The Comparative Effect of Mind Mapping and Concept Mapping on EFL Learners' Vocabulary Achievement

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Abstract - English learning is part of these days' daily program foe many people and vocabulary plays an important role. This article focuses on how Iranian intermediate- level students can improve their vocabulary achievement by using Mapping strategies of concept maps and mind maps. It is a comparative study carried out in EFL classrooms, and it addresses the implementation of different types of mapping strategies to know which one works better. This study was carried out with 62 learners who were divided in to two groups that each one experienced a single type of mapping strategies during a semester. Then a type of teacher -made post test was taken in both groups. Results show that learners in the mind mapping group benefited significantly more than those in the concept mapping group in terms of improving their vocabulary achievement.

Index Terms: Argument mapping ,Concept mapping, Mapping strategies, Meaningful learning, Mind mapping, Vocabulary achievement ,Vocabulary learning

1 INTRODUCTION

In modern times, learning and mastering English has turned into a basic necessity for many people all over the world in managing their careers and/or education. Accordingly, it is of course an incontrovertible fact that for mastering a language, learning new words beside other abilities plays an essential role as learning a language is basically a matter of learning the vocabulary of that language([1], [2],[3],[4],5]). This is perhaps true since vocabulary acquisition is crucial to students' other four language skills. With the pivotal importance of vocabulary established in ELT and also the fact that English probably contains the greatest number of words of any major language (Schmitt, 1997) thereby facilitating vocabulary achievement.

The learners' vocabulary achievement has received more attention recently (Nunan, as cited in[7]). It is important for researchers to investigate ways to improve direct instruction of foreign language vocabulary; therefore, how to teach vocabulary and use it in a productive way have become the main concerns of learners as well as teachers [8]. These ways must help both groups in increasing the speed of learning and consequently longer permanence in the memory.

When EFL learners start to read a text, what comes to their mind is how to learn and recall the new vocabulary meanings (Yu Ling, as cited in [9]).

Vocabulary Learning Strategies

While there is little debate over the importance of vocabulary learning in the process of language learning, the "whether, and how best, to teach vocabulary has long been a topic of controversy" (Levin, Levin, Glasman, &Nordwall, as cited in [10]. Thence, a multiplicity of different vocabulary teaching procedures have been designed and studied in the literature of ELT (e.g., [11];[12]). Among such procedures is the mapping strategy which is based on making associations between different nodes of the brain[13].

Rooted in Ausubel's theory [14] of meaningful learning elaborating on the principle of linking new concepts to existing concepts in cognitive structures, the mapping strategy puts forth the notion that learners also need to be taught something about brain mechanisms and knowledge organization[15].

Mapping techniques which are among visual learning strategies enhance learning as imagination and association are the keys to high-level memory and creative thinking[16]. There are different kinds of mapping strategies and consequently each type has its own impact and is used for a specific domain thus needing its own structure [17].

Among the different mapping strategies existing, mind mapping and concept mapping have been identified as efficient visual thinking tools for storing, processing, organizing, and presenting information graphically that may help learners to facilitate the process of meaningful learning [16]. Concept maps have been defined differently from various viewpoints; Basso and Margarita [18], for example, define that concept as artifacts for organizing and representing knowledge.

Just like concept maps, mind maps are also used in different fields. The term was coined in the UK by Tony Buzan in his 1974 book and BBC TV program *Use Your Head* [16]. Mind mapping is a popular brainstorming tool and thinking technique of visually arranging ideas and their interconnections; it is a way of representing associated thoughts with symbols rather than with extraneous words [19]. Others define mind maps as forms of an outline with ideas and pictures radiating out from a central concept ([20]; [21]).

2 PROCEDURE

Participants

The participants of the study were 62 female Iranian intermediate EFL learners who were aged between 13 to 19 years and studying in a Language School. The selection of the sample was done in two stages. At first, 100 students were chosen non-randomly from among the existing sample available and sat for a piloted language proficiency test with 64 of them whose scores fell one standard deviation above and below the mean being selected. The selected participants were subsequently divided into two experimental groups of 32 students. Each group comprised two classes and the assignment was random.

Another 30 learners at the same level language proficiency and age participated in the piloting of the language proficiency test and the posttest with two teachers (the researcher and one of her colleagues who held a master's degree in TEFL and had six years of experience teaching at this level) serving as the raters of the writing part of the preliminary proficiency test in the study.

Instrumentation and Materials

For the purpose of achieving the goal of this study, two tests and certain materials were used in this study which they are described below.

-Tests

-Preliminary English Test (PET)

-Rating Scale for the PET Writing Part

- Test of Vocabulary at the Outset and Posttest

- Materials

-Summit course books

The main course book which was used for this treatment was *Summit* (Saslow&Ascher, 2009). The book is designed for intermediate learners focusing on all four skills and consists of five chapters.

- Concept and Mind Mapping Handouts

As the learners were not familiar with using concept and mind mapping methods, the researcher decided to prepare two handouts in order to inform the participants what concept maps and mind maps were and how they could use these maps. The four-page handouts consisted of a brief history, description, and some images. The researcher used materials from the internet; she further shared the two handouts with five learners and two colleagues and incorporated their feedback on them before using them in class.

Procedure

At the beginning of the study, the already piloted sample PET was administered to 100 intermediate EFL learners from among whom the 64 selected participants of the study were assigned randomly into two experimental groups. The vocabulary test was subsequently administered to make sure that the learners were not familiar with the words.

In the treatment process, both experimental groups underwent 16 sessions of 105 minutes held three sessions a week. The main course book was taught to both groups with one group receiving concept and the other mind maps. During these 16 sessions, a sum of 160 new words and phrases were taught in both experimental groups alongside the other parts of language such as grammar, speaking, listening, reading, and writing. The process of teaching in each group is described as follows.

Treatment in the Concept Mapping Group

The two classes assigned to the concept mapping strategy instruction had 16 participants in each. The first session was allocated entirely to introducing concept mapping to learners with some practical examples. The participants were given handouts which contained the characteristics of a concept map, some examples of well and poorly constructed concept maps plus introduction to this kind of mapping.

After giving the handouts to every learner, they were given five minutes to have a look at the content. Then the researcher began to speak about concept mapping according to the handouts and tried to draw the example maps on the board. She drew a concept map on the board by asking the students some questions about their opinions on a birthday party which was the first selected topic intended to be something attracting the learners. The questions included many different aspects of holding a birthday party which naturally raised many different ideas and comments. Different ideas or ”concepts” were welcomed by the teacher/researcher as the nature

of this technique is learners' freedom in delineating and connecting the concepts in a way that their minds can recall it better in the future. For example, one of the questions was about how they held their birthday parties and many of the learners answered by "inviting their close friends to their home", so the researcher used two words here "invite" and "close friend" for making a node while the arrow was titled by "inviting" and the node by "close friends".

Next, the teacher drew a map by asking students' help and guidance. She encouraged the learners to provide the answers and by doing so, she made the learners interested in drawing this kind of map. Each learner was free in delineating her own map and they were not asked to copy exactly what was on the board but for drawing the map by the teacher, they had been motivated to take part and help her. The teacher tried to make all of them interested and involved in the intended process. It was indeed necessary to motivate the learners to take part in this process as this collaboration is one of the basic rules in implementing the concept mapping strategy.

The teacher/researcher followed the Davies (2010) model but before that she reminded the learners that each map is a kind of a personal track and they must feel free in how they show or relate the concepts. Copying the exact map from the board was not compulsory but the learners were encouraged to select some parts when they wished to do so.

First, the teacher asked a declarative question: What is a birthday? What do we eat on a birthday? What do we wear on a birthday? What do we buy for a birthday? And questions like these.

1. She devised a "parking lot" of concepts and ideas that were related to the concept of birthday and the questions to be answered. The purpose of this stage was brainstorming. The resulting concepts might or might not be used in the final map. The concepts were placed in circles or boxes to designate them as concepts. As an example for each question, there were lots of answers by the learners that it showed the different nature of thinking or concept-making in any individual. She did her best for not removing any concept. She wrote all of them and tried to use them in the next step of the map delineating.
2. She then put the concepts in a hierarchical order of importance in the provisional concept map.
3. Next, she linked lines between the hierarchical concepts from top to bottom. Arrows could be used in different directions. For example, when she wanted to draw an arrow or

create a connection among the circles, she preferred to draw the two circles of both ends but she let the learners say what phrase can be used for joining these two nodes.

4. She then devised suitable cross-links for key concepts in the map. Verbs and propositions / prepositional phrases were used most frequently, for example, “requires”, “to work with”, “will lead to”, “involves”, “during”, “of”, “through” and so on. The aim was to show the relationship between the key concepts and their subordinate or super-ordinate elements. This was of course a very fundamental phase of concept mapping.
5. Finally, she added some examples to the terminal points of a map representing the concepts. These were not enclosed in boxes or circles to delineate them as instances of a concept. These examples included some other words that were not related to the main topic (in this case, a birthday party). One example can be the word “glad”, when most of the learners stated that the first concept of birthday is “happiness” for them, one told ”glad”. The teacher mentioned that these two words are the same in meaning but one is more formal. So a new circle was added by arrow of “more formal” for “glad”.

These steps would help the learners in mastering the strategy and the result was a map on the board full of arrows and relationships. During the drawing phase, all the learners were encouraged to participate and help the teacher. The learners were told that for each vocabulary teaching time, they needed their own concept maps and any kind of difference was accepted by the teacher as they were all different in mind and concepts of the mind.

In the last stage, the students copied the map in their own notebooks. For homework, they were asked to draw their own maps for the next session and study the 12 new vocabularies they were taught in that session.

On the second session, the teacher first reviewed last session’s new words by asking them from some of the students while they were allowed to watch their maps. She then presented a new topic following the same procedure described above. The same procedure was implemented every session.

Treatment in the Mind Mapping Group

The first step of this class is exactly same as concept mapping class while the only difference was using mind-mapping handouts and principles. Every participant had an A4 plain paper without any line and sufficient numbers of color pens or pencils. The papers had been

located horizontally and then the instructor told the following steps to the learners while asking them to put their color pens and pencils on the desk. They were encouraged to use those colorful pens or pencils throughout the map delineating as this is a basic tenet of mind mapping and one of the major differences with concept mapping.

The teacher started asking learners about their birthday parties and how they held this event. She then followed the steps proposed by Buzan [22] the originator of mind mapping – not only in preparing the handout, but also in the teaching process.

1. First, the teacher placed a picture about birthday in the center of the board with at least three colors.
2. Then she chose some keywords and sometimes used pre-printed upper and lower case letters instead of a complete word. For example instead of “gift”, she used the upper case “G” and attached it to the board.
3. She subsequently explained that each word or image was alone and would have been placed on its specific line.
4. She then connected the lines starting from the birthday image in the center of the board. The lines became thinner as they radiated out from the center and were the same length as the word or image meaning that a short line was used for a short word and vice versa.
5. She had to tell the learners to develop their own personal styles of Mind Mapping. She told her learners that the beauty of the mind maps lies in their differences and individualities; these differences show the importance of each minds’ plans. So she encouraged the participants to feel freedom in making a personal map which could be unique for each person.
6. She was required to emphasize and show the associations in the mind. She asked them for example what they recalled when they think about the gifts in such celebration party. Certainly the answers were different because the minds were different. That could be one of the goals of Mind- Mapping to create the distinct maps.
7. She kept the mind maps clear by using radial hierarchy, numerical order or outlines for embracing the branches.

As the main aspects of mind maps are pictorial and graphical design flourishes, the researcher tried to emphasize them and help participants to create associations between their ideas about the words. Therefore, in the first session, the participants followed their teacher who

used these steps on the board and finally created a mind map about birthday parties through actively participating in the process.

For the first word, the teacher said the meaning of that word herself and for the others, she let the participants to guess the meanings. During these activities, the learners were motivated to help their teacher by telling their ideas about everything that could be related to a birthday party. For example, one of the learners said “snack”; when the teacher asked what she meant, she answered, “I always have snacks in my birthday parties”. So the researcher draw a picture of a snack and then the learner laughed and said “It’s like everything but not a snack!”

The teacher welcomed such personal opinions which caused laughs in the class. Certainly there were different ideas and suggestions so the teacher took advantage of these different opinions and she encouraged learners to have their own constructions of mapping in their works. She emphasized that the nature of our minds’ differences can be helpful for this class, so the different colors and images were assumed as valuable factors in learning.

In the last stage, the students copied the map in their own notebooks. For homework, they were asked to draw their own maps for the next session and study the 12 new vocabularies they were taught in that session.

On the second session, the teacher first reviewed last session’s new words by asking them from some of the students while they were allowed to watch their maps. She then presented a new topic following the same procedure described above. The same procedure was implemented every session. At the end of the treatment period, both experimental groups sat for the same posttest.

3 Data Collection and Analysis

Due to the non-random selection of the participants and random assignment of the participants in the two comparison groups, the study was quasi-experimental with comparison group and posttest only design. The data analysis of the present study consisted of both descriptive and inferential statistics. Descriptive statistics was utilized for calculating the mean, standard deviation, and standard error of measurement of all tests used. For the purpose of estimating the inter-rater reliability of PET in the writing part, Cronbach Alpha was used. The inferential statistics which was used to test the null hypothesis of the study was an independent

samples *t*-test for comparing the means of two experimental groups at the posttest level. The prerequisites of all parametric tests were also in place. Furthermore, the reliability of the test scores (estimated through the KR-21 procedure) gained by the participants on the pilot PET was 0.82.

As two raters were involved in the scoring of the writing section of the PET, their consistency of scoring or inter-rater reliability had to be checked. The skewness ratio of both sets of scores (-0.20 and -1.00) fell within the acceptable range of ±1.96 which means that both sets were not skewed and thus, running a parametric test to check the go-togetherness of the scores was legitimized. Consequently, the Pearson Correlation was run.

Table 4.3 below displays the significant correlation of the two sets of scores given by both raters to the writing papers ($r = 0.80$, $p = 0.00 < 0.05$).

Table 1. Inter-Rater Reliability between the Two Raters Scoring the PET Writing Papers

		Rater 1	Rater 2
Rater 1			
	Pearson Correlation	1.000	.803**
	Sig. (2-tailed)	.	.000
	N	30	30
Rater 2			
	Pearson Correlation	.803**	1.000
	Sig. (2-tailed)	.000	.
	N	30	30

**Correlation is significant at the 0.01 level

Descriptive Statistics of the PET Administration

Next, the piloted PET together with the writing section was administered for participant selection. Table 2. shows the descriptive statistics of this administration with the mean being 37.86 and the standard deviation 7.12, respectively.

Table 2. Descriptive Statistics of the PET Administration

	N	Minimum	Maximum	Mean	Std. Deviation
PET Administration	100	19	53	37.86	7.118
Valid N (listwise)	100				

Dividing the Participants into Two Groups

Among the 100 students who took the PET, the researcher selected 62 who scored between one standard deviation above and below the mean. Table 3. below shows the descriptive statistics of this test in the pilot phase. The mean and standard deviation were found to be 47.17 and 8.27, respectively.

Table 3. Descriptive Statistics of the Vocabulary Test Piloting

	N	Minimum	Maximum	Mean	Std. Deviation
PET Piloting	30	21	42	32.10	6.189
Valid N (list wise)	30				

The researcher administered the same 40-item vocabulary test as the posttest among the two experimental groups once the treatment was completed. The researcher administered the posttest to both groups in one setting. Table 4. below displays the descriptive statistics of this administration with the mean being 24.97 and the standard deviation 3.66 in the concept mapping group and 35.87 and 2.22, respectively, in the mind mapping group.

Table 4. Descriptive Statistics for the Posttest in Both Groups

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error

Group 1 (CM)	31	19	32	24.97	3.656	.316	.421
Group 2 (MM)	31	32	40	35.87	2.217	.115	.421
Valid N (listwise)	31						

Figures 1. and 2. display the above statistics for each of the experimental groups, respectively.

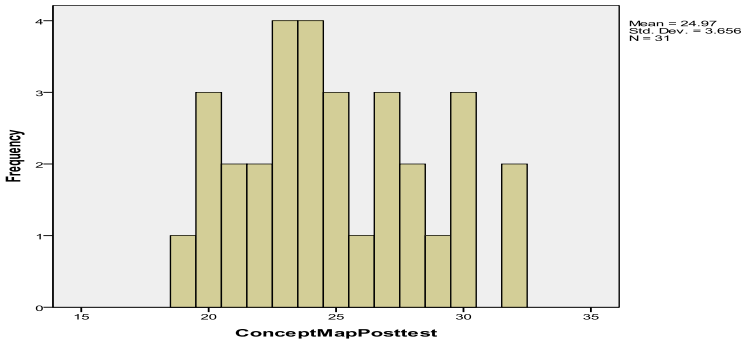

Figure 1. Histogram of the Concept Mapping Group's Scores on the Posttest

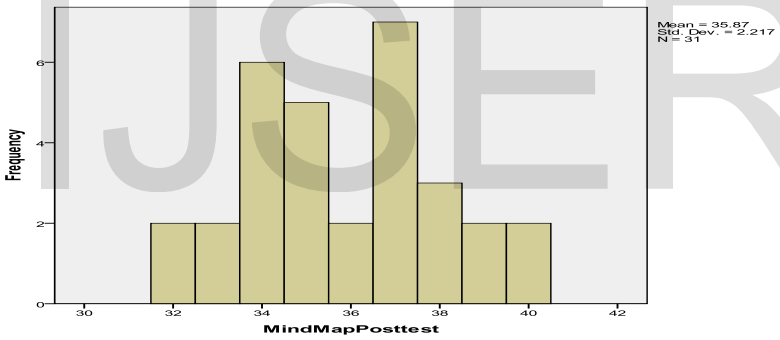

Figure 2. Histogram of the Mind Mapping Group's Scores on the Posttest

Going back to Table 4. the skewness ratios of both groups fell within the acceptable range of ±1.96 (0.74 and 0.29) thus signifying that the score distributions in both groups represented normality. Therefore, running a *t*-rest was legitimized.

As Table 5. below indicates, with the *F* value of 7.312 at the significance level of 0.009 being smaller than 0.05, the variances of the two groups were significantly different. Therefore, the results of the *t*-test with the assumption of heterogeneity of the variances were reported here.

The results (t = -14.19, p = 0.00 < 0.05) indicate that there was a significant difference between the mean scores of the two groups at the posttest. It can thus be concluded that concept

mapping and mind mapping bore a significantly different impact on the vocabulary achievement of the participants in this study.

Table 7. Independent Samples *t*-Test on the Mean Scores of Both Experimental Groups

	Levene's Test for Equality of Variances		*t*-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	*t*	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	7.312	.009	-14.19	60	.000	-10.903	.768	-12.4	-9.36
Equal variances not assumed			-14.19	49.4	.000	-10.903	.768	-12.4	-9.36

The researcher was interested to know how much of the obtained difference could be explained by the variation in the two levels of the independent variable. To determine the strength of the findings of the research, that is, to evaluate the stability of the research findings across samples, effect size was also estimated to be 1.03. According to Cohen (1988, p. 22), a value exceeding 0.8 is generally considered a large effect size. Therefore, the findings of the study could be considered strong enough for the purpose of generalization.

4 Research Findings

In the field of vocabulary achievement, there have been many studies which have focused on finding ways or strategies to facilitate the process of learning and also helping the learners in retaining and recalling them soon and at the moment.(e.g.[23];[24]; [25];[26],[27],[6],[5]).Alongside these researches, studies were done in the field of Mapping strategies which have been used in different aspects and not only vocabulary([28]; [16];[13]; [29];[30];[31]). Therefore, the researcher set out her work while she was aware of the applicability of these mapping strategies in the field of language learning and specifically "vocabulary achievement ". It was clear that these techniques can motivate learners in better learning and their main success is giving a picture to participants and helping them in non-verbal learning.

In line with the findings of the previous works which have established the effectiveness of these strategies including concept mapping, mind mapping and argument mapping ([32]; [33]; [34]) this study too emphasized the usefulness of those strategies.

As Eppler[35] believed and the current study was based on this notion, there are many familiarities and also differences between each type of mapping strategies thus leading to different outcomes. While all these techniques are trying to give a picture of each piece of knowledge to learners but they are definitely different in many aspects and it was a question for the researcher to know whether they are so different in vocabulary achievement or not while it was obvious that both of concept mapping or mind mapping are helpful and facilitator in this area but the degree of effectiveness was a question for the author.

To this purpose, the researcher clearly observed in the study that using the mind mapping strategy provide learners with better learning and easier recalling and they could reconstruct the map sooner and more simply than concept maps as the type of mind maps gave them more freedom and less complexity.

It is worth mentioning that in the process of delineating maps in both groups, they were interested in learning vocabulary through these strategies which were not classic type of word lists. The learners showed their interests by participating in all phases of drawing and the

satisfaction that they had for vocabulary learning times; not only the researcher herself saw this enthusiasm but also the learners themselves expressed it directly that they liked map drawing. Furthermore both groups had the same level of learners 'participation only in the mapping process and not for instance in the reading time.

Interestingly, while the level of participation and the allocated time for delineating a map for both concept map and mind map groups were the same but it was seen by the researcher that while she was asking the learners the pre -taught vocabularies, the learners in the mind mapping group were more qualified than the other group in recalling and they were more interested in delineating the map more. They also remembered more details than the concept map group. It is worth noting that in this group they also used less time and they repeated the words with more alacrity.

In addition, the researcher gathered from the learners in the mind map group that during the learning course, students generally appreciated this strategy and keywords or signs that they were free to use. This freedom was also considered in the concept map group but the nature of this map which needed more elaboration and time made the learners a bit bored. The final product of each type of mapping tools are different and that is the critical point as reading a mind map is easier than a concept map because in the latter , there are more connections and relations which have to be observed by the learner who is drawing .

Learning vocabularies by signs and key words gave this sight to the learners that they could also use this technique in other learning sections including writing and reading, something which was seen by the researcher that they tried to learn in a new and different way. Finally it can be said that working by mapping strategies not only helped learners in better learning but also helped the researcher herself as she was the instructor, too. As she had previously used only the word list method for teaching vocabulary, it was a new and insightful method to teach the vocabulary in more motivating condition.

Insight for Language Teacher Development

Since vocabulary learning was always a controversy for both teachers and learners in how to get command on more words and retain them for a longer time; the necessity is felt to provide learners with more essential strategies in the field of vocabulary learning. Mapping

strategies can support learners in many aspects as Cuthell and Preston[16] believed that concept maps and mind maps are quick to review and are ideal for revision; they engage much more of the brain in the process of assimilation and connecting facts than conventional notes or summaries and they can provide cues necessary to remember the information within it. Accordingly teaching mind mapping, could be a part of the pedagogical curriculum to help students empower themselves in the act of vocabulary learning. This training could be done both for teachers who are being trained to become teachers or those already engaged in the practice of pedagogy in the form of in-service courses.

In this study, the researcher would assign the beginning session of the semester for teaching and presenting the mapping strategies while delivering pre –fabricated handouts in order to give more insights to learners. This was done to activate their prior knowledge and thence she herself showed the step by step process of map delineation.

One theme which is contributory to mapping strategies is the learners ' cooperation in the process of drawing a map. It helps the learners to see their points of view as essential ingredients of map drawing; therefore, this individuality of each map gives more motivation and enthusiasm to participants. To this end, cooperative learning could be emphasized in teacher training workshops as an effective feature thereby facilitating vocabulary achievements.

In the phase of assessing the learners ' vocabulary learning, the mapping strategy can be used too. This type of assessing is giving more cues to learners and also support their subtle learning of how applying these maps. It was more essential than writing feedbacks and verbal correction. Accordingly, it is recommended to evaluate learners by asking them to draw a map which had been previously demonstrated.

Suggestions for Further Research

This research was carried out among intermediate learners; the same experiment could be implemented among other age groups to see whether the latter is a factor in comparing the impact of the two modes of mapping strategies on vocabulary achievement. Only female students participated in this research; it would be interesting to see whether gender is also a factor. These modes of mapping strategies were used for all learners while people with

kinesthetic minds can learn new materials better by these techniques. It is recommended to carry out this research among learners with that ability to see whether these two strategies are significantly different in learning new words or not.

5 CONCLUSION

The researcher thoroughly observed that using the mind mapping in the process of teaching vocabulary can enhance students' enthusiasm and participation in the learning process. This is perhaps the case as mind mapping removes the pressure of verbal modalities in the process of vocabulary learning alongside giving more freedom to use personal and individual icons .The learners were also enjoying their liberty in not using connection words as they were motivated to use more colors and shapes to draw any map. They could make it personal as each word or phrase could recall something different from each learner to another.

Furthermore, since vocabulary learning was always a controversy for both teachers and learners in how to get command on more words and retain them for a longer time; the necessity is felt to provide learners with more essential strategies in the field of vocabulary learning. Mapping strategies can support learners in many aspects as Cuthell and Preston[16] believed that concept maps and mind maps are quick to review and are ideal for revision; they engage much more of the brain in the process of assimilation and connecting facts than conventional notes or summaries and they can provide cues necessary to remember the information within it. Vocabulary achievement could be raised by many strategies with mapping being one of them. While mapping strategies are the same in the fundamental bases, they have many differences which therefore lead to different usages.

This study revealed that vocabulary achievement as an important part of language learning is enhanced through using mapping strategies but among the two chosen techniques, the mind map group outperformed the concept map group in vocabulary learning. Consequently

learners were more successful in vocabulary achievement by using mind mapping. There is of course no dispute over the effectiveness of both strategies in language learning but the teaching material can influence the degree of applicability. In other words, vocabulary as the intended part of teaching in this work was better achieved by the mind mapping than concept mapping technique.

Accordingly teaching mind mapping, could be a part of the pedagogical curriculum to help students empower themselves in the act of vocabulary learning.

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