Using E-Mind Mapping in Improving Reading Comprehension of Thai EFL Seventh Graders

Chonlada Narawang

A Thesis Submitted in Partial Fulfillment of Requirements for
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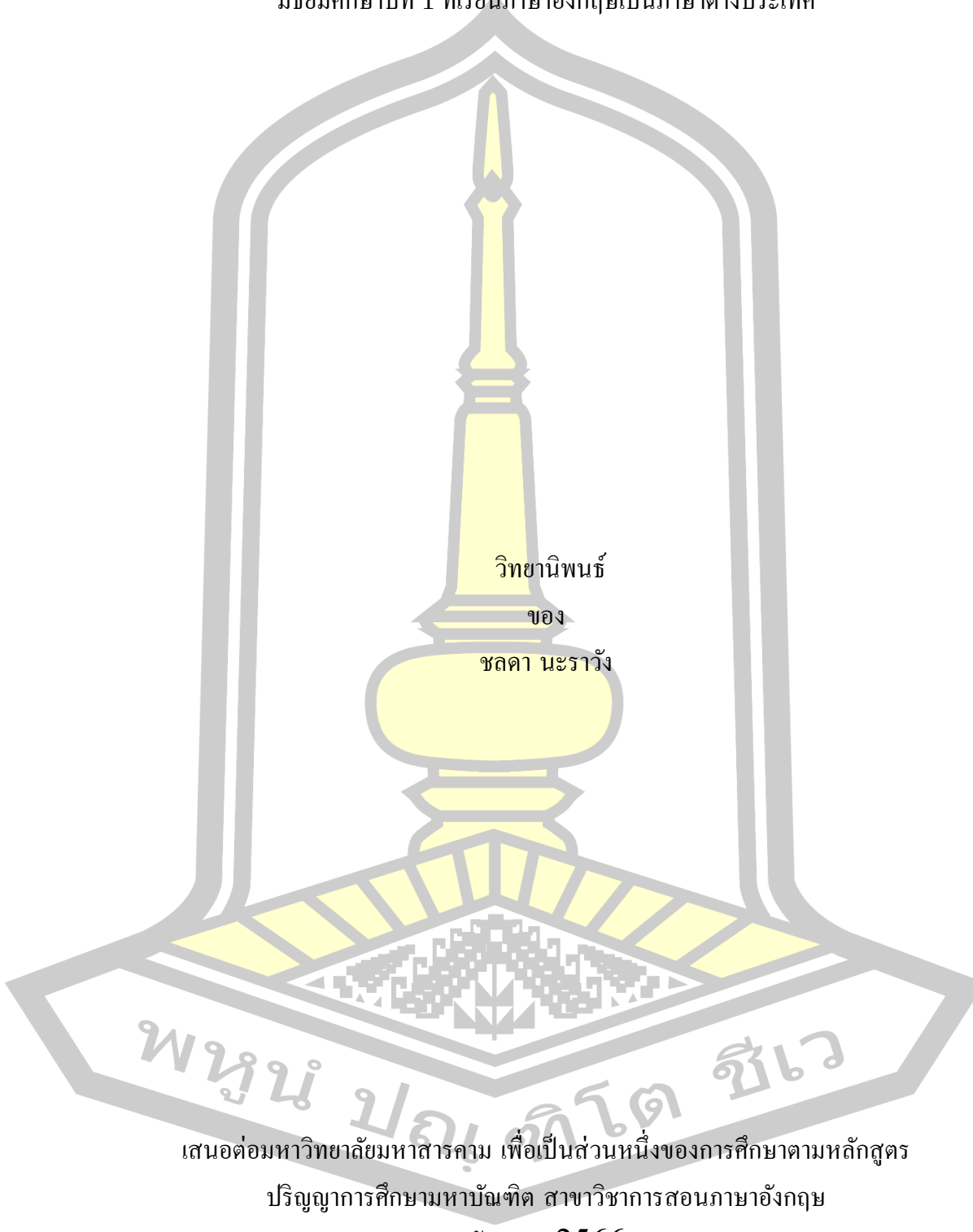
การใช้ E-Mind Mapping ในการพัฒนาการอ่านเพื่อความเข้าใจของผู้เรียนไทยระดับชั้นมัธยมศึกษาปีที่ 1 ที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ



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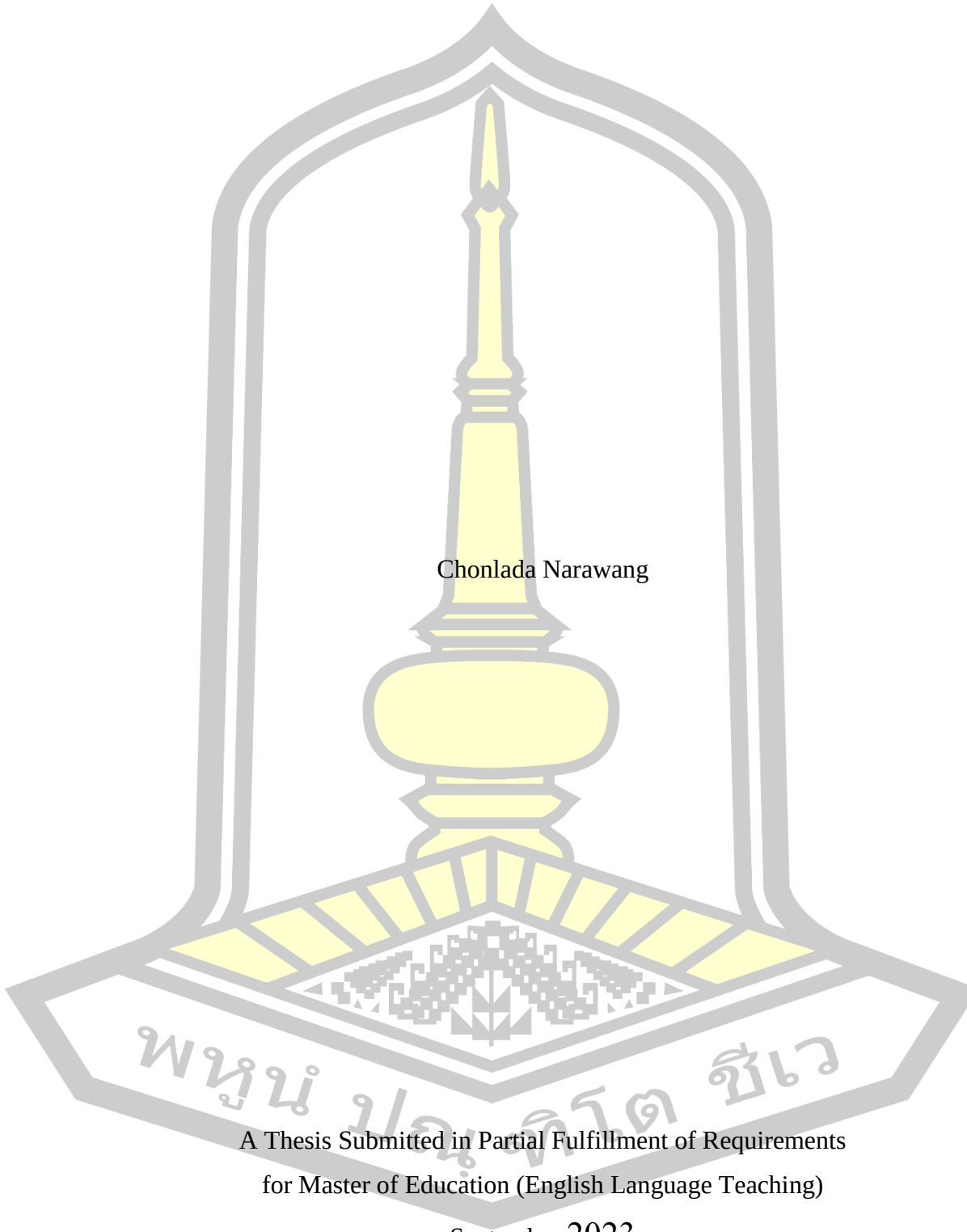

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ABSTRACT

This study investigates the potential of utilizing electronic mind mapping to enhance the reading comprehension of Thai EFL seventh graders. The impacts of the e-mind mapping method on students' reading comprehension and their attitudes towards this approach were identified. The theoretical framework of the study drew upon the cognitive theory of multimedia learning (CTML), emphasizing the significance of multimedia materials combining visual and auditory elements in facilitating comprehension. The participants included 10 Thai EFL seventh graders from a school in Yasothon province, selected through purposive sampling from one intact class. Instruments employed for data collection included a pre-test and post-test for reading comprehension, an attitude questionnaire, and a semi-structured interview. Quantitative data from the pre-test and post-test for reading comprehension and the attitude questionnaire were analyzed using mean scores, *t*-test analysis, and standard deviation. Qualitative data from the semi-structured interview underwent content analysis. The study involved four phases: orientation, pre-test administration, treatment implementation, and post-test assessment. The results revealed a significant improvement in students' reading comprehension, with a *t*-value of 15.235, highlighting the effectiveness of electronic mind mapping. Furthermore, students displayed a high level of attitude towards the use of electronic mind mapping for improving their reading comprehension, as indicated by an average mean score of 4.68.

Keyword : Reading Comprehension, Electronic mind mapping, The cognitive Theory of Multimedia Learning (CTML)

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TABLE OF CONTENTS

Page

ABSTRACT ..... D

ACKNOWLEDGEMENTS ..... E

TABLE OF CONTENTS ..... F

List of Tables I

List of Figures ..... J

CHAPTER I INTRODUCTION 1

1.1 Background of the study 1

1.2 Purposes of the study 5

1.3 Scope of the study 5

1.4 Significance of the study 6

1.5 Definitions of key terms 6

1.6 Structures of the study 7

CHAPTER II LITERATURE REVIEW 8

2.1 Theoretical framework 8

2.1.1 Cognitive Theory of Multimedia Learning 8

2.2 Reading Comprehension 11

2.2.1 Definitions of Reading Comprehension 11

2.2.2 Importance of Reading Comprehension 11

2.2.3 Models of Reading Comprehension 12

2.2.4 Reading Comprehension Assessment 16

2.2.5 Levels of Reading Comprehension 18

2.3 Electronic Mind Mapping 19

2.3.1 Definitions of Electronic Mind Mapping 19

2.3.2 Roles of Electronic Mind Mapping in Improving Reading Comprehension 20

2.3.3 Advantages and Disadvantages of Electronic Mind mapping 21

2.4 Collaborative Strategy 22
2.4.1 Definitions of Collaborative Strategy.....22
2.4.2 Roles of Collaborative Strategy in Improving Reading Comprehension.23
2.5 Previous Studies.....23
2.5.1 Previous Studies in Global Context.....23
2.5.2 Previous Studies in the Thai EFL Context 27
2.6 Summary of the chapter.....30
CHAPTER III RESEARCH METHODS 31
3.1 Research Paradigm and Design 31
3.2 Participants and Setting 31
3.3 Research Instruments.....32
3.3.1 Reading comprehension pre-test and post-test.....32
3.3.2 Students' attitude questionnaire 33
3.3.3 Semi-Structured Interview 33
3.4 Data Collection Procedure.....34
3.5 Data Analysis.....37
3.6 Summary of the chapter.....37
CHAPTER IV RESULTS.....39
4.1 The effect of E-mind mapping method on Thai EFL seventh graders' reading comprehension.....39
4.2 The students' attitude about E-mind mapping in regards to improving reading comprehension.....40
4.2.1 Students' attitude towards the use of electronic mind mapping in reading comprehension.....41
4.2.2 Students' attitude towards the reading comprehension strategies in reading comprehension class.....43
4.3 The students' attitude about E-mind mapping in regards to improving reading comprehension: Semi-structured interview.....44
4.4 Summary of the chapter.....49
CHAPTER V DISCUSSIONS AND CONCLUSION 51

5.1 Summary of the findings 51
5.2 Discussion of the findings 51
5.2.1 The effect of electronic mind mapping on students' reading comprehension.....51
5.2.2 Students' attitude towards the implementation of Electronic mind mapping in Improving Reading Comprehension 55
5.3 Pedagogical Implications.....56
5.4 Limitations of the study and recommendations for future research 57
5.5 Conclusions.....58
REFERENCES 59
APPENDICES 79
Appendix A: Reading comprehension pre-test and post-test 80
Appendix B: Students' attitude questionnaire 88
Appendix C: Interview Questions 90
Appendix D: Lesson Plans.....91
Appendix E: Activity from Lesson Plan 2: Bicycle 108
BIOGRAPHY 110

List of Tables

Page

Table 1 Lesson Plan 35

Table 2 The comparison of reading comprehension pre- and post-test scores 39

Table 3 A summary of students' reading comprehension 40

Table 4 Students' attitude towards the use of electronic mind mapping in reading comprehension 41

Table 5 Students' attitude towards the use of reading comprehension strategies..... 43

List of Figures

Page

Figure 1 Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2005) 9
Figure 2 The Psycholinguistic model. 13
Figure 3 The Bottom-Up model. 14
Figure 4 The Top-Down model. 15
Figure 5 The Interactive model. 15
Figure 6 The example of created electronic mind mapping. 20
Figure 7 Data Collection Procedure 34
Figure 8 Students' electronic mind mapping 47
Figure 9 Activity from the topic of "Bicycle" 108
Figure 10 Activity from the topic of "Bicycle" 108
Figure 11 Activity from the topic of "Bicycle" 109

CHAPTER I
INTRODUCTION

This chapter begins with a background of the study, proceeds to expound upon the purposes of the study, scope of the study, and significance of the study. Lastly, it provides a clear definition of the organizational structure employed in this study.

1.1 Background of the study

Reading comprehension is a multifaceted process that involves both extracting and constructing meaning from written language. It goes beyond recognizing words on a page; it requires active engagement and interaction between the reader and the text (Grabe & Stoller, 2002; Snow, 2002; Meniado, 2016; Alyousef, 2005). In this process, the reader not only interprets the explicit meaning of the text but also acquires knowledge from it. They accomplish by decoding words, combining information, interpreting context, and making connections between different parts of the text, drawing upon their background knowledge and experiences (Manihuruk, 2020). It is not only about understanding individual words or sentences, but about grasping the overall author's intent and message. Mastering reading comprehension is crucial for learners as it directly impacts their ability to read proficiently and learn effectively. When students comprehend what they read, they can better conceptualize and understand the subject matter (Khanthawong, 2008; Roebl & Shiue, 2014). Furthermore, reading comprehension allows readers to create images or visualize the scenarios described in the text. This process of imagination enables a more immersive reading experience and facilitates a deeper connection with the material. Readers can see the story unfold in their minds, making the reading more engaging and memorable (Bormuth, 1969; Blair, Rupley, & Nichols, 2007; Hoeh, 2015).

However, EFL learners still encounter reading comprehension difficulties. Indeed, some researchers indicated that Thai EFL secondary school students demonstrate weaknesses in reading comprehension and are often incapable of understanding the reading texts (Chawwang, 2008; Sawangsamutchai & Rattanavich, 2016). Reading comprehension is likely impeded by their lack of background knowledge, experience, purpose for reading a text, and inability to use effective comprehension strategies to

combine information from the text with their background knowledge. Low scores on reading comprehension tests may be driven by several factors. For instance, students may not know the meaning of the new vocabulary or be unable to summarize the content correctly. They may also fail to use efficient strategies that help them understand and comprehend the reading texts. Teachers also primarily focus on grammar and vocabulary and may neglect the explicit teaching of reading comprehension (Chawwang, 2008; Chomchaiya & Dunworth, 2008; Sawangsamutchai & Rattanavich, 2016; Suebpeng, 2017; Yimwilai & Samonlux, 2020; Kamchorn et al., 2022; Monliang, 2022). The seventh graders in the current study also faced the same problems in reading as many Thai EFL learners. In their daily learning, they seemed uninterested in reading English texts. They also encountered difficulties in determining the mind idea. Consequently, they found it very difficult to get the meaning of passages they were reading, as shown by their low score in reading comprehension. Besides, in the Thai education curriculum for foreign language learning, specifically for seventh-grade students, there are certain indicators and expectations related to reading comprehension. The Ministry of Education (2008) outlined the following skills that students at seventh grade level should be able to state the topic of text, main idea and answer the questions from short passage, short tales, and also reading materials such as newspaper, journal, or website. Therefore, effective teaching methods are required to improve students' reading comprehension.

Various strategies and methods have been proposed by many researchers to improve reading comprehension. Graphic representation is a recommended instructional strategy to improve reading comprehension. Graphic representations also known as graphic organizers help students organize and represent information from texts in a structured and visual format. Mind mapping is a type of graphic organizer and a visible drawing representing what happens in the process of storing information in the brain and can be used to generate ideas, take notes, organize thinking, and develop concepts (Buzan & Buzan, 1993; Ardini & Lashkarian, 2015). Additionally, the mind mapping strategy enables learners to arrange and classify ideas and tasks and to improve reading, problem-solving, and decision-making (Buzan, 2006). It facilitates learning and helps learners to write down their notes, organize them effectively, and retrieve the information easily (Tucker, Armstrong, & Massad, 2010). Mind mapping is also an

effective tool for learners with low reading proficiency (Mohaidat, 2018; Wangmo, 2018; Manotas, 2019; Morales et al., 2019; Anh et al., 2020; Saori, 2020; Al Shdaifat & Al-Abed Al-Haq, 2021; Al-Jarf, 2021; Yimwilai & Samonlux, 2020; Nisa & Novitasari, 2021; Kamchorn, 2022).

However, using a mind mapping in its traditional form, in which students draw manually using paper and a pen or on the board, might not attract students in the 21st century. It has therefore been proposed that mind mapping should be combined with technology (Samonlux & Yimwilai, 2020). Electronic mind mapping is a new teaching technique for reading. It is a modern form of mind mapping created by specialized software (Aljaser, 2017) to help students draw a mind mapping.

Several studies have investigated the impact of electronic mind mapping on reading comprehension in various contexts. In Colombia, Manotas (2019) investigated electronic mind mapping with Powerpoint and YouTube to improve reading comprehension of a short fictional text in tenth-grade students. The findings revealed that e-mind mapping helped students improve their reading comprehension and vocabulary knowledge. In addition, Yunus et al. (2020) investigated the implementation of e-mind mapping in teaching reading at a senior high school in Indonesia. The findings showed that learning reading comprehension through e-mind mapping enhanced students' reading comprehension and interest. Al Shdaifat and Al-Abed Al-Haq (2021) investigated the e-mind mapping method in improving reading comprehension of 50 seventh graders from Jordan. The findings revealed that using electronic mind mapping effectively raised the understanding of reading texts, and students enjoyed and were enthusiastic about this form of instruction. Ma et al. (2022) investigated the use of e-mind mapping on reading comprehension improvement of senior high school art and sports students in China. The findings showed that e-mind mapping improved students' reading comprehension and vocabulary knowledge. A study by Yan & Kim (2023) investigated whether electronic mind mapping helped improve reading comprehension of Chinese university EFL students in South Korea. The findings revealed that e-mind mapping was a practical tool that encourages collaboration, improves cognitive abilities, and supports thinking, comprehension, and recall improvements.

In the Thai EFL context, several studies have been conducted on using electronic mind mapping to improve reading comprehension of Thai students. Chaichompoo (2017) found that electronic mind mapping enabled second-year English major undergraduate students to analyze and summarize the contents of reading passages with greater accuracy and efficiency. Piengkes et al. (2019) investigated the effects of mind mapping technique and students' English achievement. The findings revealed that mind mapping is an effective technique for categorizing and organizing ideas that emerge during brainstorming sessions or when exploring a topic as well as students remembered the passages they have learned. Yimwilai and Samonlux & Yimwilai (2020) also investigated the effect of electronic mind mapping on students' reading ability. The findings revealed that e-mind mapping was an effective tool since it provided students with an interesting technique and enhanced students' reading ability. Monliang (2022) investigated the improvement of eleventh-grade students' reading comprehension through electronic mind mapping. The findings revealed that students' reading ability improved after implementing e-mind mapping, and their opinions were positive. A study by Kamchorn et al. (2022) examined the effect of electronic mind mapping on reading comprehension of eighth and ninth-grade students. The findings revealed that this method improves students' reading comprehension and writing skills. Namtong and Yiemkuntitavorn (2022) investigated the effects of using mind mapping on English reading comprehension ability of fifth graders. The findings showed that post-test scores are higher that pre-test scores which indicated that students improved their reading comprehension with the use of mind mapping as well as students' attitude toward mind mapping is at a very high level. Pannim et al. (2022) investigated the improvement of reading comprehension skills using multimedia storytelling with mind mapping for students with learning disabilities. The findings revealed that using multimedia storytelling with mind mapping improved students' reading comprehension with a significant difference in the mean scores of the students' reading comprehension pre-test and post-test at the .01 level and it also allows students to interact with various types of media including graphic images, sounds, and texts. This approach can stimulate and increase the learner's attention. Sommanut and Pianchana (2022) investigated the development of learning achievement in reading comprehension of eight graders using concept mapping. The findings revealed that students improved their reading

comprehension after treatment by mind mapping and students had a positive attitude with the implementation of mind mapping in improving their reading comprehension.

It is evident that many previous studies have focused on implementing mind mapping to improve reading comprehension of Thai senior high school students. However, more studies are needed to investigate the effect of electronic mind mapping on the improvement of Thai EFL seventh graders' reading comprehension. Indeed, by conducting the study to fill the aforementioned gap and investigating the effectiveness of electronic mind mapping with graphic images and collaborative strategies on improving reading comprehension among Thai EFL seventh graders, this current study was set out to use electronic mind mapping through Coggle.it to improve seventh-grade students' reading comprehension. Specifically, this current study aimed to (1) investigate the effect of the e-mind mapping method on Thai seventh-grade students' reading comprehension and (2) examine students' attitude about e-mind mapping and its ability to improve their reading comprehension skills.

1.2 Purposes of the study

The purposes of this study were to investigate the effect of the E-mind mapping method on students' reading comprehension and to examine students' attitude toward this teaching method. Two research questions were formulated to guide this study:

1. To what extent does the e-mind mapping method affect Thai EFL seventh graders' reading comprehension?
2. What are the students' attitudes toward electronic mind mapping in improving their reading comprehension?

1.3 Scope of the study

Employing a mixed-method research design, this study aimed to investigate the effect of using e-mind mapping on reading comprehension of Thai EFL seventh graders and to examine their attitudes toward electronic mind mapping. The participants were ten seventh graders, selected from one intact class, who studied the subject titled *Fundamental English* in the second semester of the academic year 2022. This school was an opportunity-extended school located in Yasothon province, Thailand. Three research instruments were used to collect data: a reading comprehension pre-test and a post-test, an attitude questionnaire, and a semi-structured interview. Teaching

procedures included the implementation of electronic mind mapping combined with pre-reading, while reading, and post reading strategies. The duration of this study was five weeks.

1.4 Significance of the study

By empirically studying the effect of electronic mind mapping on reading comprehension of Thai EFL seventh graders, this teaching method could benefit them in various ways. Specifically, incorporating electronic mind mapping as a part of the reading comprehension process can benefit students by extending beyond their improved reading skills to enhanced overall language proficiency. By actively engaging with the text and connecting various elements through visual representations, students develop a deeper understanding of the text, paving the way for more effective language learning and communication abilities.

1.5 Definitions of key terms

Reading comprehension is defined as the ability to understand the meaning of the text by reviewing the factual information from the text, stating the main idea, and answering questions about the text.

Electronic mind mapping is defined as mind mapping that is created and shared online. It is a kind of visual information organization that enables students to create relationships between the main idea and sub-topics. It is intended to reflect the relationships between ideas and thinking. The current study also employed graphic images and a collaborative strategy in order to help students to better improve their reading comprehension

Thai EFL secondary learners refers to 10 seventh graders who learned English as their foreign language at an opportunity extension school located in Yasothon province, Thailand.

1.6 Structures of the study

Chapter I presents the background of the study, including its purpose, scope, and significance, as well as definitions of key terms.

Chapter II summarizes previous literature on reading, reading comprehension, and electronic mind mapping.

Chapter III presents the research methodology, including the research paradigm and design, participants and setting, research instruments, data collection procedures, and data analysis.

Chapter IV presents the findings of the study and the answers to the two research questions.

Chapter V presents the discussion of the findings, pedagogical implications, limitations, recommendations for future research, and conclusions.

CHAPTER II
LITERATURE REVIEW

This chapter presents the theorical framework underlying the study. Specifically, the chapter first discusses the theoretical framework followed by reading comprehension, importance of reading comprehension, models of reading comprehension, reading comprehension assessment and levels of reading comprehension. Next, the definition of electronic mind mapping, roles of electronic mind mapping in improving reading comprehension, advantages and disadvantages of electronic mind mapping, collaborative strategy, roles of collaborative strategy in improving reading comprehension are discussed. The chapter ends with a review of previous research in the global and the Thai EFL context.

2.1 Theoretical framework

2.1.1 Cognitive Theory of Multimedia Learning

The cognitive theory of multimedia learning (CTML), introduced by Richard E. Mayer in 2005, revolves around the concept that learners actively strive to establish meaningful connections between textual information and visual imagery. According to this theory, learners achieve a deeper understanding when they engage with a combination of words and pictures rather than relying solely on either words or pictures in isolation (Mayer, 2009). This approach emphasizes the synergistic benefits of integrating both textual and visual elements to facilitate deeper comprehension and information retention through multimedia learning. The CTML emphasizes three primary theories: the dual coding theory proposed by Paivio in 1986, the cognitive load theory developed by Sweller in 1988, and the active learning process theory.

The dual coding theory involves two distinct channels responsible for processing information derived from sensory memory. These channels include the auditory/verbal channel and the visual/pictorial channel. The auditory/verbal channel is responsible for processing information presented in the form of spoken words, narrations, or sounds, typically received through the ears. In contrast, the visual/pictorial channel handles information in the form of pictures, graphs, videos, animations, on-screen texts, and similar visual content, which is typically received through the eyes. These channels

work in parallel to process and encode information, facilitating a richer and more comprehensive understanding of the material when both channels are engaged (Mayer, 2005; Kanellopoulou et al., 2019). As Ernest and Paivio (1971) pointed out, people who score high on assessments of imagery ability and tend to engage in mental imagery practices generate mental images more rapidly compared to individuals who score low on such measures. This phenomenon may be particularly pronounced when dealing with abstract words. In other words, those who are more adept at forming mental images and are accustomed to doing so are likely to do it more swiftly, and this effect may be especially noticeable when dealing with concepts that are less concrete or more abstract in nature. Cognitive load theory suggests that learners have a limited capacity to hold only a small number of words in their working memory at one time. The active learning process posits that individuals construct knowledge in meaningful ways when they actively engage with the relevant material. This active engagement involves paying close attention to the information, organizing it into a coherent mental structure, and integrating it with their existing knowledge base. Essentially, this concept underscores the importance of an active and purposeful approach to learning, where learners play an active role in acquiring and assimilating new knowledge (Sorden, 2013). The CTML also focuses on three memory stores in multimedia learning, which include sensory memory, working memory, and long-term memory.

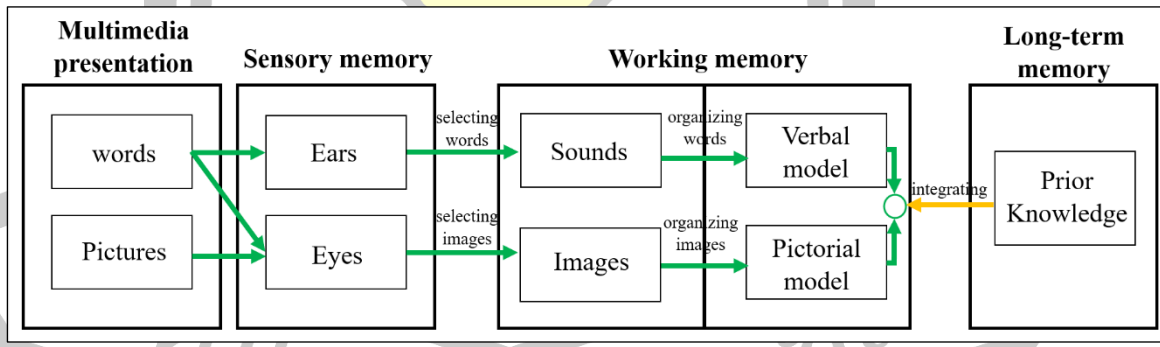

Figure 1 Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2005)

Sensory memory enables the temporary retention of visual information, such as pictures and printed texts, as precise visual images for a very brief period within the visual sensory memory system. Similarly, spoken words can be retained as exact auditory images for a very short period in the auditory sensory memory. These sensory memory

processes serve as initial registers for incoming sensory information, allowing for brief analysis and potential further processing. Indeed, learners engage in a process of material selection by directing their attention towards specific words and images. After identifying these relevant materials, learners then construct structural relationships among the elements within their working memories. This information is subsequently transferred deeper into the working memory, where it is temporarily held and subject to manipulation (Mayer, 2005). The working memory framework has two distinct facets: the left side, which represents raw materials (visual images of pictures and sound images of words), and the right side, which represents the knowledge constructed in working memory, including pictorial and verbal models as well as the connections between them. This duality allows for the dynamic interplay between sensory input and constructed knowledge during the learning process (Kanellopoulou et al., 2019). Long-term memory is responsible for storing and retaining information over an extended period (Schweppe & Rummer, 2014).

Clark and Mayer (2003) underscored the principle that "combining words and graphics is more effective than using words alone" as a key principle for designing multimedia learning materials. This principle aligns with the broader concept of multimedia learning, where the combination of texts (words) and graphics is shown to enhance learning outcomes compared to presenting information through text alone. This concept is referred to as the multimedia principle, emphasizing the value of incorporating visual elements alongside text to enhance comprehension and retention. The idea is that the integration of both texts and visuals can engage multiple cognitive processes and facilitate a deeper understanding of the material (Mayer, 2005). As a cognitive theory of learning, it fits within the broader framework of cognitive science and aligns with the information-processing model of cognition. This theoretical framework helps explain how multimedia presentations can enhance learning by considering the processes involved in memory, the coding of information, and cognitive load management (Sorden, 2013).

In summary, the CTML is a learning theory focusing on how people learn from multimedia materials that combine both visual and auditory information. By utilizing both the auditory and visual channels for learning, multimedia presentations can

significantly improve the depth of understanding, knowledge retention, and ability to apply learned concepts. The CTML is based on the idea that humans have a limited capacity to process information in their working memory. The dual coding of information in both verbal (text) and non-verbal (graphic) forms engages multiple cognitive processes, enhancing comprehension and retention. This dual-channel approach allows learners to process and store information more effectively, facilitating a better understanding of the material or content.

2.2 Reading Comprehension

2.2.1 Definitions of Reading Comprehension

Snow (2002) defines reading comprehension as the process of simultaneously extracting and constructing meaning through interaction and involvement with written language. Indeed, reading comprehension is an interactive process between the reader and the text, where the reader interprets the meaning and acquires knowledge from the text (Meniado, 2016; Alyousef, 2005).

Reading comprehension is a cognitively complex task. It requires the interaction of several skills, including visual discrimination, visual and auditory memory, language, phonological skills, and understanding of rhyme, as well as the attitude and thought of both the reader and the author (Westwood, 2003; Hermosa, 2002; Manihuruk, 2020). Reading comprehension is viewed as a word-recognition response as well as an activity in which the reader constructs the author's intent by decoding, combining, interpreting, and connecting the meanings they obtain from word to word and line to line with their background knowledge (Manihuruk, 2020).

In conclusion, reading comprehension is an interactive process whereby readers generate meaning from text. In order to comprehend the actual meaning of the text, readers must integrate their existing knowledge with the text's information. Reading comprehension is influenced by a number of factors, including teaching methods, vocabulary knowledge, prior knowledge, and the classroom environment.

2.2.2 Importance of Reading Comprehension

According to Alderson (1984), reading comprehension is crucial in the educational field since it supports people to develop as individuals and discover new academic research. Reading comprehension is the ability to understand a text passage, that students need

to master in order to understand the text's particular meaning (Khanthawong, 2008). It is the link between the passive and active reader, and is essential for effective reading (Brown, 2013; Keyser, 2021). Watson et al. (2012) state that reading comprehension is the most important skill for students to achieve academic achievement and enhances both the enjoyment and effectiveness of reading (Rutzler, 2020). Reading comprehension increases the reader's ability to assume or imagine in accordance with what is read (Bormuth, 1969) and is an essential skill in everyday life (Blair, Rupley, & Nichols, 2007; Hoeh, 2015).

2.2.3 Models of Reading Comprehension

Four reading comprehension models have been identified. These models include the psycholinguistic model, the bottom-up model, the top-down model, and the interactive model. The four models differ on the primary method that the reader uses to understand a text. For instance, in the bottom-up model, the reader decodes each word in the text in order to gain meaning. In contrast, the top-down model emphasizes the role that both the reader's background knowledge and previous experience about the given topic play in order to obtain meaning form a text. The interactive model views the reading process as an activity that requires both bottom-up and top-down interactions. The first interaction occurs between the written text and the reader's prior experiences about the topic, while the second interaction occurs between the different reading strategies that the reader uses (Ahmadi, Ismail, & Abdullah, 2013; Brunning, Shraw, & Ronning, 1999; Eskey, 2005; Grabe, 1991; Grabe, 2004). Each of these models will be explained in detail in the following sections.

Psycholinguistic model

This model was proposed by Goodman (1967). Goodman (1967) states that while reading the reader attempts to predict, sample, and confirm or modify previous predictions, and then test and sample the text once again. In this model of reading comprehension, skilled readers are not required to use all existing textual indications. If the reader is able to make suitable and related guesses, the less confirmation via the text is required, that is, the less visual perceptual information the reader needs. The basic psycholinguistic model was refined by Coady (1979), who suggested a model in

which the reader's conceptual abilities and strategies act together with their background knowledge to understand the text.

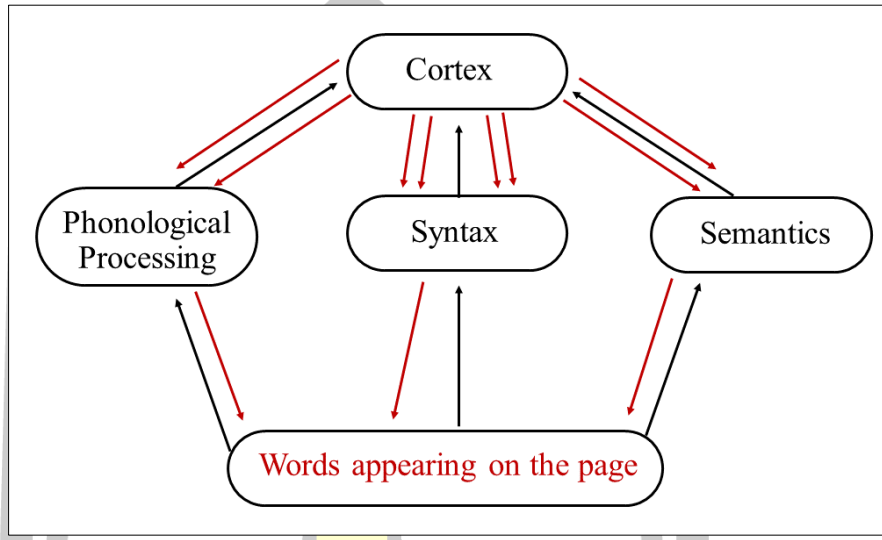

Figure 2 The Psycholinguistic model.

Bottom-up model

This model was proposed by Gough (1972) and focuses on vocabulary. It is regarded as a decoding process. Readers begin with decoding words, which are the smallest linguistic units, and syntactic features of a text, after which they construct textual meaning (Suraprajit, 2019). The teacher will provide new vocabulary and teach sentence by sentence and will provide the actual meaning of the sentences in order to help students understand the meaning of the whole text (Al Hosani, 2005). Readers who follow the bottom-up reading process rapidly become expert readers whose proficiency plays a significant role in improving their ability to decode (Pressley, 2000). Proficiency in decoding enables successful readers to easily and rapidly understand letter chunks, prefixes, suffixes, and the original vocabulary.

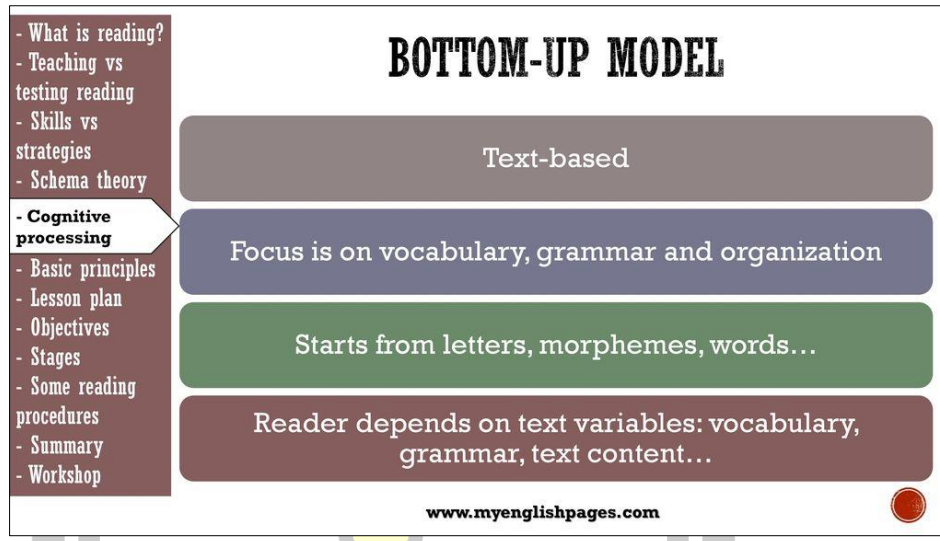

Figure 3 The Bottom-Up model.

Top-down model

Gough (1972) also proposed the top-down model, which is a psycholinguistic guessing game where readers are asked to predict the text's meaning based on their prior knowledge. Grabe (1988) states that this model is a connection between prior knowledge and the present information from the text. In the top-down model, readers must begin the reading comprehension process by forming specific expectations about the text. These expectations should be based on the reader's prior knowledge of the subject matter. After establishing some expectations, the reader moves on to a second task that requires them to use their world knowledge to decode the text's vocabulary in order to either confirm or change their pre-established expectations (Almutairi, 2018).

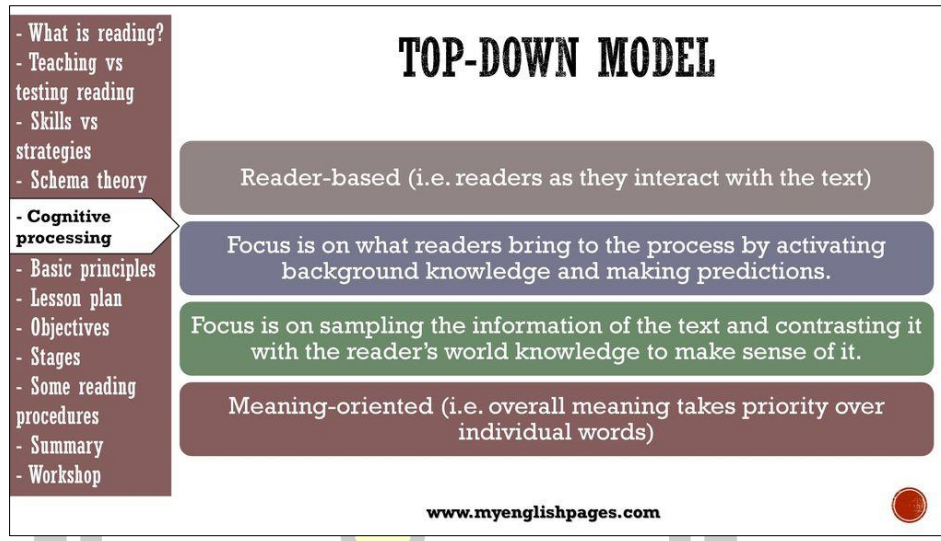

Figure 4 The Top-Down model.

Interactive model

The interactive model was developed by Rumelhart (1977) and is also called the Schema Theory Model. This model attempts to establish a relationship between the bottom-up and top-down reading paradigms (Souhila, 2013) and concurrently recognizes the interaction of both models during the reading process. Readers receive visual information by scanning the text, simultaneously examine information through cognitive process and comprehend the text's meaning.

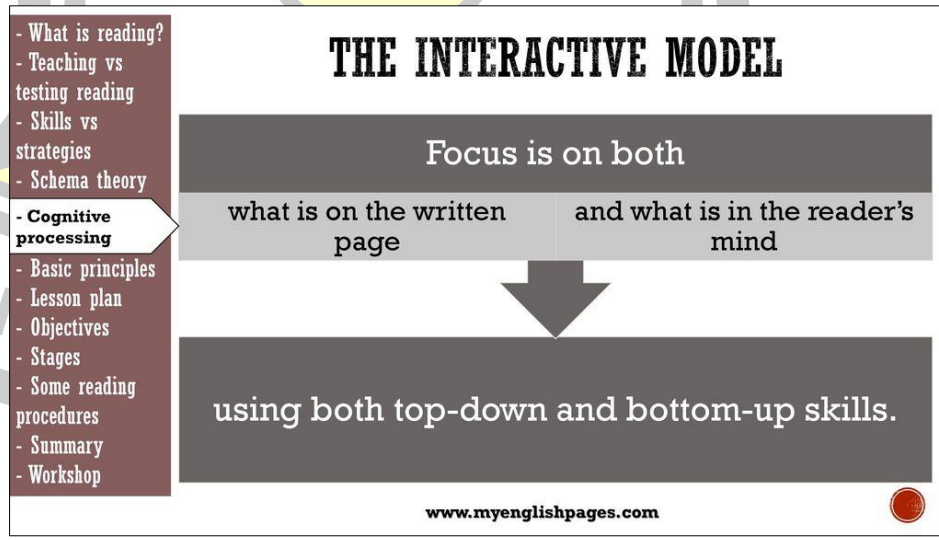

Figure 5 The Interactive model.

In this current study, the interactive model will be employed to improve students' comprehension since it appropriates and familiar to their learning behavior. The interactive model is a combination of the bottom-up and top-down reading model. In term of using the bottom-up model, teacher will provide students new vocabulary due to its emphasis on the linguistic aspect of comprehension, it will give students the chance to increase their vocabulary and move to teach and translate sentence by sentence in Thai. In the light of top-down model, students need to take an overview of what they are expecting to read which is similar to scanning the text. Students may use their prior knowledge when they were taught using the bottom-up process. Question will be implemented to ensure students' understanding.

2.2.4 Reading Comprehension Assessment

Heaton (1990) recommends the following types of reading assessment tasks:

Matching Tests. It is divided into three types which are word matching, sentence matching and pictures and sentence matching. *Word Matching.* The students are required to draw a line under the word which is the same meaning as the given word. *Sentence Matching.* This is similar to the word-matching item. Students are required to recognize as quickly as possible sentences which consist of the same words in the same order. They read a sentence, followed by four similar sentences, only one of which is exactly the same as the previous one. *Pictures and sentence matching.* This task requires students to match the words, phases, or paragraphs with the corresponding pictures.

True/False Reading Test. This is one of the most widely used tests of reading comprehension. It is a dichotomous item test where students can choose true or false. Scoring is quick and straightforward. The scores obtained by the students can be very reliable indices of reading comprehension provided that the items are well constructed. However, it must be noted that students have a 50% chance of guessing the correct answer.

Multiple-choice items. Alderson (2000) states that "multiple choice tasks allow testers to control the range of possible answers to comprehension questions, and to some extent to control the students' thought processes when responding". Multiple choice questions provide students with information at a higher level of comprehension, as opposed to

merely testing the ideals of higher order learning. If testing items are designed appropriately, the test measures the depth and breadth of the test takers' knowledge (Epstein et al., 2002).

Completion items. Completion items are a type of short answer question which is similar to the cloze test. The items require students to insert a word or a short phrase to complete a sentence, or a series of sentences. Types of completion items for testing reading comprehension are divided into two groups: Type 1 consists of blanks for completion in the items following the text, and Type 2 consists of blanks in the text itself. Type 2 includes a matching exercise which words and phrases for the completion are required. However, less emphasis is placed on the writing skills in such a test than in a test consisting of open-ended questions. In Type 2 items, students are required to complete the blank spaces in a reading text. The blanks have been substituted for what the test writer considers are the most significant content words.

Rearrangement items. This type of assessment is for testing the ability to understand a sequence of steps in a process or events in a narrative. Students will be required to rewrite the jumbled sentences in their precise sequence. It is preferable for testing purposes to instruct them to write simply the numbers or letters of the jumbled sentences.

Cloze procedure or Cloze test. In this test, words are removed from a passage according to a word-count formula or other criteria. Students are given the passage and must insert words as they read to finish and generate meaning from it.

Open-ended questions. Open-ended questions allow students to answer in open text format. This type of assessment does not provide students with a predetermined set of answer choices, instead allowing the participants to provide responses in their own words (Allen, 2017).

Cursory reading. Cursory reading is a general term to describe reading quickly, including skimming and scanning. Skimming is used to denote the method of glancing through a text in order to become familiar with the gist of the content; scanning refers to the skills used when reading in order to locate specific information.

In this present study, multiple-choice items, open-ended questions as well as cloze test will be used. Multiple-choice items are one of the most effective methods to assess students' comprehension. This method is an objective measurement of the students'

achievement and is appropriate for all levels of students. It also reduces guesses, produces highly reliable test scores, and has good scoring efficiency and accuracy (Ory, 1983). Open-ended questions are useful in assessing the component skills of comprehension such as the ability of learners to make inferences from the text (Khaleel, 2020). A cloze test is suitable to assess the understanding of the text as a whole, considering integration and inferences beyond word decoding, vocabulary, and single sentence comprehension (Elbro et al., 2012). The cloze test is also suitable when the students have low-level language skills, which is the case for Items can be a matching exercise in which the required words and phrases for the completion the participants in the current study (Alderson, 1979). This assessment technique assesses the student's ability to read and analyze written passages, comprehend the context of reading material, and employ word prediction abilities (Spinelli, 2012). It also helps students who have trouble with reading understanding and vocabulary (Palumbo & Loiacono, 2009).

2.2.5 Levels of Reading Comprehension

Bloom's taxonomy (1956) classifies reading comprehension into six levels, including knowledge level, comprehension level, application level, analysis level, synthesis level, and evaluation level.

Knowledge level refers to a lowest level of Bloom's taxonomy. It involves recalling specifics information or facts, recalling techniques and procedures, or recalling a pattern, structure, or setting of the reading text.

Comprehension level refers to an understanding of the reading text. Readers are able to draw connections from the complex information and instead describe it in their own terms (Cullinane, 2010) and also summarize the information from the text as well.

Application level involves the ability of applying the information or knowledge from the reading text. It is expected of readers to adapt or apply their acquired knowledge to a new situation. For instance, after finishing a reading assignment, readers can respond to the questions that are provided. The provided questions have to be in a different format (Anderson et al., 2001).

Analysis level refers to the break down material into its component parts that the relative hierarchy of ideas is made clear. It involves the ability of distinguishing facts from hypotheses. It is higher level than comprehension and application level since it requires an understanding of both the content and structural form of the material.

Synthesis level involves the ability to combine elements to create a new or unique pattern. In this level, readers are required to use the given facts to create new theories or make predictions at this level (Cullinane, 2010).

Evaluation level refers to the ability to assess the accuracy of the reading text and draw conclusions. Readers are supposed to evaluate the reading text's quality.

The current study focused on comprehension level. The seventh graders were expected to be able to state the topic of text, the main idea, and answer questions from short passages, tales, or stories and also reading materials such as newspapers, journals, or websites. They should be able to understand the meaning provided in the text, including ideas and information, and recall directly stated information.

2.3 Electronic Mind Mapping

2.3.1 Definitions of Electronic Mind Mapping

Electronic mind mapping is a new teaching technique for reading. As young generations are surrounded by many electronic devices, the technology is quite accessible and familiar to them. Electronic mind mapping is a modern form of mind mapping which is created by specialized software (Aljaser, 2017; Al-Badwoi, 2015). Electronic mind map is comprised of various elements, such as lines, arrows, geometrical forms, images, colors, and symbols. The use of several colors in e-mind mapping can also enhance memory and inspire innovation (Tungprapa, 2015; Abdulbaset, 2016). Atmono et al. (2021) states that “electronic mind mapping employs the same steps as traditional mind mapping through using computer software that automatically generate flow branches of idea derived from central one. It is a potentially effective evaluation technique. It enabled instructors to acquire understanding into their students' analytical and synthesis skills as well as their students' thought processes.”

Electronic mind mapping is also flexible and allow the construction of verbal and visual models for the presentation of educational content at different structural levels (Mamontova, 2016). These maps are an active learning strategy that contributes to improving memory, generating creative ideas, and organizing information in a manner that facilitates reading, retrieving information, and connecting concepts through lines or arrows (Aljaser, 2017). The electronic mind mapping therefore has an important role in education. It is a teaching method which combines the principles of mind mapping and technology in order to support students' reading comprehension. The e-mind mapping in this study is used to help organize the students' idea using texts, shapes, images, and colors.

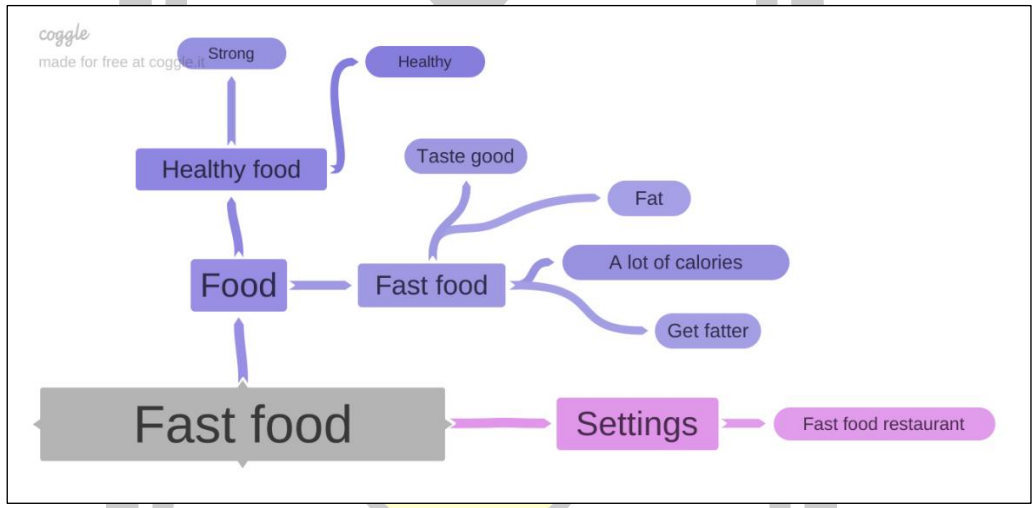

Figure 6 The example of created electronic mind mapping.

2.3.2 Roles of Electronic Mind Mapping in Improving Reading Comprehension

According to Tungprapa (2015), electronic mind mapping is effective since they rely on quick and specialized computer software that includes images, colors, and designs, as well as photographs and drawings to entice the reader (Aljaser, 2017) and raise students' concentration level and improve their comprehension by making learning interesting and studying easier, as well as encouraging them to think freely (Hasan, 2013; Abdulrazeq, 2016). In addition, Ruffini (2008) argues that electronic mind mapping is an outstanding e-learning tool for organizing and navigating Web-based content. It enables teachers to express ideas and demonstrate interrelationships between concepts and the curriculum using a highly visual and non-linear framework.

Phongploenpis & Supangyut (2018) also notes some roles of mind mapping including helping students to focus on key word and concepts, store related facts together, be aware of hierarchies as well as to encourage creative thinking. Students can better comprehend and recall the passage through the creation of important connections, themes, and relationships between ideas and information (Baghagho, 2021). Moreover, Yen & Thao (2021) also stated that mind mapping helps students to organize information, enhance comprehension, improve retention of details, and provide an overview of the reading text by visually representing the relationships between different concepts, mind mapping facilitates a deeper understanding of the reading texts and support more effective learning.

2.3.3 Advantages and Disadvantages of Electronic Mind mapping

According to Tungprapa (2015), electronic mind mapping is more effective and more appealing than traditional mind mapping since they rely on professionally quick and specialized computer software that includes images, colors, and designs. Similarly, Aljaser (2017) mentions that electronic mind mapping is more effective and eye catching than traditional ones since they rely on professionally quick and specialized computer software that incorporates photographs, colors, and drawings to entice the reader. It raises students' concentration level, gain knowledge, improves the performance of their memories, makes learning interesting, and make studying simpler as well as encourage them to think freely (Hasan, 2013; Abdulrazeq, 2016). Ruffini (2008) states that electronic mind mapping is an outstanding e-learning tool for organizing and navigating Web-based content. It enables instructors to express ideas and demonstrate interrelationships between concepts and curriculum using a highly visual and non-linear framework. Moreover, Phongploenpis and Supangyut (2018) points out the advantages of mind mapping are helping students to focus on key word and concepts, to store related facts together, to be aware of hierarchies as well as to encourages creative thinking. Electronic mind mapping is an effective method for brainstorming because it allows ideas to be captured as they are provided, without regard to their placement in a hierarchy (Yunus, 2022).

On the other hand, electronic mind mapping also has its disadvantages. Fadillah (2019) argued that electronic mind mapping method requires computers for instruction and it

took longer time to create and organize the ideas. Likewise, the study of Almelhi (2017) showed that electronic mind mapping used computers as a tool for instruction and generate mind mapping. Due to the fact that some students may have trouble using a computer and may find it difficult to summarize text, the mind mapping method might be time-consuming (McClean, 2019).

In summary, electronic mind mapping's visual representation of reading materials offers students a more intuitive and comprehensive way to approach and comprehend complex texts. It provides a clear and organized view of the content, making it easier to identify key concepts and relationships within the text, ultimately enhancing the overall reading comprehension experience. Furthermore, electronic mind mapping employs various visual elements such as colors, shapes, and images to enhance the representation of ideas. These visual cues can serve as memory aids, making it easier for students to recall and retain information. Additionally, electronic mind mapping allows students to actively engage with the content by adding their own notes, comments, or links, further reinforcing their understanding. However, the process of organizing electronic mind mapping could indeed be time-consuming.

2.4 Collaborative Strategy

2.4.1 Definitions of Collaborative Strategy

Barkley et al. (2014) states that collaborative strategy is a strategy that students work together and share idea to complete assignments. Additionally, Ayon (2013) defines collaborative strategy as a pedagogical practice in which students work together in small groups of two or more to complete a common task within the class session or outside the classroom for a certain period of time ranging between two weeks and a month depending on the complexity and the scope of the task. Laal and Ghodsi (2011) also state that collaborative strategy is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product. It involves small groups to employ in education as part of a working together technique, which encourages students to cooperate in order to improve both their own and one another's learning (Johnson & Johnson, 1996; Smith & MacGregor, 1992).

2.4.2 Roles of Collaborative Strategy in Improving Reading Comprehension

Laal and Ghodsi (2011) state the benefits of collaborative strategy, which involves actively engaging students in the learning process. In collaborative learning settings, students work together in groups, actively participating and contributing to the learning experience. Students have the opportunity to interact and build relationships with classmates who possess different strengths and experiences and also encourages diversity understanding, students gain exposure to diverse ideas, values, and ways of thinking (Webb, 1980; Peterson & Swing, 1982) as well as help reduce anxiety since working together in a group can provide a sense of social support, as students can rely on each other for assistance, guidance, and encouragement. According to Hazeymeh & Alomery (2021) stated that brainstorming helps students to exchange their ideas and information of the reading texts as well as helps them to create associations between the main ideas, supporting ideas, and conclusion of the reading texts. Chalermchai (2017) encouraged group discussions and collaborative e-mind mapping activity that enable students to actively engage with the reading texts, construct knowledge together, support each other's learning, and enhance their communication and collaboration abilities. It supports a collaborative and interactive learning environment where students can express their ideas, and learn from others.

2.5 Previous Studies

2.5.1 Previous Studies in Global Context

This current study focuses on investigating the effectiveness of an electronic mind mapping in improving reading comprehension. The following studies are included in this section as relevant studies for electronic mind mapping and mind mapping used in teaching and learning reading comprehension in global context as follows:

Mohaidat (2018) also conducted a quasi-experimental study to investigate the effect of e-mapping on reading comprehension. An experimental group was taught the chosen texts using the Electronic Mind Mapping strategy while a control group was taught the same texts using the traditional method. The study data were collected using a reading comprehension test that was administered for both groups as a pre and a post-test. The findings demonstrated that a higher level of comprehension in the experimental group than in the control group during the post-test.

Wangmo (2018) conducted a qualitative research design to investigate the implementation of digital mind mapping tools on academic reading and summary writing using Mindmeister. The participants were thirty-one first-year students studying a Bachelor of Engineering in Power Engineering at Jigme Namgyel Engineering College. Their CEFR level was between B1 and B2, with a few students at the A2 level in reading. The instruments were a pre- and post-test, attitude questionnaire, as well as self-assessment form. Before completing the pre-test, students were expected to complete the self-assessment in order to assess their ability of reading and writing. After completing the self-assessment, students were asked to complete the pre-test which included six reading passage. They were required to read and solve the comprehension questions and write a summary of the passages in the pre-test as well as post-test. The findings showed that digital mind mapping tools improved academic reading comprehension and summary writing skills. Specifically, students were able to distinguish between major and minor points and extract the substance of the original passage.

Manotas (2019) used mind mapping on a short fictional text to improve their reading comprehension of twenty-seven tenth-graders in Colombia. Four instruments were used to collect data: rubric, reading comprehension pre- and post-test, mind mapping which was Mind Manager, and field notes. The results of the study revealed that students could summarize, and classify the key concepts and ideas as well as reading comprehension post-test scores were higher than pre-test scores.

Felipe et al. (2019) investigated the implementation of mind mapping as graphic organizers to teach reading comprehension skills to second graders of the Sur Oriental Boston branch School. The participants were fifteen ESL second grade students. The teacher used flash-cards, worksheets containing mind mapping as a graphic organizer tool, along with narrative text and reading comprehension questions. The results showed that mind mapping was effective for the learners to become aware of how to classify specific information in the mind map under specific titles.

Anh et al. (2020) examined the use of mind mapping to improve reading comprehension in Vietnamese EFL undergraduate students at a public university in Ho Chi Minh City, Vietnam. A mixed-method research design was used and the research instruments

included a pre- and post-test, attitude questionnaire, and interview. Students were provided the pre-test which consisted of 20 questions and provided the instruction of using mind mapping as a part of learning. After completing the pre-test and treatment, the post-test was administered to the students. After completing the test, the students were given a questionnaire to assess their opinions on the mind mapping method. After completing the questionnaire, students were interviewed. The interview questions were prepared on the basis of the questionnaire in order to collect in-depth information from the students regarding the efficacy of mind-mapping. The findings showed that using mind mapping in reading can help students identify the general idea of the reading text, review the text and new words as well as enhance motivation in reading.

Saori (2020) conducted a qualitative research design. The participants were two English teachers who teach in the second grade of senior high schools. Each English teacher had eight meetings that observed by the researcher. The instruments were an observation, document analysis checklist and interview. Teachers assigned students to state the title of the text, problem, action, setting, characters, emotion, and conclusion. The findings stated that using mind mapping help easily understand the text as well as develop brainstorming.

Al Shdaifat & Al-Abed Al-Haq (2021) also investigated e-mapping using a quasi-experimental design with fifty seventh graders from UM Ateya Al-Ansaria Basic School for Girls in Qasabat Mafraq Directorate of Education in the northern region of Jordan. They were divided into experimental and controlled group and the research instrument was a reading achievement test which included nine questions. The exam included true/false, multiple-choice, and fill-in-the-blank questions to assess the four subskills of literal reading comprehension. The first question involved identifying cause and effect. The second question examined the ability to recognize important components. The third, sixth, seventh, and eighth questions required students to find information (who, what, where, when). The fourth question examined the sequencing skill, which required students to sequence facts. The fifth question related to the skill of outlining, whereby students were required to outline the text's details. Students completed the pre-test before the treatment stage and completed the test again after the treatment. This study, which was completed in one semester, revealed that using

electronic mind mapping was effective in raising the level of understanding of reading texts and students enjoyed and were enthusiastic about this form of instruction.

Hardiyanti et al. (2021) conducted a quasi-experimental study with thirty-two eleventh-grade students and also found that e-mapping highly adaptive and effective tool for enhancing reading comprehension ability.

Al-Jarf (2021) examined Free-mind as mind mapping software in teaching reading. The participants were EFL freshman students and reading comprehension tests and an attitude questionnaire were used as research instruments. The findings indicated that mind mapping software was effective in enhancing reading comprehension among EFL freshman students. The students also had positive attitudes towards mind mapping and reading English texts. They considered mind mapping a new way of showing interrelationships between main topics and supporting details.

Hamid (2021) conducted quasi-experimental research design using E-mind mapping on Prep School Students' Metacognitive Reading Skills. The participants were 50 EFL first- year prep stage students at Abd Elwahab Elgohary Preparatory School in Egypt. The instruments were a questionnaire, a test, and a Rubric of metacognitive reading test. The findings showed that E- mind mapping has a positive effect on improving reading comprehension and students were also able to judge and express their attitude toward the reading text.

Novitasari & Nisa (2021) conducted a qualitative research design involving the use of mind mapping through miMind application in improving students' reading comprehension of narrative text. The participants were 36 first-year students at a public high school in Indonesia. The instruments were a reading comprehension test and questionnaire. The results showed that 89% of students responded positively to mind mapping through miMind application response, while 11% gave negative responses. It was also shown that mind mapping technique through miMind application is effective in improving students' reading comprehension of narrative text.

Finally, Yunus (2022) conducted a qualitative research design with senior high school students in Indonesia. An interview was conducted between the teacher and the students to determine the students' attitude of e-mind mapping and its impact on their reading

skills. Students were also observed using a checklist during the implementation of e-mind mapping. The findings showed that e-mapping method has a positive impact on students' reading comprehension as well as interested in English text.

2.5.2 Previous Studies in the Thai EFL Context

This current study focuses on investigating the effectiveness of an electronic mind mapping in improving reading comprehension. As relevant studies for electronic mind mapping and mind mapping used in teaching and learning reading comprehension in Thai EFL contexts, the following studies are provided in this section:

Chaichompoo (2017) investigated the use of e-Mapping to improve the reading comprehension and summary skills of EFL students. The participants were fifty second-year English major students. The instruments used were reading comprehension pre- and post-tests, fourteen reading passages, and an attitude questionnaire. Students were asked to complete pre- and post-test consisted of 20 questions to assess their reading comprehension abilities. Students were also required to register for the free online mind mapping website Mindomo.com. Students completed the post-test after using mind mapping throughout the semester. The results indicated that mind mapping enabled the learners to analyze and summarize the contents of the reading passages more quickly and accurately.

Piengkes et al. (2019) investigated the effects of mind mapping technique and students' English achievement. The participants were thirty-five fourth grade students in demonstration school of Khon Kaen University. The instruments were five lesson plans and an achievement test. In order to analyze an achievement test, mean, percentages, and effectiveness index were used. The findings revealed that mind mapping helped students to categorize and organize ideas that emerged from brainstorming and identify content associations with the average mean score of 18.3 (S.D. = 2.68).

Yimwilai and Samonlux (2020) investigated the effect of electronic mind mapping on students' reading abilities. The study was conducted with forty-two undergraduate students enrolled in the Critical reading course and the American short story course. The instruments included a reading achievement test, lesson plans, and a semi-structured interview. Before the lessons, students were asked to complete the pre-test which consisted of 30 questions, with 4 multiple choice answers in each question.

Students were required to identify topics, main ideas, references, purposes, the author's attitude and tone, inferences, conclusion, as well as facts and opinions. After the lessons, the students completed the post-test, which was the same test as the pre-test. In the semi-structured interview stage, the attitudes of the students regarding the use of electronic mind mapping in the classroom were discussed. There were four open-ended questions. The results revealed that e-mind mapping enhanced students' reading ability and motivated them to read. Electronic mind mapping was convenient for the learning environment and also helped with class presentations, enhanced their creativity, and most importantly, reduced their boredom in the classroom.

Kamchorn et al. (2022) examined the effect of using mind mapping towards English reading comprehension. The study was conducted with twenty-six students at grade 8 – 9. The two instruments were used which were reading comprehension test and lesson plans. The findings revealed that students improved their reading comprehension through mind mapping method with a statistically significantly at .01.

Namtong and Yiemkuntitavorn (2022) investigated the effects of using mind mapping on English reading comprehension ability of fifth graders. The participants were seventeen fifth graders in Nakhon Si Thammarat province. Three instruments included eight lesson plans, reading comprehension test which contained 12 items, and satisfaction questionnaire which contained 11 statements. The study was conducted within four weeks with sixteen hours. The findings showed that post-test scores are higher that pre-test scores which indicated that students improved their reading comprehension with the use of mind mapping with the total mean score of 48.06 (S.D. = 3.17) as well as students' satisfaction toward mind mapping was at a very high level with the total mean score of 4.57 (S.D. = 0.55).

Pannim et al. (2022) investigated the improvement of reading comprehension skills using multimedia storytelling with mind mapping for students with learning disabilities. The participants were thirty-six students with learning disabilities from fourth grade to six grade in Bangkok. The study conducted with two experimental groups and a control group. The instruments were the proposed mobile application with contained with multimedia storytelling and mind mapping and the pre- and post-test. The proposed mobile application was provided to the first experimental group, which included mind

mapping and multimedia storytelling, while the proposed mobile application was provided to the second experimental group, which included multimedia storytelling. The control group was assigned to use hand-drawn mind mapping after teacher read texts. The results showed that using multimedia storytelling and mind mapping improved students' reading comprehension, with a significant difference between the mean reading comprehension scores of the students' pre-test and post-test at the.01 level. It also allowed students to interact with a variety of media, including graphic images, sounds, and texts. The learner's attention may be stimulated and improved with this strategy.

Sommanut and Pianchana (2022) investigated the development of learning achievement in reading comprehension of eight graders using concept mapping. The participants were sixteen eight-graders who were chosen by cluster random sampling. The instruments were four lesson plans, a reading comprehension pre- and post-test included thirty items, and satisfaction questionnaire included fifteen statements. The study was conducted in eight hours. The findings revealed that students improved their reading comprehension after treatment by mind mapping with the total mean score of 20.69 (S.D. = 4.42). Additionally, students satisfied with the use of mind mapping in improving their reading comprehension at very high level with the total mean score of 4.79 (S.D. = 0.41). The researchers suggested that times of collecting data need to be increased and two-group experimental is required in the future research.

According to the studies mentioned above, a number of studies in the Thai EFL context involved junior high school students at various grades, while fewer of them involved university students. However, less emphasis is paid to teaching reading comprehension to Thai EFL seventh-graders using electronic mind mapping. In order to analyze students' attitudes, this study employed an attitude questionnaire, whereas a few studies employed a satisfaction questionnaire. One of the studies employed a semi-structured interview to acquire qualitative data. Therefore, a semi-structured interview was also employed in this study in order to support the findings derived from the students' attitude questionnaire.

2.6 Summary of the chapter

This chapter delves into the utilization of electronic mind mapping to improve the reading comprehension skills of Thai EFL seventh graders. Previous studies applied the cognitive theory of multimedia learning to assess the impacts of multimedia learning, which integrates visual and textual elements, on students' reading comprehension improvement. Electronic mind mapping, which incorporates graphic images, served as the primary tool for investigations. The interactive model was employed to provide students with new vocabulary in the initial stages of teaching and an overview of the materials they would be reading. A combination of various assessment tools was employed, including multiple-choice questions, open-ended inquiries, and cloze tests. The inclusion of multiple-choice questions was based on their recognized effectiveness in evaluating comprehension, making them suitable for students of all proficiency levels. Collaborative learning theory was also integrated into the studies, advocating for group discussions and collaborative e-mind mapping activities. These activities encouraged active engagement with the reading material, fostering collective knowledge construction, mutual learning support, and the development of communication and collaboration skills among students. Furthermore, this chapter provides a literature review of studies related to electronic mind mapping. Detailed information on the research methods is described in the following chapter.

CHAPTER III
RESEARCH METHODS

This chapter presents the research methods used in conducting the research. It discusses the research paradigm and design, participants and setting, research instruments, data collection procedure and data analysis.

3.1 Research Paradigm and Design

Mixed methods research is an approach where both qualitative and quantitative data are gathered for a single research subject. Researchers using this method merge their qualitative and quantitative results to gain a more profound comprehension. This approach is chosen when there is a need for in-depth insights into concepts or phenomena. While either a standalone quantitative or qualitative study can offer valuable insights, relying on a single method may fall short of fully grasping a topic or issue. Researchers conducting mixed methods research recognize the significance of combining both qualitative and quantitative methods to attain a more comprehensive understanding. However, it is essential to emphasize that mixed methods research is not just about collecting additional data without a clear purpose. Instead, it involves a purposeful approach to crafting research questions and carefully choosing suitable research methods to effectively address and fill gaps in knowledge related to a specific research inquiry.

The current study used two phases to investigate the effect of electronic mind mapping on the reading comprehension of Thai EFL seventh graders. A quantitative method was employed to collect and analyze the data from a reading comprehension pre-test and post-test and an attitude questionnaire. The qualitative method was employed to collect data from a semi-structured interview to gain a deeper understanding of complex phenomena and explore participants' perspectives.

3.2 Participants and Setting

This study was conducted in an opportunity extended school, a public school in Yasothon province. Using an intact class as selection criteria, the participants were ten seventh graders (five males and five females). Participants were 12 to 13 years old, and their native language (L1) was Thai. All participants spoke English as their foreign

language and had been learning English for six years. However, the students were considered to be at a beginner's level. To improve their English proficiency, all participants were required to enroll in the subject called *Fundamental English* in the second semester of the 2022 academic year. Fundamental English was a subject for seventh graders which required students to understand basic words, sentences, and the main idea of reading texts.

All participants resided in a small village in a rural area of Yasothon province. Their parents were farmers. The students faced difficulties learning English. In their daily learning, they seemed uninterested in reading English texts. They also encountered difficulties distinguishing the topic sentence from the supporting sentences, skimming, and scanning. Consequently, as indicated by their low reading comprehension scores, students had great difficulty understanding the meaning of the paragraphs they read.

3.3 Research Instruments

This study included three instruments: a reading comprehension pre-test and post-test, an attitude questionnaire, and a semi-structured interview. These instruments are described in detail in the following sections.

3.3.1 Reading comprehension pre-test and post-test

The reading comprehension pre-test and post-test were used to examine the participants' reading comprehension before and after the implementation of electronic mind mapping. The reading comprehension pre-test and post-test consisted of four short passages with 30 test items, which included 16 multiple-choice questions with four options for each question, 11 open-ended questions, and 3 cloze test questions. The reading passages were obtained from an educational website for EFL students. The same reading passages and questions were used for both the pre-test and the post-test. The test items were derived from the content of Grade 7th English passages that were also obtained from an educational website for EFL students. They included the following topics: Fast food, A Visit to the Water Park, Going fishing, and Students from Different Countries. The passages were appropriate for junior high school students and related to the Basic Education Core Curriculum B.E. 2008 determination of themes. Each reading passage included 100 – 150 words. All 50 items were examined by three

experts to verify the content validity, using an index of Item Objective Congruence (IOC). The IOC ranged from -1 to +1, with +1 meaning congruent, 0 meaning unclear, and -1 meaning incongruent. Items with an IOC score of more than 0.5 were retained, whereas items with less than 0.5 were discarded. The test was then modified in response to the experts' feedback. The difficulty index and the discrimination index of the test were also verified. Based on these indexes, 30 items were selected for the actual pre-test and post-test.

3.3.2 Students' attitude questionnaire

An attitude questionnaire was administered after the treatment to examine the participants' attitudes toward the electronic mind mapping teaching method. The questionnaire comprises close-ended questions in response to the instructional strategy using electronic mind mapping. The attitude questionnaire was in Thai and consisted of 16 items with a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The questionnaire included two sections. The first section assessed students' attitudes toward the electronic mind-mapping teaching method after the treatment, and the second section included two open-ended questions that aimed to gather students' opinions on the treatment. Three experts were asked to examine and rate the validity of the questionnaire.

3.3.3 Semi-Structured Interview

A semi-structured interview was used to obtain qualitative data to support the findings from the students' attitude questionnaire. Five participants were purposively selected to participate in the face-to-face interview since it can assess all participants' attitudes (Adams, 2015: 495), which included four open-ended questions. The interview was conducted in Thai after the treatment using an audiotape, and each interview took approximately three minutes.

3.4 Data Collection Procedure

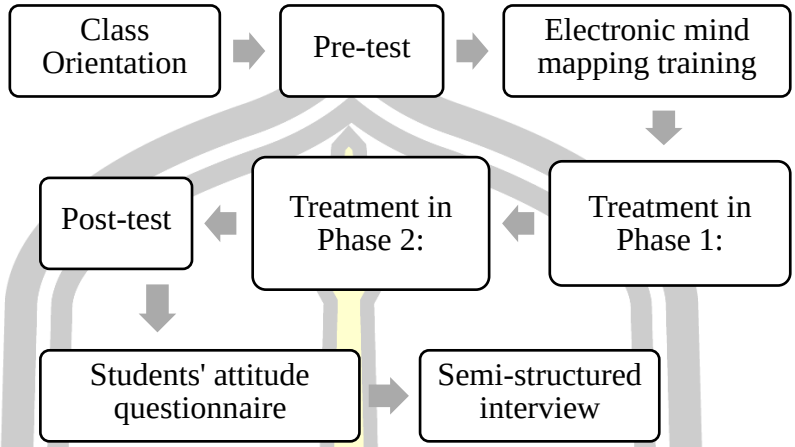

Figure 7 Data Collection Procedure

The participants were first given a class orientation. Before the experiment, the participants were informed of the concept of electronic mind mapping, purposes of this study, the research procedure, and the benefits of using electronic mind mapping. The participants' parents were asked to submit the ethical consent form. Then, the pre-test was administered to examine participants' reading comprehension before implementing electronic mind mapping. The pre-test was completed in 1 hour.

The teaching phase as the treatment step then began, which included three stages: pre-reading, while-reading, and post-reading activities. In the pre-reading stage, the teacher provided students with unknown vocabulary from four short passages and asked them to guess the meaning of the words. The teacher informed students about an online platform for creating mind mapping, which was www.Coggle.it. This online platform was used by students to create their mind mapping of the reading passages. In the while-reading stage, the teacher assigned students to work in groups of 3 - 4 students. The teacher assisted the students in forming predictions, expressing visuals while reading, and vocalizing a difficult point. The teacher also explained strategies to improve their comprehension, including rereading a sentence, reading ahead to explain, and using the context. In the post-reading stage, the participants interpreted the text. The teacher assigned them to work collaboratively and students were required to use the mind mapping to summarize their information.

In accordance, this study was carried out using two phases, which included four steps: planning, acting, observing, and reflecting. The first phase was a pilot stage to generate solutions to practical concerns, and the second phase was the stage to develop a teaching method from the reflection of the first phase. The first phase consisted of four steps: planning, acting, observing, and reflecting. In the planning step, the teacher designed the lesson plans. In the acting steps, the teaching procedure from lesson plans was employed. After that, the researcher observed how students reacted during the treatment using electronic mind mapping and reflected based on the outcomes. The reflection stage allowed the researcher to revise the teaching plans for the second phase. The second phase consisted of four steps. The three revised lesson plans were used. The planning step involved the preparation step of using lesson plans 2 – 4. In the acting step, the teaching procedure from lesson plans was employed. The observing step was the same as the phase 1. The researcher observed, reflected, and evaluated.

Table 1 Lesson Plan

Week	Class Session No.	Topic	Teaching Strategies & Activities
2	4	Mother's Day	Pre-reading 1. Teacher read aloud the topic. 2. Teacher introduced the unknown vocabulary. 3. Teacher provided vocabulary games. 4. Teacher introduced sentence structures which related to the passages. 5. Teacher presented the picture of the passage and asked them, "What can you see in this picture?" and "Can you guess what the story is about?" 6. Teacher discussed with students about the topic and the picture. While-reading 1. Teacher read aloud the story and picked some complicated sentences in the passage to describe. 2. Teacher assigned two students to read aloud one part of the passage.

Week	Class Session No.	Topic	Teaching Strategies & Activities
			3. All students read aloud the whole the passage together. 4. Students scanned the passage, found the vocabulary they had learned, and then applied the vocabulary to the passage in order to comprehend the meaning of the text. 5. Students were required to complete exercise 1, which involved matching the words to the correct pictures.
2	5	Mother's Day	Post-reading 1. Teacher let students work in groups of 3-4 for brainstorming on discussion about the text. 2. Teacher assigned students to complete electronic mind mapping. Teacher assisted students in creating electronic mind mapping when they found it complicated. 3. Students had to answer the questions to check their understanding through exercise 2, which involved answering the question from the text. 4. Students had to state the main idea of the passages.

After the treatment, the participants took the reading comprehension post-test. The test included the same set of reading passages and questions as the pre-test, and the duration was one hour. The participants were then given 15 minutes to complete the attitude questionnaire to assess their attitude towards the e-mind mapping method. Finally, five participants were purposively selected to participate in a semi-structured interview. The face-to-face interview was conducted in Thai to avoid any language barriers. The interview was recorded and transcribed. The data collection procedure is summarized in Figure 7.

3.5 Data Analysis

To answer research question #1, the data collected from the pre- and post-test were analyzed using t-test dependent.

To answer research question #2, the data collected from the attitude questionnaire were analyzed using percentage, mean and standard deviation. The data from the semi-structured interviews were analyzed using content analysis. According to Graneheim & Lundman (2003), the obtained data were divided into meaningful segments, or "meaning units" to categorize or break down the obtained data into accessible coding categories. After identifying meaning units, condense or summarize the data. This condensation involves reducing the content within each unit to its core essence while retaining the essential information. Once the meaning units are condensed, abstract the key concepts or ideas from each meaning. These abstract notions are then given labels or codes. The codes were then classified into "themes" to summarize the data. The theme usually represents the main idea or content of the meaning unit.

3.6 Summary of the chapter

The current study presents the research methods, including research paradigm and design, participants and setting, research instruments, data collection procedure and data analysis. The treatment was conducted for five weeks, with three hours of instruction per week. It employed two phases. The treatment targeted ten Thai EFL seventh-graders who have experienced difficulties in learning English. The three instruments were used, which were a reading comprehension pre- and post-test, an attitude questionnaire, and a semi-structured interview. A reading comprehension pre-test was administered to the ten Thai EFL seventh-graders before the treatment. After the treatment, a reading comprehension post-test was conducted to evaluate the students' reading comprehension. This allowed for a comparison between their pre- and post-treatment performance to determine the impact of the treatment on their reading comprehension. In addition, an attitude questionnaire was administered to examine the students' attitudes of the electronic mind mapping used during the treatment. To further investigate and validate the students' attitudes, a semi-structured interview was conducted. The semi-structured interview involved open-ended questions that allowed

students to provide more in-depth insights and explanations regarding their attitudes of electronic mind mapping. The SPSS program was employed to evaluate the acquired data statistically. In addition, *t*-test dependent was employed to examine the reading comprehension pre-and post-test results. Mean scores and standard deviations were employed to examine the students' attitude questionnaire findings.

CHAPTER IV
RESULTS

This chapter presents the results of the data analysis and the answers of the two research questions 1) To what extent does the E-mind mapping method affect Thai EFL seventh graders' reading comprehension? and 2) What are the students' attitude about E-mapping in regards to improving reading comprehension?. This chapter consists of four sections are as follows. The first section compares the reading comprehension of seventh graders before and after employing electronic mind mapping. The second section reveals the seventh graders' attitudes toward electronic mind mapping as a method of improving their ability to comprehend the passages in order to respond to the second question. The third section reveals the results from the semi-structured interview to support the findings from students' attitude questionnaire. The last section includes a summary of the current chapter as well as the overall findings of the two research questions.

4.1 The effect of E-mind mapping method on Thai EFL seventh graders' reading comprehension.

Research Question 1: To what extent does the E-mind mapping method affect Thai EFL seventh graders' reading comprehension?

Table 2 The comparison of reading comprehension pre- and post-test scores

Students No.	Pre-test		Post-test		Dif.
	Score	%	Score	%	%
1	6	20	16	53.33	33.33
2	3	10	19	63.33	53.33
3	4	13.33	20	70.00	56.67
4	5	16.67	15	50.00	33.33
5	3	10	16	53.33	43.33
6	4	13.33	22	73.33	60
7	1	3.33	15	50.00	46.67
8	2	6.67	21	70.00	63.33
9	2	6.67	16	53.33	46.67
10	5	16.67	19	66.67	50
Total	$\bar{x}$ = 3.50 S.D. 1.581	$\bar{x}$ = 11.67	$\bar{x}$ = 17.90 S.D. 2.601	$\bar{x}$ = 60.33	

In order to answer the first question, the data obtained from the reading comprehension pre-test and post-test and then analyzed to find mean scores, standard deviations, percentages, and t-test. Table 2 as shown above presents the mean scores and percentage of students' reading comprehension pre- and post-test scores.

Table 3 A summary of students' reading comprehension

	N	Mean	S.D.	t	P (Sig.)
Pre-test	10	3.50	1.581	15.235	.000
Post-test	10	17.90	2.601		

Note: Significant at the 0.01 level ($p < 0.01$)

Table 3 presents a statistical summary of students' reading comprehension. In this study, a one-tailed hypothesis test was used to analyze the data. The p-value, which is reported as .000, indicates a statistically significant difference between the mean scores of students in the reading comprehension pre-test and post-test at the 0.01 significance level, $(t=15.235, p<0.01)$. The mean scores of reading comprehension pre-test are 3.50 (S.D. = 1.581), whereas the mean scores of reading comprehension post-test is 17.90 (S.D. = 2.601). It indicates that E-mind mapping improves students' reading comprehension, as shown in the post-test score, which is higher than the pre-test score.

4.2 The students' attitude about E-mind mapping in regards to improving reading comprehension.

Research Question 2: What are the students' attitude about E-mapping in regards to improving reading comprehension?

To answer the second question the data were analyzed mean scores, standard deviations, and percentages. The results of applying the e-mind mapping method to the data collected from the students' attitude questionnaire. It included two aspects: electronic mind mapping and reading comprehension strategies, which were both addressed by the closed-ended and open-ended questions. The students rated on a 5-points scale ranging from strongly disagree to strongly agree. Based on Best (1981), the following range of mean scores were used to interpret the findings: Very high =

4.50 - 5.00, High = 3.50 - 4.49, Average = 2.50 – 3.49, Low = 1.50 - 2.49, and Very low = 1.00 - 1.49.

4.2.1 Students' attitude towards the use of electronic mind mapping in reading comprehension

The aspect 1 of the students' attitude questionnaire was purposed to investigate students' attitude toward the use of electronic mind mapping on improving seventh graders' reading comprehension. The questions in the aspect 1 were a close-ended questions which included twelve items which students were asked to rate the items from strongly disagree (1) to strongly agree (5). The results of the agreement are revealed in the Table 4. The following table shows the findings of the mean scores and the standard deviation of the students' attitude questionnaire.

Table 4 Students' attitude towards the use of electronic mind mapping in reading comprehension

	Questionnaire items	Mean	S.D.	Results
Aspect 1: Electronic mind mapping				
1	Using the electronic mind mapping in reading classes was interesting.	4.70	0.46	Very high
2	Using the electronic mind mapping in reading classes was useful.	4.80	0.40	Very high
3	Using the electronic mind mapping helped me understand the content of the story better.	4.60	0.49	Very high
4	Completing the information in the electronic mind mapping was easy.	4.70	0.46	Very high
5	The electronic mind mapping helped me to identify the main ideas of the stories.	4.60	0.49	Very high
6	The electronic mind mapping helped me to identify key elements of the stories.	4.60	0.49	Very high

	Questionnaire items	Mean	S.D.	Results
Aspect 1: Electronic mind mapping				
7	I found that using the electronic mind mapping after reading helped me remember details from the stories better.	4.70	0.46	Very high
8	The electronic mind mapping helped me to summarize the stories.	4.60	0.49	Very high
9	Creating electronic mind mapping was helpful for me in answering comprehension questions.	4.60	0.49	Very high
10	The electronic mind mapping made reading more purposeful.	4.50	0.50	Very high
11	The reading classes in which the electronic mind mapping was used were effective.	4.70	0.46	Very high
12	I would like to use the electronic mind mapping in upcoming reading classes.	4.70	0.46	Very high
	Total	**4.65**	**0.47**	**Very high**

Table 4 presents the mean scores of students' attitude towards the use of electronic mind mapping in reading comprehension. The highest mean score was item 2: *"Using the electronic mind mapping in reading classes was useful"* ($\bar{x}$=4.80, S.D.=0.40). Furthermore, students reveal that *"Using the electronic mind mapping in reading classes was interesting"* ($\bar{x}$=4.70, S.D.=0.46), *"Using the electronic mind mapping helped me understand the content of the story better"* ($\bar{x}$=4.60, S.D.=0.49), *"Completing the information in the electronic mind mapping was easy"* ($\bar{x}$=4.70, S.D.=0.46), *"The electronic mind mapping helped me to identify the main ideas of the stories"* ($\bar{x}$=4.60, S.D.=0.49), *"The electronic mind mapping helped me to identify key elements of the stories"* ($\bar{x}$=4.60, S.D.=0.49), *"I found that using the electronic mind mapping after reading helped me remember details from the stories better"* ($\bar{x}$=4.70, S.D.=0.46), *"The electronic mind mapping helped me to summarize the stories"*

(x̄=4.60, S.D.=0.49), *"Creating electronic mind mapping was helpful for me in answering comprehension questions"* (x̄=4.60, S.D.=0.49), *"The electronic mind mapping made reading more purposeful"* (x̄=4.50, S.D.=0.50), *"The reading classes in which the electronic mind mapping was used were effective"* (x̄=4.70, S.D.=0.46) and *"I would like to use the electronic mind mapping in upcoming reading classes"* (x̄=4.70, S.D.=0.46).

In conclusion, the overall level of using the electronic mind mapping in reading comprehension class was very high level of agreement, with a mean score of 4.65 (S.D. = 0.47). It indicates that seventh-grade students have positive attitudes with the use of electronic mind mapping to enhance their reading comprehension.

4.2.2 Students' attitude towards the reading comprehension strategies in reading comprehension class

In the aspect 2 questionnaire, students were required to respond the four items which were close-ended questions in order to investigate respondents' attitude toward the use of two reading comprehension strategies adopted in the reading comprehension class: graphic organizers and collaborative strategy. The results of the agreement are revealed in the Table 5.

Table 5 Students' attitude towards the use of reading comprehension strategies

	Questionnaire items	Mean	S.D.	Results
Aspect 2: Reading comprehension strategies				
Graphic organizers				
13	I found that graphic organizers helped me understand the stories through drawing inference.	4.70	0.46	Very high
14	I found that graphic organizers helped me draw connections between prior knowledge and the new information.	4.70	0.46	Very high
Collaborative strategy				

	Questionnaire items	Mean	S.D.	Results
15	I found that sharing information with friends helped me understand the stories better.	4.80	0.40	Very high
16	Working with friends made me understand how to create an electronic mind mapping.	4.80	0.40	Very high
	Total	**4.75**	**0.43**	**Very high**

Table 5 presents the mean scores of students' attitude towards the use of reading comprehension strategies. The highest mean score was item 15 and 16: *"I found that sharing information with friends helped me understand the stories better"* with the mean score of 4.80 (S.D.=0.40) and *"Working with friends made me understand how to create an electronic mind map"* with the mean score of 4.80 (S.D.=0.40). On the contrary, the lowest mean score was item 13 and 14: *"I found that graphic organizers helped me understand the stories through drawing inference"* with the mean score of 4.70 (S.D.=0.46), *"I found that graphic organizers helped me draw connections between prior knowledge and the new information"* with the mean score of 4.70 (S.D.=0.46).

In conclusion, the use of graphic organizers and the collaborative strategy resulted in the findings shown in Table 5, which indicate that the average level of agreement is very high, with a mean score of 4.75 (S.D. = 0.43).

4.3 The students' attitude about E-mind mapping in regards to improving reading comprehension: Semi-structured interview.

The current section is presented to address the second question and to corroborate the findings from the students' attitude questionnaire. Five participants were purposefully chosen to be interviewed and provided with four open-ended questions. All respondents agreed that implementing electronic mind mapping for improving their reading comprehension was an effective approach since it provided an exciting teaching method and encouraged them to analyze the stories and identify the main idea, which they thought it was difficult.

*"*I was able to comprehend the stories better and more clearly.

(Respondent 1)

"It was a good teaching method because I was able to understand English story through creating mind mapping."

(Respondent 2)

"It encourages me to read since I could understand the passages and identify the main idea."

(Respondent 3)

"I think it effective to me because I was able to comprehend the passages."

(Respondent 4)

"I think it was a good method because it reduced boredom in English class since it was a unique way of teaching that I had not experienced before and because I was permitted to use a computer in reading class."

(Respondent 5)

All respondents also found that studying reading comprehension using electronic mind mapping was enjoyable and helped them keep themselves more involved in their English classes since it offered them access to an interesting online platform as well as provided them with the motivation to search for images to add to their mind mapping.

"I think it was a good method because it reduced boredom in English class and allowed me to study English using an online platform and I could design my e-mind mapping with my classmate and search some pictures to decorate our mind mapping."

(Respondent 1)

"I enjoyed using E-mind mapping in class since I could design it with helpful features on the web platform, such as having to use different colors to distinguish each sub-topic."

(Respondent 2)

"I enjoyed implementing this method since it was a unique way to teach that attracted my attention."

(Respondent 3)

"*I think it was a good method because it reduced boredom in English class since it was a unique way of teaching."*

(Respondent 4)

"It reduced boredom in English class since it was a unique way of teaching that I had not experienced before and because I was permitted to use a computer in reading class. This e-mind mapping platform provided me with interesting features such as adding pictures, changing the colors of lines, and changing shapes."

(Respondent 5)

Three respondents found graphic organizers helpful in organizing information and enhancing their comprehension of stories.

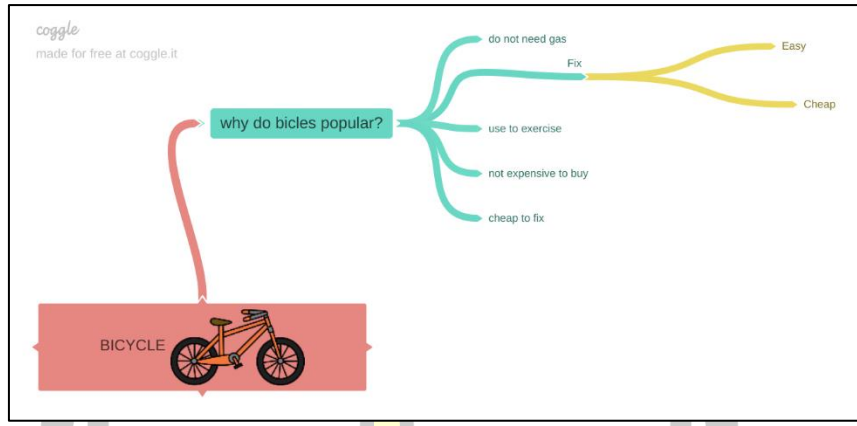

Figure 8 Students' electronic mind mapping

"The graphic organizers provided subtopics for dividing the information into smaller groupings, they made it easy for me to summarize the passages."

(Respondent 2)

"It helps me to summarize information because it enabled me to express my ideas through it and I could answer the questions from those passages."

(Respondent 4)

"It helps me organize my information from texts as well as understand the passages with simplicity."

(Respondent 5)

Additionally, three respondents are able to communicate with others in their group to clarify any complicated information when they were having trouble comprehending the information from the stories they were reading.

"I was able to brainstorm with classmate, it helps to increase my reading comprehension since I can focus on the story's keywords and importance details."

(Respondent 2)

"I found that discussing the passages with my friends and creating our mind mapping together had helped me understand them better."

(Respondent 3)

"I could collaborate with classmate for sharing information from the passages when I found it complicated."

(Respondent 4)

On top of that, three respondents reported that they accepted that using this teaching method had improved their reading comprehension and their ability, to sum up the main idea of a story. They require the teacher to use this method in future reading classes.

"I want the teacher to implement the e-mind mapping method in the next class."

(Respondent 1)

"I found it was effective for me, and I hope teacher keep using this approach to instruction."

(Respondent 2)

"This type of teaching helped me organize information from the texts and was exciting, I was able to understand the passages with simplicity. I hope the teacher will implement this method in the following classes."

(Respondent 5)

Although many respondents revealed positive attitude about E-mind mapping method however using e-mind mapping method could be time-consuming and difficult for two respondents.

> *"I think it was difficult and took times at the first time"*
>
> (Respondent 1)

> *"The first time I studied reading comprehension through E-mind mapping, I found it was difficult, but in the end, I found it was effective for me."*
>
> (Respondent 2)

In conclusion, all respondents had positive experiences with implementing electronic mind-mapping method and found it beneficial for improving reading comprehension and encouraging creativity. The use of electronic mind mapping allowed them to effectively summarize and consolidate their understanding of the stories or passages they read. Furthermore, the collaborative strategy employed by the respondents contributed to their improved comprehension. Collaborative learning encourages active participation, discussion, and the sharing of different perspectives, which can deepen understanding and expose individuals to new insights. By working together on mind-mapping activities, the respondents likely benefited from the collective knowledge and perspectives of their peers, enhancing their comprehension even further.

4.4 Summary of the chapter

This current chapter presented the findings of two research questions, and the overall conclusion is that the findings are positive. The findings of the first question revealed that students had the ability to understand and comprehend texts or stories more effectively. Furthermore, their level of reading comprehension is on the comprehension level as defined by Bloom's Taxonomy (1956). The findings of the second question revealed that students had a very high level of positive attitude, with an average mean score of 4.68, regarding the applying of electronic mind mapping as a tool to improve their reading comprehension. The interview-based evidence corroborated this assertion, with most students expressing an appreciation for the use of electronic mind mapping,

which, in their view, not only enhances their reading comprehension but also reduces their boredom during English reading classes.

CHAPTER V
DISCUSSIONS AND CONCLUSION

This chapter discusses findings on the effect of e-mind mapping on seventh graders' reading comprehension and their attitude toward the e-mind mapping method. This current chapter also covers pedagogical implications, limitations of the study, recommendations for future research, and conclusion of the study.

5.1 Summary of the findings

The purposes of this study were to investigate the effect of electronic mind mapping on Thai EFL seventh graders' reading comprehension and to examine their attitudes about electronic mind mapping in improving their reading comprehension.

According to the *t*-test dependent results, there was a significant difference between the pre-and post-test mean scores for reading comprehension, with the pre-test mean score of 3.50 and the post-test mean score of 17.90. The results showed that electronic mind mapping helped students comprehend what they were reading. Additionally, students showed a very high level of agreement on their attitudes toward using electronic mind mapping to improve their reading comprehension, as revealed by their average mean score of 4.68 on the attitude questionnaire.

5.2 Discussion of the findings

5.2.1 The effect of electronic mind mapping on students' reading comprehension

Based on the pre-test and post-test results, the students' reading comprehension significantly improved after learning through electronic mind mapping to improve reading comprehension at the 0.01 level. Furthermore, the post-test scores ($\bar{x}$ =17.90) were found to be significantly higher than the pre-test ($\bar{x}$ = 3.50). This indicated that the students' reading comprehension improved after learning through electronic mind mapping.

The reading comprehension post-test scores improved from the pre-test scores due to a few reasons. Firstly, electronic mind mapping represents an application of the cognitive theory of multimedia learning (CTML). Electronic mind mapping involves the use of graphic organizers that incorporate graphic images, serving as visual aids that can assist students in constructing visual representations of the information contained in the texts

they have read (Alkhasawneh et al., 2013; Samat & Aziz, 2020). When students were presented with both images and text, they would actively choose which ones to store in their working memory as students typically have a restricted capacity to hold a limited amount of textual information (Paivio, 1971). Consequently, the use of electronic mind mapping could aid them in structuring words, text, and graphical images into a cohesive mental framework. This facilitated their ability to integrate these materials with their prior knowledge to comprehend the information. The students' excerpts are as follows:

"I could design my e- mind mapping with my classmate and search some pictures to decorate our mind mapping."

(Respondent 1)

"I enjoyed using e-mind mapping in class since I could design it with helpful features on the web platform, such as having to use different colors to distinguish each sub-topic."

(Respondent 2)

"This e-mind mapping platform provided me with interesting features such as adding pictures, changing the colors of lines, and changing shapes."

(Respondent 5)

Utilizing electronic mind mapping as a graphic organizer serves as a visual aid for students. In this study, students were tasked with creating mind mapping that incorporated graphic elements. This approach enhanced students' understanding of the components of reading texts once they had completed their mind mapping. This is because of combining textual and visual elements can activate various cognitive processes and promote a more profound grasp of the texts (Mayer, 2005). The following excerpts support the findings:

"The graphic organizers provided subtopics for dividing the information into smaller groupings, they made it easy for me to summarize the passages."

(Respondent 2)

"It helps me to summarize information because it enabled me to express my ideas through it and I could answer the questions from those passages."

(Respondent 4)

"It helps me organize my information from texts as well as understand the passages with simplicity."

(Respondent 5)

Hence, the utilization of electronic mind mapping may facilitate students in retaining information in their long-term memory since students receive visual content through their eyes, and when presented with relevant images related to the reading texts, students can potentially form a comprehensive mental picture of the content from the reading texts.

The finding regarding the effectiveness of electronic mind mapping as graphic organizers on improving reading comprehension aligns with the study of Mohaidat (2008), who claimed that electronic mind mapping had an impact on students' reading comprehension since it provided a tool for graphic images and encouraged students to retain passages more effectively. The findings also align with previous studies, which revealed that electronic mind mapping and graphic images helped students improve their reading comprehension (Sam & Rajan, 2013; Aljaser, 2017; Morales et al., 2019; Anh et al., 2020). Students were able to visually represent the connections and relationships between different ideas and concepts within the passages since visual display helped in organizing information. They allowed students to see the overall structure and main points of the text, facilitating a deeper understanding.

Another explanation of students' improvement in reading comprehension may be based on the reading stages used in this study. This current study included pre-reading, while-reading, and post-reading. The pre-reading stage aimed to familiarize students with the vocabulary related to the passages and develop their understanding of sentence structures. A vocabulary game was implemented, which actively engaged the students and facilitated their acquisition and retention of new vocabulary. This game included relevant pictures alongside the text, a strategy that could enhance students' ability to grasp and remember the vocabulary words. During the while-reading stage, both the

teacher and students read the passages aloud. Following the reading, students were tasked to scan the passages to locate the vocabulary they had previously learned. Students could enhance their understanding of the sentences and overall passage meaning by applying the vocabulary in context. In the post-reading stage, which was considered the most critical stage, students had to brainstorm with their friends to discuss information about the passages. Then students were assigned to create an e-mind mapping to summarize the passages. Students' reading comprehension was enhanced by completing the e-mind mapping activity in the post-reading stage. Summarizing the information and creating visual representations of the passages encouraged students to organize their thoughts and identify important information. This activity also allowed students to review and reinforce their understanding of the passages, leading to improved comprehension. The finding is in line with Al-Jarf (2021), who stated that using e-mind mapping in the post-reading stage helped students comprehend the texts. This finding is also in line with the study of Monliang (2022), which reported that using electronic mind mapping in the post-reading stage helped students to comprehend the reading passages better. In addition, the findings are also consistent with previous studies which asserted that electronic mind mapping was useful and effective as the post-reading activity to review the reading passages (Siriphanich & Lohawiriyanon, 2010; Yimwilai & Samonlux, 2020; Phongploenpis & Supangyut, 2018).

Moreover, using the collaborative strategy while reading might improve their reading comprehension. This study encouraged students to exchange information and discuss difficult parts of the passages with their classmates. This collaborative environment fostered others to learn, where students could benefit from diverse perspectives and insights. It also encouraged active engagement with the passage and promoted deeper comprehension. This is in line with Hazaymeh & Alomery (2021), who supported the idea that students can enhance their reading comprehension through activities such as brainstorming and creating associations between the main ideas, supporting ideas, and the conclusion of a given text. These strategies promote active engagement with the text and help students organize their thoughts effectively. The finding also aligns with the study of Chaichompoo (2017), which supported the notion that collaborative

strategy was effective in fostering students' individuality by providing an opportunity for useful discussions and knowledge generation within a group. Moreover, previous studies were also reported that brainstorming as a collaborative strategy encouraged students to create electronic mind mapping and comprehend the reading passages easily (Malekzadeh & Malekzadeh, 2015; Sabbah, 2015; Yimwilai & Samonlux, 2020).

The following excerpts support the findings:

> *"When I brainstormed with classmates, it helped increase my reading comprehension since I could focus on the story's keywords and important details."*
>
> (Student 2)

> *"I found that discussing the passages with my friends and creating our mind mapping together helped me understand the reading passages better."*
>
> (Student 3)

> *"I collaborated with classmates to share information from the passages when I found them too difficult to understand."*
>
> (Student 4)

5.2.2 Students' attitude towards the implementation of Electronic mind mapping in Improving Reading Comprehension

In response to Research Question 2: What are the students' attitude about e-mind mapping in improving reading comprehension? Students' attitude questionnaire was administered to examine their attitude towards electronic mind mapping. A semi-structured interview was also conducted to obtain their attitude of using electronic mind mapping to improve reading comprehension.

The students' attitude questionnaire results indicated that students showed their attitude towards electronic mind mapping at a very high level, with a total mean score of 4.68. Based on the questionnaire results toward aspect 1: electronic mind mapping, it can be inferred that seventh-grade students showed their attitude at a very high level with the use of electronic mind mapping to enhance their reading comprehension with a mean

score of 4.65. The participants responded that the electronic mind mapping was interesting, useful, and effective. It also helped them comprehend the reading texts better, was easy to use, helped them identify the reading texts' main idea and key elements, helped them remember details and summarize them, and helped them answer questions. They perceived that electronic mind mapping helped them understand through drawing inferences, helped them draw connections between prior knowledge and the new information, helped them understand the stories better and helped them understand how to create an electronic mind mapping.

5.3 Pedagogical Implications

The results of this study revealed the positive effect of electronic mind mapping on students' reading comprehension, and their attitude towards the use of electronic mind mapping was at a very high level. The results suggest some pedagogical implications for teachers when teaching reading for comprehension. Teachers should incorporate electronic mind mapping since it provides students with graphic images and help them to see components of the reading passages and comprehend the reading passages better.

Furthermore, this current study implemented three reading stages: pre-reading, while-reading, and post-reading. In pre-reading was designed to prepare students for the upcoming reading task. It aimed to activate students' attention and familiarity with the upcoming reading passages. One effective way to engage students during this stage is to provide interesting activities related to the passages they will be reading. In the while-reading stage, the goal is to assist students in actively applying the information they have acquired during the pre-reading stages to the reading passages. This approach can indeed enhance their comprehension and enable them to grasp the content more effectively. To support students in this process, teachers should offer additional guidance on how to integrate their prior knowledge with the information presented in the passages. Indeed, the post-reading stage is essential for reinforcing students' comprehension of the reading text and creating electronic mind mapping can be a valuable activity during this stage. Moreover, working in groups of 3-4 students allows for collaborative learning and exchanging ideas. However, it is also beneficial for students to create their own individual electronic mind mapping after the group work.

This individual step further enhances their understanding and application of the information to the mind-mapping process.

By incorporating both collaborative strategy and electronic mind mapping, students have the opportunity to engage in meaningful discussions, collectively make sense of complex information, and benefit from the diverse perspectives of their classmates. This approach will promote active learning, critical thinking, and deeper comprehension of the reading texts.

5.4 Limitations of the study and recommendations for future research

It is important to acknowledge the limitations of a study and consider potential improvements for future research. A one-group pre-test and post-test design may not provide a strong basis for determining the effectiveness of employing electronic mind mapping. Future research may include a two-group experimental design with an experimental group that employs electronic mind mapping and a control group that does not would be beneficial. This would provide stronger evidence of the effects of electronic mind mapping on students' reading comprehension. By using a control group, researchers can compare the outcomes of students who use electronic mind mapping with those who do not, which helps establish a baseline for comparison.

Most students revealed their positive attitude of electronic mind mapping in improving reading comprehension at a very high level. However, some students responded in a semi-structured interview that electronic mind mapping could be difficult and time-consuming. Future research may consider extending the training duration from one hour to three hours to ensure students truly understand how to design an electronic mind mapping. This extended training duration would allow for a more comprehensive understanding of the tools and techniques involved, which could ultimately enhance the effectiveness of electronic mind mapping as an educational tool.

Finally, since this study only used computers to train students to design an electronic mind mapping, future researchers may include other teaching materials to help students understand the concept faster, such as tablets, worksheets, YouTube, and mobile applications.

5.5 Conclusions

This study is aimed to investigate the effect of electronic mind mapping in improving reading comprehension and students' attitudes of this method. The participants were ten Thai EFL seventh-graders who are studying in an opportunity extended school, which is a public school in Yasothon province. This study was conducted with a one-group experimental design. The study was conducted in five weeks. The reading lessons employed both narrative and descriptive passages, and the lessons included three stages: pre-reading, while-reading, and post-reading, which combined with reading comprehension strategies that are graphic organizers and collaborative strategy. The findings of this study revealed that electronic mind mapping affected students' reading comprehension with an overall mean score of 17.90 and a significant difference between the reading comprehension pre-test and post-test mean scores of the students at the .01 level ($t=15.235$, $p<0.01$). The students' attitude toward implementing electronic mind mapping is also positive based on students' attitude questionnaire, which included two aspects with an overall mean score of 4.68 (S.D. = 0.46). Furthermore, semi-structured interview revealed positive opinions toward electronic mind mapping. The positive opinions expressed in the interviews provide additional support for the effectiveness of electronic mind mapping.

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APPENDICES

Appendix A: Reading comprehension pre-test and post-test

Directions: Read the passages and answer the questions with the best answer.

Fast Food

Fast food may taste good, but it is not good for you. You should not eat it very often. This food does not have the vitamins and nutrients that you need. Healthy food will help you grow strong and healthy. There are extra calories and fat in fast food. Fast food restaurants also give you servings that are too big. Every once in a while, it is fun to go out and have a fast-food meal. In order to stay healthy. These meals should not be eaten all the time. Choose healthier food to keep a healthy diet.

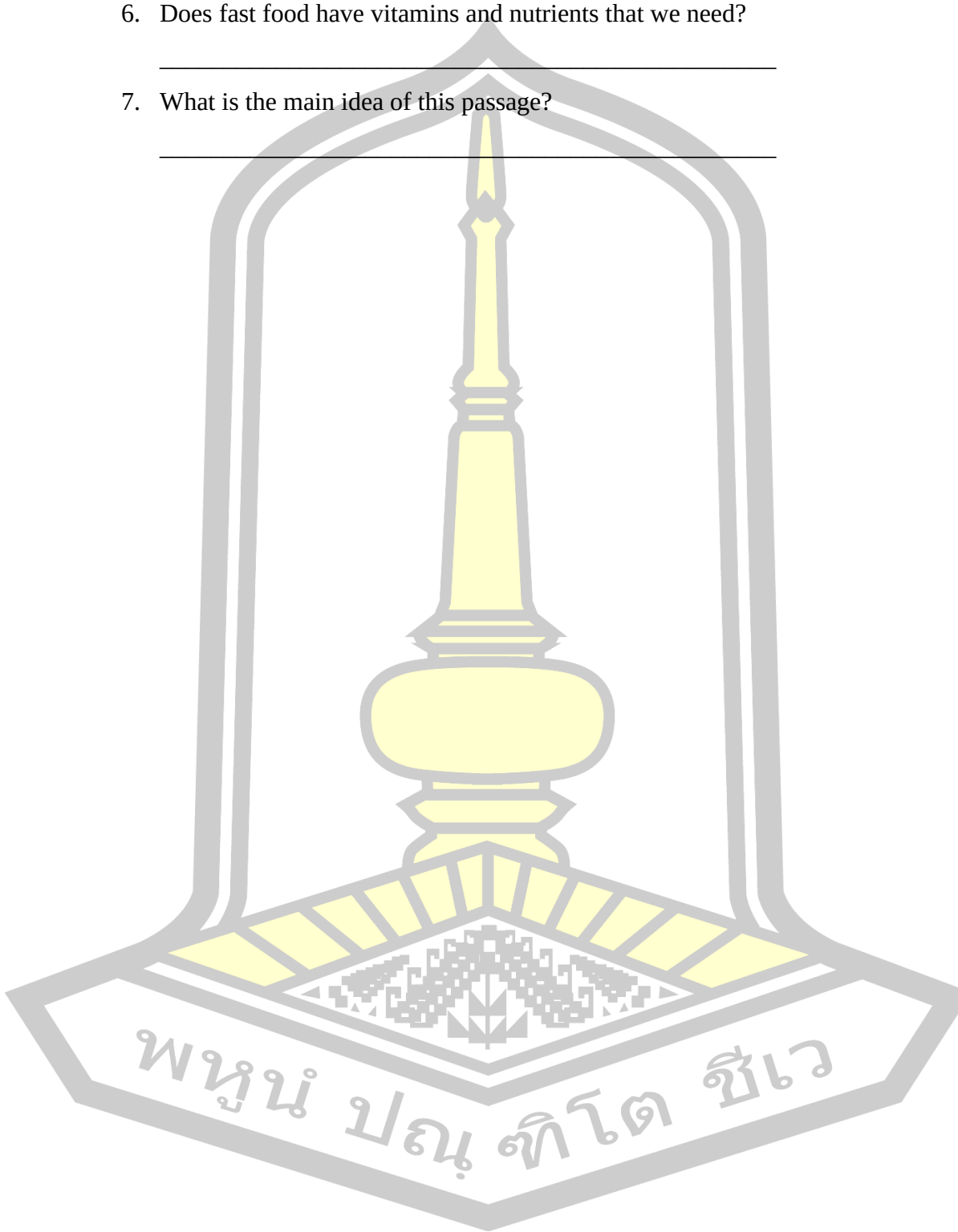
1. What are the benefits of eating healthy food?
    a. It is bad for health.
    b. It helps us strong.
    c. It does not have vitamins.
    d. It has calories.
2. What is **NOT** true about fast food?
    a. It is healthy.
    b. It provides vitamins.
    c. It tastes good.
    d. It makes you strong.
3. What should **NOT** be eaten all the time?
    a. A burger
    b. Salad
    c. Milk
    d. Vegetables
4. What are in fast food?
    a. Vitamins
    b. Nutrients
    c. Calories
    d. None of above.

5. Fast food restaurants give very _____ servings.
6. Does fast food have vitamins and nutrients that we need?

   _____

7. What is the main idea of this passage?

   _____



A Visit to the Water Park

There is a new water park in town. We go there on the first day of summer. It has pools and water slides. There are sprinklers too. The slides are scary at first. After the first ride, we love the water slides. The sprinklers are cool on hot days. One of the pools makes its own waves. All the kids try to surf the waves. It is really fun. The water park can be very crowded. There are many kids and adults, but they do not allow pets. We really like the ice cream at the snack bar. They also sell pop and donuts. We all love the new water park.

1. What is new in town?
    a. A Sprinkler
    b. The donut shop
    c. The water park
    d. The pool
2. What is **NOT** provided in the water park?
    a. Colas
    b. Pools
    c. Water slides
    d. Bicycles
3. What ages are the majority of water park visitors?
    a. Teenagers
    b. Adults
    c. Kids
    d. Elders
4. How many pools can make waves?
    a. One pool
    b. Three pools
    c. Six pools
    d. Two pools

5. The kids try to surf the waves, it was _____.
6. Does the water park allow the pet in?

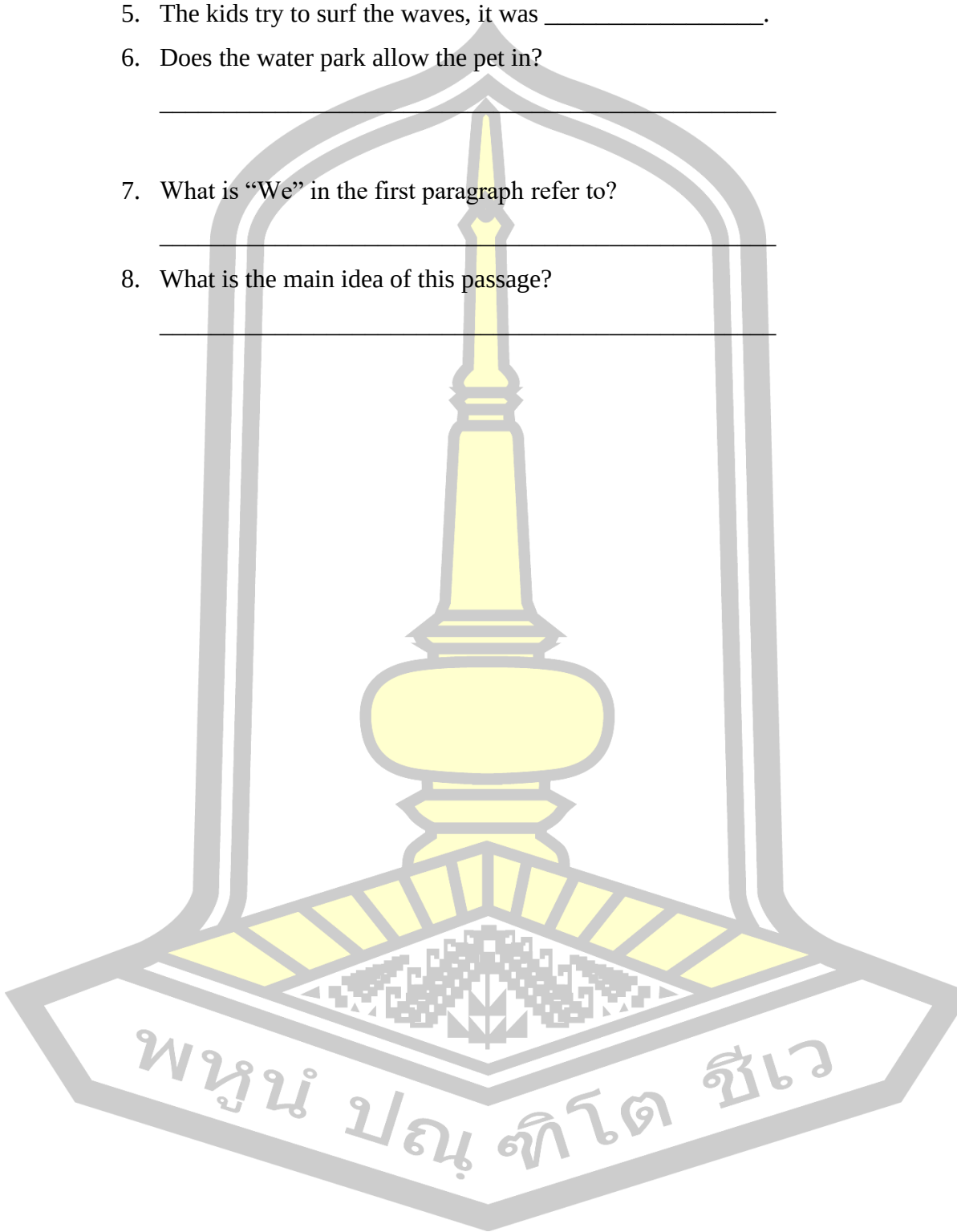
   _____

7. What is “We” in the first paragraph refer to?

   _____

8. What is the main idea of this passage?

   _____



Going fishing

I love to go fishing. I like to sit by the lake in the sun. I have a long fishing rod and a hook on the end of it. I have to put some food on the end of the hook. If the fish like the food they will bite it and I can catch them. If I catch a fish, I can take it home to eat for dinner. I don't catch fish every time I go to the lake, but that is ok it is still fun to try. At the weekend my dad comes fishing with me, he can catch a lot of fish!

1. What does he do with the fish he caught?
    a. He throws it away.
    b. He eats them for his dinner.
    c. He puts it on the hook.
    d. He delivers it to his father’s house.
2. Who goes fishing with him on Saturday and Sunday?
    a. His mother
    b. His friends
    c. His brother
    d. His father
3. What stuff does he bring along when he goes fishing?
    a. He brings a fishing rod, a hook, and food.
    b. He brings fish and a fishing rod.
    c. He brings a hook and a fishing rod.
    d. He brings his meal, a hook, and fish.
4. What happens when fish love the food on the rod?
    a. The fish will spit it out.
    b. The fish will swim away.
    c. The fish will take a bite.
    d. The fish will be stronger.
5. He cannot catch _____ every time but it still fun.
6. Where does he like to sit?

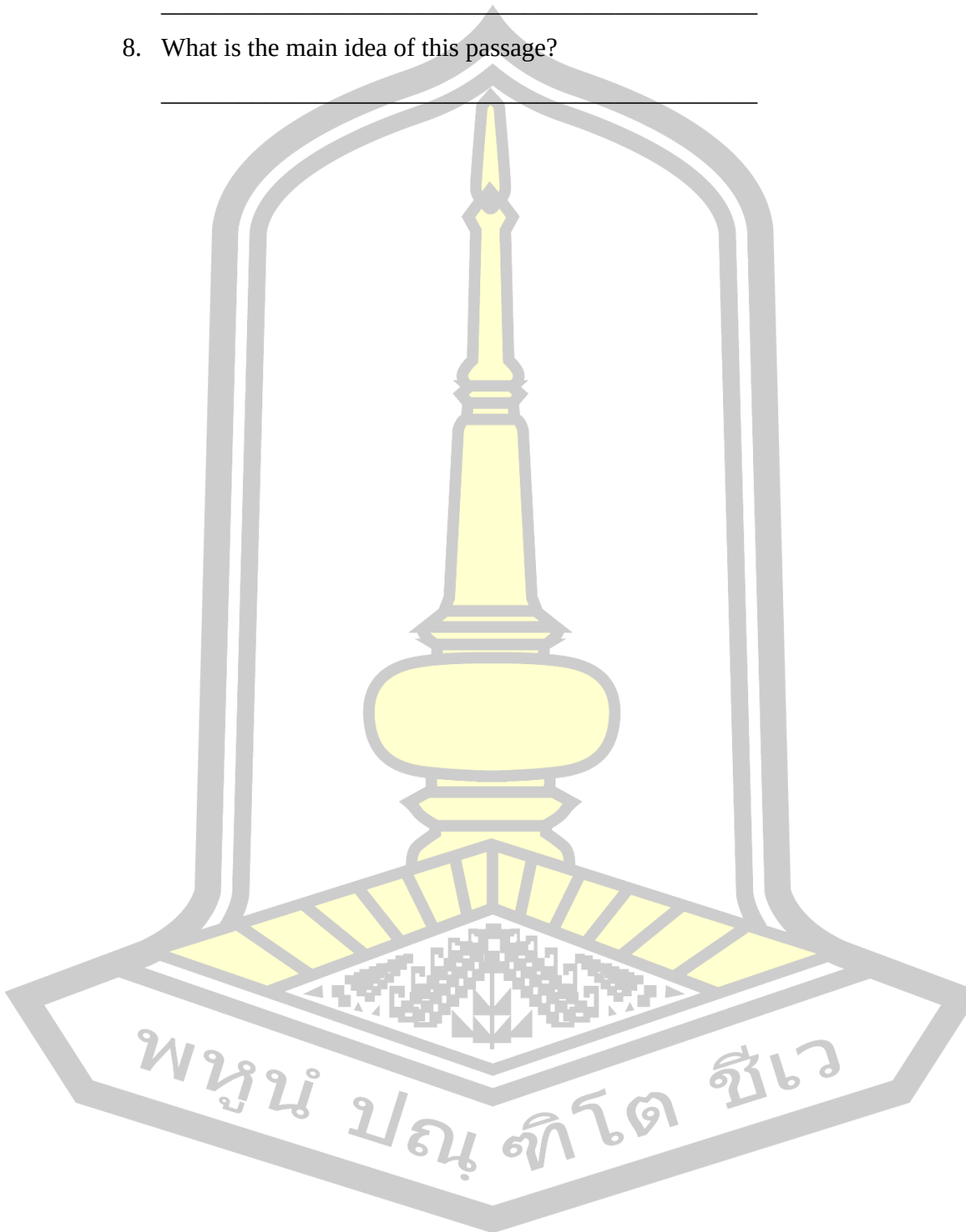
    _____

7. Why does he put food on the end of the hook?

_____

8. What is the main idea of this passage?

_____



Students from Different Countries

The students in the class come from many different parts of the world. Some are from European countries, such as France, Spain, and Italy. Others are from Middle Eastern countries like Saudi Arabia and Israel. Still other students were born in Asian countries, including Japan and Korea. The largest number of students is from Latin American countries like Mexico, Venezuela, and Peru. The class is an interesting mix of people from many different countries. My name is Romeo. I'm from Italy. There are five of my best friends. Steve is Japanese. He's from Hokkaido. Kim is Korean. She's from South Korea. Lee is from the same country as Kim. Alexandro and Camila are from Mexico, which is next to the United States of America.

1. Which Middle Eastern countries are mentioned in the classroom?
    a. France and Venezuela
    b. Mexico and Peru
    c. Israel and Saudi Arabia
    d. Spain and Italy
2. What country is Alexandro from?
    a. He is from Mexico.
    b. He is from Venezuela.
    c. He is from Italy.
    d. He is from Korea.
3. How many of author's best friends?
    a. The author has got two best friends.
    b. The author has got no best friend.
    c. The author has got five best friends.
    d. The author has got three best friends.
4. How many Latin American countries in this class.
    a. There are three countries.
    b. There are two countries.
    c. There is one country.
    d. There is no Latin American country in this class.

5. Who are author’s best friends?

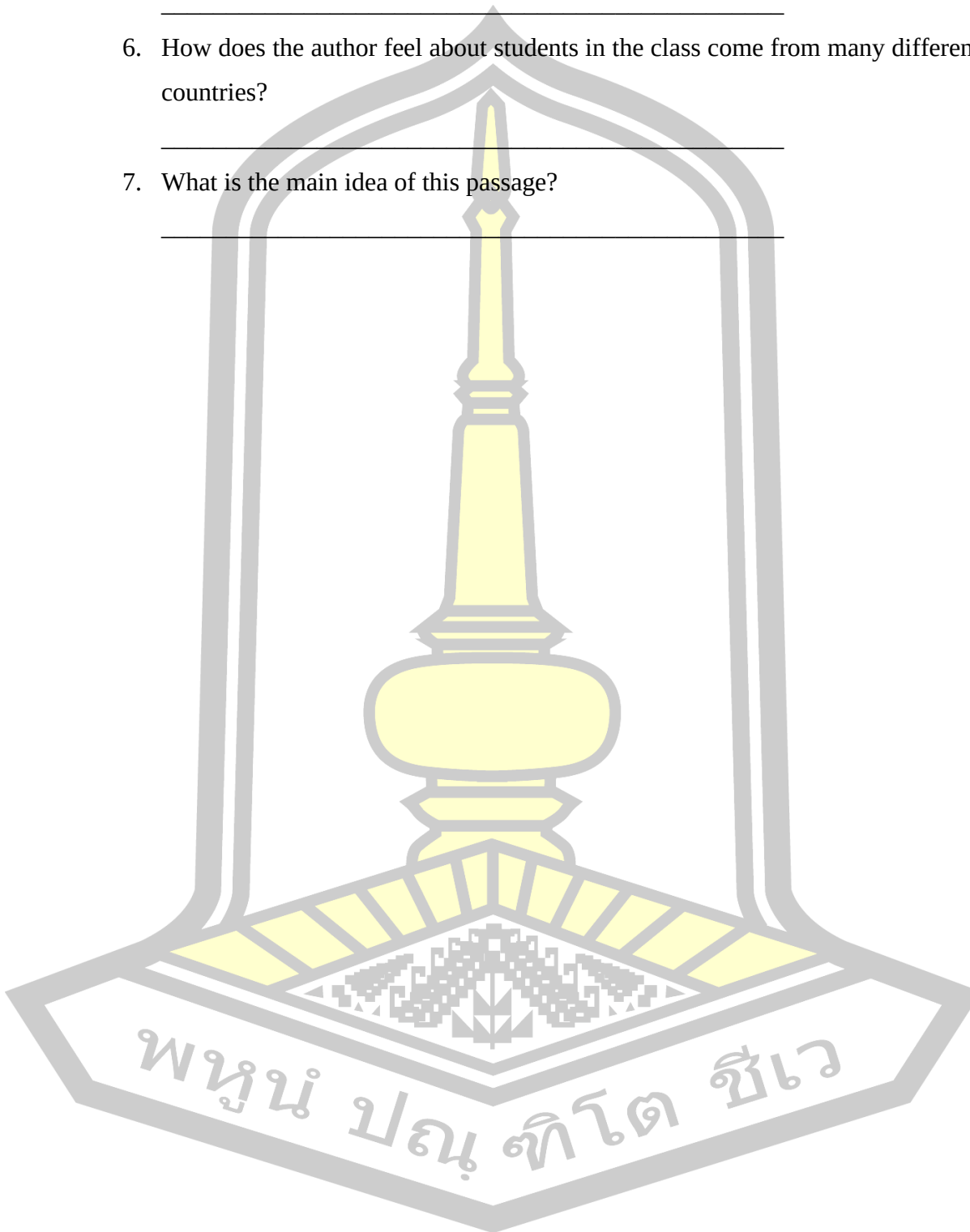
_____

6. How does the author feel about students in the class come from many different countries?

_____

7. What is the main idea of this passage?

_____



Appendix B: Students' attitude questionnaire

Students' attitudes toward e-mind mapping in improving reading comprehension

Directions: Please respond to the following items by placing a check mark (/) in the rating scale

scale according to your opinion.

5 = strongly agree 4 = agree 3 = uncertain
2 = disagree 1 = strongly disagree

Questionnaire Item	Attitudes				
	5	4	3	2	1
Aspect 1: Electronic mind mapping					
1. Using the electronic mind mapping in reading classes was interesting.					
2. Using the electronic mind mapping in reading classes was useful.					
3. Using the electronic mind mapping helped me understand the content of the story better.					
4. Completing the information in the electronic mind mapping was easy.					
5. The electronic mind mapping helped me to identify the main ideas of the stories.					
6. The electronic mind mapping helped me to identify key elements of the stories.					
7. I found that using the electronic mind mapping after reading helped me remember details from the stories better.					
8. The electronic mind mapping helped me to summarize the stories.					
9. Creating electronic mind mapping was helpful for me in answering comprehension questions.					
10. The electronic mind mapping made reading more purposeful.					
11. The reading classes in which the electronic mind mapping was used were effective.					
12. I would like to use the electronic mind mapping in upcoming reading classes.					

Questionnaire Item	Attitudes				
	5	4	3	2	1
Aspect 2: Reading comprehension strategies					
Graphic organizers					
13. I found that graphic organizers helped me understand the stories through drawing inference.					
14. I found that graphic organizers helped me draw connections between prior knowledge and the new information.					
Collaborative strategy					
15. I found that sharing information with friends helped me understand the stories better.					
16. Working with friends made me understand how to create an electronic mind map.					

Open answer

1. When completing electronic mind mapping, you found it difficult to

.....

.....

.....

.....

2. How helpful has the use of electronic mind mapping been in improving your reading comprehension?

.....

.....

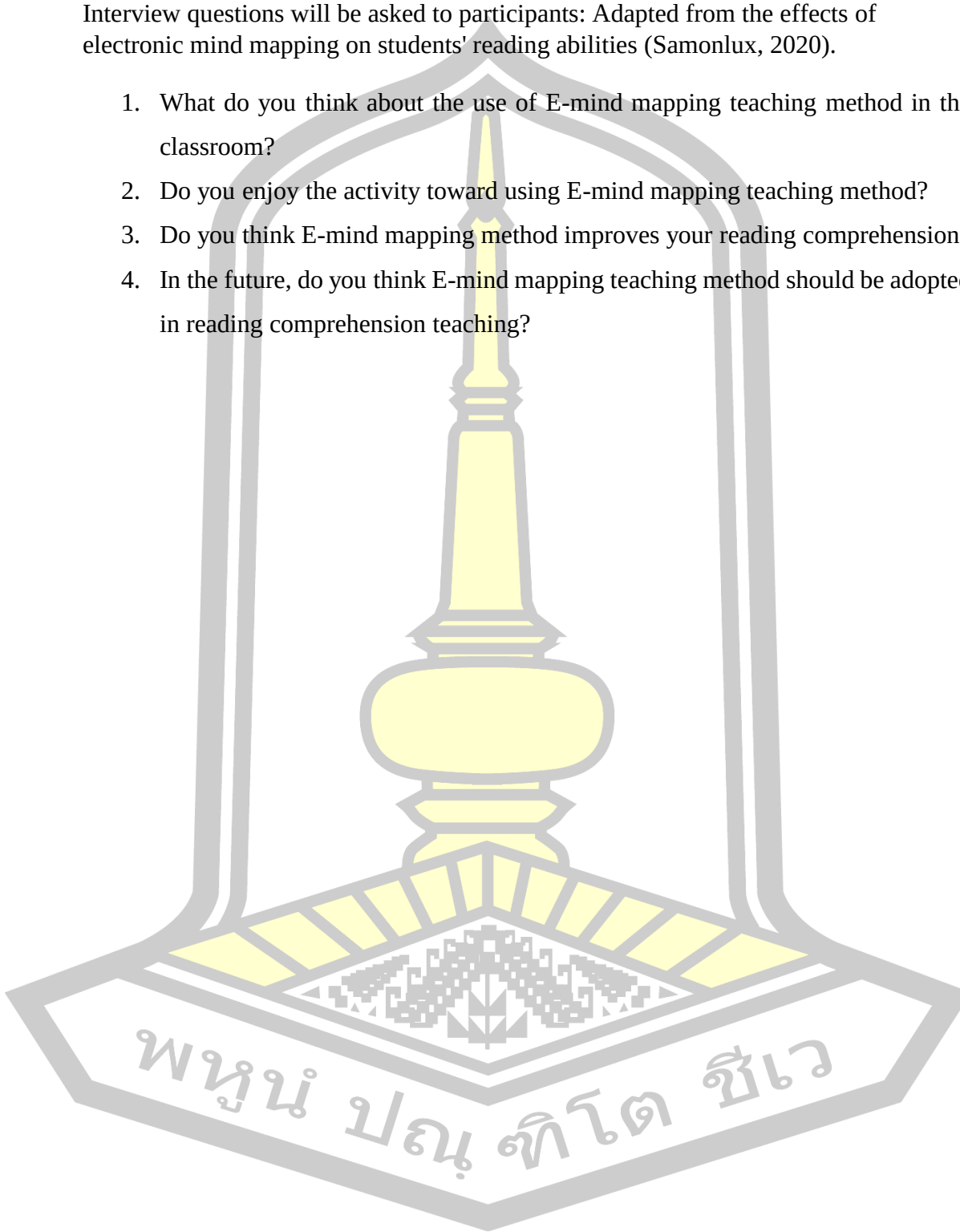
.....

.....

Appendix C: Interview Questions

Interview questions will be asked to participants: Adapted from the effects of electronic mind mapping on students' reading abilities (Samonlux, 2020).

1. What do you think about the use of E-mind mapping teaching method in the classroom?
2. Do you enjoy the activity toward using E-mind mapping teaching method?
3. Do you think E-mind mapping method improves your reading comprehension?
4. In the future, do you think E-mind mapping teaching method should be adopted in reading comprehension teaching?



Appendix D: Lesson Plans

Lesson plan 1: Mother's Day

Course: **Fundamental English (E21102)** **Level of students**: **Grade 7**

Foreign Language Department **Time**: **2 periods**

Learning outcome: 1. Students are able to identify the main idea and details of the text.

2. Students are able to answer the questions from the text.

Learning content: 1. Vocabulary

- Celebration, Around, World, Card, Japanese, Chinese, Bakery, Breakfast, Important

2. Grammar

- Present simple tense

Materials: 1. Handout

2. Exercises 1, 2

Assessment: Students are able to create and design the e-mind mapping using the information from the text and answer the reading questions correctly.

Procedures:

Time	Reading stage	Procedures	
		Teacher (T)	**Students (Ss)**
1	Pre-reading (25 minutes)	1. T asks students to look at the picture and the topic of the story. - What do you see in this picture? - What is this story about? 2. T introduces the unknown vocabulary 3. T introduces sentence structure that related to this story.	1. Students look at the picture and guess what is this story about?

Time	Reading stage	Procedures	
		Teacher (T)	**Students (Ss)**
1 1	While-reading (25 minutes)	1. T reads aloud the story and assign Ss to read aloud one part of the story. 2. T assists Ss when they face the problem on reading aloud. 3. T introduces the strategy to find the main idea of the story. 4. T assigns Ss to gather information and comprehend the story.	1. Ss listen to the teacher and read aloud the story. 2. Ss read the story and discuss their information with their friends. 3. Ss have to comprehend the story and practice to identify the main idea of the story.
2	Post-reading (50 minutes)	1. T assigns collaborative assignment that Ss have to create their e-mind mapping via Coggle.it. One group consist of 3-4 students. 2. T rechecks students' understanding of using e-mind mapping. 2. T asks Ss to check their understanding - What is this story about? - How many characters in this story? And who? 3. T asks students to complete the Exercise 1 4. After completing exercise 1, Ss have to complete answer the question from exercise 2.	1. Ss works in group and create their e-mind mapping in Coggle.it 2. Ss answer teacher's questions. 3. Ss complete exercise 1 and 2.

Handout

Mother's Day

Mother's Day is a celebration for mothers around the world. On this day, people offer cards to their mothers to show love. Some people even make their own cards. While Japanese and Chinese people usually give their mothers some red carnations, Thai people give white jasmines to mothers.

In some European countries like Norway and Belgium, people often go to bakeries to buy some cakes and croissants and bring these to their mothers for breakfast in bed. So, the children and family can take care of their mothers on this important day.

Exercise 1

Vocabulary

Direction: Match these words to the correct pictures.

Celebration Around Japanese World Card
Chinese Bakery Breakfast Important

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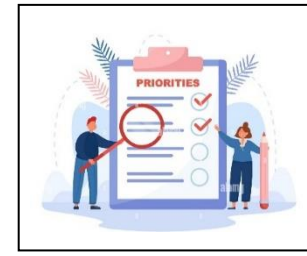

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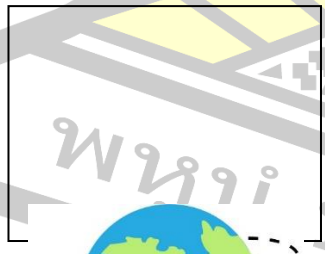

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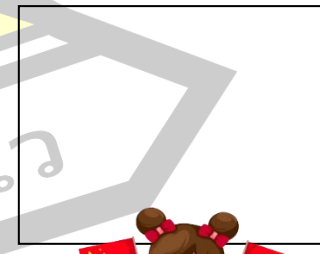

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Exercise 2

Answer the question from the text.

Direction: Answer the questions with the correct answer.

1. What is the purpose of offering cards to mother in Mother's Day?

   ……..

2. What flower that Chinese and Japanese give to their mother?

   ……..

3. European countries buy cakes and croissants for eating in …….

4. Thai people usually give their mother ……..…… in Mother's Day.

5. What is the main idea of this passage?

   ……..

Lesson plan 2: Bicycle

Course: **Fundamental English** (**E21102**) **Level of students**: **Grade 7**

Foreign Language Department **Time**: **2 periods**

Learning outcome: 1. Students are able to identify the main idea and details of the story.
2. Students are able to answer the questions from the story.

Learning content: 1. Vocabulary
- Exercise, Reason, Expensive, Fix, Traffic, Pollution, Gas

Materials: 1. Handout
2. Exercises 1

Assessment: Students are able to create and design the e-mind mapping using the information from the story and answer the reading questions correctly.

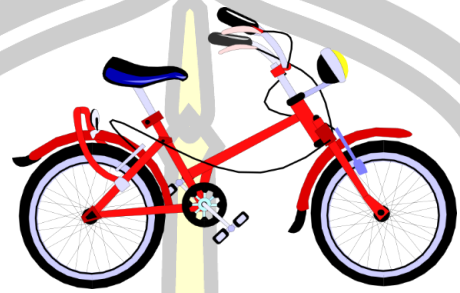
Procedures:

Time	**Reading stage**	**Procedures**	
		Teacher (T)	**Students (Ss)**
1	Pre-reading (25 minutes)	1. T reads aloud the topic. 2. T introduces the new vocabulary. 3. T presents the picture about the passage and asks them "What can you see in this picture?" and "Can you guess what the story is about?" 4. T discusses with students about the topic and the picture. 5. T provides an exercise 1 which Ss are expected to match the words to the correct pictures.	1. Ss look at the picture and guess what is this story about? 2. Students are required to complete exercise 1: match the words to the correct pictures.

Time	Reading stage	Procedures	
		Teacher (T)	**Students (Ss)**
1	While-reading (25 minutes)	1. T reads aloud the text. 2. T picks some difficulty sentences in the passage to describe.	1. Ss have to read aloud the whole passage together. 2. Ss work in group as the same as the previous class. 3. Ss have to scan the text and also identify it.
2	Post-reading (50 minutes)	1. T assigns students to summarize the texts through e-mind mapping and to identify the main idea. 2. T asks students some questions about the text. "Do bicycles cause any pollution?" and "Could you explain the reasons why bicycles are popular?"	1. Ss work in group to summarize the story by creating e-mind mapping. 2. Ss identify the main idea. 3. Ss have to answer the questions from the text.

Handout

Bicycle



Bicycles are very popular today in many countries. Many people use bicycles for exercise. But exercise is only one of the reasons why bicycles are popular. Another reason is money. Bicycles are not expensive to buy. They do not need gas to make them go. They also are easy and cheap to fix. In cities, many people like bicycles better than cars. With a bicycle, they never have to wait in traffic. They also do not have to find a place to park. And finally, bicycles do not cause any pollution!

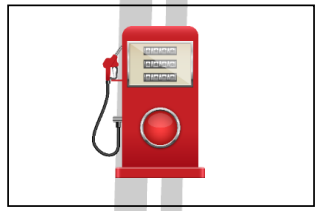
Exercise 1

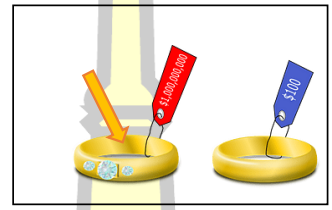
Vocabulary

Direction: Match these words to the correct pictures.

traffic gas pollution exercise

expensive fix reasons





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Lesson plan 3: Ice cream

Course: **Fundamental English** (**E21102**) **Level of students**: **Grade 7**

Foreign Language Department **Time**: **2 periods**

Learning outcome: 1. Students are able to identify the main idea and details of the story.
2. Students are able to answer the questions from the story.

Learning content: 1. Vocabulary
- Treat, Record, Reveal, Mixture

Materials: 1. Handout
2. Exercise
3. Flashcards (Quizlet)

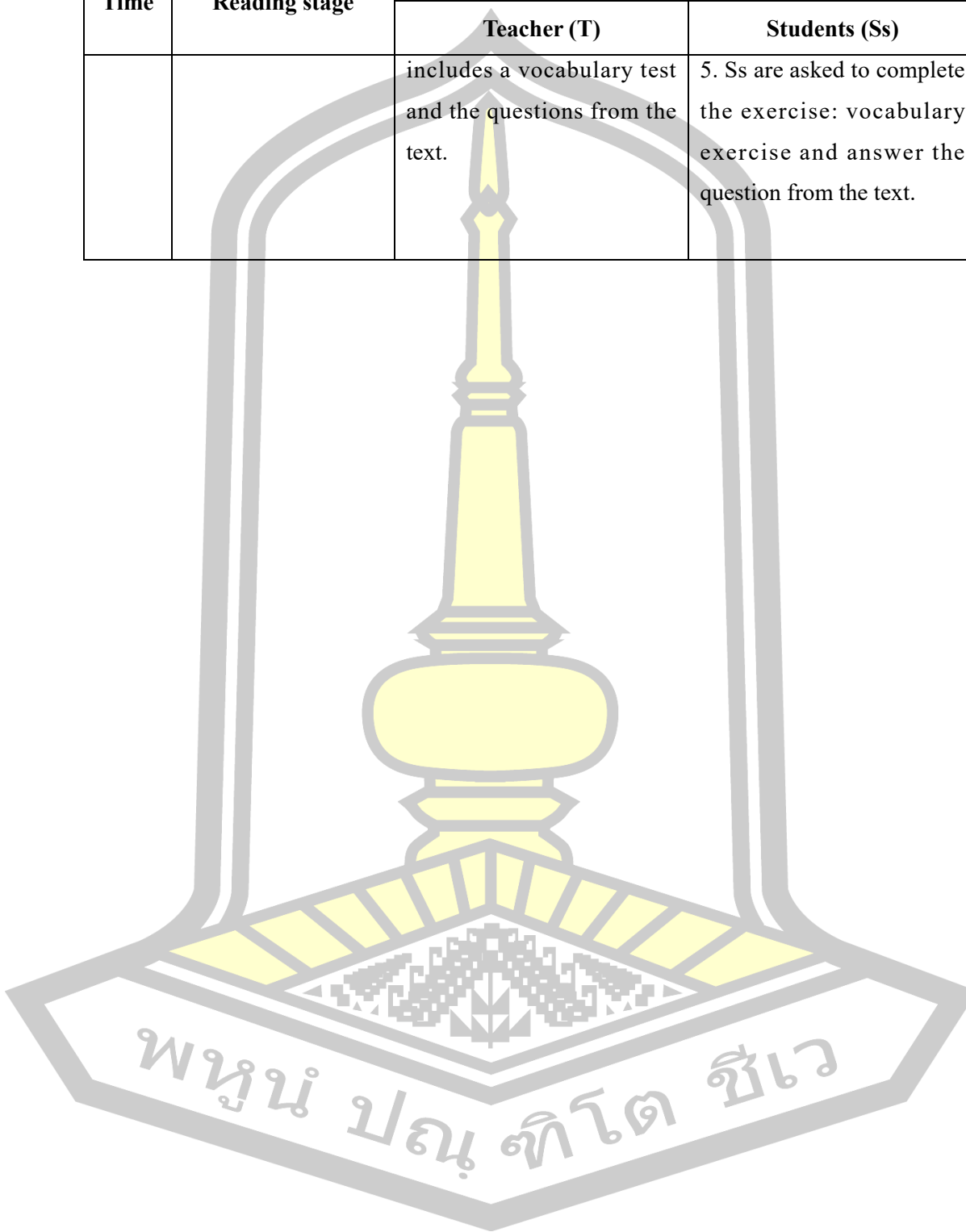
Assessment: Students are able to create and design the e-mind mapping using the information from the story and answer the reading questions correctly.

Procedures:

Time	**Reading stage**	**Procedures**	
		Teacher (T)	**Students (Ss)**
1	Pre-reading (25 minutes)	1. T reads aloud the topic. 2. T presents the picture of ice cream and then asks students "Which flavor of ice cream do you like?". 3. T introduces students the unknown vocabulary which relate to the text. 4. T provides a vocabulary game which is matching vocabulary to correct pictures via quizlet.com.	1. Ss look at the picture and guess what is this story about? 2. Ss are required to answer the question. 4. Ss are required to draw and color their favorite flavor of ice cream.

Time	Reading stage	Procedures	
		Teacher (T)	**Students (Ss)**
			3. Ss are required to complete exercise 1: match the words to the correct pictures.
1	While-reading (25 minutes)	1. T assigns students to read the whole text. 2. T questions the class on part of the text's vocabulary to check their memorization. 3. T assigns students to reread and identify the text individually. 4. T asks students in order to check students' understanding with the question "Do you understand what you read?".	1. Ss read aloud the text. 2. Ss reread and identify the text individually. 3. Ss answer the questions.
2	Post-reading (50 minutes)	1. T assigns students to brainstorm as a group assignment. 2. T asks each group to share their understanding. 3. T assigns students to put the information about the text in electronic mind mapping. 4. T asks students to present their e-mind mapping. 5. T asks students to complete the exercise which	1. Ss are required to brainstorm discussing about the text in the group. 2. Ss present their understanding about the text. 3. Ss create e-mind mapping in order to organize and summarize the text. 4. Each group of students are required to present their e-mind mapping and also share the main idea of the text.

Time	Reading stage	Procedures	
		Teacher (T)	**Students (Ss)**
		includes a vocabulary test and the questions from the text.	5. Ss are asked to complete the exercise: vocabulary exercise and answer the question from the text.



Handout

Ice cream

Ice cream is one of the best – loved treats throughout the world, especially in the United States. Americans eat more ice cream than any other people. In spite of its popularity,

no one knows exactly when ice cream was first made. However, records reveal that Nero Claudius Caesar, Emperor of Rome (in the first century A.D.), enjoyed eating a mixture of snow and fruit juices. In 1295 A.D., the Italian trader, Marco Polo, returned from China and is thought to have brought an Asian recipe for ice cream with him. English colonists probably took ice cream recipes to America as early as the 1700s.

Ice cream: Exercise 1

Vocabulary test and answer the question from the text.

Vocabulary test.

Direction: Match these words to the correct pictures.

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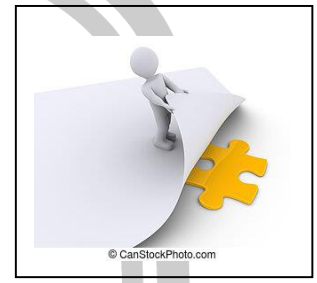

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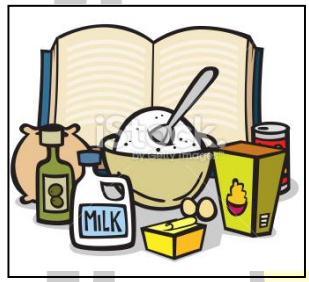

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Answer the question.

Direction: Answer the questions with the correct answer.

1. Who brought Asian recipe for ice cream back to Italy?

……..

2. When English colonists brought recipe of ice cream to America?

……..

3. What is the main idea of this passage?

……..

Lesson plan 4: Medicinal drugs

Course: **Fundamental English** (**E21102**) **Level of students**: **Grade 7**

Foreign Language Department **Time**: **2 periods**

Learning outcome: 1. Students are able to identify the main idea and details of the text.
2. Students are able to answer the questions from the text.

Learning content: 1. Vocabulary
- Medicinal drugs, Driver, Accident, Sick, Harm, Remember, Affect, Careful

Materials: 1. Handout
2. Flashcards (Quizlet)

Assessment: Students are able to create and design the e-mind mapping using the information from the text and answer the reading questions correctly.

Procedures:

Time	**Reading stage**	**Procedures**	
		Teacher (T)	**Students (Ss)**
1	Pre-reading (25 minutes)	1. T reads aloud the topic. 2. T presents the picture of medicinal drugs. 3. T asks students "What is the picture about?" and "Can you guess what the text is about?" 4. T lets students to predict what will happen in the text. 5. T introduces the unknown vocabulary in the text which is underlined through Quizlet.com 6. T provides vocabulary game which is matching	1. Ss look at the picture and guess what is the text about? 2. Ss are required to answer the question. 3. Ss read aloud the vocabulary. 4. Ss join the vocabulary game.

Time	Reading stage	Procedures	
		Teacher (T)	**Students (Ss)**
		vocabulary to correct pictures through Quizlet.com.	
1	While-reading (25 minutes)	1. T assigns students to read the whole text. 2. T questions the class on part of the text's vocabulary to check their memorization. 3. T selects difficult-to-understand parts to explain in detail more clearly. 4. T assigns group assignment to reread and identify the text.	1. Ss read aloud the text. 2. Ss answer the questions. 3. Ss brainstorm in order to reread the text and identify the text.
2	Post-reading (50 minutes)	1. T assigns students to create e-mind mapping. 2. T assigns students to identify the main idea of the text. 3. T asks students to present their e-mind mapping. 4. T asks students a question in order to check their understanding. “Why may medicinal drugs cause an accident?”	1. Ss create e-mind mapping to summarize the text. 2. Ss identify the main idea. 3. Each group of students are required to present their e-mind mapping and also share the main idea of the text. 4. Ss answer the question.

Handout

Medicinal drugs

Medicinal drugs may cause you to be a poor driver. You might even cause an accident. Some drugs may make a sick person think he or she can drive. But many drugs cause you to think more slowly and some even harm your vision, so remember that drugs can affect your driving. Be careful! Drive only when you are sure that drugs aren't affecting you. Take medicines only as directed. Good drivers may become poor ones when they use drugs or other forms of medication.

Appendix E: Activity from Lesson Plan 2: Bicycle

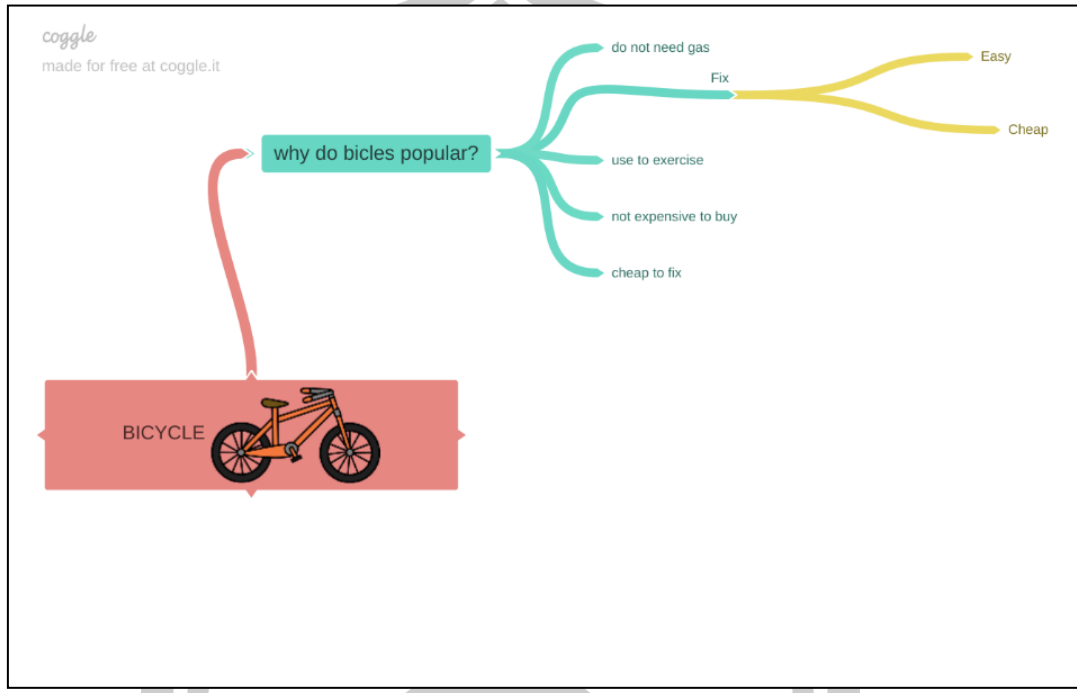

Figure 9 Activity from the topic of "Bicycle"

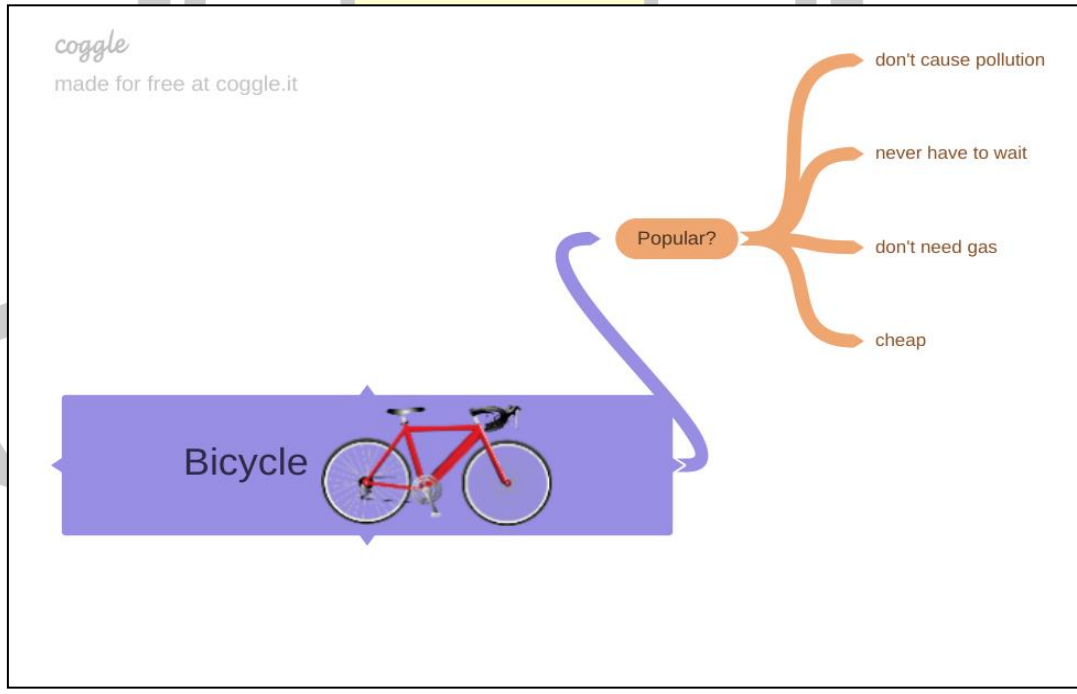

Figure 10 Activity from the topic of "Bicycle"

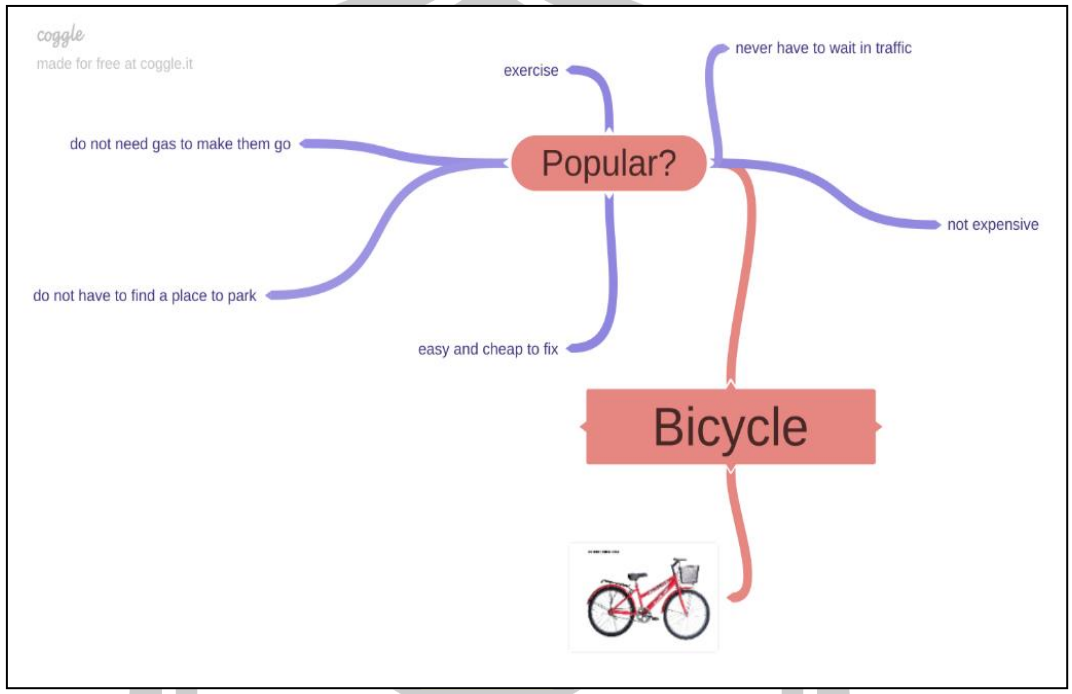

Figure 11 Activity from the topic of “Bicycle”

BIOGRAPHY

NAME	Miss Chonlada Narawang
DATE OF BIRTH	October 13, 1996
PLACE OF BIRTH	Buriram, Thailand
ADDRESS	565 Village no.5 Sa Khu sub-district, Suwannaphum district, Roi-et province, 45130
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EDUCATION	2014 Mahasarakham University Demonstration School (Secondary) 2020 Bachelor of Education (B.E.) in English, Rajabhat Mahasarakham University 2023 Master of Education in English Language Teaching (M.Ed), Mahasarakham University