



## THE EFFECTS OF MIND MAPPING ON THE 6TH GRADERS' VOCABULARY RETENTION: A CASE STUDY AT TAM BINH SECONDARY SCHOOL

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### Abstract:

Vocabulary acquisition and retention remain major challenges for lower-secondary EFL learners in Vietnam, particularly for Grade 6 students who are transitioning to a more demanding English curriculum. This study investigated the effects of mind mapping on Grade 6 students' vocabulary retention and explored their perceptions of using mind mapping in vocabulary learning at Tam Binh Secondary School. A mixed-methods research design was employed with two intact Grade 6 classes: an experimental group receiving vocabulary instruction through mind mapping and a control group taught using traditional techniques. Quantitative data were collected through pre-tests, immediate post-tests, and delayed post-tests, while qualitative data were gathered from student questionnaires, interviews, and classroom observations. The results showed that the experimental group achieved significantly higher scores than the control group in both immediate and delayed post-tests, indicating that mind mapping improved short-term vocabulary learning and long-term retention. Qualitative findings also revealed that most students perceived mind mapping as engaging and helpful for organizing and remembering vocabulary. Classroom observations further showed increased student participation and collaborative learning during mind mapping activities. In general, the study suggests that mind mapping is an effective instructional strategy for enhancing vocabulary retention and learner engagement among Grade 6 EFL learners.

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## 1. Introduction

### 1.1 Background of the Study

In the context of globalization, English has become an essential tool for communication, academic development, and career opportunities. In Vietnam, improving students' English proficiency is a national priority, as emphasized in the General Education Curriculum 2018 issued by the Ministry of Education and Training (MOET, 2018). This curriculum aims to develop students' core competencies, including autonomy, communication, cooperation, problem-solving, creativity, and foreign language ability for international integration.

In addition, recent educational policies such as Conclusion No. 91-KL/TW (2024) continue to promote comprehensive educational reform and emphasize improving students' foreign language skills, with the long-term goal of making English a second language in schools.

Despite these efforts, vocabulary learning remains a major challenge for many Vietnamese lower-secondary students. Grade 6 students, who transition from primary to secondary education, often face difficulties due to increased vocabulary demands and more complex language use. In many classrooms, vocabulary teaching still relies on traditional methods such as word lists, repetition, and translation. Although these approaches may support short-term memorization, they often fail to promote long-term retention.

Recent studies in cognitive psychology suggest that effective vocabulary learning requires meaningful processing and active learner engagement. One promising strategy is mind mapping, a visual learning technique that organizes information around a central concept using branches, images, and colors (Buzan, 2009). This approach reflects the associative nature of human cognition and may improve both comprehension and vocabulary retention.

Although previous studies have reported positive effects of mind mapping in EFL contexts, research focusing on Vietnamese lower-secondary students, especially Grade 6 learners in rural or semi-rural settings, remains limited. Therefore, this study investigates the effects of mind mapping on vocabulary retention among Grade 6 students at Tam Binh Secondary School.

### 1.2 Statement of the Problem

Vocabulary retention is a fundamental yet challenging aspect of second language learning. Although Vietnamese students learn English from primary school, many struggle to remember new vocabulary over time. In many classrooms, vocabulary learning mainly involves rote memorization, which often leads to short-term recall but poor long-term retention.

At Tam Binh Secondary School, Grade 6 students often remember vocabulary immediately after lessons but forget it in later assessments. This indicates that vocabulary learning may remain superficial and does not effectively transfer to long-term memory. One possible reason is the dominance of teacher-centered instruction and linear note-taking methods, which may not support deeper cognitive processing.

Learning theories such as the Levels of Processing framework ( Craik & Lockhart, 1972) and Dual Coding Theory (Paivio, 1986) suggest that information processed visually and semantically is more likely to be retained. Mind mapping, which combines visual organization and associative thinking, may therefore help improve vocabulary retention. However, mind mapping has not been widely implemented or systematically studied in vocabulary instruction for Grade 6 students at Tam Binh Secondary School. Furthermore, students' attitudes toward this strategy remain unclear. Therefore, this study examines the effects of mind mapping on vocabulary retention and explores students' perceptions of its use in learning English vocabulary.

### 1.3 Research Objectives

This study aimed to:

- 1) Examine the effects of mind mapping on the vocabulary retention of Grade 6 students at Tam Binh Secondary School.
- 2) Explore students' perceptions and attitudes toward the use of mind mapping in vocabulary learning.

### 1.4 Research Questions

To achieve the above objectives, the study sought to answer the following research questions:

- 1) How does mind mapping affect vocabulary retention among Grade 6 students at Tam Binh Secondary School?
- 2) What are students' perceptions and attitudes toward the use of mind mapping in learning English vocabulary?

### 1.5 Scope of the Study

This study investigates the effects of mind mapping on vocabulary retention among Grade 6 students at Tam Binh Secondary School in Vinh Long Province, Vietnam. The participants include two Grade 6 classes: an experimental group and a control group during the 2024–2025 academic year.

The research focuses only on vocabulary taught in the regular English curriculum. Vocabulary retention is measured at two stages: immediate retention through a post-test after the intervention and delayed retention through a test administered four weeks later. Other language skills, such as grammar, reading, writing, and speaking, are not examined. Therefore, the findings are limited to this specific context.

## 1.6 Significance of the Study

This study contributes to English language teaching and learning in several ways.

*For teachers*, it provides evidence on the effectiveness of mind mapping as a vocabulary teaching strategy that supports visual and associative learning. The findings may help teachers design more engaging and effective vocabulary lessons.

*For schools and curriculum developers*, the study highlights the importance of learner-centered and visually supported teaching approaches that align with the General Education Curriculum 2018.

*For researchers*, the study adds to the literature on vocabulary retention and visual learning strategies in EFL contexts, particularly for Vietnamese lower-secondary students, and may serve as a reference for future research.

## 2. Literature Review

### 2.1 Vocabulary Retention

Vocabulary retention refers to learners' ability to store, recall, and use words after initial learning. In second language acquisition (SLA), it is an important indicator of successful vocabulary learning because knowing a word involves remembering its form, meaning, and use in long-term memory (Nation, 2013; Schmitt, 2000).

From a cognitive perspective, vocabulary retention depends on how information is processed in memory. The Levels of Processing theory suggests that information processed at a deeper semantic level is more likely to be remembered than information processed superficially ( Craik & Lockhart, 1972). In vocabulary learning, activities that encourage meaning analysis, associations, and contextual use promote stronger retention than rote memorization.

Another explanation comes from Dual Coding Theory, which states that information presented both verbally and visually is easier to remember (Paivio, 1986). When vocabulary is supported by visual elements such as images or diagrams, it can be stored in both verbal and visual memory systems, increasing the likelihood of recall.

Vocabulary retention is often categorized into short-term retention and long-term retention. Short-term retention refers to recalling vocabulary shortly after learning, while long-term retention refers to the ability to remember vocabulary after a longer period (Schmitt, 2019). Long-term retention is considered a more reliable measure of effective vocabulary learning.

Traditional teaching methods, such as memorizing word lists, may help students recall vocabulary temporarily but often fail to support long-term retention (Nation, 2013). In contrast, strategies that involve meaningful learning and active engagement tend to improve vocabulary retention.

For lower-secondary learners, vocabulary retention can be particularly challenging due to increasing vocabulary demands and differences in learning strategies. Therefore, identifying effective instructional approaches is essential to support long-term vocabulary learning.

### **2.1.1 Definitions and Types of Vocabulary Retention**

Vocabulary retention is commonly defined as learners' ability to remember and retrieve words after learning them. Nation (2013) describes vocabulary retention as the ability to recall and use words accurately over time, while Schmitt (2000) emphasizes maintaining the form–meaning connection in long-term memory.

Vocabulary retention can be classified in several ways. The most common distinction is between short-term retention and long-term retention. Short-term retention refers to immediate recall after instruction, whereas long-term retention refers to recalling vocabulary after a delay, indicating durable learning (Schmitt, 2019).

Another classification distinguishes between receptive vocabulary retention and productive vocabulary retention. Receptive retention refers to recognizing and understanding words when listening or reading, while productive retention involves actively using words in speaking or writing (Schmitt, 2000).

Vocabulary retention can also involve form-based retention, which focuses on remembering spelling or pronunciation, and meaning-based retention, which focuses on understanding the meaning and usage of words. Effective vocabulary instruction should ideally support both aspects.

### **2.1.2 The Role of Vocabulary in Language Learning**

Vocabulary is a fundamental component of language learning and plays a key role in communication. Without sufficient vocabulary knowledge, learners cannot understand messages or express ideas effectively. Wilkins (1972) famously noted that while grammar is important, communication is impossible without vocabulary.

Vocabulary knowledge supports the development of the four language skills: listening, speaking, reading, and writing. According to Nation (2013), vocabulary provides the basic units needed for both comprehension and production of language. Limited vocabulary often leads to difficulties in understanding texts and expressing ideas clearly.

Research also shows a strong relationship between vocabulary size and overall language proficiency (Schmitt, 2000; Nation, 2013). Learners with a larger vocabulary tend to perform better across language skills.

From a cognitive perspective, vocabulary acts as a foundation for organizing and processing language knowledge. Learning new words helps learners expand their conceptual networks and integrate new information with existing knowledge (Ausubel, 1968).

For lower-secondary students, vocabulary development is particularly important because they encounter more complex language tasks. Insufficient vocabulary may reduce learners' confidence and participation in classroom activities. Therefore, effective vocabulary instruction is essential to support successful language learning.

### **2.1.3 Cognitive Theories Underlying Vocabulary Retention**

Several cognitive theories explain how vocabulary is retained in memory.

One important concept is depth of processing, which suggests that vocabulary is more likely to be remembered when learners engage in deeper semantic processing, such as analyzing meaning, making associations, and using words in context (Schmitt, 2000; 2019).

Another relevant theory is Dual Coding Theory, which states that information presented through both verbal and visual channels improves memory retention (Nation, 2013). Visual tools such as diagrams or graphic organizers can therefore enhance vocabulary learning.

Working memory theory also contributes to understanding vocabulary retention. According to Baddeley's model, working memory has limited capacity, so learning strategies that organize information clearly can help learners process and remember vocabulary more effectively (Schmitt, 2019).

Additionally, constructivist learning theory suggests that learners retain vocabulary better when they actively construct knowledge and connect new words with prior knowledge (Oxford, 2011).

Overall, these theories emphasize the importance of meaningful learning, visual support, and active learner engagement in promoting vocabulary retention.

## **2.2 Mind Mapping and Vocabulary Learning**

### **2.2.1 What Is Mind Mapping?**

Mind mapping is a visual technique used to organize information around a central concept using branches, keywords, images, and colors. It reflects the brain's natural way of processing information through associations (Buzan & Buzan, 2010).

Unlike traditional linear note-taking, mind mapping encourages learners to visualize relationships between ideas. Davies (2011) describes mind mapping as a visual-spatial tool that helps learners organize knowledge and identify connections between concepts.

A typical mind map includes a central idea, main branches representing key concepts, and sub-branches containing related information or keywords. The use of images and colors enhances memory and makes information easier to recall.

In language learning, mind mapping has been used to support vocabulary learning, reading comprehension, writing organization, and speaking preparation (Al-Jarf, 2011). By visually representing relationships between words and concepts, mind mapping promotes deeper understanding and retention.

### **2.2.2 Characteristics and Benefits of Mind Mapping**

Mind mapping has several distinctive characteristics. One important feature is its non-linear structure, which organizes ideas around a central concept and allows learners to see relationships among ideas clearly (Buzan & Buzan, 2010).

Another characteristic is the use of keywords instead of full sentences, which helps learners focus on key ideas and reduces cognitive overload (Davies, 2011).

Mind maps also emphasize visual elements, such as colors, symbols, and images. These elements support memory by providing visual cues that facilitate recall (Al-Jarf, 2011).

Research shows that mind mapping can improve comprehension, memory retention, and learner engagement. It also increases motivation because learners can personalize and creatively organize information.

Furthermore, mind mapping encourages learner autonomy and collaboration. When students create their own mind maps or work in groups, they actively participate in the learning process and develop responsibility for organizing their knowledge (Oxford, 2011).

### **2.2.3 Empirical Evidence on Vocabulary Retention**

Many studies have examined the effectiveness of mind mapping in vocabulary learning. Research generally shows that learners who use mind mapping achieve better vocabulary recall than those taught through traditional methods.

For example, Morsi and Sivakami (2024) found that EFL students who learned vocabulary through mind mapping achieved significantly higher vocabulary test scores than a control group using traditional instruction. The experimental group also showed greater engagement and better long-term retention.

Similar studies in other EFL contexts have reported improvements in both immediate and delayed vocabulary retention when mind mapping is used. These studies also indicate that mind mapping can increase learners' motivation and participation.

In general, empirical evidence suggests that mind mapping is an effective strategy for enhancing vocabulary retention and supporting meaningful vocabulary learning.

### **2.2.4 Implementation Considerations**

Although mind mapping has many benefits, its successful use in classrooms requires careful planning.

Firstly, teacher guidance is important, especially for younger learners who may need support in organizing ideas and selecting keywords (Davies, 2011).

Secondly, mind maps should be designed according to students' proficiency level and cognitive ability. For lower-secondary students, simple and clear mind maps are more effective.

Thirdly, mind mapping should be integrated into lesson objectives, such as during vocabulary presentation, practice, or review activities (Oxford, 2011).

Fourth, teachers should consider time management and classroom organization, since creating mind maps may require additional time.

Finally, digital mind-mapping tools can support collaboration and creativity, although they require access to technology and basic digital skills.

### 2.3 Research Gaps and Rationale

Although previous studies have demonstrated the benefits of mind mapping in vocabulary learning, several research gaps remain.

First, many studies focus mainly on immediate vocabulary recall, while fewer studies examine delayed retention, which better reflects long-term learning (Schmitt, 2019).

Second, most research has been conducted with university students or adult learners, while lower-secondary learners, particularly Grade 6 students, have received less attention.

Third, previous studies often rely mainly on quantitative questionnaires, providing limited insight into students' perceptions and experiences with mind mapping.

Finally, there is a lack of studies conducted in Vietnamese EFL contexts, where teaching practices and learning conditions may differ from other settings.

Therefore, the present study investigates the effects of mind mapping on both immediate and delayed vocabulary retention among Grade 6 students and explores students' perceptions of this learning strategy in a Vietnamese secondary school context.

### 2.4 Conceptual Framework

The conceptual framework of this study is based on theories of vocabulary learning, cognitive processing, and visual learning strategies.

In this framework, mind mapping serves as the independent variable. It is viewed as a visual learning strategy that organizes vocabulary through associations, keywords, images, and colors (Buzan & Buzan, 2010; Davies, 2011).

The dependent variable is vocabulary retention, measured through immediate and delayed post-tests. Delayed retention is considered an important indicator of long-term learning (Schmitt, 2019).

The framework also includes mediating factors, such as learner engagement and motivation, which may enhance the effectiveness of mind mapping (Oxford, 2011).

In addition, moderating factors such as students' proficiency level, prior knowledge, and teacher guidance may influence learning outcomes.

In brief, the framework suggests that mind mapping can improve vocabulary retention by promoting deeper cognitive processing, visual learning, and active learner engagement.

## 3. Research Methodology

### 3.1 Research Design

This study adopted a **mixed-methods design**, combining quantitative and qualitative approaches. The study followed Creswell's (2003) **sequential explanatory design**, in which quantitative data were collected and analyzed first, followed by qualitative data to explain the results.

The quantitative phase used a **quasi-experimental design** with a pre-test, post-test, and delayed post-test. This design examined both immediate and long-term vocabulary retention and compared the experimental and control groups.

The qualitative phase included **semi-structured interviews and classroom observations** to explore students' perceptions and classroom behaviors related to mind mapping. The combination of both methods strengthened the credibility of the findings through data triangulation.

### 3.2 Participants

The participants were Grade 6 students at Tam Binh Secondary School in Dong Thap Province, Vietnam. A total of 78 students participated and were divided into two intact classes:

- **Experimental group (n = 39):** students learned vocabulary through mind mapping.
- **Control group (n = 39):** students learned vocabulary through traditional methods.

Participants were selected using purposive sampling because intact classes were used to maintain the natural classroom setting. The two groups were similar in age, curriculum exposure, and English proficiency according to school records.

Participation was voluntary. Parental consent was obtained, and students' confidentiality was protected.

### 3.3 Data Collection Tools

Several instruments were used to collect data.

#### 3.3.1 Vocabulary Tests

Three vocabulary tests were administered: **pre-test, post-test, and delayed post-test.**

- The **pre-test** measured students' initial vocabulary knowledge before the intervention.
- The **post-test** measured immediate vocabulary learning after the intervention.
- The **delayed post-test** was conducted **four weeks later** to measure long-term retention.

The tests focused on vocabulary items taught during the intervention and included multiple-choice, matching, and sentence completion tasks. The tests were designed as parallel forms to maintain similar difficulty levels.

A pilot test was conducted with a similar group of students. Item analysis and Cronbach's alpha were used to check reliability, and revisions were made where necessary.

#### 3.3.2 Questionnaire

A structured questionnaire measured students' perceptions of mind mapping in vocabulary learning.

The questionnaire used a five-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The items were developed based on language learning strategy and motivation frameworks (Oxford, 2017; Teng, 2022).

Two experienced EFL teachers reviewed the questionnaire to ensure content validity. A pilot study was conducted to check clarity and reliability. Cronbach's alpha was used to evaluate internal consistency, and items with low correlations were revised.

### **3.3.3 Semi-structured Interviews**

Semi-structured interviews were conducted to obtain in-depth information about students' learning experiences.

Approximately five to six students from each group were selected using purposive sampling. Participants represented different achievement levels.

The interviews explored:

- students' feelings about vocabulary learning
- perceived benefits and challenges of mind mapping
- confidence in remembering vocabulary

The interviews were conducted in Vietnamese to ensure clear responses. With participants' consent, the interviews were audio-recorded and transcribed for thematic analysis.

### **3.3.4 Classroom Observation**

Classroom observations were conducted during the intervention to record students' participation and classroom interactions.

A structured observation checklist focused on:

- student engagement in vocabulary tasks,
- peer interaction and collaboration,
- use of mind mapping strategies.

Observations were conducted in multiple sessions. Field notes were recorded after each lesson. In selected sessions, a second observer checked the ratings to improve reliability.

## **3.4 Data Collection Procedures**

### **3.4.1 Planning Phase**

Before the study began, all research instruments were designed and pilot tested. Revisions were made based on feedback and item analysis.

Permission to conduct the study was obtained from the school administration. Parents received information about the research, and written consent was collected.

Lesson plans were prepared for both groups. The experimental group used mind mapping activities, while the control group followed traditional vocabulary instruction.

### **3.4.2 Implementation Phase**

#### **3.4.2.1 Pre-test**

One week before the intervention, both groups completed a vocabulary pre-test to measure baseline knowledge.

The test included multiple-choice, matching, and sentence completion items. It was administered under the same classroom conditions for both groups. Pre-test results were analyzed to check group equivalence.

#### **3.4.2.2 Intervention**

The intervention lasted four weeks with two vocabulary lessons per week (eight sessions in total).

In the experimental group, students learned vocabulary using mind mapping. They organized vocabulary around a central theme and created branches with related words, images, and colors. Students completed both individual and group mind-mapping activities.

In the control group, students learned vocabulary through traditional methods such as teacher explanation, translation, repetition, and textbook exercises.

Classroom observations were conducted during the intervention.

#### **3.4.2.3 Post-test and Questionnaire**

After the intervention, both groups completed the post-test to measure immediate vocabulary learning.

Students then completed the questionnaire to report their perceptions of the learning activities. The questionnaire was administered in Vietnamese to ensure comprehension.

#### **3.4.2.4 Interviews**

Semi-structured interviews were conducted within one week after the post-test. Selected students from both groups participated. Each interview lasted 20–30 minutes and was audio-recorded and transcribed.

#### **3.4.2.5 Delayed Post-test**

Four weeks after the intervention, students completed a delayed post-test to measure long-term vocabulary retention.

The test assessed the same vocabulary items but used slightly different contexts to reduce recall from previous tests.

### **3.5 Data Analysis**

#### **3.5.1 Quantitative Data Analysis**

Quantitative data from the tests and questionnaire were analyzed using SPSS.

First, the data were checked for missing values and outliers. Normality and homogeneity of variance were examined before conducting statistical tests.

- **Descriptive statistics** (mean and standard deviation) summarized students' performance.
  - **Paired-samples t-tests** compared scores within each group (pre-test vs. post-test; post-test vs. delayed post-test).
  - **Independent-samples t-tests** compared the experimental and control groups.
- Statistical significance was set at  $\alpha = .05$ , and Cohen's *d* was calculated to determine effect size.

### 3.5.2 Qualitative Data Analysis

Interview and observation data were analyzed using **thematic analysis** (Braun & Clarke, 2006).

The analysis followed several steps:

- 1) Reading the transcripts repeatedly to become familiar with the data,
- 2) Coding meaningful segments of information,
- 3) Grouping codes into themes,
- 4) Reviewing and refining themes,
- 5) Interpreting the results.

Interview findings were compared with observation and questionnaire data to strengthen interpretation.

### 3.6 Validity and Reliability

Several measures were taken to ensure research quality.

**Internal validity** was strengthened by using a control group, equivalent instructional time, and baseline comparison through the pre-test.

**External validity** was supported by providing detailed descriptions of the research context and participants.

**Instrument reliability** was checked using Cronbach's alpha, and vocabulary tests were piloted before the study.

For qualitative data, triangulation was used by combining interviews, observations, questionnaires, and test results.

## 4. Results and Discussion

### 4.1 Quantitative Findings

To examine differences in vocabulary retention between the control and experimental groups, paired-samples t-tests were conducted. The analysis compared students' performance across three testing occasions: pre-test, post-test, and delayed post-test. The results help determine both immediate vocabulary gains and the stability of vocabulary retention over time.

### 4.1.1 Results of the Test of the Control Group

Table 4.1 presents the paired-samples t-test results for the control group across the three testing stages.

First, the comparison between the pre-test and post-test shows a statistically significant difference ( $t = -6.67$ ,  $df = 38$ ,  $p < .001$ ). The mean difference was  $-1.24$ , indicating that the post-test scores were approximately 1.24 points higher than the pre-test scores. The 95% confidence interval ranged from  $-1.62$  to  $-0.86$ , confirming that the improvement was statistically reliable. This suggests that students in the control group achieved some vocabulary improvement after the instructional period using traditional learning methods.

Second, the comparison between the pre-test and delayed post-test also revealed a statistically significant difference ( $t = -4.40$ ,  $df = 38$ ,  $p < .001$ ). The mean difference was  $-0.81$ , meaning that delayed post-test scores were 0.81 points higher than the pre-test scores. The confidence interval ranged from  $-1.19$  to  $-0.44$ . This result indicates that students retained part of their vocabulary knowledge after a period of time, although the improvement was smaller than that observed immediately after instruction.

Finally, the comparison between the post-test and delayed post-test showed a statistically significant difference ( $t = 5.45$ ,  $df = 38$ ,  $p < .001$ ). The mean difference was  $0.43$ , indicating that delayed post-test scores were 0.43 points lower than post-test scores. The confidence interval ranged from  $0.27$  to  $0.59$ . This finding suggests that some vocabulary knowledge was forgotten over time.

In summary, the control group showed short-term vocabulary improvement, but the decrease in delayed post-test scores indicates that vocabulary retention was not stable in the long term when learning relied mainly on traditional methods.

**Table 4.1:** Results of the Test of the Control Group

**Paired Samples Test**

	Paired Differences	t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval
Pair 1	ConPre - ConPost	-1.24	1.16	.19
Pair 2	ConPre - ConDelay	-.81	1.15	.18
Pair 3	ConPost - ConDelay	.43	.49	.08

### 4.1.2 Results of the Test of the Experimental Group

Table 4.2 shows the paired-samples t-test results for the experimental group.

First, the pre-test and post-test comparison shows a mean difference of 4.64 points, indicating higher post-test scores. The result reached the threshold of statistical significance ( $t = -2.00$ ,  $df = 38$ ,  $p = .05$ ). The confidence interval ranged from  $-9.21$  to  $-0.07$ . This suggests that the mind-mapping method contributed to improved vocabulary performance immediately after instruction, although the variation among students was relatively large.

Second, the pre-test and delayed post-test comparison showed a statistically significant difference ( $t = -8.00$ ,  $df = 38$ ,  $p < .001$ ). The mean difference was 1.62 points,

indicating that delayed post-test scores were higher than pre-test scores. The confidence interval ranged from  $-2.02$  to  $-1.21$ , suggesting a stable improvement. This result indicates that mind mapping helped students retain vocabulary over a longer period.

Third, the post-test and delayed post-test comparison showed that delayed post-test scores were lower than post-test scores (mean difference = 3.03). However, this difference was not statistically significant ( $t = 1.00$ ,  $df = 38$ ,  $p = .19$ ), and the confidence interval included zero. This indicates that the decrease in scores was not sufficiently strong to confirm a real decline.

All in all, the experimental group demonstrated clear vocabulary improvement and relatively stable retention, suggesting that mind mapping supported both immediate learning and long-term vocabulary maintenance.

**Table 4.2:** Results of the Test of the Experimental Group

**Paired Samples Test**

	Paired Differences	t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval
				Lower
Pair 1	ExpPre - Expect	-4.64	14.11	2.26
Pair 2	ExpPre - ExpDelay	-1.62	1.25	.20
Pair 3	ExpPost - ExpDelay	3.03	14.16	2.27

**4.1.3 Results of the Questionnaire**

Table 4.3 summarizes students' responses to the questionnaire before and after the intervention.

For the control group, the pre-intervention mean score was 3.69 (SD = 1.17), indicating moderately positive perceptions but relatively varied responses. After the instructional period, the mean increased to 4.17 (SD = 0.68), showing a more positive evaluation and greater agreement among students.

For the experimental group, the pre-intervention mean score was 3.51 (SD = 0.83), slightly lower than that of the control group. After the intervention, the mean increased to 4.13 (SD = 0.71). The increase in the experimental group (+0.62) was larger than that of the control group (+0.48).

Overall, both groups showed improved perceptions after instruction, but the experimental group demonstrated a greater increase in positive attitudes toward vocabulary learning, suggesting that mind mapping enhanced students' learning experiences.

**Table 4.3:** Descriptive Statistics of the Questionnaire

	N	Minimum	Maximum	Mean	Std. Deviation
Control questionnaire (Pre)	39	1.00	5.00	3.69	1.17
Control questionnaire (Post)	39	1.00	5.00	4.17	.68
Experience questionnaire (Pre)	39	1.42	5.00	3.51	.83
Experience questionnaire (Post)	39	1.00	5.00	4.13	.71

#### 4.1.4 Comparison between Pre-test and Post-test within the Control Group

The paired-samples test was conducted to examine changes in students' perceptions in the control group.

For Perceptions of Mind Mapping, the post-test mean score was higher than the pre-test score by 0.38 points, but the difference was not statistically significant ( $t = -1.67$ ,  $p = .10$ ). This indicates that students' perceptions of mind mapping remained relatively stable without direct experience with the method.

For Anticipated Difficulties, the post-test mean exceeded the pre-test mean by 0.83 points, and the difference was statistically significant ( $t = -3.51$ ,  $p < .01$ ). This suggests that students increasingly perceived mind mapping as a potentially challenging method when they had not yet practiced it.

For Expectations, the difference between pre-test and post-test scores was minimal (mean difference = 0.17) and not statistically significant ( $p = .50$ ).

Overall, the control group showed little change in perceptions, except for a stronger awareness of potential difficulties associated with mind mapping.

**Table 4.4:** Results of the Pre-test and Post-test within the Control Group

	Paired Differences	t	df	Sig.
	Mean	SD	SE	Lower
Pair 1	Perceptions (Pre-Post)	-.38	1.44	.23
Pair 2	Anticipated Difficulties	-.83	1.48	.24
Pair 3	Expectations	-.17	1.58	.25

#### 4.1.5 Comparison between Pre-test and Post-test within the Experimental Group

For Perceptions of Mind Mapping – Experience Using Mind Maps, the post-test score was slightly higher than the pre-test score (mean difference = 0.39). However, the difference was not statistically significant ( $t = -1.86$ ,  $p = .07$ ).

For the second pair, the post-test mean exceeded the pre-test mean by 1.47 points, and the difference was highly significant ( $t = -7.91$ ,  $p < .001$ ). This indicates that students became more aware of the practical challenges and support needed when using mind mapping after experiencing the method.

For Expectations, the difference between pre-test and post-test scores was small (0.15) and not statistically significant ( $p = .59$ ).

Overall, the results suggest that students developed a more realistic understanding of mind mapping after using it, particularly regarding the learning process and necessary support.

## 4.2 Qualitative Results

### 4.2.1 Interview Results

#### 4.2.1.1 Control Group

Before the intervention, most students relied on rote memorization strategies, such as copying vocabulary several times and memorizing Vietnamese meanings. Although some students used minor variations such as reading aloud or making sentences, their

approaches remained largely mechanical. Students reported difficulties with long-term retention and often forgot vocabulary after tests.

Before the pre-test, many students expressed anxiety about forgetting words or making spelling mistakes. Their review strategies mainly involved rereading vocabulary lists and copying words repeatedly. These responses indicate that vocabulary learning was strongly dependent on short-term memorization.

After the instructional period, although the control group did not experience mind mapping, students expressed positive expectations toward the method. They believed that visual diagrams could help organize vocabulary, create associations between words, and reduce the need for repetitive copying.

After the post-test, students showed greater awareness of the limitations of traditional learning methods. Many believed that their performance might have improved if they had used mind mapping, particularly in tasks requiring word recall and meaning recognition. Overall, the interviews suggest that students recognized the need for more effective vocabulary-learning strategies.

#### **4.2.1.2 Experimental Group**

Before learning with mind mapping, students mainly relied on repetition and copying to memorize vocabulary. None had previously used mind mapping, and several students initially felt uncertain about the new method.

During the early stages of implementation, students reported mixed reactions. Some described mind mapping as interesting and engaging, while others found it challenging at first due to difficulties in organizing ideas or drawing branches.

After practicing mind mapping, most students reported better vocabulary organization and recall. They explained that seeing vocabulary arranged in groups helped them remember multiple words simultaneously. Some students even recalled vocabulary during tests by mentally visualizing their mind maps.

The interviews also revealed positive changes in learning attitudes and confidence. Students described vocabulary learning as more enjoyable and creative. However, a few challenges remained, including the time required to draw mind maps and the need for additional guidance.

After the post-test, students reported noticeable improvements in vocabulary retention and expressed interest in continuing to use mind mapping in the future. Overall, the qualitative data suggest that mind mapping supported both learning effectiveness and student motivation.

#### **4.2.3 Observation Results**

##### **4.2.3.1 Control Group**

Observation data indicate that students in the control group generally paid attention to the teacher's instructions. However, participation in vocabulary activities remained relatively limited and mostly involved copying, repeating words, and completing textbook exercises.

Interaction among students occurred only occasionally during pair-check activities, and most tasks were completed individually. Students' confidence in using new vocabulary was moderate, as many relied on textbooks or notebooks when responding to questions. In general, vocabulary learning in the control group was teacher-centered and based mainly on memorization, providing limited opportunities for creative language use.

**Table 4.11:** Summarize the Responses of the Students in the Control Group

No.	Observation Criteria	Yes	Partly	No
1	Students pay attention to the teacher's instructions	5	0	0
2	Students participate in vocabulary activities	0	5	0
3	Students rely on memorization and repetition	5	0	0
4	Students interact with classmates	0	5	0
5	Students show confidence when using new vocabulary	0	5	0

#### 4.2.3.2 Experimental Group

Observation results for the experimental group reveal high levels of engagement during mind-mapping activities. Students consistently paid attention to instructions and actively participated in constructing mind maps.

Students used colors, images, and diagrams to categorize vocabulary and frequently collaborated with classmates during group work. The interactive nature of these activities encouraged discussion, idea exchange, and collaborative problem-solving. Students also demonstrated higher confidence in using new vocabulary, speaking more clearly and relying less on textbooks during presentations. These observations indicate that mind mapping promoted a more student-centered learning environment.

**Table 4.12:** Summarize the Responses of the Students in the Experimental Group

No.	Observation Criteria	Yes	Partly	No
1	Students pay attention to the teacher's instructions	5	0	0
2	Students actively participate in mind map activities	5	0	0
3	Students use colors and images to learn vocabulary	5	0	0
4	Students interact with classmates during group work	5	0	0
5	Students show confidence when using new vocabulary	5	0	0

### 4.3 Discussion

The purpose of this study was to examine the impact of mind mapping on sixth-grade students' vocabulary retention in an EFL context. Both quantitative and qualitative findings indicate that mind mapping contributed positively to vocabulary learning, particularly in terms of long-term retention.

The quantitative results show that both groups improved after instruction; however, the control group experienced a decline between the post-test and the delayed post-test. This suggests that vocabulary learned through traditional methods may remain in short-term memory but fade over time.

In contrast, the experimental group demonstrated more stable performance, especially in the delayed post-test. This indicates that mind mapping helped students store vocabulary more effectively in long-term memory.

These findings support the Levels of Processing Theory, which suggests that deeper cognitive processing enhances memory retention. Constructing mind maps requires students to categorize vocabulary, identify relationships, and organize information meaningfully, leading to deeper processing than simple repetition.

The results are also consistent with Dual Coding Theory, which states that combining verbal and visual information enhances memory. In this study, students used colors, diagrams, and spatial organization to represent vocabulary, creating multiple pathways for retrieval.

Furthermore, mind mapping aligns with constructivist learning principles, as students actively organized vocabulary rather than passively memorizing isolated words. This approach encouraged meaningful learning and increased engagement.

Overall, the findings demonstrate that mind mapping not only improves vocabulary retention but also promotes more effective learning strategies and positive learning attitudes among students.

## 5. Conclusion

### 5.1 Summary of Key Findings

This study investigated the effects of mind mapping on Grade 6 students' vocabulary retention and explored students' perceptions of using mind mapping in vocabulary learning. Both quantitative data (tests and questionnaires) and qualitative data (interviews and classroom observations) indicate that mind mapping has positive pedagogical value in the lower-secondary EFL context.

#### 5.1.1 Effects of Mind Mapping on Vocabulary Retention

The quantitative results show that mind mapping positively influenced students' vocabulary retention, particularly in the long term.

First, both the control and experimental groups improved from the pre-test to the immediate post-test, suggesting that regular classroom instruction can support short-term vocabulary learning. However, the two groups showed different patterns of retention over time.

The control group showed a significant improvement from the pre-test to the post-test, but their scores declined in the delayed post-test. This suggests that vocabulary learned through repetition and memorization was not firmly stored in long-term memory. Students could recall vocabulary immediately after instruction, but tended to forget it over time.

In contrast, the experimental group demonstrated more stable results across the testing stages. Although the difference between the two groups was not statistically significant in the immediate post-test, a significant difference appeared in the delayed

post-test. The experimental group achieved a higher mean score ( $M = 7.17$ ) than the control group ( $M = 6.34$ ), and the independent-samples t-test confirmed that this difference was statistically significant ( $t(76) = -2.80, p = .01$ ). This indicates that mind mapping effectively improved long-term vocabulary retention.

Overall, the findings suggest that mind mapping helps students process vocabulary more deeply by organizing words into meaningful categories and connections. This deeper processing allows vocabulary to be stored more effectively in long-term memory rather than remaining at the level of short-term recall.

### 5.1.2 Students' Perceptions of Mind Mapping

Qualitative findings and questionnaire data provide additional insight into students' learning experiences.

Before the intervention, students in both groups mainly relied on traditional vocabulary-learning methods such as copying words repeatedly, memorizing Vietnamese meanings, and rereading vocabulary lists. These methods often led to short-term memorization and limited motivation. Many students described vocabulary learning as repetitive and boring.

After the intervention, students in the experimental group reported several positive changes. They found vocabulary learning more interesting and engaging when using mind maps. The visual structure, including colors, images, and branch organization, helped them remember vocabulary more easily. Many students reported that they could recall words by remembering the position of branches or visual elements in their mind maps. Students also felt more confident when using new vocabulary and relied less on repeated copying.

Interview results revealed that some students mentally reconstructed their mind maps during tests to recall vocabulary items. Classroom observations also showed higher levels of participation, collaboration, and learner autonomy in the experimental group.

Although students initially experienced some difficulties—such as organizing ideas or drawing mind maps—these challenges gradually decreased with practice and teacher guidance. Interestingly, students in the control group also expressed interest in using mind mapping after recognizing the limitations of traditional memorization strategies.

### 5.1.3 Overall Synthesis

Generally speaking, the findings indicate that mind mapping positively influenced both cognitive and affective aspects of vocabulary learning. Cognitively, it strengthened long-term vocabulary retention by encouraging meaningful organization and visual association. Affectively, it increased students' motivation, engagement, and confidence in vocabulary learning.

Therefore, the study concludes that mind mapping is an effective instructional strategy for improving vocabulary retention among Grade 6 EFL students in Vietnamese

lower-secondary schools, especially when the goal is sustainable vocabulary development rather than short-term memorization.

## 5.2 Pedagogical Implications

The findings of this study suggest several implications for English vocabulary teaching in Vietnamese lower-secondary schools. Since mind mapping was shown to enhance vocabulary retention and learner engagement, vocabulary instruction should move beyond exclusive reliance on rote memorization and translation-based techniques. Instead, teachers should incorporate learning strategies that support deeper cognitive processing and meaningful knowledge organization.

First, teachers are encouraged to integrate mind mapping into vocabulary instruction, especially when teaching vocabulary within thematic units. However, successful implementation requires clear guidance and scaffolding. At the beginning, teachers should demonstrate how to identify key concepts, choose appropriate keywords, and organize vocabulary into logical branches. Without such guidance, students may focus too much on decoration rather than meaningful organization.

Second, mind mapping should be integrated with other learning activities such as pronunciation practice, sentence construction, and communicative tasks. The visual structure of mind maps can help students organize vocabulary before applying it in speaking or writing activities. This integration can strengthen vocabulary retrieval and promote meaningful language use.

Third, teachers should gradually encourage learner autonomy. After students become familiar with mind mapping, teachers can reduce guidance and encourage students to create their own vocabulary maps during self-study. This approach can help learners develop independent learning strategies and improve long-term retention.

At the curriculum level, visual learning strategies could be incorporated more systematically into textbooks and teaching materials. For example, vocabulary exercises could include mind-map completion tasks or vocabulary-network reconstruction activities. Teacher training programs should also provide guidance on how to apply visual learning techniques effectively in the classroom.

For students, mind mapping offers benefits beyond vocabulary memorization. By organizing vocabulary into semantic networks, learners can develop more stable memory structures and retrieve words more efficiently. The strategy can also be applied to other areas of language learning, such as organizing ideas in writing or summarizing reading texts.

In addition, the use of mind mapping supports current educational reforms in Vietnam that emphasize learner autonomy, active participation, and competency-based learning. By encouraging students to categorize and connect knowledge, mind mapping promotes higher-order thinking and collaborative learning.

In summary, when implemented with appropriate guidance and integration, mind mapping can serve as a practical and effective tool for improving vocabulary instruction and promoting more meaningful language learning.

### 5.3 Recommendations for Practice

Based on the study findings, several practical recommendations can be proposed for implementing mind mapping effectively in EFL classrooms.

First, mind mapping should be introduced gradually. Teachers may begin with teacher-led demonstrations before moving to pair or group activities and eventually encouraging independent student work. Providing structured templates or partially completed mind maps at the beginning can help students understand the technique and reduce cognitive overload.

Second, teachers should emphasize conceptual organization rather than artistic design. Students should focus on identifying relationships among vocabulary items and explaining why certain words belong to specific branches. This encourages deeper cognitive engagement with vocabulary.

Third, classroom time should be managed carefully. Although mind mapping can be engaging, excessive attention to decoration may reduce learning efficiency. Teachers should therefore set clear time limits and focus on logical organization and accuracy. Assigning group roles, such as idea generator, writer, or presenter, can also ensure active participation from all students.

Fourth, digital mind-mapping tools can be used where technology is available. These tools allow students to edit, store, and review vocabulary networks easily. However, technology should support learning rather than replace the cognitive processes involved in organizing vocabulary.

Finally, mind mapping can also be incorporated into revision and assessment activities. For example, teachers may ask students to recreate mind maps from memory or complete partially prepared vocabulary diagrams. These activities can reinforce vocabulary retention and help students internalize the learning strategy.

When used consistently and purposefully, mind mapping can become an effective long-term strategy for vocabulary learning and learner autonomy.

### 5.4 Limitations of the Study

Despite providing useful insights, this study has several limitations that should be acknowledged.

First, the study was conducted in a single lower-secondary school with students from the same grade level. Although this helped control external variables, it limits the generalizability of the findings to other educational contexts.

Second, the duration of the intervention was relatively short. Although the study included a delayed post-test, the long-term effects of mind mapping over longer periods remain unclear. Vocabulary learning is cumulative, and longer-term studies would be needed to evaluate sustained effects.

Third, the assessment instruments mainly focused on receptive vocabulary knowledge and controlled tasks. Other aspects of vocabulary competence, such as spontaneous speaking or extended writing, were not fully examined.

Fourth, some qualitative data relied on self-reported student perceptions and classroom observations. These data may be influenced by factors such as social desirability or the novelty of the teaching method.

Finally, the study focused primarily on vocabulary retention and did not examine other potential benefits of mind mapping, such as its impact on reading comprehension, writing organization, or learner autonomy.

Therefore, the findings should be interpreted as context-specific evidence rather than universal conclusions.

### **5.5 Suggestions for Further Research**

Future research could extend this study in several directions.

First, larger and more diverse samples should be included across different schools, regions, and grade levels. This would help determine whether the effectiveness of mind mapping is consistent across various educational contexts.

Second, longitudinal studies are needed to examine the long-term effects of mind mapping on vocabulary retention. Research conducted over longer periods could provide clearer evidence of sustained vocabulary development.

Third, future studies could explore the impact of mind mapping on other language skills, such as reading comprehension, writing organization, and speaking fluency.

Fourth, researchers could investigate the cognitive processes involved in mind mapping, including memory encoding and strategy use. Methods such as think-aloud protocols or digital learning analytics could provide deeper insights into how mind mapping supports vocabulary learning.

Fifth, comparative studies could examine different visual learning strategies, such as concept mapping or semantic mapping, to determine which approaches are most effective for specific learner groups.

Finally, future research may also examine teachers' perspectives and classroom implementation challenges to better understand how mind mapping can be integrated into everyday teaching practice.

In conclusion, although further research is needed, the present study provides encouraging evidence that mind mapping is a promising strategy for improving vocabulary learning and supporting more meaningful language development in EFL classrooms.

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### **Conflict of Interest Statement**

Both authors strongly agreed on the publication of this paper, and there was no contention or rivalry during the finishing of the work. In other words, the authors declare no conflicts of interest in this article. Both authors are fully and equally responsible for the benefits and harms after this article is published. The authors, moreover, declare that the material presented by us in this paper is our original work and does not contain any materials taken from other copyrighted sources. Wherever such materials have been included, they have been clearly indented or/and identified by quotation marks, and due and proper acknowledgements have been given by citing the source at appropriate places.

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