

Original Article

Scrutinizing the Supremacy of Age & Proficiency Level in Learning Content Vocabulary via Concept Mapping among Iranian EFL Learners

Azadeh Sarabandi¹, Marjan Vosoughi^{1,}, Neda Moezzi Pour²*

¹Department of English, Sabzevar Branch, Islamic Azad University, Sabzevar, Iran

²Ferdowsi University of Mashhad, Iran

Submission date: 11-01-2022

Acceptance date: 30-04-2022

Abstract

In this study, the researchers investigated the possible effect of teaching content words through using Concept Mapping (CM) strategy plotted on two cognitive variables: language proficiency and age within some eighty Iranian young and old English language learners with higher and lower proficiency levels (Elementary vs. Intermediate) who were conveniently selected and classified into four classes. Their age range varied from 10 to 25 years old. After five sessions of treatment, the researchers gave the post-test. The results could not identify priority in the predictability power for any of the two age and proficiency variables $F(2, 77) = 1.96, p < .15, R^2 = .04$. The findings can be helpful for English teachers as well as syllabus designers to use CM strategies for teaching vocabulary and including such materials in the sources regarding age and proficiency level as cognitive variables related to CM implementation.

Keywords: Age, Concept Mapping Strategies, Content Words, Proficiency Level.

* Corresponding Author's E-mail: Vosoughee@iaus.ac.ir

1. Introduction

Vocabulary knowledge (VK) as one crucial variable in reading comprehension as well as other aspects of language learning has been well recognized in second language (L2) learning settings (Cheng & Matthews, 2018; González-Fernández & Schmitt, 2020; Mezynski, 1983; Olinghouse & Leaird, 2009; Quinn, Wagner, Petscher, & Lopez, 2015; Shakoori, Kadivar, & Sarami, 2017; Stahl, Stevens, 2003; Vellutino, Tunmer, Jaccard, & Chen, 2007). Nevertheless, there exists a growing number of studies that show VK is a multifaceted construct not defined and depicted only in terms of breadth, or the number of words known by the learners (Cameron, 2002; Christ & Wang, 2011; Read, 1989, 2000; Schoonen & Verhallen, 2008) but depth as well. As Laufer and Yano (2001) designated, VK ‘does not amount to a quarter of the vocabulary known by their native-speaking peers’ (p.549).

Teachers while teaching may find some students learning vocabulary more easily than others. This suggests that learning vocabulary is not constant among students. Very few studies on the depth and breadth of VK are existent (Hadley, et al., 2016). The exploration of different factors/variables which foster or hinder the process of learning vocabulary would then be crucial.

One strategy which is used and proved to be fruitful is ‘Concept Mapping’ (CM) or otherwise known as Semantic Mapping (SM) (Nassaji, 2003). Ghazal (2007) believes that some strategies in learning vocabulary typically include using notebooks, dictionaries along with some expansion exercises like SM, which can be highly advantageous and extremely early for implementation. As Dilek and Yürük (2013) claim, CM is a strategy to visually display the categories and the relationship among them in a graphical way so that making schematic representations of text is taught to students. These representations include nodes which contain index terms and expressions, along with links amid nodes. They continued that this approach can help the learners to subsume their new experience under the previously learned materials in their minds.

But, after all, what is not that clear within the literature is the effect of students’ cognitive variables such as age and level of proficiency on this strategy use. In this study, the effect of CM strategy was examined on the amount of content vocabulary learning with mediating effects related to diverse proficiency levels and age.

2. Literature Review

2.1. Concept Mapping

The use of CM, as a teaching strategy, was originally established by J.D. Novak in the early 1980s, on the basis of Ausubel's Learning Theory which emphasized the influence of learners' prior knowledge on subsequent meaningful learning. These diagrammatic representations which show the meaningful relationship between and among different notions/propositions are called CM; and their propositions are linked together by cross-links, circles, and words (Flood & Lapp, 1988; Novak & Canas, 2006; Novak & Gowin, 1989; Novak, 1993).

CM has long been utilized for improving reading comprehension skills (Chang, Sung, & Chen, 2002), and diverse aspects of psychological concerns (Alibabae, Mehranfar & Zarei, 2014), writing efficacy (Farshi, & Tavakoli, 2014), speaking fluency (Ghonsooly & Hosienpour, 2009), listening comprehension (Fahim & Pour Azar, 2007) as well as vocabulary instruction (Zarei & Keysan, 2016). Teaching students to understand different structures of text are also possible by using particular arrangements of ideas on maps (Johnson, Pittelman, & Heimlich, 1986).

The belief that students should understand the 'facts' rather than rote memorization has been increasingly reflected in curricula during the past few decades (Kumari & Gupta, 2014). It is considered as a shift from behavioristic to constructivist approaches as it is argued that an individual's knowledge is constructed through meaningful interaction with the world (Hodson, & Hodson, 1998; Neutzling, Pratt, & Parker, 2019). Here, on the basis of the learners' prior knowledge, new knowledge is built through active experience (Aggarwal, 2007). As a useful tool in leading students towards meaningful learning, CM is one of the strategies that has been evolved. In order to help students, CM is seen as a useful tactic i.e. it is considered as a 'meta/knowledge' implementation by the teacher (Novak, 1989). There is an expectation that the students engaged in meaningful learning, recollect/keep knowledge for a long time and learn new things easily in contrast to the students who learn by rote learning (Kumari & Gupta, 2014).

The arrangement of the concepts is a hierarchical one in which the super-ordinate concepts are on top and sub-ordinate concepts which are less all-encompassing than upper ones, are at the bottom. Different segments of concepts are connected by cross-links and the

result of these new connections is a new synthesis of old concepts (Kumari & Gupta, 2014). Visualizing propositions and concepts in a schematic form is the technique of CM.

A great number of studies were found on the strategies for efficient learning of English vocabulary in Iran through CM (Alavi & Kaivanpanah, 2006; Saeidi, Mazandarani, & Barani, 2016) and around the globe (Beck, Perfetti, & McKeown, 1982; Hsueh-Chao, & Nation, 2000; Kaveh & Rassaiee, 2016; Khoii & Sharififar, 2013; Ojima, 2006; Nation & Newton, 1997).

2.2. CM Efficacy Studies on Confounding Variables

Among the studies which reported using CM on vocabulary items as mapped on learners' personal variables, Saeidi and Atman (2010) was a case in point in that gender typology was explored which showed no significant gender difference among intermediate participants in the positive promoting effects gained from CM. In another study by Augustina (2013), the results showed that students having higher IQ were better with Semantic Mapping strategies than the lecturing method by the teacher. Instead, those with lower IQs benefitted more from the lecturing method. Abdollahzadeh, and Amiri (2009) explored the intermediating effect of students' learning styles with CM as a promoting factor. They proved no significant effect for students' learning modality/style though they reported better performance with visual learners. In order to fill in this gap in the literature, this research was projected to investigate the contrived effects of two cognitive factors: learner's age and level of proficiency. Hence, based on what was mentioned as gaps thus far, two research questions were suggested:

1. How can the learners' proficiency level or age be related to more success regarding the utilization of concept mapping in teaching vocabulary items in English?
2. Can learners' proficiency level or age predict more success regarding the utilization of concept mapping in teaching vocabulary items in English?

3. Method

3.1. Participants

Participants were all chosen from some randomly selected language institutes located in Sabzevar, Khorasan Razavi province, Iran. Regarding learners' level of proficiency, elementary learners (less proficient) and learners within the intermediate level (more proficient) were categorized in two subsequent experimental and control groups making four groups. The biological age range of the participants was between 10 and 15 for less proficient groups and between 18 and 25 for more proficient groups. The proficiency of the participants was examined by a Preliminary English Test (PET) of proficiency and the levels which were mentioned in this study are based on this test's guidelines and administered by the language institute. The native language of all participants was Farsi. Convenience sampling was used in this study because random selection and grouping of the participants at institutes were not possible but institute selection was random from among 10 active institutes in the city. Therefore, based on the requirements for answering the research questions, four groups of participants were selected and the research procedures were precisely followed in order to achieve the preferred results. Table 1 shows information of all the participants in terms of both demographic and educational aspects.

Table 1

Demographic and Educational Information of Participants

Group No.	Experimental / Control	Level	Age	Concept Mapping
Pair 1	Control	Elementary	Kids	-
	Experimental	Elementary	Kids	+
Pair 2	Control	Intermediate	Adults	-
	Experimental	Intermediate	Adults	+

3.2. Instrumentation

Initially, before starting teaching, a validated placement test of PET was administered to see if the levels were homogeneous.

A vocabulary test with 58 items was initially used to check if the students knew the words that were going to be taught. The words known by the participants were omitted from the teaching procedure and replaced by another unknown word. In this study, the vocabulary items were selected from two consecutive books for the younger and older learners entitled “Mr. Bugs Phonics 2” by Catherine Yang Eisele, Dina Sun, and Richmond Hsieh (1998) from Oxford University Press and “Top Notch 2” (2nd edition) by Joan Saslow and Allen Ascher (2011) from Pearson Longman Series respectively.

3.3. Data Collection Procedures

In this study, in order to investigate the aforementioned issues, four groups of language learners were selected as in the following to see the moderating factors of age and proficiency level. In both experimental groups, the teacher-researcher (first author) taught the same words using CM. However, the difference was that in one group (experiential) the way the new vocabulary was presented was through CM but in the next group (control), traditional ways of teaching vocabulary were used including pronouncing the English forms and students had to write them in their notebooks without mentioning the common semantic relationship between the words as in CM. The participants’ proficiency level was checked by the guidelines of PET test of proficiency. Then, another test of vocabulary was also used to check if the students knew the words that were going to be taught. This pre-test was administered to each pair of groups and the results exhibited no substantial difference between control and experimental groups at the beginning of the study. Some words known by the participants were omitted from the teaching procedure and replaced by another unknown word. Then, at the end of teaching the selected new words, the same test of vocabulary was administered to see the progress of the participants among the above-four groups.

In fact, in order to measure the mediating effect of level on this relationship, groups 1 and 2, as well as 3 and 4 were compared because the other factors between the two pairs had been stabilized. Based on the categorization in this study, the researchers only selected content words to be taught within the treatment sessions during the study.

4.Results

In this research, the researchers assigned participants to four different groups based on their proficiency level and age. Generally, four groups involving two groups of less and more proficient and younger vs. older learners participated in this study.

4.1. Variability due to CM

After administering the project for five sessions, the performance of four different groups was compared to see if CM as a strategy could have helped targeted language learners in remembering the meaning of assigned words. At first, the normality of the gathered data was calculated and ensured by running the Kolmogorov-Smirnov test. The first step was then to compare the performance of all the learners in pretest and post-tests and between control and experimental groups through ANCOVA. Descriptive statistics are depicted in Table 1 for all four groups in the post-test.

Table 1
Descriptive Statistics for the Post Test

Groups	Mean	Std. Deviation	N
Less proficient younger Con.	39.2500	7.18826	20
Less proficient younger Exp.	51.5000	3.28473	20
More proficient older Con.	36.8000	2.94868	20
More proficient older Exp.	54.7000	1.62546	20
Total	45.5625	8.79419	80

First, a One-way ANCOVA was conducted to determine a statistically significant difference between the control and experimental groups regarding CM treatment and content word recall controlling for the pre-test as a covariate (Table 2).

Table 2

Tests of Between-Subjects Effects Controlling for Pre-test

Source	Type III		Mean Square	F	Sig.	Partial		Observed Power ^b
	Sum of Squares	Df				Eta Squared	Noncent. Parameter	
Corrected Model	4724.015 ^a	4	1181.004	63.922	.000	.773	255.689	1.000
Intercept	2280.911	1	2280.911	123.455	.000	.622	123.455	1.000
Pretest group	16.478	1	16.478	.892	.348	.012	.892	.154
Error	4507.076	3	1502.359	81.316	.000	.765	243.947	1.000
Total	1385.672	75	18.476					
Corrected Total	172185.000	80						
	6109.688	79						

a. R Squared = .773 (Adjusted R Squared = .761)

b. Computed using alpha = .05

As Table 2 designates, there was a significant effect of CM on the selected content vocabulary items after controlling for the pre-test, $F(3, 78) = 8131, p \leq .05$. Thus, we could claim that CM could have helped learners in remembering the meaning of content words. For a clear and precise comparison, Table 3 also shows pair-wise comparisons in this regard.

Table 3

Pairwise Comparisons in the Post Test

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Less Cont.	Less Exp.	-12.012 [*]	1.382	.000	-14.766	-9.259
	More Cont.	3.294 [*]	1.626	.046	.053	6.534
	More Exp.	-14.442 [*]	1.728	.000	-17.885	-10.998

Less Exp.	Less Cont.	12.012*	1.382	.000	9.259	14.766
	More Cont.	15.306*	1.503	.000	12.312	18.300
	More Exp.	-2.429	1.585	.130	-5.588	.729
More Cont.	Less Cont.	-3.294*	1.626	.046	-6.534	-.053
	Less Exp.	-15.306*	1.503	.000	-18.300	-12.312
	More Exp.	-17.735*	1.370	.000	-20.465	-15.005
More Exp.	Less Cont.	14.442*	1.728	.000	10.998	17.885
	Less Exp.	2.429	1.585	.130	-.729	5.588
	More Cont.	17.735*	1.370	.000	15.005	20.465

4.2. Variability due to Age vs. Proficiency

In the next phase, for examining the predictive effect of age and proficiency upon the positive effect of CM, a regression analysis was run on the dataset.

Since there were two independent variables, multiple regression analysis was selected as the statistical method with two predictors (age and proficiency) and one dependent variable- results of post-test. With other assumptions in mind including the continuous nature of the dependent variable, independence of observations, the existence of a linear relationship between the dependent variable and each of the utilized independent variables, no outliers, and insurance of homoscedasticity, the tests were run (Tables 4 through 6).

Table 4

Model Summary for the Generated Regression Age and Proficiency as Two Predictors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.21 ^a	.04	.02	8.69

a. Predictors: (Constant), Level, Age

As Table 4 depicted, the estimated indices were used to determine how well a regression model fits the data, which in this case it showed that R (0.21) was not high indicating that a good level of prediction could not be established in this dataset. The R^2 value of 0.04 also

indicated that our independent variables explain only 4 % of the variability of our dependent variables. Subsequent Table (5) for the results of ANOVA, confirmed such a finding as well.

Table 5

ANOVA Results from Age and Proficiency Levels and Content Word Recall

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	288.23	2	144.11	1.90	.15 ^b
	Residual	5821.45	77	75.60		
	Total	6109.68	79			

a. Dependent Variable: Posttest

b. Predictors: (Constant), Level, Age

As seen in Table 5, the independent variables could not have significantly predicted the dependent variable, $F(2, 77) = 1.96, p < .15$. Accordingly, the regression model was not a good fit for the data.

Although at this stage of the analyses, further analysis could be stopped, for understating the general form of the equation for prediction, the data obtained from the coefficients Table was also inspected (Table 6).

Table 6

Coefficients for the Effect of Age and Proficiency over Post Test Results

Model		Unstandardized		Standardized		95.0% Confidence		
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	38.620	4.128		9.355	.000	30.400	46.841
	Age	.360	2.023	.021	.178	.859	-3.669	4.389
	Level	3.235	1.771	.211	1.826	.072	-.293	6.762

a. Dependent Variable: Posttest

Table 6 displayed the unstandardized coefficients. Considering the effect of age and proficiency in this example, the unstandardized coefficients for age and proficiency were equal to .360 and 3.23 respectively. This meant that for each increase in age and proficiency, though there was an increase in the results, this was not significant statistically. Accordingly, it could be stated that as the results from multiple linear regression in this study for predicting the effect of CM in the post test from age, and proficiency showed, these variables did not significantly predict a positive effect for CM, $F(2, 77) = 1.96, p < .15, R^2 = .04$. Hence, no variables added statistically significantly to the prediction, $p > .05$.

5. Discussion

The researchers in this study measured the effect of CM on content word grasping with regard to two cognitive variables: language proficiency and age and two questions were posed. The results of multiple regression analyses revealed that neither age nor proficiency level could predict learners' success by utilizing CM strategies.

The findings in this study were both similar and different from other studies in ELT realms. Identifying main ideas in each paragraph and clarifying relations and links among paragraphs were reported as the positive outcome for using CM.

Reporting positive outcomes for using CM, though is common (Khamesan & Baradaran Khaksar, 2011), in some research, it was reported that compared with other strategies, it might be less efficient. Simanjuntak, and Simanjuntak (2018) is one such research in which, the priority of a technique in teaching vocabulary- Diglot Weave- was proved over CM. In other studies, other techniques for teaching vocabulary items had been used among Iranian learners (Esfandiari & Hezari, 2017). In their study, three techniques including 'dictionary use', 'etymological analyses, and 'glossing' were compared with one another. The findings showed that the group which had received dictionary use improved in their ESP learners' vocabulary production. In the current study, producing vocabulary items was in the form of production as recall and writing the meaning in Persian. In some ways, CM might be comparable to dictionary use in that students activate other related words to the targeted words.

Using CM among adult learners was one existing trend as Arshadi and Yavari (2015) claimed a beneficial effect for instruction through CM on some Iranian undergraduate students' writing and recall.

Taghavi and Sadeghi (2008) studied the impact of CM on the reading comprehension of undergraduate non-English major students and came up with similar results. They selected 120 learners including both genders. Having divided them into experimental and control groups, they implemented the instructions germane to CM strategies for pre-reading comprehension activity. Moreover, they considered gender as one of the variables in their study. The results also revealed that there was not any statistically significant relationship between the students' gender and the effectiveness of CM strategy training on reading comprehension.

In other studies, conducted by Zaid (1995) Heimlich and Pittelman (1986), the effect of CM as a pre-reading strategy was investigated. Present findings are in accordance with their results in case of the significant effect of CM on reading comprehension. Moreover, the findings of this study revealed that gender did not have any significant effect on the efficiency of CM on content word learning. It seems that learners' cognitive variables (here gender) cannot have a predictive value as age and proficiency levels in this present study. Maheswary and Sultana (2019) proposed a model for learning content words and their findings covered four different aspects. First, they proved the efficacy of the VLS (vocabulary learning strategies) Model for content words in English. Second, the exclusion of social strategies in content word learning was validated. Third, there was ample scope for deep processing or elaborate rehearsal which was vital for improving productive vocabulary. Fourth, the inclusion of scientific affixes in language teaching has added a new dimension to integrated learning. They believed that the social strategies were more important in improving language proficiency, but in content vocabulary learning, for better comprehension of academic texts, social strategies took a backseat.

In another study conducted by Ghonsooly and Hoseinpour (2019), the effect of CM on EFL learners' proficiency was investigated on some 80 freshmen/women EFL university students. The results of the proficiency test showed that CM had a significant effect on EFL learners' fluency at the intermediate level. The findings of this study also revealed the significant difference between the performances of learners in experimental groups who received CM strategies in learning content words against the performance of learners in the control group.

Zarei and Shirmohammadi (2019) made an attempt to inspect the effect of four diverse forms of strategy instruction involving including form-focused, monitoring, evaluating, and

meaning-focused strategies on idioms comprehension and production. Findings indicated that the form-focused group achieved better results as compared with the other groups. This counteracted the results reached in this study in which case the priority of meaning-based instruction was proved for vocabulary instruction.

5.1 Conclusion & Pedagogical Implications

The findings can be fruitful for diverse groups of ELT practitioners. Teaching vocabulary is a vital concern of any English teacher. Although different methods were suggested for teaching vocabulary, it is still one of the difficult activities in English language teaching. Language teachers can manipulate the findings of this study in a way that they become aware of the benefits of using CM strategies in teaching vocabulary items. They can possibly apply these strategies and test learners' progress in each session as well.

In language institutes, learners with different age groups participate in a class. Teachers can consider them as equal learners in the case of vocabulary with regard to CM implementation, though still, other research studies with larger participants and wider age ranges must prove this fact. To use a specific method for teaching, it is required to have suitable sources. Including content words in reading passages and other parts of a unit or lesson in the source mandates the teachers to have acceptable knowledge and skill to use appropriate methodology. Syllabus designers can take advantage of the findings of the present study by including more content words in reading comprehension passages or word functions in a unit to provide the teachers with fruitful sources of data for the learners.

The researchers in the current study focused their attention to conduct exploration in private institutes because it was very hard to gain the acceptance of school managers and teachers to take the class time for conducting research for a longer time. The other interested researchers can investigate the effect of CM strategies on content word learning in public schools. Likewise, more studies can be conducted in this field considering the role of other variables which are logically attributable to reading comprehension or vocabulary learning.

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