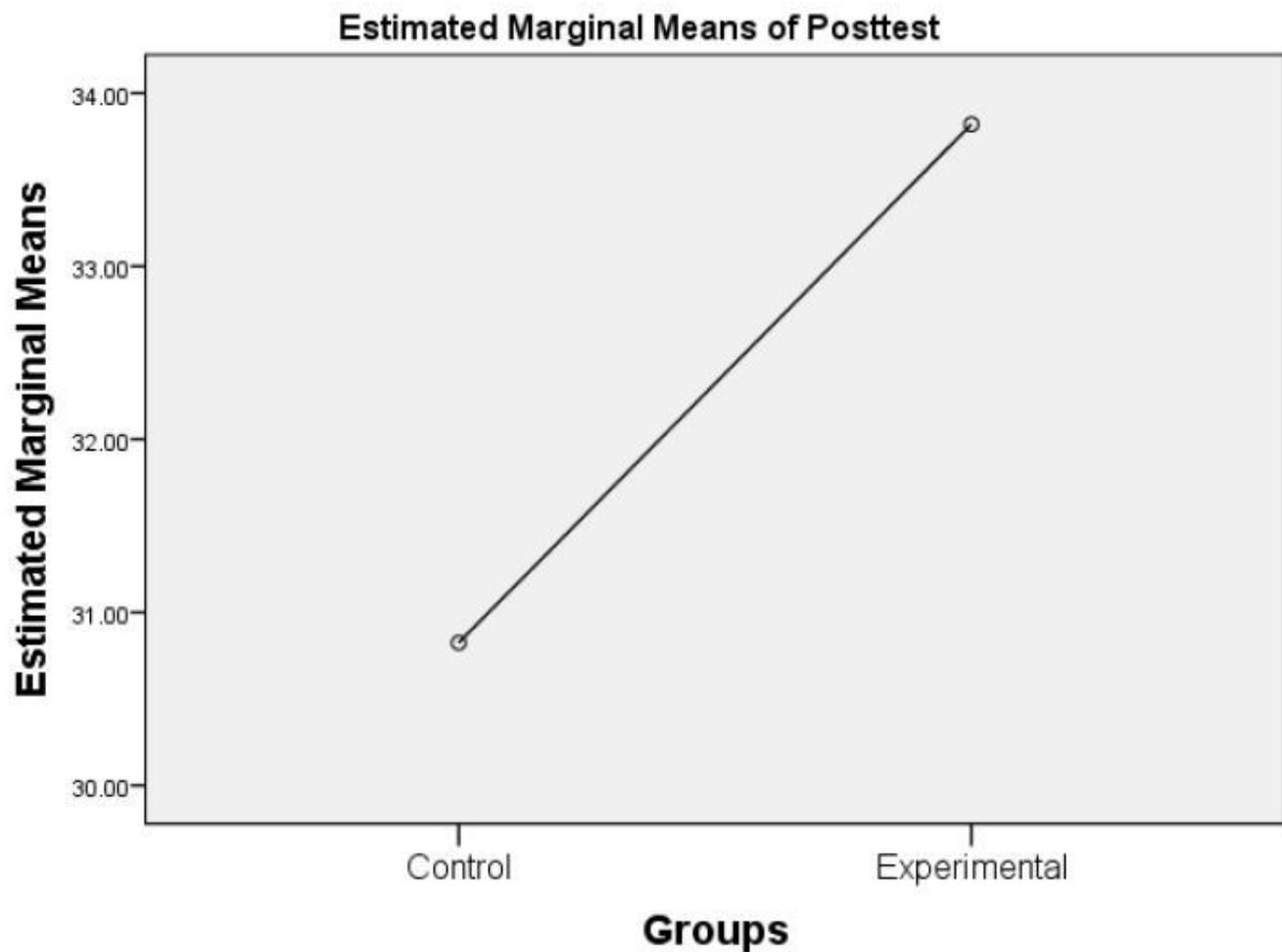
Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Software and code

SPSS has been used and authors are liable to make use of the data in our research. The assumptions for the conduction of Analysis of Covariance (ANCOVA) were tested.

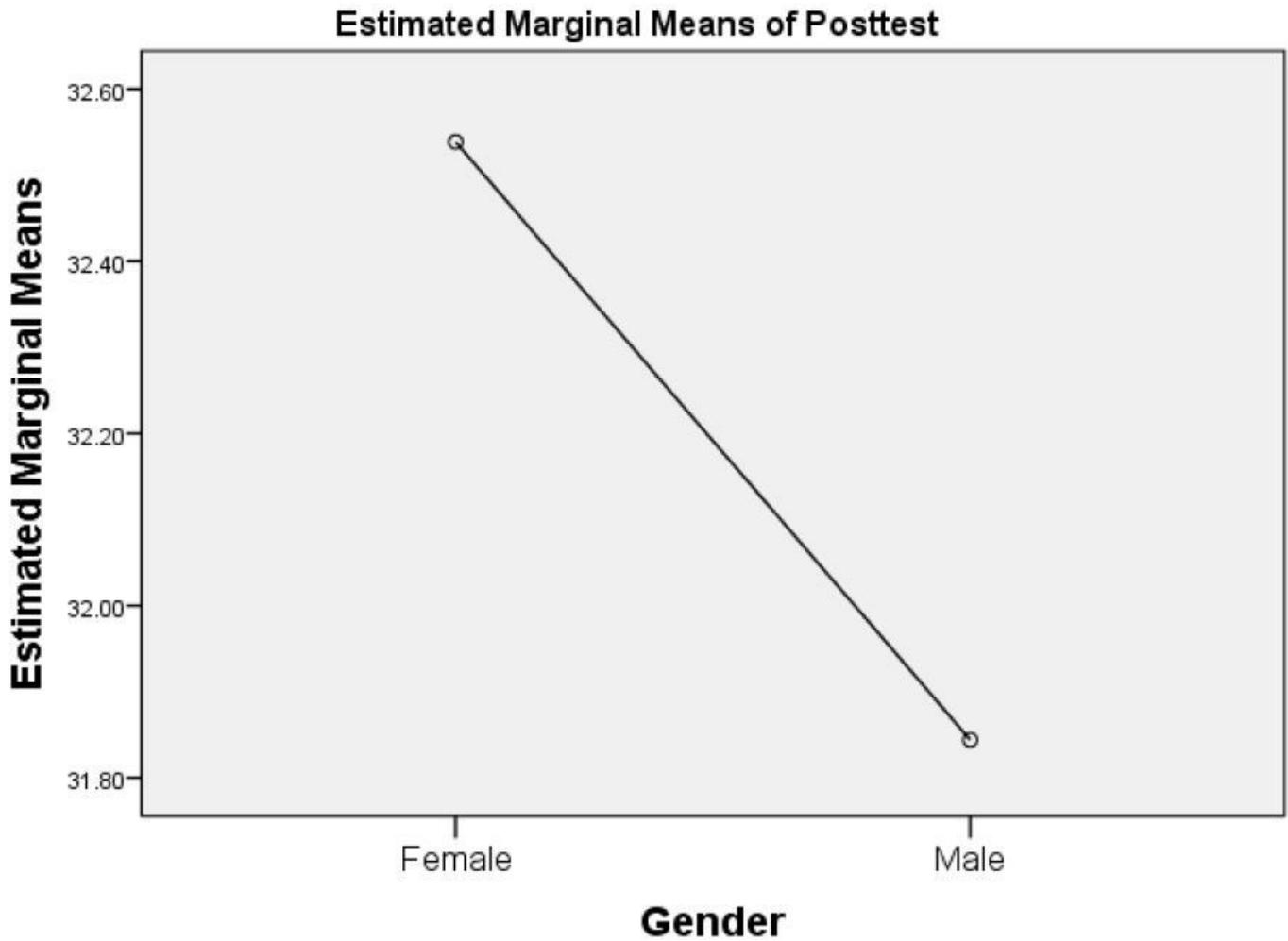
Figures



Covariates appearing in the model are evaluated at the following values: Pretest = 30.2000

Figure 1

The descriptive statistics, too, point to the same finding showing that learners in the experimental group ($M = 34.00$, $SD = 6.18$) outperform those in the control group ($M = 30.66$, $SD = 6.08$). The eta squared showed a large effect size for the analysis (0.12). Eta-squared as the effect size measure describes the ratio of variance explained in the dependent variable according to the predictors.



Covariates appearing in the model are evaluated at the following values: Pretest = 30.2000

Figure 2

The descriptive statistics, too, point to the same finding showing that female ($M = 31.85$, $SD = 6.87$) and male ($M = 32.65$, $SD = 5.65$) learners had similar values. The eta squared showed a small effect size for the analysis (0.007).