



## The Effect of Mind Mapping on EFL High School Students' Vocabulary Retention

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### Abstract

The present paper tries to find out the role of mind mapping in improving Iraqi EFL students' vocabulary retention. It aims to find answers to the following questions: (1) Does mind mapping improve Iraqi EFL students' vocabulary retention and recalling? (2) Is there any statistically significant difference in the mean scores of the post-test and the delayed post-test? and (3) What are the students' attitudes towards the use of mind mapping technique? To answer the posed questions, the study hypothesizes (1) Mind mapping has a favorable consequence on improving vocabulary retention and recalling, (2) There is no statistically significant difference in the mean scores of the post-test and the delayed post-test and (3) Students show positive attitudes towards the use of mind mapping. To answer the research questions and test the posed hypotheses, a posttest is followed where both the experimental and control groups received it. To gather data, immediate and delayed posttests are used in addition to a questionnaire. The results showed that mind mapping significantly contributes to enhancing the retention of vocabulary among EFL female high school students. Moreover, students show positive attitudes towards the effect of mind mapping as a technique to vocabulary retention.

**Keywords:** *mind mapping, high school students, vocabulary retention, language learning.*

تأثير الخرائط الذهنية في حفظ المفردات لطلاب المدارس الإعدادية الدارسين اللغة الإنكليزية بوصفها لغة  
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### المستخلص

تحاول الدراسة الحالية تسليط الضوء على دور الخرائط الذهنية في تحسين الاحتفاظ بالمفردات لطالبات المرحلة الإعدادية الدارسات للغة الإنكليزية بوصفها لغة اجنبية. تحاول الدراسة إيجاد أجوبة للأسئلة التالية: (1) هل تُحسّن الخرائط الذهنية من حفظ وإنتاج الطلاب العراقيين الدارسين للغة الإنكليزية بوصفها لغة أجنبية للمفردات؟ (2) هل يوجد فرق احصائي مهم في معدلات الاختبار البعدي والاختبار البعدي المتأخر؟ و (3) ما هي وجهات نظر الطلاب تجاه استخدام إستراتيجية الخرائط الذهنية؟ لأجابه الأسئلة المطروحة، تقترض الدراسة ما يلي: (1) للخرائط الذهنية أثر إيجابي في تحسين الاحتفاظ بالمفردات وإنتاجها، (2) لا



يوجد فرق احصائي مهم في معدلات الاختبار البعدي والاختبار البعدي المتأخر، و (3) يظهر الطلاب وجهات نظر إيجابية تجاه استخدام الخرائط الذهنية. ولتحقيق أهداف البحث وأسئلته، تم اعتماد تصميم تجريبي باختبار بعدي فقط، حيث تلقت طالبات المجموعتين التجريبية والضابطة الاختبار البعدي. ولجمع البيانات، استُخدم اختبار بعدي فوري وآخر مؤجل، بالإضافة إلى استبيان. أظهرت النتائج أن الخرائط الذهنية تسهم بشكل ملحوظ في تعزيز الاحتفاظ بالمفردات لدى طالبات المرحلة الإعدادية الدارسات للغة الإنكليزية كلغة أجنبية. كما أظهرت الطالبات اراء إيجابية تجاه استخدام الخرائط الذهنية كإستراتيجية للاحتفاظ بالمفردات.

**الكلمات المفتاحية:** الخرائط الذهنية، طلاب المدارس الإعدادية، حفظ المفردات، تعلم اللغة.

## 1. Introduction

Vocabulary learning is a very essential component of language development. It forms the base for a powerful communication that includes the four basic language skills (listening, speaking, reading, and writing). Among these skills, listening functions the crucial role in exposing language learners to new vocabulary through authentic and contextualized forms. Most EFL learners find challenges in retaining new words during listening tasks due to the fast nature of the spoken language. These challenges call the need to find strategies that improve vocabulary retention without interrupting the natural flow of listening.

Mind mapping, as a visual learning technique that supports learners to organize ideas and connect them, has shown promise in developing vocabulary retention and comprehension. Mind mapping has been widely used in the domains of reading and writing where learners use it to plan, summarize and structure the content (Buzan and Buzan, 1994). Thus, using mind mapping in EFL classroom to promote vocabulary retention through listening comprehension activities may offer valuable support in the learning of vocabulary.

### 1.1. The Statement of the Problem

Many EFL learners struggle to retain new words through listening comprehension. Listening, as a receptive skill, forms unique challenges for the acquisition of vocabulary due to different reasons including; the nature of spoken language and the cognitive demands of processing meaning. As a result, learners fail to store and recall vocabulary that are heard during listening activities.

Although various strategies of vocabulary learning have been introduced in literature, limited attention has been given to visual and organizational tools like mind mapping in the specific context of listening-based vocabulary retention. Most existing studies such as Al-Jarf (2021), Wahid and Sudirman (2023), and Hamed (2024), emphasize mind mapping as a learning technique in reading/writing skills to improve these skills. No focus is given regarding the use of mind mapping technique in supporting vocabulary learning through input. As such, a lack of empirical evidence on whether mind mapping can function as an effective technique to reinforce vocabulary learning through listening comprehension is



observed. This gap highlights the necessity to examine mind mapping as a learning technique to improve vocabulary retention through listening tasks.

## 1.2. The Study Questions

The present study addresses the following questions:

- (1) Does mind mapping improve Iraqi EFL students' vocabulary retention and recalling?
- (2) Is there any statistically significant difference in the mean scores of the post-test and the delayed post-test?
- (3) What are the students' attitudes towards the use of mind mapping technique?

## 1.3. Hypotheses

The current study hypothesizes that:

- 1- Mind mapping has a favorable consequence on improving vocabulary retention and recalling.
- 2- There is no statistically significant difference in the mean scores of the post-test and the delayed post-test.
- 3- Students show positive attitudes towards the use of mind mapping.

## 2. Literature Review

### 2.1. Vocabulary and Vocabulary Retention

Language learning is composed of different foundational elements, one of these elements is vocabulary. In EFL context, learning vocabulary is crucial because it helps learners express their thoughts and ideas to communicate effectively inside and outside the classroom. Vocabulary is the component that integrates with listening, speaking, reading, and writing (Hung and Lan, 2023). The term vocabulary is tackled by different scholars. According to Ur (1996) vocabulary is the words that learners acquire in a foreign language which take the forms of single, compounds and multi-word expressions or idioms. Richards and Schmidt (2010) define vocabulary as "a part of language skills that assists learners how to speak, listen, read and write well". A learner's vocabulary represents the set of words within a language that are familiar and actively used by them. From these definitions, it is clear that vocabulary refers not only to isolated words, but also to the learner's knowledge of word forms, meanings, and usage within context. This is on one hand.

On the other hand, vocabulary retention, as a subcomponent of vocabulary acquisition, participates effectively in language learning. It is the ability that learners have to store, maintain, and recall vocabulary over time. Budd (2003)



defines vocabulary retention as the ability to hold and absorb a certain number of words in memory. It includes both short-term memory (STM), where recently learned vocabulary is temporarily held, and long-term memory (LTM), where vocabulary is stored and retrieved over time. For Nation (2012) vocabulary retention refers to the way students and learners recall and reuse vocabulary appropriately in the context. It means that students not only have to remember the form and structure of the words, but also to use them correctly

In the context of this study, vocabulary is understood as a set of words and phrases that carry meaning orally and in writing. Vocabulary retention refers to the learner's ability to recall and use these items accurately over time, which is essential for effective language comprehension and production.

## **2.2. Vocabulary in Language Learning: Significance**

Vocabulary knowledge is recognized as an integral aspect of EFL language learning. Schmitt (2000, p. 55) states that "lexical knowledge is central to communicative competence and to the acquisition of a second language". He emphasizes the significant role of vocabulary in enabling learners express and comprehend meaning. Similarly, Nation (2012) mentions that vocabulary knowledge is very important as it supports both language use and performance. Vocabulary knowledge helps in developing the four language skills making it a reliable predictor of academic success. Research has shown that successful learners typically possess a broader vocabulary which contributes to their ability to construct coherent spoken and written texts.

Despite its complexity, vocabulary remains central in language assessment. Schmitt (2000) notes that one key component used to measure language proficiency is vocabulary knowledge. Consequently, researchers have recognized the need to explore effective strategies and techniques for vocabulary teaching. Traditional approaches, including rote memorization or passive exposure, often fail to support long-term retention, especially when learners are faced with large volumes of unfamiliar vocabulary. In response, researchers explored dynamic strategies that help learners recall and retain vocabulary effectively. One approach to vocabulary retention is mind mapping that help learners actively and effectively organize, associate, and personalize new vocabulary, making the learning process meaningful and memorable by supporting both short-memory and long-memory.



### 2.3. Mind Mapping: Definitions, Characteristics and Advantages

In 1960s, the English scholar, Tony Buzan has developed mind maps to emphasize the use of both hemispheres of the brain during learning. From that times, scholars and educators view mind mapping differently. To begin with, Buzan & Buzan (1994, p.1) argue that “mind maps are effective graphic methods that provide information to unlock brain’s capability in learning”. Casco (2009) says that mind maps refer to the ability of using diagrams with sub-branches to control language skills. In the same vein, Krasnic (2011) mentions that mind maps are visual diagrams used to manage information through key words to help learners recognize and organize the key concepts in order to achieve understanding. So, mind maps are tools used in language learning to express thoughts by drawing a diagram with main and sub-branches depending on key images or words. It is used as a creative method to retain vocabulary that has positive results in brainstorming, organizing, and problem solving.

The spider map, schematic map or mind map is mainly designed in form of brain cells with the following features as Buzan & Buzan (1994) suggest:

- The main subject is presented in a central image or word(s).
- Branches are presented to connect the major themes to the central image word(s).
- Branches include either key image or word on a related line. There are other branches that are connected to the main branches including less important topics.
- The main and sub- branches form a related essential map.

A key feature of mind mapping is the ability to use both sides of the brain. Mind mapping utilizes images, symbols, and colours, which activate the right hemisphere of the brain which is responsible for creativity and imagination. However, text and logical connections activate the left hemisphere which is responsible for both analysis and reasoning. Through combining these activities of thinking, mind mapping assist learners generate and connect new ideas. This in turn leads to greater insights in understanding how complex information are processed (Wei, 2021).

In short, it is evident that mind mapping has its positive role in organizing and connecting ideas through retaining vocabularies. Here learners use their radiant thinking where information is ordered to reflect how the brain works by connecting ideas to the main topic.



## 2.4. Mind Mapping as a Vocabulary Retention Technique

Learning vocabulary does not go without obstacles. One of the main obstacles that hinders vocabulary learning lies in the difficulty of storing and recalling vocabulary items from memory. Although EFL learners attempt to enhance their ability to memorize words following self-directed strategies, they still struggle to retain new vocabulary. To overcome such challenges, scholars and researchers emphasize the importance of supplying learners with effective vocabulary retention techniques to make vocabulary memorizing more manageable and meaningful (Ebrahimi & Azhideh, 2015).

Oxford (1990), as cited in Jenpattarakul (2012), categorizes various techniques of vocabulary retention, these are: grouping, association, context placement, use of imagery, semantic mapping, keyword and structural review. Jenpattarakul (2012) says that many learners prefer techniques like visual imagery and mind mapping because they are simple and effective in aiding memory. Accordingly, teachers and instructors are encouraged to present vocabulary learning in an engaging and comprehensible manner. Studies show that learners remember unfamiliar words more successfully when both visual (e.g., pictorial) and verbal (e.g., written) annotations are provided, as opposed to just one modality (Wu & Zheng, 2023). As a visual and verbal technique, mind mapping enables learners to activate the role of both the left and right hemispheres of the brain in the memorization process, thereby enhancing the process of recalling vocabulary. It also encourages learners to categorize and link words meaningfully, which leads to clearer thinking and improved retention. Buzan and Buzan (1994) further supports this by describing mind maps as memory-friendly patterns involving pictures, colours and symbols that stimulate positive emotions and increase learner interest. These features make vocabulary learning more effective and enjoyable.

Moreover, mind mapping has proved to be beneficial across proficiency levels, offering flexibility and adaptability to diverse learning contexts (Eppler, 2006). It has been used successfully in global EFL classrooms, where it is found to improve vocabulary memorization and foster positive learner attitudes. Such findings support the adoption of mind mapping as an accessible and cognitively rich vocabulary learning technique. As a result, the present study adopts mind mapping as a core technique for improving students' vocabulary retention through listening-based activities.

## 2.5. Previous Studies

In EFL setting, mind mapping is widely investigated and utilized in researches. Scholars have investigated the use of mind maps across various



educational stages from primary to high school. In Iraqi context, Hasan (2017) explored the relationship between mind mapping and reading comprehension skill of Iraqi ESP learners. The participants of the study were 40 students studying business management, Technical College, University, Erbil. They were divided into experimental and control groups, (20) students for each group. The experimental group followed a treatment period where students received lessons to enhance reading comprehension through mind mapping, while the control group received traditional instructions for reading comprehension. The study results showed that mind mapping was a beneficial method for teaching reading comprehension for ESP learners who always struggled the comprehension of the reading passages due to teacher's traditional method. Alba's (2021) study investigated the effectiveness of mind mapping strategies on developing EFL learners' use of vocabulary. The study participants were 62 Iranian EFL university learners who equally were divided into groups: experimental and control. Both groups got pre-test and post-test. Between the tests, the experimental group received twelve sessions on the vocabulary and mind maps instruction. The control group received traditional teacher instruction technique of defining vocabulary and usage. After the 12 sessions, a vocabulary post-test was given to see the effect of mind-map on vocabulary development. The results of the study proved that students of the experimental group outperformed those of the control group as far as the post-test is concerned. This suggests that implementing mind-map inside the class bring its benefit to the process of vocabulary learning.

Similarly, Wannas et al. (2022) conducted a study to examine the effect of mind mapping in learning vocabulary for ESP. To that end, they follow a quasi-experimental design with pre-and-posttest. 74 undergraduate engineering students were chosen to be the study sample. They were divided as follows: (33) students were the experimental group and (41) students were the control group. The experimental group were trained on different mind maps, meanwhile the control group followed the traditional way of teaching. Pre-test and post-test were conducted to see the efficacy of mind mapping in learning ESP vocabulary. The study findings showed that the post-test results of the experimental and control groups had no significant difference. This indicates that both methods of teaching (conventional and mind mapping) proved to have the same impact on language development through learning vocabulary.

In examining the role of mind mapping on recalling vocabulary, motivation, and willingness, Feng et al., (2023) presented their study. 60 Iranian EFL learners represent the participants of the study. Following the experimental research design,



both groups received a pre-test and a post-test, followed by a questionnaire to measure motivation and willingness of learners. The study findings proved that mind mapping method proved its effectiveness in enhancing EFL vocabulary learning, retention, and recalling. In addition, it motivated learners to learn new vocabulary for the purpose of communication. More recently, Zhang & Jin (2025) examined the implementation of mind mapping to English vocabulary teaching. The participants of their study were two high school classes, selected from Chinese schools. The participants were randomly selected and divided into experimental and control groups. The researchers followed an experimental design with a pre-test and a post-test. In between, the experimental group got series of treatment lessons on teaching vocabulary through mind mapping. The final results proved that implementing mind mapping had its great effect on vocabulary teaching and enhancing learning autonomy.

From the above-mentioned studies, it is clear that Iraqi EFL learning context lacks the investigation and exploration of mind mapping as a teaching and learning technique to develop vocabulary retention. So, the present study tries to meet this need and to treat this dearth through examining the role of mind mapping on enhancing the recalling and retention of the vocabulary among Iraqi EFL female high school students.

### **3. Methodology**

#### **3.1. The population and Sample of the Study**

Population refers to the general community of the study, while sample refers to the real participants who are derived from the general community. As for this study, the population is represented by all Iraqi EFL high school students, but the sample is represented by two out of four classes of fifth grade female students who study at Mosul high school for outstanding female students in the first semester of the academic year 2024-2025. These two classes were randomly selected to be the sample where each class includes 34 students.

#### **3.2. Design, Instruments, and Procedures of the Study**

The study adopts a post-test design where students receive a post-test only without a pre-test. It is an experimental design with two groups namely experimental and control. The post-test is used to check and examine how utilizing mind mapping as a learning technique can affect the development of vocabulary retention.



Post-test, delayed post-test, and a questionnaire were the instruments used in this study for data collection. The post-test is followed by the end of the training lessons to examine vocabulary retention through short-term memory, while the delayed post-test is conducted after six weeks from the first post-test with the purpose of examining vocabulary retention through long-term memory. It is essential to mention here that the sequence of the questions in the delayed post-test is reversed to avoid questions familiarity. After conducting the delayed post-test, the experimental group received a questionnaire, adopted from Munsakorn 2012, to see their attitudes towards the role of mind mapping in vocabulary retention.

Turning to the study procedures, the current study is applied through six phases. Phase 1: post-test and lesson plan design, phase 2: implementing the training lessons, phase 3: doing the post-test, phase 4: doing the delayed post-test, phase 5: conducting a questionnaire for the experimental group, and phase 6: data analysis. In the first phase, the researcher prepared the instruments of the study and a sample training lesson to offer them to the experts for the purpose of validity. Then, the second phase began by starting the application of the training lessons for the experimental group and the traditional lessons for the control group. This phase lasted for four weeks with two training lessons per week. Each training lesson is structured carefully in terms of time, objectives, materials, and application. The objectives include helping EFL high school students memorize, recall, and produce a large number of vocabularies to help them communicate effectively, whether in spoken or written language, through listening. The materials refer to the passages that are selected to assist students memorize words to use them later. These passages are selected from Lee & Gundersen's Selected Readings (pre-intermediate level). The selected listening passages include vocabularies about travelling, health, technology, studying and homestay, mobile phones, colours connotation, urban farming, and organic food. In the application part of the lesson, students were trained on using a mind map to find out the headings and sub-headings vocabulary that are related to the listened passage. In this phase, i.e., the training lessons, students were able to explore the vocabularies in the listened passages, retain and reuse them by visualizing the stored vocabularies into maps. What's more, each training lesson is delivered during 45 minutes divided into 10 minutes for listening, 25 minutes for practice, and 10 minutes for discussion.

By the end of the training, students of both groups received the post-test and the delayed post-test, which represent the third and fourth phases. The



post-test and delayed post-test were the same in structure and materials, but they were different slightly in their procedure and mainly in aims. The post-test was applied to test the short-term memory on vocabulary retention, and the delayed post-test was applied to see the effect of using mind mapping on long-term memory to recall the vocabularies. Both tests include four various questions like *fill in the blanks, matching, choose the correct answer, and put the following words under the correct heading and in meaningful sentences*. The testing procedure is different. In the post-test, students were listened to a passage of each question. The aim here is to test initial learning and short-term memory. After six weeks the delayed post-test was conducted, using the same material, with the aim of testing how mind mapping evokes long-term memory recall and retain the vocabularies. Thus, students did not receive any kind of input, but instead they relied on the received input from the previous post-test. In the fifth phase, the experimental group students only answered the items of a questionnaire to investigate the students' attitudes regarding the implementation of mind mapping as a technique to memorize vocabularies. As a final stage, independent t-test and paired t-test were used as methods of data collection analysis.

#### 4. Data Analysis and Discussion of the Results

The obtained data from both groups are organized into tables to interpret and analyze them easily. The data were distributed into five tables that show the descriptive results. Then, an inferential analysis is followed to understand students' achievement in vocabulary retention.

##### 4.1. Analysis and Discussion of Post-test and Delayed Post-test Results of the Experimental and Control Groups

This sub-section is mainly devoted to present and analyze the students' results, in their post-test and delayed post-test, as presented in the coming tables:

**Table (1)** Results of Unpaired t-test of the Post-test of the Control and Experimental Groups

Group	No.	Mean	SD	T-Value	Sig	Significant Difference
Cont.	34	50.10	11.33	4.72	0.003	Significant
Exp.	34	63.54	9.20			



The descriptive results of table (1) reveal that the mean scores of the control and experimental groups were (50.10) and (63.54), respectively, with a standard deviation (SD) (11.33) for the control group and (9.20) for the experimental. The t-value records (4.72) for both groups under the level of significance ( $>0.05$ ). These results indicate that when students of both groups listen to the passage of each question, the immediate input they received helped them in recalling the required vocabulary. Here, their short-term memory is actively working and assists them remember and reuse the vocabularies they have listened to. The mean score difference between both groups was a good indicator that the experimental group students did better in the post-test than the control group students. This good performance is related to the effective use of mind mapping as a way to visualize the heard words and put them into schemes. Moreover, experimental group students showed good progress in the post-test due to the systematic organization of mind maps.

**Table (2)** Results of Unpaired t-test of the Delayed post-test of the Control and Experimental Groups

Group	No.	Mean	SD	T-Value	Sig	Significant Difference
Cont.	34	28.76	8.22	17.98	0.001	Significant
Exp.	34	56.90	5.10			

Table (2) reveals that the mean scores of the control and experimental groups in the delayed post-test were (28.76) and (56.90) respectively. The SD was (8.22) for the control group and (5.10) for the experimental. The t-value recorded (17.98) for both groups under the level of significance ( $>0.05$ ). These descriptive results show that there is a significant and considerable difference in the results of both groups in the delayed post-test. One reason for this difference is mainly related to the effective training lessons that the experimental students have taken which put students in the correct path. Another reason is related to the fact that long-term memory has effectively stored the vocabularies that students listened to in the previous post-test. when students received the delayed post-test, most of them can easily remember, retain, and recall the vocabularies again. In the delayed post-test, students reused the stored input that are related to the test's questions. This is for the experimental group. As for the control group, it is noticed that students of this group find difficulties



in recalling the previous input and this difficulty was clearly presented in their results.

To discuss the research question and hypothesis in relation to the results of tables 1 and 2, the first research question “Does mind mapping improve Iraqi EFL students’ vocabulary retention and recalling?” is answered and the first hypothesis “Mind mapping has a favorable consequence on improving vocabulary retention and recalling” is verified.

**Table (3)** Results of Paired t-test of the Experimental Group in the Post-test and Delayed Post-test

Group	No.	Test	Mean	SD	T-Value	Sig	Significant Difference
Exp.	34	Post-test	63.54	9.20	3.33	0.002	Significant
		Delayed Post-test	56.90	5.10			

In table (3), paired t-test is used to show how the experimental group student did in both post-tests. As the table shows, the mean scores in both post-test and delayed post-test were (63.54) and (56.90), respectively. The SDs were (9.20 and 5.10) with the t-value (3.33) at the significance level ( $>0.05$ ). The comparison between the post-test and delayed post-test results finds that although the students’ performance in the delayed post-test is decreased due to forgetting some vocabularies, students still show significant progress. This progress goes back to the use of mind mapping as a technique to store the listened words in the long-term memory and recall them when necessary. In the case of the delayed post-test where there was no input, students depended on their storage memory in answering the required questions. Here, the relatively small decline suggests that integrating mind mapping into EFL classes in high schools proves its effective and powerful impact on vocabulary retention.

**Table (4)** Results of Paired t-test of the Control Group in the Post-test and Delayed post-test

Group	No.	Test	Mean	SD	T-Value	Sig	Significant Difference
Cont.	34	Post-test	50.10	11.33	14.99	0.001	Significant
		Delayed Post-test	28.76	8.22			



A similar statistical method is used to show the difference between the control group results in the post- and delayed post-test. Table (4) shows that the post-test mean score was (50.10) while the delayed post-test mean was (28.76). The SD results were (11.33) and (8.22) with a t-value (14.99) under the significance level ( $>0.05$ ). These results indicate that there is a significant statistical difference from post-test to the delayed one. This essential difference can be analyzed as follows: (1) students' performance in the post-test was better than their performance in the delayed post-test. This is closely related to the effect of input on vocabulary retention. (2) The lack of training on using vocabulary retention strategies (mind mapping) was a direct factor in the statistically significant decrease of the delayed post-test results. This outcome supports the claim that vocabulary retention, if not supported by powerful strategies, tend to decay rapidly especially in EFL context.

The interpretation of the results of tables 3 and 4 answer the second research question "Is there any statistically significant difference in the mean scores of the post-test and the delayed post-test?". Regarding the second related hypothesis that reads "There is no statistically significant difference in the mean scores of the post-test and the delayed post-test", the results prove that a significant change is observed in the mean scores of both post-test and delayed post-test. Thus, the second hypothesis is not verified and the alternative one is accepted.

#### **4.2. Analysis of Delayed Post-test Questionnaire items of the Experimental Group**

To prove that mind mapping helps students recall vocabulary over time, the researcher tends to provide a questionnaire to the experimental group students. It is an adapted questionnaire taken from Munsakorn (2012) and includes ten items with five options following Likert-scale (strongly agree, agree, neutral, disagree, strongly disagree). Table (5) below presents the mean of each item.

**Table (5)** Means of the Delayed Post-test Questionnaire Items of the Experimental Group

No.	Items	Mean
1	Mind mapping helps me to acquire vocabulary knowledge through working by myself.	69.00



2	Mind mapping helps me recall new words with ease.	66.61
3	Mind mapping helps me to learn vocabulary easily.	53.75
4	I feel relaxed when I study new vocabularies by using mind mapping.	65.35
5	Mind mapping strengthens my ability to retain vocabulary over time.	74.28
6	Mind mapping motivated me to learn new vocabularies.	76.44
7	I expanded my vocabulary by connecting related words in a mind map.	55.84
8	Mind mapping supports deep understanding and long-term memory of word meanings.	68.90
9	Mind mapping decreases difficulty in vocabulary retention.	82.35
10	I can remember words in a very short time.	50.11
<b>Total Mean</b>		<b>66.26</b>

The above table shows the mean score of each item in the questionnaire, in addition to the total mean score. Item no. (9) “Mind mapping decreases difficulty in vocabulary retention” received the first highest mean (82.35). This indicates that students get benefit in recalling vocabulary by increasing the ability of using and retaining vocabulary in communication. Items no. (6 and 5) “Mind mapping motivated me to learn new vocabulary, and Mind mapping strengthens my ability to retain vocabulary over time” gained the second highest mean score (76.44 and 74.28). Here, students are motivated to learn vocabulary through the application of mind mapping that assists them to memorize the learned vocabularies well, which in turn helps in maximizing the proficiency level of retention.

Items no. (1,8,2, and 4) received the third highest mean score. They were “Mind mapping helps me to acquire vocabulary knowledge through working by myself”, “Mind mapping supports deep understanding and long-term memory of word meanings”, “Mind mapping helps me recall new words with ease”, and “I feel relaxed when I study new vocabularies



by using mind mapping” respectively. Their mean scores were (69.00, 68.90, 66.61, and 65.35). The analysis of these items reveals that mind mapping as a retention technique helps students store and recall vocabularies quickly and easily. It also helps them to activate the role of their long-term memory and helps students be active and self-independent.

The last group that got the lowest mean is represented by items no. (7,3, and 10) which say “I expanded my vocabulary by connecting related words in a mind map, Mind mapping helps me to learn vocabulary easily, and I can remember words in a very short time”. The mean scores of these items are (55.84, 53.75, and 50.11) respectively. These results explain that EFL students become able to add new words to their knowledge by making good connections in the map. This meaningful connection has its effective role in reducing the challenge of remembering vocabulary. This reduction reflects the deep influence of using mind mapping on both short- and long-term memories when learning new vocabulary. By analyzing the questionnaire result, it is essential here to refer back to the related research question and hypothesis. The third question “What are the students’ attitudes towards the use of mind mapping technique?” finds its answer and the third hypothesis “Students show positive attitudes towards the use of mind mapping” is confirmed.

## 5. Conclusions and Recommendations

The results of the study show that mind mapping significantly contributes to the enhancement of vocabulary retention among EFL high school students. Specifically, it facilitates the recall of newly acquired vocabulary, strengthens the ability to retain lexical items over extended periods, and promotes the deep processing of word meanings. The visual and associative structure of mind maps aids in organizing vocabulary in meaningful ways, which in turn supports long-term memory storage and retrieval. Additionally, students reported that mind mapping increased their motivation and reduced cognitive difficulty when engaging with vocabulary. These findings suggest that mind mapping is an effective pedagogical technique for improving both the acquisition and retention of vocabulary in EFL contexts.

Regarding recommendation, the study recommends EFL teachers to implement mind mapping technique in their classes so as to assist students memorize vocabularies and use them in the correct context. In addition, it also recommends to integrate mind mapping with other strategies of vocabulary to maximize vocabulary retention. Additionally, using mind



mapping for independent learning through encouraging students to use it not only inside the classroom but also outside it, is also highly recommended.

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