The Effects of Metacognitive Reading Strategy Instruction on Reading Comprehension, Metacognitive Reading Strategies Use, and Attitudes of Thai EFL Engineering Students

Jiraporn Noipa

A Thesis Submitted in Partial Fulfillment of Requirements for
degree of Doctor of Philosophy in English Language Teaching
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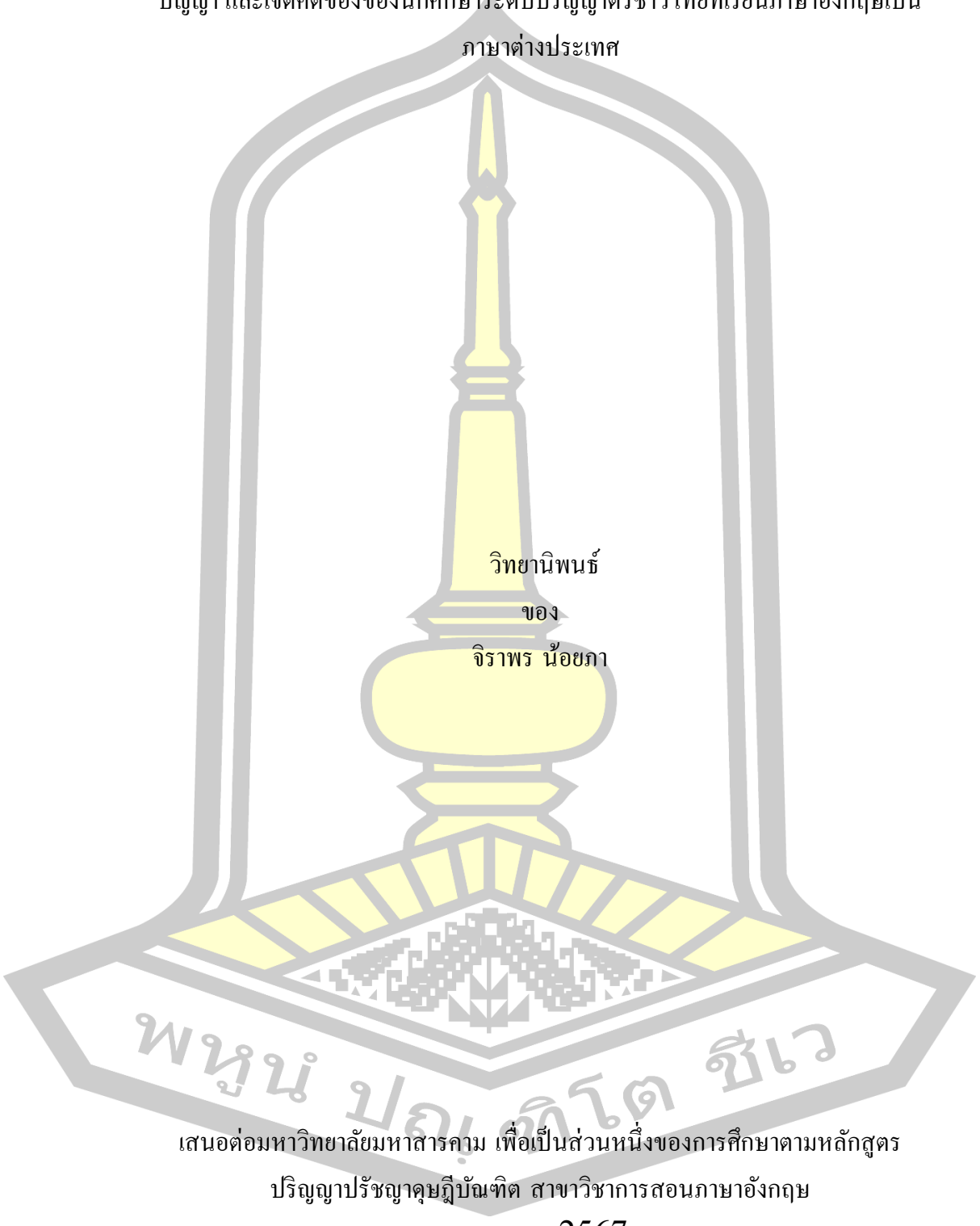
ผลของการสอนอ่านแบบกลวิธีอภิปัญญาต่อการอ่านเพื่อความเข้าใจ การใช้กลวิธีการอ่านแบบอภิปัญญา และเจตคติของของนักศึกษาระดับปริญญาตรีชาวไทยที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ



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ABSTRACT

This quasi-experimental research investigated the effects of metacognitive reading strategy instruction (MRSI) on reading comprehension of Thai EFL undergraduates majoring in Mechanical Engineering in an English for Specific Purposes (ESP) setting. Their attitudes toward MRSI and their use of metacognitive reading strategies in helping them comprehend the reading texts were also explored. The participants of the study included two intact classes. One class served as a control group which received traditional reading instruction whereas the other class was the experimental group which received the MRSI. Three instruments were used to collect data: a reading comprehension pretest and posttest, an attitude questionnaire and a semi-structured interview. In term of qualitative data analysis, it used thematic analysis to identify key themes in interview transcripts to capture core ideas, followed by grouping codes into potential themes and refining them iteratively for accuracy. In addition, the themes were examined for connections to construct a narrative reflecting participants' perspective on the use of MRSI in understanding English reading texts, supported by relevant excerpts from interviews to enhance credibility. The findings of the study indicated a significant improvement in the participants' reading comprehension after receiving MRSI, as evidenced by their higher post-test scores compared to pre-test scores ($p < 0.05$). Furthermore, the findings showed that after 13 weeks of instruction the participants held positive attitudes towards the implementation of MRSI in improving their reading comprehension. Finally, the findings also suggested that the participants frequently used metacognitive reading strategies before reading, during reading, and after reading. The global reading strategy proved to be the most commonly used in the English Reading for Academic Purposes class, followed by the support strategy and problem-solving strategy respectively across three groups of participants (highly proficient readers, moderate proficient readers and low proficient readers). However, highly proficient readers tended to automatically employ metacognitive reading strategies to focus their attention, to monitor and to direct their own learning processes quite efficiently, to arrive at meaning, and to make necessary adjustments when something goes wrong. In contrast, moderate proficient readers were likely to apply metacognitive reading strategies for understanding and remembering purposes to understand the significance

of combining different aspects of the text to form a more complete comprehension, emphasizing a significant change towards deeper mental involvement with reading content. Low proficient readers aimed to strengthen their comprehension by repeating crucial information. Although this approach is helpful for solidifying fundamental understanding, it often only scratches the surface in terms of engagement. In conclusion, the study suggests that integrating metacognitive reading strategies instruction into various educational contexts, including ESP classes, can enhance students' reading comprehension, improve their attitudes toward metacognitive reading strategies instruction and facilitate their use of these strategies in comprehending the English reading texts. This suggests that such strategies should not be limited to English reading classes but should also be incorporated into other disciplines that involve reading activities, thereby fostering students' mastery of reading with strategies that facilitate comprehension.

Keyword : metacognitive reading strategy instruction, reading comprehension, reading strategies, Thai EFL engineering undergraduate students

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TABLE OF CONTENTS

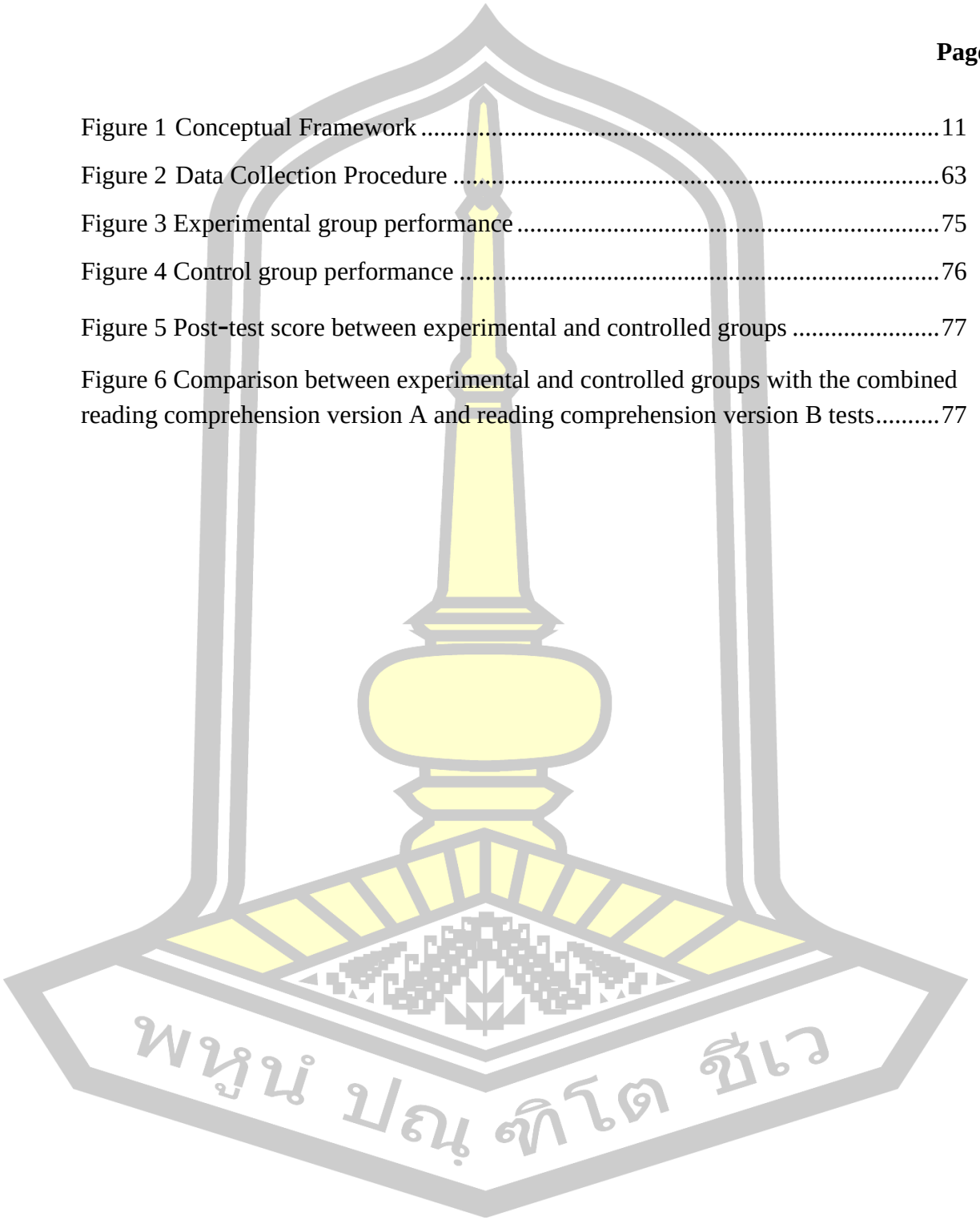
Page

LIST OF TABLES

Page

LIST OF FIGURES

Page



CHAPTER I
INTRODUCTION

This chapter provides an overview of this study. The chapter begins with the background of the study, followed by the purposes of the study, the research questions, the significance of the study, and the scope of the study. Next, the key terms of this study are defined. Finally, an outline of this dissertation is provided.

1.1 Background of the Study

Reading is a purposeful undertaking to foster comprehension of a subject or topic. It is an indispensable skill for individual success in various facets of life. Individuals remain well-informed, stay current, and cultivate thoughtful perspectives by engaging in reading. This activity is characterized as receptive and active, constituting a dynamic process wherein the reader actively seeks connections among ideas within the text. The cognitive demands of reading involve the deployment of numerous mental processes, encompassing information collection, processing, and analysis. Moreover, reading transcends its utilitarian function, providing individuals with a source of enjoyment (Li and Wilhelm, 2008). While the act of reading is undeniably crucial for personal and educational advancement, the concept of comprehension assumes even greater significance. Mere engagement with written material is insufficient; one must be able to deconstruct, analyze, and reorganize ideas and information. Comprehension entails not only the extraction of explicit content but also a profound understanding of the author's intended communication.

Reading comprehension is an intricate and multifaceted cognitive skill encompassing many tasks. Grabe and Stoller (2002) delineate two principal types of processes integral to this skill: lower-level and higher-level. The former comprises word recognition, graphophonic, and related abilities, while the latter encompasses syntactic, semantic, and other cognitive processes. Proficiency in comprehending written material necessitates familiarity with text structure and topic, an awareness of reading strategies, and the adept utilization of these strategies in material processing and word recognition, as emphasized by Pang (2008). The definition of reading comprehension extends beyond mere understanding of text; it encompasses the ability to analyze information and interpret the author's intended meaning. According to

Grabe and Stoller (2002:17), no single process in isolation defines reading comprehension, but collectively, these processes provide a comprehensive account of the requisite skills for fluent reading. Earlier works by Janzen and Stoller (1998) identified ten processes or strategies crucial to reading comprehension, including identifying a purpose for reading, previewing, predicting, asking questions, checking predictions, connecting the text to prior knowledge, summarizing, connecting different parts of the text, and recognizing text structure. In a comprehensive definition, reading comprehension is characterized as a cognitive process wherein a reader selectively extracts facts, information, or ideas from printed materials, discerns the author's intended meanings, relates them to prior knowledge, and assesses their appropriateness and value in meeting the reader's objectives (Veeravagu et al., 2010:206). Word recognition emerges as a pivotal component of comprehension, with proficient readers demonstrating the ability to process words swiftly, accurately, and automatically (Pressley, 1998; Stanovich, 2000). As noted by Pressley (1998), good readers can read more challenging texts at rates of 200 words per minute and, for leisurely reading, between 250 to 300 words per minute, achieving this with minimal effort. In contrast, poor readers encounter difficulties processing complex texts, as reading extends beyond mere letter recognition to involve meaning and context determination. Information assimilation occurs through data organization into recognizable patterns, where direct or indirect connections are forged between pieces of information, ultimately culminating in comprehension development (Norris, 1998).

Flavell (1976) introduced the concept of metacognition. Metacognition, in the context of reading, encompasses several key processes, including planning, monitoring, controlling, and evaluating (Efklides, 2001). Planning occurs before reading, where strategic readers establish their reading objectives (e.g., recall or comprehension), preview the text to understand its nature, activate prior knowledge, select appropriate strategies, allocate necessary resources (such as reading time), and anticipate outcomes (Pressley & Gaskins, 2006; Schraw & Dennison, 1994). During the reading process, strategic readers engage in metacognitive monitoring of text complexity (Joseph, 2005), their cognitive processes (Schraw, 2001), and reading comprehension (Dole et al., 2014). Comprehension monitoring is particularly crucial (Baker & Brown, 1984), as readers must continually assess the relevance of the text to their

objectives and compare new information with their existing knowledge (Pressley & Gaskins, 2006). Control comes into play when readers adjust their approach based on monitoring feedback, such as when facing difficulties (Nelson & Narens, 1990). For instance, if the text seems challenging, readers may reread, paraphrase passages in their own words, or seek assistance (Griffith & Ruan, 2005). Evaluation marks the conclusion of the reading process, where readers assess their performance and reflect on the effectiveness of employed strategies (Schraw, 2001; Schraw & Dennison, 1994).

The field of reading comprehension recognizes metacognitive reading strategy awareness as a vital factor influencing effective reading strategies. Metacognitive reading strategy awareness is strategies that help students regulate or monitor cognitive strategies. They are the notions of thinking about thinking and are defined as planned, intentional, goal-directed, and future-oriented mental processing that can be used to accomplish cognitive tasks (Salataki & Akyel, 2002; Phakiti, 2003). Furthermore, metacognitive strategies differ from cognitive ones because they span multiple subject areas. In contrast, cognitive strategies are likely to be encapsulated within a subject area so readers who are meta-cognitively aware know what to do when they face difficulties in learning. They would utilize strategies to recognize what they should do. Metacognitive strategies indicate one’s thinking and can facilitate more learning and developed performance, especially among students who try hard to understand the written context. Muhid et al. (2020) stated that metacognitive techniques impacted students' achievement in reading comprehension. It enhanced both the reading proficiency and effective reading utilization of the students. Students will develop the skills necessary to become competent, strategic readers by becoming accustomed to applying metacognitive methods in their reading activities. In addition, according to Aziz (2020), reading comprehension could be improved by teaching metacognitive reading skills. The results showed that there was a positive response to this query. According to Slaouti et al. (2013), adequate reading comprehension involves establishing clear objectives during reading to motivate themselves and heighten their awareness of various reading strategies. Ismail et al. (2015) elaborate on this by identifying three distinct stages of the comprehension

process. The first stage encompasses literal comprehension, focusing on decoding and recognizing explicit information.

The second stage involves inferential skills, aiding in the analysis of decoded content to extract implicit meanings. Finally, the third stage, critical comprehension, entails making inferences and predictions based on the text, transcending its surface-level meaning and engaging with more profound interpretations. Generating inferences plays a crucial role in achieving critical comprehension, as highlighted by McNamara & Kendeou (2011). Mayer (1996) underscores the significant impact of metacognitive strategies on students' ability to generate inferences, a finding supported by extensive research. McNamara and Kintsch (1996) emphasize that reading processes such as integrating existing knowledge, inferring, and selecting pertinent information from the text can enhance comprehension. Best et al. (2005) further assert that employing effective reading strategies fosters the generation of accurate inferences, thereby facilitating comprehension. Follmer and Sperling (2018) argue that readers proficient in inference generation tend to comprehend text better and can monitor their performance effectively by utilizing reading strategies. Moreover, McNamara and Kendeou (2011) summarize several key points: firstly, early childhood education should prioritize teaching comprehension skills; secondly, instruction should focus on processes to enhance reading performance; thirdly, scaffolding is essential for generating inferences when text ambiguity arises; fourthly, comprehension is an interactive process influenced by both the reading task and the reader, necessitating tailored material selection for instruction; finally, educators can benefit from employing standardized reading comprehension assessments to gain insights into students' strengths and weaknesses.

Researchers have increasingly focused on reading strategy use and instruction to aid readers in honing their skills and becoming strategic readers (Grabe, 2009). However, crafting an effective strategy instruction model poses numerous challenges for instructors (Billmeyer, 2006). Integrating strategies into classroom activities demands considerable effort from both teachers and students, necessitating planning, definition, and modeling to foster a sense of responsibility for learning (Nelson & Manset-Williamson, 2006). Despite the initial difficulties, Nelson and Manset-Williamson (2006) advocate for integrating explicit strategy instruction into classroom activities.

Nonetheless, Pressley et al. (1989) caution that not all teachers successfully incorporate explicit strategies into reading activities. Gooden's (2012) study revealed that many teachers were initially unaware of the application of their students' strategies during reading. Over time, however, they gained insights into their students' strategy preferences and cognitive processes. Teachers must design instruction carefully based on their students' needs and cognitive abilities, selecting strategies thoughtfully before commencing the instructional process (Iwai, 2011).

An increasing body of literature acknowledges the significance of reading within the context of higher education (Abd Ali, Bashar, & Khonamri, 2023; Hapsari, 2019; Miller & Merdian, 2020; Yapp, de Graaff, & van den Bergh, 2021; Muhid et al., 2020; Lin & Zhang, 2011; Oxford, 1990; Acmed-Ismael, 2021; Khellab et al., 2022;). University students' academic success relies on their reading proficiency, as they need to engage with textbooks and resources to acquire substantive and procedural knowledge in their respective fields. Effective reading involves successful interactions among writer-specific, context-dependent, and text-based factors, encompassing fluency and automaticity in text processing, lexical resources, background knowledge, motivation for reading, and metacognitive reading strategies (Ghaith & El-Sanyoura, 2019; Kung & Aziz, 2020). Some scholars argue that a notable proportion of EFL learners may enter tertiary education without adequate preparation for the reading demands of their academic programs (Cabinda, 2016; Aghajani, 2019).

Learning to read within an English for Specific Purposes (ESP) context demands increased student effort. A case study involving four Iranian students revealed that, when tackling ESP texts, they relied heavily on their prior knowledge to aid comprehension (Tabataba'ian & Zabihi, 2011). Similarly, in Tunisia, traditional methods of teaching reading fell short in aiding students' comprehension of highly specialized texts in their academic fields. In contrast, instruction in metacognitive strategies enhanced students' reading skills, particularly in the context of reading research articles (Dhieb-Henia, 2003). Simply lecturing students on reading strategies does not ensure their practical application. Therefore, merely presenting a list of strategies is insufficient. Metacognitive reading strategy instruction, especially in ESP courses, where proficient reading skills are crucial for students' career paths, addresses this issue (Dhieb-Henia, 2006).

The exploration of metacognitive reading strategies within ESP classroom settings has been investigated across various scenarios. In Iran, Ajideh's study (2009) suggested that while language communication is vital in ESP courses, attention should also be given to how students learn. Therefore, the study recommended implementing autonomous learning and metacognitive strategies for ESP teaching and learning. Additionally, research conducted at the university level with Iranian ESP students revealed that they were moderate users of reading strategies, prompting the need to enhance metacognitive awareness due to the importance of employing strategies in reading ESP texts (Khoshsima & Samani, 2015). This finding resonates with a study on metacognitive reading strategies among Croatian ESP students, which indicated moderate use of these strategies when engaging with academic texts. The study stressed the necessity of teaching the application of strategies to enable students to utilize effective strategies and become critical readers (Terzić, 2015). The effectiveness of instruction metacognitive strategies on reading comprehension was examined among ESP students studying Civil Engineering in Iran, revealing that those in the experimental groups outperformed the control group in post-test reading comprehension (Ahangari & Mohseni, 2016). This finding aligns with a study by Ajideh et al. (2018) investigating the impact of explicit instruction in metacognitive reading strategies among undergraduate students in Iran, which also reported positive results in ESP text comprehension. These studies highlight the positive effects of explicit instruction in metacognitive reading strategies on enhancing reading comprehension achievement, particularly within ESP contexts. Essentially, explicit instruction in metacognitive reading strategies has been shown to facilitate students' learning to read in ESP settings.

In summary, the delineation of English for Specific Purposes (ESP) and its significance within research contexts serves as a crucial foundation, ensuring clarity and understanding among readers. This becomes particularly pertinent in discussions surrounding metacognitive reading strategies within ESP domains, exemplified by studies conducted in Iran, Tunisia, and Croatia. These investigations underscore the efficacy of explicit instruction in metacognitive reading strategies, showcasing substantial improvements in students' comprehension of specialized texts, a pivotal

skill for their academic and professional advancement. Notably, such research highlights the inadequacy of mere strategy enumeration, emphasizing the necessity of structured teaching methodologies. Through explicit instruction, students acquire the ability to employ effective reading strategies, fostering critical reading capabilities within their disciplines. Numerous studies attest to the positive correlation between structured guidance in metacognitive strategies and enhanced comprehension and learning outcomes in ESP courses. Furthermore, the findings underscore the transformative potential of metacognitive strategy instruction, fostering not only improved text comprehension but also cultivating autonomy in learning. As students adeptly apply these strategies, they gain proficiency in navigating complex texts within their fields, thereby augmenting their academic and professional success. Ultimately, a clear understanding of ESP and its contextual application is imperative, as it underpins comprehensive insights into its profound impact on students' educational journeys, thus paving the way for future advancements and studies in the field.

The exploration of metacognitive reading strategies within ESP classroom settings for engineering students is a focus on this study as engineering education is a key driver of global sustainability and innovation (Elinwa and Agboola, 2013). It comprises an undergraduate degree (bachelor's or master's), as well as any further graduate work and specializations. As part of the criteria for a professional engineering license, engineering education is usually followed by extra postgraduate exams and supervised training. In engineering education, the application of English metacognitive reading strategies is crucial for fostering effective comprehension and critical thinking skills among students. These strategies involve the conscious monitoring and regulation of one's reading process, enabling students to actively engage with English texts encountered in their coursework. Through metacognitive reading strategies, engineering students learn to preview texts, set goals for comprehension, and make predictions about the content. Moreover, fostering metacognitive awareness in engineering education promotes lifelong learning skills, empowering students to become self-directed learners capable of adapting to new challenges and opportunities in their professional careers.

Research on metacognitive reading strategies in Thailand has also been conducted, primarily focusing on students' awareness of these strategies and the effectiveness of instruction in improving reading comprehension (Oranpattanachai, 2023; Ketworrachai & Sappapan, 2022; Thongwichit & Buripakdi, 2021; Banditvilai, 2020; Seedanont & Pookcharoen, 2019; Chutichaiwirath & Sitthitikul, 2017; Lien, 2016; Phaiphimai & Meesri, 2015; Akkakoson & Setobol, 2009; Pookcharoen, 2009; Chomphuchart, 2007; Sudachit, 2005). Many studies have advocated for integrating metacognitive reading strategy instruction into reading classes due to its effectiveness in improving reading comprehension achievement. For instance, Wichadee (2011) found that explicit instruction in metacognitive strategies could enhance reading comprehension among first-year students at a private university in Thailand. Given students' various challenges during the reading process, metacognitive reading strategy instruction emerges as a potential solution to help students overcome these obstacles.

Subsequent investigations into the awareness of reading strategies among first-year students from the science and social science departments at Bangkok University revealed that despite years of English instruction, Thai students' reading abilities remain limited (Munsakorn, 2012). As a result, there is a suggestion that students require instruction and guidance in applying various strategies to enhance their reading performance. Further research on Thai EFL learners' metacognitive reading strategies and awareness, conducted with fourth-year students in the central region of Thailand, concluded that issues in reading among less successful participants at the tertiary level might stem from focusing too heavily on individual word meanings rather than grasping the overall message of the text (Chutichaiwirath & Sitthitikul, 2017). It emphasizes the importance of raising awareness of metacognitive reading strategies to address this problem, as understanding every word is unnecessary to comprehend the author's message. Simultaneously, examining engineering and science students' reading strategies at King Mongkut's University of Technology in Northern Bangkok indicated a positive reception to instruction based on reading strategies, as it enhances systematic thinking and reading comprehension (Akkakoson & Setobol, 2009). Teachers are encouraged to use direct explanation combined with modeling techniques in teaching reading strategies, as this approach is more effective

in improving English reading competence (Akkakoson, 2012). Recent research at a public university in Bangkok corroborated these findings, demonstrating the positive impact of explicit reading strategy instruction on raising Thai EFL adult learners' awareness and fostering independence (Chumworatayee, 2017).

Examining existing literature regarding metacognitive reading strategies and their influence on reading comprehension, it becomes apparent that these strategies are pivotal in enhancing reading comprehension. Nevertheless, a noticeable research gap exists concerning the utilization and effectiveness of metacognitive reading strategies among Thai engineering students within an English for Specific Purposes (ESP) framework. While studies in Thailand have delved into the advantages of these strategies in bolstering reading comprehension among English as a Foreign Language (EFL) learners, there is a scarcity of research explicitly addressing their applicability and efficiency in engineering education. It is crucial to comprehend how metacognitive reading strategies can aid Thai engineering students in understanding technical texts and overcoming academic obstacles, thereby facilitating the development of tailored instructional methods and fostering academic achievement within this demographic. Consequently, there is a necessity for further exploration into the role of metacognitive reading strategies in augmenting reading proficiency among Thai engineering students.

Therefore, this study was set out in order to investigate the impact of metacognitive reading strategy instruction on mechanical engineering students' reading comprehension. Firstly, the investigation aimed to assess the extent to which metacognitive reading strategy instruction influenced the reading comprehension abilities of mechanical engineering students. Secondly, it sought to elucidate the specific metacognitive strategies employed by these students when engaging with English for Specific Purposes (ESP) reading materials, thereby highlighting their cognitive processes and adaptive learning approaches. Lastly, the study endeavored to examine the attitudes of mechanical engineering students towards metacognitive reading strategy instruction, discerning their perceptions regarding its effectiveness in improving their reading comprehension skills. Through these targeted inquiries, the study aimed to contribute valuable insights into the efficacy and utilization of

metacognitive strategies in enhancing reading comprehension among mechanical engineering students.

1.2 Purposes of the Study

The current study investigated the effect of metacognitive reading strategy instruction (MRSI) on EFL engineering undergraduates' reading comprehension. Moreover, this study explored how this instruction improved their reading comprehension.The research questions that guided this study are as follows:

1. To what extent does metacognitive reading strategy instruction affect the reading comprehension of mechanical engineering students?
2. How do mechanical engineering students employ metacognitive strategies to enhance their comprehension of ESP reading materials?
3. What are the students' attitudes toward metacognitive reading strategy instruction in improving their reading comprehension?

1.3 Scope of the Study

Using a mixed methods research design, this study investigated the impact of how MRSI on reading comprehension of engineering students in an English for Specific Purposes (ESP) setting. Additionally, it aimed to uncover the mechanisms by which this instruction improved their reading comprehension. The study also delved into the students' attitudes of MRSI. The study involved 145 engineering students chosen from two intact classes at a university located in the northeastern part of Thailand. One class was assigned as a control group, while the other served as an experimental group. They were enrolled in the English Reading for Academic Purposes class during the 2022 academic year, which lasted 13 weeks. Research instruments included a reading comprehension pretest and posttest, an attitude questionnaire and a semi-structured interview.

Figure 1 depicts the conceptual framework outlining the variables examined in this study, along with the anticipated connections among them. The framework comprised one predictor variable, which was MRSI, and three outcome variables: reading comprehension test scores, utilization of metacognitive reading strategies, and attitudes toward MRSI.

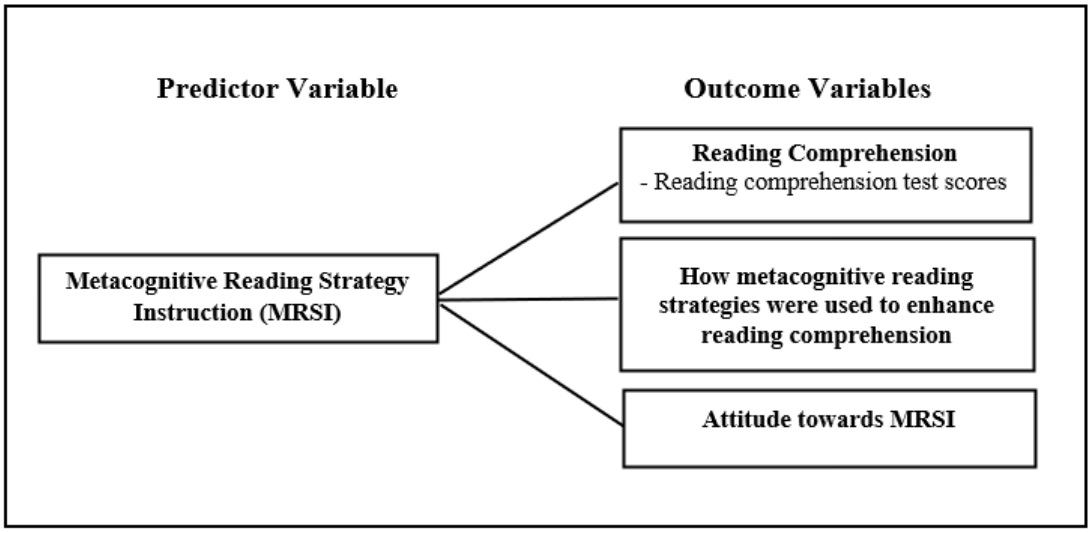


Figure 1 Conceptual Framework

1.4 Significance of the Study

The study's findings yield significant implications for various facets of EFL reader instruction. With regard to students' proficiency in employing metacognitive reading strategies, EFL instructors and educational practitioners can utilize these results to design pedagogical plans aimed at enhancing EFL learners' reading comprehension and, consequently, improving their overall reading comprehension. When teachers assist students to develop strong metacognitive reading strategies, students develop a deeper awareness of the reading process and gain control over their own learning. This leads to enhanced personal capacity for self-regulation, increased ability to manage one's own reading motivation, and students becoming strategic readers. Moreover, the insights obtained from this study were anticipated to furnish invaluable guidance for scholars in the domain of ESP (English for Specific Purposes).

This study possesses significant relevance for various stakeholders involved in EFL reader instruction, particularly concerning the integration of metacognitive reading strategies (MRS) into teaching methodologies. These implications extend to curriculum designers, English language teachers, and engineering students, each with distinct roles and responsibilities in the educational process. For curriculum designers, the study underscores the imperative of systematically integrating metacognitive strategies into reading instruction. This integration necessitates careful consideration within foundational program curricula, supported by comprehensive teacher training

initiatives. The findings suggest that curriculum materials should progressively introduce metacognitive strategies, ensuring students could engage with higher-order thinking skills from the outset. By incorporating these strategies into the curriculum framework, curriculum designers facilitate the development of robust reading comprehension skills among learners, thus laying a solid foundation for their academic and professional pursuits.

Furthermore, English language teachers played a pivotal role in facilitating students' acquisition and application of metacognitive reading strategies. The study advocated for educators to educate students on the rationale, timing, and relevance of various reading strategies, with a particular emphasis on metacognitive approaches. By fostering an understanding of these strategies, teachers could positively influence students' learning attitudes and contribute significantly to their reading objectives. Effective teaching involved not only imparting knowledge but also modeling the cognitive processes behind metacognitive strategies, potentially requiring tailored feedback and repetition based on individual comprehension levels. Active student participation in modeling activities, whether in group or individual settings, was crucial for deepening understanding and fostering peer collaboration.

Finally, for Thai engineering students, the study highlighted the transformative potential of metacognitive reading strategies in enhancing reading comprehension skills within the context of learning English as a foreign language. By integrating these strategies into the curriculum, educators empowered students to become independent readers while also nurturing critical thinking abilities essential for success in their field. The incorporation of metacognitive strategies into English language instruction offered significant benefits for Thai engineering students, enabling them to navigate complex academic texts more effectively and enhance their overall academic performance. Furthermore, providing adequate training and support for teachers to implement these strategies ensured that students received the necessary guidance and resources to develop their reading skills successfully.

1.5 Definition of Key Terms

The terms that are considered to be important to this study are:

Metacognitive Reading Strategy Instruction (MRSI) in this study refers to an explicit instruction and guidance on various metacognitive strategies to enhance engineering students' reading comprehension by teaching them how to monitor, regulate, and reflect on their cognitive processes while reading academic texts.

Metacognitive Awareness in this study refers to students' metacognitive awareness of their thinking and selection of reading-related strategies such as making predictions before reading, strategy sequencing, and allocating time or attention selectively before beginning a reading task.

Reading Comprehension in this study refers to the measure of students' achievement, as indicated by their scores on the reading comprehension pretest and posttest after receiving MRIS over a 13-week period.

English for Specific Purposes (ESP) in this study refers to a category of language learning that focuses on teaching English to engineering students with a view toward meeting their specific language needs, ensuring that the language instruction provided is tailored to their academic and professional contexts. This involves the incorporation of metacognitive reading strategies aimed at enhancing students' comprehension of specialized texts relevant to engineering disciplines.

Undergraduates in this study refers to 145 engineering students at a technology university selected from two intact classes. One class was assigned as a control group, while the other was assigned as an experimental group. They were enrolled in the English Reading for Academic Purposes class during the 2022 academic year, which spanned a duration of 13 weeks.

Attitudes in this study refers to the score obtained from students' responses to an opened ended questionnaire on their evaluative reaction toward MRSI and their reading comprehension.

1.6 Outline of this Thesis

This thesis includes the following six chapters;

Chapter I provides a brief overview of the research topic and forms the basis of this dissertation. It lays out the main goals of the investigation and establishes the parameters that the research would work inside. The chapter goes into more detail on

the study's importance in relation to both academic and practical contexts. Furthermore, important terms related to the research are defined. The chapter ends with a summary of the dissertation's organizational framework, which serves as a guide for the parts and chapters that follow.

Chapter II presents an extensive literature review, delving into the background of reading, reading in second language, Thai EFL reading, various reading comprehension models, metacognitive reading strategies, and their effectiveness based on previous studies. Finally, the chapter concludes with a summary of the reviewed literature, setting the stage for the subsequent chapters.

Chapter III describes the research methodology employed in this study, encompassing aspects such as the research design, participants, ethical considerations, research instruments, data collection procedures, sample lesson plans, data analysis, pilot study results, and a summary of the chapter's contents.

Chapter IV presents the quantitative results providing an understanding of the reading comprehension of Thai EFL engineering students as a consequence of undertaking MRSI. The chapter also explores the participants' attitudes toward the implementation of MRSI on their reading comprehension. The chapter ends with a summary that recaps key conclusions and how they relate to the study's wider objectives.

Chapter V presents thematic patterns of metacognitive reading strategies employed by engineering students after undertaking MRSI. Through a thorough analysis of qualitative data, this chapter provides rich insights into the nuanced use of metacognitive reading strategies among participants. Finally, the chapter concludes with a succinct summary, encapsulating the key thematic patterns and insights derived from the qualitative analysis.

Chapter VI provides discussions and conclusion of the study, implications of the study, limitations and recommendations for future research.

CHAPTER II
LITERATURE REVIEW

This chapter explores existing literature on reading and reading comprehension and its models, reading strategies, metacognition, metacognitive reading strategies, and instructions, as well as previous related studies in global and EFL contexts. It ends with a chapter summary.

2.1 Reading

Engaging with written material serves as a means to delve into and grasp various subjects or themes, constituting a fundamental skill crucial for success in life. It serves to keep individuals informed, updated, and intellectually stimulated. Reading encompasses both receiving and actively engaging with content, involving a dynamic process where readers seek connections among ideas presented in the text. This cognitive endeavor involves employing various mental faculties to gather, process, and scrutinize information. Moreover, reading offers individuals a source of pleasure (Li and Wilhelm, 2008). However, while reading is pivotal for personal and educational advancement, comprehension is even more critical. Merely reading is insufficient; individuals must also be able to deconstruct, analyze, and restructure ideas and information. This entails the ability to grasp the writer's intended message.

Reading transcends mere recognition of letters; it involves deciphering meaning and grasping context. As individuals engage in reading, information is structured into recognizable patterns (Norris, 1998), with direct or indirect connections being established between pieces of information. Through this processing of information, comprehension is cultivated. Norris (1998) identifies two forms of information processing when confronted with visual stimuli: perceptual and conceptual. Perceptual processors receive and process input such as individual or grouped letters, passages, phonemics, and word forms. Meaning is derived through prior knowledge, discourse structure examination, and context consideration. Numan (2003) suggests reading comprehension is a fluid process integrating textual information with existing knowledge to derive meaning.

Reading plays a crucial role in mastering language proficiency within and outside the classroom (Divrik et al., 2020). According to Muhid et al. (2020), reading skills are

vital for English as a Foreign Language (EFL) students as they enhance their overall English language proficiency. The improvement of reading skills in EFL students has a positive impact on their academic performance. Engaging with written material goes beyond simply deciphering the words on a page. Apart from the perceptual aspect, reading demands learners to undertake psychological and social activities to comprehend the content (Bloome & Green, 1984; Paris et al., 1983).

Reading is also highly essential to Thai people in Thailand, particularly reading English. This is due to the fact that Thai people employ English as a medium language when collaborating with their neighbors in the AEC (Asian Economic Community) and other overseas nations who utilize English for various forms of communication (Suraprajit, 2019). However, the majority of Thai people still view reading as a challenging endeavor. Thailand is among the poor performers in reading below the Organization for Economic Co-operation and Development (OECD) average, which is around 20% of pupils in OECD nations, according to PISA (2015), the report from the program for international student assessment. The EF EPI surveys from 2017 likewise showed that Thais had very poor and below-average English proficiency. Numerous earlier research had also revealed that Thai people have reading problems for example Pangsapa (2012), who investigated the difficulties Thai editorial staff members were having reading English. Her research showed that there are four primary reading difficulties: not knowing the meaning of technical phrases; not grasping the meaning of words; dealing with lengthy, complicated sentences that contain several dependent clauses or paragraphs; and encountering new words.

2.2 Reading in a Second Language

Reading is comparable to entering large quantities of information and knowledge worldwide, mainly when it is conducted in English, which is regarded as an international language. Within academic contexts, reading typically aims to acquire knowledge; students navigate texts designated by educators with the gleaned information intended for future application (Grabe, 2012). Consequently, proficiency in English reading is indispensable for students pursuing higher education. Their ability to comprehend assigned English texts directly correlates with their academic progression and the fortification of their professional prospects. As articulated in the preceding statement, adept reading skills are fundamental for success.

However, reading becomes more challenging for many students when they are tasked with reading in a language other than their native one. One possible explanation for this difficulty is that comprehending a writer's message in another language requires more effort from students than reading in their mother tongue. For example, reading comprehension in English requires readers to possess both linguistic and non-linguistic knowledge. Concerning language proficiency, it is widely believed that proficiency in the second language (L2) impacts reading comprehension (Aebersold & Field, 2004). According to the short circuit hypothesis, limited proficiency in the L2 could lead proficient readers in the first language (L1) to struggle when reading in the second language (L2) (Clarke, 1980). This theoretical assumption underscores the significance of L2 language proficiency in attaining reading comprehension.

However, the emphasis on language proficiency may not always be a crucial focus in this context. According to Pae (2018), the disparity between lower and higher levels of second language (L2) proficiency might not significantly affect the transfer of reading skills from the first language (L1) to the second language (L2). It was suggested that students with lower L2 proficiency could transfer their L1 reading skills as effectively as those with higher L2 proficiency. Pae's study aligns with the linguistic interdependence hypothesis, which posits that language processes such as reading and writing are transferable and interconnected (Bernhardt & Kamil, 1995; Cummins, 1991). From this theoretical perspective, it implies that reading skills acquired in the L1 are accessible to students when engaging in reading tasks in the L2.

Regarding the issue of second language acquisition, vocabulary presents a significant hurdle for students when reading in a different language. It is noted that while struggling readers may understand which strategies to employ, their challenges often stem from a deficiency in vocabulary or other schema-related information, hindering their success in reading (Anderson, 1991). However, it is also valid to assert that many unfamiliar words may not directly relate to the main idea of the reading passage and can be disregarded without impeding students' comprehension. This exemplifies a characteristic of fluent reading, where readers prioritize important details while skimming over less crucial ones (Ur, 2012). Consequently, students who are not fluent readers may lack this skill and struggle to decipher every word's meaning.

Hence, it proves beneficial to aid students in learning to read by employing strategies to compensate for unknown vocabulary. By doing so, they stand a better chance of enhancing their reading comprehension (Kulaç & Walters, 2016).

Another factor contributing to the increased effort required for students to achieve reading comprehension in another language is the contextual information presented in the text. It's not just the second language (L2) aspect that challenges readers but also the context of the points being made that must be integrated into their cognitive processes during reading. Without relevant background knowledge about a reading passage, readers cannot fully grasp its central point. This theoretical perspective aligns with schema theory, which emphasizes the significance of readers' background knowledge in reading comprehension. According to this theory, reading comprehension is an interactive process between the reader's background knowledge and the text (Carrell & Eisterhold, 2002). Moreover, under certain circumstances, students' background knowledge can be activated. For example, having students watch videos during the pre-reading stage can stimulate their prior experiences, enhancing their reading comprehension skills (Saeidi & Ahmadi, 2016).

2.3 Background in Thai EFL Reading

Reading in a foreign language (FL) presents significant challenges as it involves navigating between two or more languages. Previous studies on FL reading highlight various contributing factors to this challenge, including prior knowledge, proficiency in both the first language (L1) and second language (L2), and metacognitive skills. Consequently, mastering FL reading demands considerable time and effort for learners to make noticeable improvements (Phaiphimai & Meesri, 2015). In the context of English as a Foreign Language (EFL), reading is a fundamental learning skill. However, efforts to integrate practical English language skills into national curricula in non-Anglophone countries face numerous sociocultural barriers (DeWaelsche, 2015; Djamàa, 2016; Shaaban, 2014; Zhao & Zhu, 2012). Additionally, the role of teachers in English classrooms and learning assessment methods further complicate the situation (DeWaelsche, 2015; Djamàa, 2016; Fahim & Sa’eepour, 2011; Zhou et al., 2015;).

In Thailand, English is taught as a foreign language, yet despite years of EFL instruction, Thai students' reading abilities remain limited (Jaengsaengthong, 2016).

In response to this concern, the Ministry of Education in Thailand has attempted to revise the national curriculum to enhance English language proficiency. This shift in English language instruction has emphasized the importance of English for higher education and professional communication (Pookcharoen, 2009). However, despite these efforts, improvements in English proficiency among Thai EFL learners have been modest (Phaiphimai & Meesri, 2015). To address the reading proficiency issue among Thai EFL learners, past research has proposed the implementation of reading strategy instruction (e.g., Sudachit, 2005; Chomphuchart, 2007; Phaiphimai & Meesri, 2015). It is believed that teaching specific reading strategies can aid EFL learners in improving their reading comprehension (Chomphuchart, 2007). Moreover, teaching these strategies can foster positive self-beliefs among learners, influencing their perceptions and management of anxiety when encountering unfamiliar texts, thus potentially leading to better learning outcomes (Lien, 2016).

2.4 Reading Comprehension

Reading comprehension is a multifaceted skill involving a variety of tasks. Grabe and Stoller (2002) categorized these tasks into two main types: lower-level and higher-level, equally challenging processes. Lower-level abilities encompass tasks like word recognition, graphophonic skills, and others, while higher-level abilities involve syntactic, semantic, and other methods. To comprehend written material effectively, individuals must possess familiarity with text structure and topic, awareness of reading strategies, and proficiency in applying these strategies during processing information and word recognition (Pang, 2008). Reading comprehension involves grasping a text's meaning, analyzing its data, and interpreting the author's intent accurately. Grabe and Stoller (2002:17) state, "No one process defines reading comprehension by itself, but together they provide a fairly accurate account of the processes required for fluent reading." In an earlier study, Janzen and Stoller (1998) identified ten processes or strategies crucial for reading comprehension, including identifying a purpose for reading, previewing, predicting, asking questions, checking predictions or finding answers, connecting the text to prior knowledge, summarizing, linking different parts of the text, and recognizing text structure.

Reading comprehension involves a cognitive process wherein a reader selects facts, information, or ideas from printed materials, interprets the intended meanings of the

author, relates them to existing knowledge, and assesses their relevance and value in achieving the reader's objectives (Veeravagu et al., 2010:206. Word recognition constitutes a component of comprehension. Proficient readers can swiftly and accurately process words, doing so automatically (Pressley, 1998; Stanovich, 2000). Pressley (1998) further observed that skilled readers can read more challenging texts at a rate of 200 words per minute, while leisurely readers manage around 250 to 300 words per minute, accomplishing this with minimal effort. In contrast, struggling readers encounter difficulty when faced with complex texts.

Comprehension extends beyond linguistic abilities; it encompasses a broader cognitive skillset (Walter, 2007). Walter's research drew upon Gernsbacher's Structure Building Framework (SBF), which consists of three key processes: establishing a foundation for a mental structure, integrating new information into the evolving mental structure, and transitioning to construct a new substructure. These processes, largely automatic and unconscious, rely on "memory nodes" as fundamental building blocks in the comprehension process, as described by Gernsbacher. These memory nodes are activated by (a) information presented in the input, (b) the reader's background knowledge, and (c) the reader's language proficiency (Walter, 2007).

The comprehension process unfolds through three main stages. Firstly, laying the foundation begins at the onset of reading, progressing as the reader navigates through phrases, sentences, and paragraphs, gradually building comprehension of the material. Secondly, the mapping of new information onto the existing structure occurs. Here, the coherence between the two structures is pivotal, with new information being matched to previous details regarding time and reference, facilitating quicker processing and recall (Gernsbacher, 1997). The third process, shifting, occurs when the material read lacks coherence with the reader's existing knowledge, prompting the activation of alternative memory nodes and the development of new substructures.

Comprehension is intricately linked to the accessibility of material for recall by the reader, which is influenced by the level of activation of the information. Additionally, the reader's vocabulary size plays a significant role in comprehension. Hsueh-Chao and Nation (2000) estimated that readers need to know approximately 98% of the words in a text to comprehend it without assistance, with repeated exposure necessary for understanding to develop (Nation & Wang, 1999). Babayiğit and Stainthorp

(2011:172) noted that vocabulary knowledge affects comprehension directly through its impact on the text's semantic understanding and indirectly through its influence on word reading skills. Grabe and Stoller (2002) emphasized the importance of addressing vocabulary size, phonemic awareness, and phonic skills in teaching reading.

Moreover, understanding involves the interaction of various processes, encompassing knowledge and abilities, decoding, sentence structure, and cognitive functions (Hudson, 1996). Hudson identified several reading skills, including automaticity in word and sentence recognition, content and schema comprehension, strategies and metacognitive skills application, and understanding of reading purpose and context. Ultimately, reading is a complex amalgamation of these processes.

In summary, reading comprehension is critical for both academic and personal growth. It entails more than just letter recognition. It also involves context knowledge and meaning interpretation. Challenges remain despite efforts to improve English language competency, requiring diversified approaches such as curriculum modifications and education in reading strategies. A variety of cognitive processes and elements, including vocabulary knowledge and familiarity with the text's structure, are necessary for proficient comprehension. The intricacy and significance of learning reading comprehension for learners in a variety of circumstances are highlighted by effective reading education, which includes abilities like automaticity and comprehension methods.

2.5 Reading Comprehension Models

Three important models of reading comprehension should be emphasized during the reading comprehension process**.** The three models consist of *Bottom-Up, Top-Down,* and *Interactive.* According to Eskey (2005), these models assist reading comprehension by facilitating readers in trying to interpret texts and solving problems while reading**.** These three major reading models help cognitive processes in first and second language learning**.** They influence both L1 and L2 reading research and can be distinguished from one another by their increasing focus on how meaning is sourced from a paper form**.** The *Bottom-Up, Top-Down,* and *Interactive* reading comprehension are discussed in detail as follows;

2.5.1 The Bottom-Up Model

According to Gough (1972), this model focuses on the text, teachers, and readers, which they begin reading by perceiving the words and letters, advancing to larger linguistic chunks to sentences, and ending in meaning. The bottom-up model is the reading process recognizing each word that the learners construct meaning from context based on the words. It is conducted to allow the readers to utilize the process of becoming skilled readers. Reading activities based on the bottom-up theory include students learning to read from the ground up, beginning with the basics and progressing to concepts such as phonics and phonemic awareness.

According to Brunfaut and McCray (2015), bottom-up reading does not cover the complete reading process for effective comprehension. This method involves interpreting letters, sounds, words, and structures to understand the meaning of a text. It is commonly utilized in lower-level reading. This could explain why many students acquire vocalized and subvocalized reading skills. In addition, Nadea (2021) state that this method combined perceptual precision, sound, and the capacity to identify texts, words, spelling patterns, and language units. Readers could generate meaning from the text's smallest to largest components. Bottom-up reading strategies analyze language units, as previously explained. Readers could also interpret text by developing meaning from small to large units, adjusting existing knowledge, and generating predictions.

2.5.2 The Top-Down Model

The top-down model is an attitude-driven model in which students' prior knowledge and expectations assist in the construction of meaning from a reading text. Eskey (2005) explained that it is based on the concept of "from brain to text" and focuses on the entire reading process. Hairul et al. (2012) also mentioned that the top-down model focuses on reading skills, including prediction, summarizing, and anticipating from texts. It enhances the significance of prediction, guessing from the text, and understanding a text’s meaning in both L1 and L2 reading instruction. However, this model has been criticized for emphasizing a reader’s prior linguistic and conceptual knowledge while ignoring the importance of the text.

Furthermore, Ardhani (2016) mentioned that the top-down reading approach referred to a guessing game in psycholinguistics. These reading strategies relied on schemata,

or prior experiences and knowledge, to comprehend literature. Its methodologies require strong knowledge, comprehension, and language abilities to interpret the meaning of the text. Also, from Nadea (2021), greater language units that concentrate on the reader's knowledge could be processed to learn to read. As a result, the reader incorporates prior knowledge into the text. Unlike bottom-up, this approach requires the reader to extrapolate meaning from a text. Until now, bottom-up and top-down models have been considered inadequate for explaining a good reading process. As a result of the insufficiency of both the bottom-up and top-down models in interpreting the reading process, the interactive reading model has emerged in the following section.

2.5.3 The Interactive Model

The interactive model was developed by Rumelhart in 1977. It describes a reading process and the way the brain processes and interprets linguistic elements to build meaning and memory for all learners. This model combines surface structure systems, such as the sensory, bottom-up aspects of reading, with deep structure systems, such as the thinking, or top-down, aspects of reading. Rumelhart also claimed that sensory and non-sensory emerge together in one place, and the reading process is the consequence of the combined joint application of all knowledge sources.

According to Ahmadi and Gilakjani (2012), combining interactive models with the assumption of compensatory processing, which held that a deficit in any particular process would lead to a significant reliance on other sources of knowledge, regardless of their level in the processing hierarchy provided a better estimate of the available data on the application of orthographic, linguistic, syntactic, semantic understanding, and conceptual frameworks. For Babashamsi et al. (2013), the interactive model is the model in which the reader interacts with it and integrates various information sources, such as top-down schematic knowledge and linguistic or common knowledge from bottom-up processing. Interactive reading models offered a more accurate understanding of reading performance than solely top-down or bottom-up reading strategies.

This model aims to gain comprehension and new knowledge; therefore, students should be encouraged to share their knowledge with classmates or peers when using this tool in the classroom. This model allows the readers to bring their prior reading

experience and interact with others to perceive text meanings and memories (Whitehurst, 2019). Additionally, they might respond to high-level processes whenever the readers lose the bottom-up skills required to comprehend a text. This circumstance explains why incompetent readers resort to high-level processes more frequently than skilled readers, as top-down processes emerge to compensate for the poor readers' limited ability to use bottom-up processes (Eskey, 2005; Stanovich, 1980).

Finally, readers can comprehend texts effortlessly with the help of three essential reading comprehension models: Bottom-Up, Top-Down, and Interactive. Bottom-up prioritizes linguistic components, whereas Top-Down depends on past information. Interactive content integrates cognitive and sensory elements, encouraging reader engagement to improve understanding. Every model detail reading processes and emphasizes the significance of combining several techniques to achieve successful comprehension.

2.6 Cognitive Learning Theory: A Theoretical Framework

Watson's (1913) behaviorism theory revolutionized educational studies by showing that learning can be influenced by external stimuli (Ashworth et al., 2008). This theory became the basis for the traditional teacher-centered teaching approach (Gorowara & Lynch, 2019). However, the unidirectional lecture method associated with this approach has been criticized for its inability to promote independent thinking and problem-solving. Critics argue that it may stifle students' ability to learn autonomously, leading to lower cognitive engagement (Serin, 2018). In light of these shortcomings, there has been a move towards self-regulated learning theories, which focus on the learner's active involvement in their cognitive development. This shift aims to address the limitations of behaviorism by fostering more complex cognitive learning processes.

Over time, pedagogy has increasingly adopted cognitivism (Ashworth et al., 2008), which emphasizes the role of internal cognitive structures in learning. Piaget’s cognitive learning theory (1952) played a key role in this shift, concentrating on mental processes such as perception, memory, and problem-solving. Cognitive learning involves more than just acquiring information; it includes how learners manage and use their knowledge. As learners grow, they not only absorb information

but also enhance their ability to monitor their own learning progress. This shift towards self-regulated learning highlights the potential of these theories to explain complex, independent, and effective learning processes that lead to positive educational outcomes. Notable self-regulated learning models by Zimmerman (2000), Pintrich (2000), and Winne and Hadwin (1998) are significant in this regard. These models integrate cognitive, behavioral, motivational, emotional, and social aspects into a comprehensive framework for understanding learning (Zimmerman & Moylan, 2009). They provide an alternative to behaviorism by encouraging deep engagement, effective management of cognitive resources, and continuous assessment and improvement of understanding.

Central to cognitive learning theories, particularly self-regulated learning, is the concept of active learning. This concept is embedded in the forethought phase of Zimmerman's (2000) and Pintrich's (2000) models, where active learning involves not only activating prior knowledge but also strategically planning to integrate new information. This approach aligns with the shift from behaviorism to a learner-centered model, enabling learners to critically evaluate and build upon their existing knowledge.

Interactive learning exemplifies this dynamic shift from traditional teaching methods, incorporating feedback-driven elements of self-regulated learning. It emphasizes dialogue and collaboration, reflecting the monitoring and control aspects highlighted by Zimmerman (2000). Similarly, Winne and Hadwin's model (1998) emphasizes adapting learning based on external feedback, a key component of interactive learning.

Constructive learning, where learners actively construct and link new information, aligns with the performance and control phases in self-regulated learning models. This aspect promotes deeper engagement with the material, leading to a better understanding and application of knowledge. Reflective learning is also crucial, with both Zimmerman (2000) and Pintrich (2000) emphasizing the importance of self-reflection. This practice encourages learners to regularly evaluate their understanding, strategies, and outcomes, thereby solidifying learning and aligning with cognitive processes of assimilating and refining information.

Collectively, these four learning processes—active, interactive, constructive, and reflective—challenge learners to engage deeply, manage their cognitive resources, and continuously assess and refine their understanding. This underscores the inherent cognitive rigor and self-regulated nature of these processes. Additionally, operational definitions of these learning processes were provided.

2.7 Metacognition and Reading Comprehension

Metacognition means “cognition about cognition” or “thinking about thinking” in a more figurative sense. The term "metacognition" is usually associated with Flavell (1979), who defined metacognition as cognition knowledge and cognition control. Flavell (1979) emphasizes the simultaneous occurrence of metacognitive information and experiences. The former refers to a person's knowledge or ideas about cognitive enterprises, while the latter refers to using metacognitive methods or regulation. Metacognition, in essence, involves understanding the process of knowing and encompasses awareness, planning, and monitoring of cognitive processes. Karbalaei (2010) describes it as involving various aspects such as planning, monitoring, repairing, revising, summarizing, and evaluating. It also encompasses selective attention, organizing, planning, and monitoring comprehension (Imtiaz, 2004).

The relationship between metacognition and reading comprehension is robust. Metacognition encompasses awareness of one's cognitive processes, a crucial element. Teaching metacognitive strategies during lessons can enhance students' metacognitive awareness, particularly in reading comprehension, both before, during, and after reading (Okkinga et al., 2018b; Pressley & Gaskins, 2006). Zhang and Seepho (2013) suggest that before reading, a reader plans and organizes their approach, choosing appropriate strategies for comprehension. During reading, they continuously monitor their understanding and strategy effectiveness. Afterwards, readers assess whether they've met their reading goals and comprehended the material.

Metacognition, including metacognitive awareness, can be developed through training, especially in problem-solving domains (Batha & Carroll, 2007). A recent meta-analysis examined the impact of strategy instruction on academic performance across various subjects, finding that instruction in metacognitive knowledge significantly improves reading comprehension and academic achievement (Donker et

al., 2014). A study by Guterman (2003) focused on fourth-grade students, revealing that those who received MetaCognitive Awareness Guidance (MCAG) scored significantly higher on reading tasks than control and placebo groups. Similarly, Çubukcu (2008) observed college students benefiting from instruction in metacognitive strategies, leading to improved comprehension outcomes.

In summary, prior research underscores the value of metacognition in enhancing reading comprehension. It can be cultivated through training and involves planning, monitoring, and evaluating cognitive processes during reading tasks. In higher-order thinking contexts like problem-solving, metacognition is highly effective for improving reading comprehension. However, further investigation is needed to ascertain the applicability of these findings to engineering students and how they employ specific metacognitive strategies when tackling reading comprehension questions.

2.8 Metacognitive Reading Strategies

Metacognitive strategies are divided into three sub-categories. The Global Strategy involves identifying a purpose for reading, previewing the content, and planning what to read and ignore in a chapter. The Support Strategy involves using external reference materials to improve reading comprehension. This includes summarizing significant information, accessing dictionaries, and taking notes. Pammu et al. (2014) define problem-solving strategy as solving reading comprehension problems, such as increasing or decreasing reading pace and paying more attention to the text.

These three board categories are Global Reading Strategies (GLOB), Problem Solving Strategies (PROB), and Support Strategies (SUP). Global Reading Strategies (GLOB) assist students in controlling or dealing with their reading through deliberate, carefully planned techniques (e.g., having a target, previewing the reading text in terms of design and arrangement, or utilizing graphs, tables, and figures). Problem Solving Strategies (PROB) are the activities and processes that readers are involved in while directly interacting with the text. When readers have difficulty comprehending texts, they use these strategies as confined, attentive techniques. For example, adjusting reading speed as textual information becomes simpler or even more challenging to understand, predicting the meanings of unknown vocabulary, and rereading the text to better understand the text.

In addition, Batang (2015) and Guo (2018) stated that problem-solving strategies are methods for overcoming cognitive stumbling blocks. Some research suggests that metacognitive reading methods and reading scores are related. In summary, metacognitive strategies are high-level executive skills that include thinking about the learning process, planning for learning, monitoring the learning task, and assessing how well one has learned. Meanwhile, metacognitive reading strategies are used to monitor and control cognitive strategies.

2.8.1 Different Kinds of Metacognitive Reading Strategies

Reading strategy instruction has garnered support from numerous studies examining metacognitive reading strategies among native English speakers and learners of English as a foreign language for various reasons. It generally includes three metacognitive reading strategy awareness types: Declarative Knowledge, Procedural Knowledge, and Conditional Knowledge.

Declarative Knowledge

Knowing "about" things is defined as declarative knowledge. It is knowledge that includes information about an individual's knowledge as a learner and what factors influence one's performance. For example, research into meta-memory or knowledge about memorial processes reveals that students know the cognitive processes associated with memory. Declarative knowledge refers to facts or information that are static in nature and are stored in the memory. Declarative knowledge, also known as conceptual, propositional, or descriptive knowledge, describes things, events, or processes and their attributes and relationships to one another. As it accumulates facts and is the proper tool for answering questions, declarative knowledge can be divided into two sub-aspects: *Factual* and *conceptual knowledge*. Firstly, factual knowledge is the understanding of specific details and elements or the knowledge of terminology; meanwhile, conceptual knowledge is the knowledge of theories, models, and structures that all come under declarative knowledge (Patel, 2021).

Procedural Knowledge

Veenman and Spaans (2005) defined procedural knowledge as knowing "how" to do things. It is defined as knowledge of how to carry out procedural skills. Individuals with high procedural knowledge use skills more automatically and are more likely to sequence strategies effectively and solve problems using qualitatively different

strategies. Higher grade groups demonstrated a greater ability to apply procedural knowledge in reading (e.g., Mol & Bus, 2011). This was attributed to a larger interaction effect between literature knowledge and reading strategies, demonstrated in higher-grade students compared to lower-grade students (Grabe & Mann, 1984; Berthiaume et al., 2010; Turnbull, 2017; MacSwan, 2017).

Conditional Knowledge

According to Zsigmond (2009), the conditional knowledge of "when" played a crucial role in determining the summarizing strategy's purpose and effectiveness in reading comprehension. When the goal was to simplify complex text, summarizing served as a cognitive strategy aimed at advancing understanding. Alternatively, summarizing functioned as a metacognitive strategy when the objective was to ensure comprehension or monitor understanding. In this context, successful summarization indicated a certain level of knowledge achieved by applying either cognitive or metacognitive strategies.

To conclude, three types of metacognitive knowledge in deductive domains are declarative, procedural, and conditional learning (Anderson, 2005; Schraw, 1998; Bloom, 1956). While substantial research has indicated that these three types can be acquired sequentially or simultaneously (Teng, 2020; Yildrim et al., 2001; Schraw, 1998), it has also been demonstrated that each learner tends to possess a dominant type of knowledge depending on the educational context and learning environment (Kuhn, 2000; Brown, 1987). Furthermore, prior studies have shown that students' metacognitive knowledge can develop over time during learning (Rittle-Johnson et al., 2001; Baker, 1994). Therefore, adaptive interventions considering such developmental changes are necessary (Azevedo & Hadwin, 2005; Pintrich, 2002; Butler, 1998).

2.9 The Interplay of Reading Comprehension and Metacognitive Strategies

The challenge of developing proficiency in second language (L2) learners as readers has been a prominent concern for both researchers and practitioners. Numerous studies have delved into the connection between the application of reading metacognitive strategies and reading comprehension across diverse international and sociolinguistic contexts. Notable among these investigations are the foundational studies conducted by Sheorey and Mokhtari (2001) in the USA, Hosseini (2006) in

Iran, Hong-Nam and Leavell (2006) in China, Malcolm (2009) in Bahrain, and Park (2010) in Korea. Moreover, over the past six years, there has been a notable increase in the publication of studies focusing on the frequency of using metacognitive strategies and their role in English as a Foreign Language (EFL) reading comprehension, with this trend expected to persist.

An overview of international studies on the reported use of global, problem-solving, and support categories of metacognitive reading strategies and their role in English as a Foreign Language (EFL) comprehension needs to be reviewed. As defined by Mokhtari and Reichard (2002), global strategies encompass strategies that prepare readers for reading, such as setting a purpose, previewing text characteristics, skimming, predicting, and activating prior knowledge. Problem-solving strategies come into play when the text becomes challenging to read, including re-reading, slowing down, reading aloud, guessing the meaning of a word, and visualizing information in the text. Lastly, support strategies are utilized to assist readers while they are reading, incorporating the use of outside reference aids, paraphrasing what was read, note-taking, and annotating.

Previous studies have produced mixed findings regarding the connection between using different categories of metacognitive strategies and English as a Foreign Language (EFL) reading comprehension. For instance, Madhumathi and Ghosh (2012), as well as Meniando (2016), identified notable correlations between all categories of metacognitive strategies (global, problem-solving, support) and the reading comprehension of Indian engineering students and Saudi EFL learners in preparatory year programs, respectively. Conversely, Wahyuni et al. (2018) discovered no significant correlations between the three strategy categories and the reading comprehension of Indonesian college students studying EFL. Additionally, certain studies have found significant associations between problem-solving and global strategies while detecting no connection between support strategies and reading skills (e.g., Al-Sobhani, 2013).

Similarly, conflicting findings arise when examining the reported frequency of metacognitive reading strategy use among English as a Foreign Language (EFL) learners in various sociolinguistic and international settings. For instance, Jafari and Shokrpour (2012) and Tavakoli (2014) argued that Iranian learners predominantly

utilize support strategies, global strategies, and problem-solving strategies. In contrast, problem-solving strategies were found to be the most commonly employed by Indian learners (Madhumathi & Ghosh, 2012), Turkish learners (Yüksel & Yüksel, 2012), Yemeni learners (Al-Sobhani, 2013), and English language learners (ELLs) in the USA (Hong-Nam & Leavell, 2006). Moreover, several studies suggest that the problem-solving category is the most frequently used. However, there are discrepancies regarding whether the support category surpasses the global category regarding usage frequency. Specifically, Maasum and Maarof (2012), Ahmadian and Pasand (2017), Koshima and Samani (2015), and Shang (2017) found that EFL learners in Malaysia, Iran, and Taiwan tend to utilize the global category more frequently than the support category. Conversely, Ghwela et al. (2017), Pammu et al. (2014), and Meniado (2016) concluded that EFL learners in Libya, Indonesia, and the Kingdom of Saudi Arabia favor the support category over the global one.

In conclusion, previous research examining the relationship between the use of metacognitive reading strategies and reading comprehension suggests that the reading proficiency of English as a Foreign Language (EFL) learners may be influenced by specific contextual, sociocultural, and linguistic factors. These findings underscore the importance of further investigation into these factors to better understand their impact on EFL learners' comprehension abilities.

2.10 Metacognitive Reading Strategy Instruction

Metacognitive reading strategy refers to strategies that assist students in controlling or monitoring cognitive strategies. Several types of metacognitive strategies for reading were identified by Mokhtari and Sheorey (2002). They categorized these into global reading, problem-solving, and supportive reading. Global Reading techniques assisted readers in clarifying their reading objective, enhancing vocabulary and comprehension of specific topics. Problem-solving tactics involved readers altering their reading speed, reviewing the material, reading aloud, and guessing the meaning of difficult words. Support reading strategies and additional reading techniques were provided through reference materials.

However, metacognitive reading strategies could be in different aspects. For example, Abu-Snoubar (2017) mentioned that metacognitive reading strategies meant that readers were mentally active in regulating and monitoring their reading

comprehension process. Readers regulated their reading through global reading strategies in the first reading stage, which could be assumed in pre-reading activities. Meanwhile, readers implemented problem-solving strategies while reading if they faced any difficulties or distractions. Support reading strategies were employed in the post-reading activities to enhance comprehension. However, it could not be said that implementing a metacognitive reading strategy was restricted to the reading stage. The strategies could be used in any stage of reading.

There are some examples of successful use of instruction metacognitive strategy for the instruction. As in the study of Wichadee (2011), forty English as a Foreign Language (EFL) university students from Thailand were involved in a research project. Over a period of fourteen weeks, these students underwent structured instruction sessions designed to enhance their understanding and application of metacognitive strategies. Assessments, including metacognitive questionnaires and reading tests, were administered at the beginning and end of the semester to evaluate the impact of the intervention. The analysis revealed significant improvements in students' reading scores and metacognitive strategy use, indicating the effectiveness of targeted instruction. These findings emphasize the value of metacognitive strategy instruction in academic settings, especially in language learning, and suggest its potential for enhancing student learning outcomes and skill development.

Navigating the complexities of Metacognitive Reading Strategy Instruction requires a comprehensive grasp of its fundamental pillars: Planning, Monitoring, and Evaluation. These foundational elements guide the development of robust reading comprehension and retention strategies. By meticulously planning one's approach to reading, actively monitoring comprehension during the process, and critically evaluating the strategy’s effectiveness, readers can cultivate a deeper understanding of texts and enhance their overall learning experience. Thus, acknowledging and mastering these core components is pivotal in unlocking the full potential of metacognitive reading strategy instruction, enabling individuals to become more proficient and strategic readers.

2.10.1 Planning

According to Zare-ee (2008), planning involves selecting appropriate strategies and allocating resources that affect performance, for example, making predictions before

reading, strategy sequencing, and allocating time before beginning a task. Additionally, the process of thinking about and organizing the activities required to achieve a desired goal is known as planning (also known as forethought). The ability to plan is a fundamental property of intelligent behavior.

Metacognitive reading strategy instruction, emphasizing planning strategies, emerged as a pivotal component in enhancing reading comprehension among diverse learner groups. Wichadee's (2018) study highlighted the effectiveness of planning strategies in this instruction, revealing a significant positive impact on the reading comprehension of EFL university students. This underscored the importance of meticulous planning in approaching reading tasks, laying the groundwork for improved comprehension outcomes. Such findings highlighted the value of integrating planning strategies into metacognitive reading instruction, providing learners a structured approach to navigating complex texts and enhancing their comprehension abilities. In the planning phase, pre-reading involves selecting appropriate strategies and organizing activities necessary to achieve reading goals. Learners can establish a structured approach to reading tasks by emphasizing meticulous pre-reading, laying the groundwork for improved comprehension outcomes.

Pre-reading

Pre-reading activities help to lead the way for understanding the main ideas of a text since some inexperienced EFL readers may find it challenging to follow along between lines in a text for a variety of reasons, including unfamiliar vocabulary (Yorio in Madaoui, 2013), unfamiliar concepts, and cultural boundaries (Bernhardt, 2005). Before teaching the real reading materials, pre-reading exercises are employed. By acquainting students with the book's subject, vocabulary, and structural elements, pre-reading exercises help them understand it better (Bilokcuoğlu, 2011).

One evident study of effective pre-reading activities was conducted by Weganofa et al. in 2020. This study was conducted to discover more about Iranian college students' preferences for pre-reading activities and how effective pre-reading activities affect their reading comprehension through quasi-experimental research. Thus, the findings revealed that pre-reading questioning is more effective than pre-reading vocabulary lists for enhancing reading comprehension. Both activities received positive feedback,

suggesting their value for low-level students in improving comprehension. However, teachers needed to recognize that instructing students to formulate "good and meaningful" questions required time and was not easy. Future researchers could explore the types of questions students generated that contributed to improved comprehension.

2.10.2 Monitoring

Monitoring refers to the conscious awareness of one's comprehension and text achievement. Monitoring is demonstrated by the ability to participate in a rational and orderly while reading. During this process, students will monitor how well they are learning the material to determine the current learning state. After that, they will be assigned to use several strategies, such as making connections predictions, using context clues and text features, identifying text structures, using graphic organizers to pinpoint specific text information, and writing comments or questions on notes or in the margins.

Exploring metacognitive reading tactics indicates the critical significance that monitoring techniques play in improving reading comprehension across varied learner populations. Lee's (2020) study emphasizes the importance of monitoring tactics within this framework, revealing a favorable relationship with reading proficiency levels among Korean EFL university students. This emphasizes the active participation required during the reading process, emphasizing the role of metacognitive monitoring in improving comprehension outcomes. Such observations shed light on the relationship between monitoring tactics and good reading comprehension, directing instructional practices to develop strategic reading habits. This study showed a good association between monitoring strategies and reading competence levels among Korean EFL learners, highlighting the necessity of active participation in the reading process. These findings highlight the importance of adding monitoring tactics into instructional approaches, giving learners the skills to actively check their comprehension and adapt their reading strategies, accordingly, ultimately leading to better comprehension outcomes. This active participation underscores the critical role of metacognitive monitoring in enhancing comprehension outcomes. It emphasizes the importance of integrating monitoring tactics into instructional practices to foster strategic reading habits, as mentioned below.

While-reading

Monitoring was a strategy involving the analysis of information as a project progressed, and readers used it to keep track of their learning process. Examples of monitoring strategies included vocabulary comprehension, self-questioning (reflecting on whether they understood what they had read so far), summarizing, and inferring the main idea of each paragraph (Israel, 2007:450). To understand progressively challenging texts and the necessity for learners to be flexible in their reading approach, Duke and Martin (2008) underscored the importance of students acquiring methods that allowed them to adjust their strategies during reading and monitor their comprehension effectively.

2.10.3 Evaluation

Evaluation is assessing the conclusion and regulatory processes of an individual's learning. For example, evaluation involves re-evaluating a person's objectives and findings. The comparison of actual project impacts to accepted strategic plans is known as evaluation. It examines what students set out to do, what they have accomplished, and how they have achieved it. Many studies indicate that metacognitive knowledge and regulatory skills, such as planning, are related to evaluation and are among the most important factors that assist reading comprehension (Baker, 1989).

Exploring metacognitive reading strategies reveals the critical significance that evaluative processes play in improving reading comprehension and language development. Ningsih (2019) analysis emphasized the importance of the evaluation step within this framework, demonstrating a considerable improvement in reading comprehension among Indonesian EFL learners. This stresses the value of reflective activities in assessing comprehension and altering techniques accordingly. Such findings focused on the efficiency of metacognitive evaluation procedures in leading learners toward better comprehension outcomes. These findings highlight the importance of incorporating evaluation approaches into instructional methodologies, allowing students to critically analyze their comprehension processes and adapt strategies, resulting in improved reading comprehension outcomes. This emphasis on evaluation transitions seamlessly to the subsequent discussion on post-reading

strategy, where learners reflect on their reading experience and consolidate their understanding of the text, as further mentioned.

Post-reading

Post-reading strategies play a vital role in enabling students to transfer the knowledge they have acquired from reading to real-world contexts. This phase serves as a platform for readers to articulate and record their critical insights and interpretations gleaned from the text, fostering deeper comprehension and application of the material (Akbari et al., 2018). Ahmed et al. stated in 2024 that these strategies help teachers assess comprehension levels and adjust lesson plans accordingly. They provide insight into students' progress through activities like summarizing, discussing, and reflecting on reading, enhancing comprehension skills significantly. In order to learn, store, and remember the specifics of the reading material, post-reading strategies are also regarded as memory techniques. In the study of improving reading comprehension skills through post-reading strategies, Ahmed et al. also revealed firm conjectural connections between post-reading strategies and reading comprehension. Through the use of post-reading procedures, public secondary school students were able to advance their critical thinking skills to the point that they could confidently analyze, synthesize, and summarize a wide range of English-language literature on their own.

To sum up, metacognition significantly influences reading comprehension, and some tactics can help before, during, and after reading. A few of them are planning, keeping track of, and assessing comprehension. Controlling cognitive processes is made easier with the help of strategies including global, problem-solving, and support techniques. Effective understanding is aided by declarative, procedural, and conditional knowledge. However, the connection between awareness and metacognition differs depending on the situation. Effective education in metacognitive methods improves reading proficiency by placing a strong emphasis on preparation, observation, and assessment in the pre-reading, while-reading, and post-reading stages. To increase comprehension and learning outcomes overall, mastering these tactics is essential.

2.11 Metacognitive Reading Strategy Instruction (MRSI) and Reading Comprehension

Metacognitive Reading Strategy Instruction (MRSI) is an instructional approach designed to enhance students' mastery of metacognitive knowledge and strategies (Goh & Vandergrift, 2021). Numerous studies have demonstrated that MRSI can contribute to developing learners' awareness and ability to plan their reading process. It also aids in regulating their reading activities by facilitating information processing and managing obstacles by applying appropriate strategies. Additionally, MRSI supports learners in self-appraising their reading outcomes. Recognizing its importance, Mokhtari and Reichard (2002) have highlighted the need for further investigations involving diverse target groups with varying language proficiency levels and in different learning contexts. Such studies can provide deeper insights into the usage and effectiveness of metacognitive strategies.

In response to the call for further research, global studies have revealed a positive causal relationship between using metacognitive strategies and reading performance (O'Malley & Chamot, 1990; Sheorey & Mokhtari, 2001; Shih & Huang, 2018). Foreign research has also supported the facilitative effects of various MetaSI programs on English as a Foreign Language (EFL) learners' reading performance, self-perceived usage of metacognitive reading strategies, metacognitive awareness of reading strategies, and reading behaviors (Dabarera et al., 2014; Diaz, 2015; Estacio, 2013; Seifoori, 2018). However, some studies, such as those by Mehrdad et al. (2012), Korotaeva (2012), and Pammu et al. (2014), have reported different findings, suggesting no statistically significant effect from metacognitive strategy instruction on EFL learners' reading comprehension performance. These mixed results indicate that investigations into the instruction of metacognitive reading strategies are still exploratory, and more empirical studies are needed. Compared to extensive foreign research on MRSI, related research in Thailand reading classrooms appears insufficient. Consequently, there is a need for further empirical studies to examine the effectiveness of using MRSI on Thai EFL learners' reading comprehension in Thai learning contexts.

2.12 Roles of Metacognitive Reading Strategy Instruction (MRSI) in Reading Comprehension

MRSI is pivotal in enhancing reading comprehension by equipping students with the skills and strategies to navigate and understand complex texts. At its core, metacognition involves thinking about one's thinking processes. When applied to reading, it means that students not only read the text but also actively monitor and control their comprehension as they read. This self-awareness enables them to regulate their reading using specific strategies when comprehension falters, such as rereading a passage, asking questions, or making predictions. As a result, students become more engaged and proactive readers.

Metacognitive instruction also equips students with problem-solving skills when they encounter comprehension difficulties. They learn to identify their specific challenges, whether related to vocabulary, text structure, or content knowledge. With this awareness, they can apply appropriate strategies to address these challenges. For example, if they encounter an unfamiliar word, they might use context clues or prior knowledge to decipher its meaning. Furthermore, metacognitive instruction introduces students to various comprehension strategies, including predicting, summarizing, making inferences, and visualizing. These strategies serve as valuable tools for interpreting and understanding text. Students learn when to apply these strategies and why they are effective, deepening their understanding of the reading process.

In summary, MRSI is believed to provide benefits for students who start learning how to read and for those who attempt to overcome reading problems. It empowers students to participate actively in their reading process, fostering a deeper understanding of the text. With increasing self-awareness, the students would become more efficient in reading because skilled reading is the orchestration between awareness and monitoring of a reader’s comprehension (Mokhtari & Reichard, 2002).

2.13 Previous Studies on MRSI and Reading Comprehension

Many researchers have attempted to examine the impact of MRSI on reading comprehension of EFL learners (Zhang and Seepho, (2013); Ismail and Tawalbeh, (2015); Hapsari, (2019); Muhid et al. (2020); Acmed-Ismael (2021); Babashamasi et al. (2022); Khellab et al. (2022); Abd Ali et al. (2023). This review delves into the

existing literature on this subject within both a global context and specifically within the Thai EFL context.

In China, Zhang and Seepho (2013) examined the metacognitive approaches employed by English significant students during academic reading at Guizhou University in China. The participants consisted of third-year English majors. Data collection involved the utilization of a Metacognitive Strategy Questionnaire (MSQ), semi-structured interviews and a reading comprehension assessment. The findings depicted the overall utilization of metacognitive strategies among Chinese EFL (English as a Foreign Language) students in academic reading comprehension, irrespective of their proficiency levels. Moreover, a detailed examination of the distinctions between high and low proficiency levels was presented. The results highlighted a significant positive relationship between the utilization of metacognitive strategies and English reading proficiency. This study carries important implications for the pedagogical approach to teaching reading skills to EFL learners.

Similarly, in Saudi Arabia, Ismail and Tawalbeh (2015) used a quasi-experimental research methodology to evaluate the effectiveness of MRSI among 21 female university students divided into an experimental group (10 students) and a control group (11 students). Analysis of pre-and post-test data aimed to gauge the intervention's impact on these students' reading comprehension. The results revealed significant differences between the experimental and control groups in post-test reading comprehension scores and reading strategies questionnaire responses, indicating significant improvement in reading comprehension among the experimental group. Furthermore, significant differences were observed between pre-and post-test results within the experimental group, demonstrating enhanced reading skills after program participation, as evidenced by post-test performance.

Hapsari (2019) explored the application of Metacognitive Reading Strategy Instruction (MRSI) among English Language Teaching Department students. A standardized English reading comprehension test similar to EPT/TOEFL® was administered, consisting of multiple-choice questions (A, B, C, and D), to assess students' proficiency. Pretest scores were used to establish baseline performance, while posttest scores evaluated the instructional intervention's impact. The researcher analyzed the data by tabulating test results, conducting statistical analyses such as t-

tests using IBM SPSS Statistics Version 20, and testing hypotheses based on the results. The findings indicated that students who received training in metacognitive strategies outperformed those taught through conventional methods in reading comprehension.

In a study conducted in Indonesia, Muhid et al. (2020) explored whether there was a significant difference in students' reading comprehension achievement scores when utilizing metacognitive strategies and investigated the specific metacognitive strategies employed by students to enhance their reading comprehension. The participants included students in the eleventh grade of Senior High School. Data collection involved administering a Reading Comprehension Test (RCT) and a Metacognitive Strategy Questionnaire (MSQ). Results revealed a positive impact of metacognitive strategies on students' reading achievement with a large effect size. The study identified nine sub-categories of metacognitive strategies contributing to students' reading comprehension achievement: Advance Organizer, Self-management, Comprehension Monitoring, Production Monitoring, Self-assessment, Self-evaluation, and Self-reflection. Among these, the most frequently implemented metacognitive strategies in reading comprehension were Selective Attention and Organizational Planning, with Selective Attention being the highest and Self-reflection the least utilized strategy.

In Malaysia, Babashamasi et al. (2022) conducted a study to assess the effectiveness of explicit training in metacognitive strategies on online reading comprehension among undergraduate students during the pandemic. Both experimental and control groups participated in 14 training sessions, with the experimental group also undergoing interviews and assessments. Results showed significantly higher scores in the metacognitive group than in the conventional reading group. Students exhibited greater awareness of global and supporting reading strategies but less utilization of evaluative strategies. Challenges identified included a lack of vocabulary knowledge, dependence on teachers, and inadequate strategy training, suggesting the need for EFL teachers to integrate metacognitive reading strategies into their teaching practices.

Acmed-Ismael (2021) conducted a study focusing on primary school students to examine the impact of metacognitive learning practices on the reading comprehension

abilities of fifth-grade pupils through four phases. Initially, both experimental and control groups underwent assessment through a Personal Background Questionnaire (PBQ) and the Strategy Inventory for Language Learning (SILL) developed by Oxford (1990) before the commencement of strategy instruction. The PBQ complemented the SILL assessment by providing contextual information on student characteristics, thereby aiding in the interpretation of results (Oxford, 1990), while the SILL evaluated the frequency of participants' utilization of various language learning techniques. The study yielded several key findings: firstly, metacognitive strategy instruction significantly enhanced reading comprehension. Secondly, both metacognitive and traditional strategies effectively improved comprehension, suggesting the continued relevance of conventional teaching methods. Thirdly, using authentic texts proved more effective in teaching reading comprehension. Additionally, metacognitive strategy instruction increased learners' awareness of their metacognitive processes.

In a study conducted in Libya by Khellab et al. (2022), an experimental approach was employed to evaluate the effectiveness of metacognitive strategy training on the reading proficiency of computing engineering students. The researchers utilized the Survey of Reading Strategies (SORS) and a reading comprehension exam based on Boechner and Brown's 'Oxford English for Computing manual. The training implemented the CALLA model, focusing on various metacognitive strategies such as skimming, predicting, paraphrasing, revisiting, guessing unfamiliar words, and visualizing information. Descriptive statistics and statistical analysis, including t-tests, were used to assess the impact. Results showed improvement in students' awareness and application of metacognitive strategies. The study recommends integrating MRSI into English for Specific Purposes (ESP) courses and similar contexts, suggesting the development of a specialized metacognitive strategy framework tailored to ESP instruction.

In Iraq, Abd Ali et al. (2023) researched the impact of metacognitive strategies on reading comprehension among female Iraqi students. They utilized a quasi-experimental design and quantitative methodology, dividing students into experimental and control groups. The experimental group underwent instruction in metacognitive methods, while the control group did not. The evaluation was done

using the specialized comprehension subtest of the Test of Reading Performance (TORP) and a questionnaire assessing students' abilities using online platforms. The study emphasized the importance of long-term solutions for improving adolescent reading comprehension, including addressing factors like background knowledge and comprehension skills. Collaboration among researchers, educators, and policymakers was crucial for effective literacy programs. The research filled a gap in understanding reading comprehension ability in Iraqi schools and underscored the positive impact of metacognitive strategies. The study recommended integrating reading comprehension strategy instruction into university-level courses.

Research conducted in diverse global contexts consistently indicated the efficacy of MRSI in enhancing reading comprehension. Studies consistently showed that students who received such instruction outperformed those taught through conventional methods. This instruction improved students' comprehension skills and fostered their metacognitive awareness, enabling them to become more strategic and efficient readers. Using authentic texts in teaching enriched the learning experience, providing students with real-world contexts to apply their comprehension skills. Collaborative efforts among educators, researchers, and policymakers were crucial for implementing effective literacy programs integrating metacognitive reading strategies into educational curricula. By prioritizing developing reading comprehension skills through targeted instruction and instructional approaches, educators empowered students to become proficient and confident readers, thus enhancing their overall academic success.

In Thailand, many researchers have explored how MRSI impacts the reading comprehension of Thai students across various educational levels. The following section offers a detailed overview of studies conducted within the Thai educational context.

Expanding their knowledge of EFL reading concepts, Seedanont and Pookcharoen (2019) conducted an experimental study to investigate the impact of MRSI on Thai EFL students' awareness of reading strategies. The study involved 43 male Thai EFL students from a private school in Bangkok, Thailand. Participants underwent an initial assessment with the Survey of Reading Strategies (SORS) and IELTS reading proficiency test, instruction sessions spanning 18 sessions, and a final assessment

phase with a new set of IELTS reading tests and SORS. The independent variable was Thai EFL classrooms, and the dependent variable was metacognitive reading strategies. Results revealed significant improvements in students' awareness of reading strategies across subcategories and their IELTS reading test scores.

Focusing on university students, Banditvilai (2020) conducted a study to assess the impact of reading strategies on the reading comprehension of second-year English major students at Kasetsart University's Faculty of Liberal Arts and Science. The aim was to determine whether students, following training in reading strategies, could effectively utilize these strategies during their reading activities. Data were gathered through questionnaires, reading tasks, and semi-structured interviews. Results indicated that the implementation of reading strategies had a positive influence on students' reading comprehension. Participants exhibited favorable attitudes towards techniques such as skimming, scanning, prediction-making, and questioning and demonstrated their ability to apply these strategies, leading to improved text comprehension.

In previous studies conducted in the Thai EFL context, researchers investigated the impact of metacognitive reading strategy instruction on students' reading comprehension abilities. They found significant improvements in students' awareness of reading strategies and reading proficiency following metacognitive strategy instruction. Strategies like skimming, scanning, predicting, and questioning enhanced comprehension and fostered positive attitudes towards these strategies. Moreover, consistent progress was observed in students' metacognitive reading strategies and reading comprehension. The relationship between test-taking strategies and reading comprehension performance was highlighted, emphasizing the positive impact of test-taking strategies on comprehension. Additionally, the research explored the correlation between reading strategy use, reading self-efficacy, and reading comprehension, revealing a positive association among these factors. These findings underscore the importance of metacognitive reading strategy instruction in enhancing reading comprehension skills among diverse Thai EFL students.

2.13.1 Metacognitive Reading Strategy Instruction and Reading Comprehension in ESP Classrooms

Learning to read in the context of English for Specific Purposes (ESP) demanded greater effort from students, as seen in various studies that explored metacognitive reading strategies. For example, a case study involving four Iranian students showed that they heavily relied on their prior knowledge to comprehend ESP texts (Tabataba'ian & Zabihi, 2011). However, a traditional reading instruction approach in Tunisia proved ineffective for students trying to understand specialized texts in their academic domains. Conversely, metacognitive strategy training had a positive impact on students' comprehension of research articles (Dhieb-Henia, 2003). Simply providing lectures on reading strategies was not enough to guarantee students could apply them effectively; therefore, explicit metacognitive strategy training emerged as a viable solution, particularly in ESP courses where reading skills were crucial for students' career development (Dhieb-Henia, 2006).

In Iran, Ajideh's 2009 study emphasized the importance of language communication in ESP courses and recommended the use of autonomous learning and metacognitive strategies to enhance teaching and learning in ESP. Likewise, a study at the university level in Iran revealed that ESP students used reading strategies moderately and suggested increasing metacognitive awareness to improve reading ESP texts (Khoshsima & Samani, 2015). Similarly, Terzić (2015) highlighted the importance of teaching strategy application explicitly to enable students to develop critical reading skills. Research among ESP students specializing in Civil Engineering in Iran showed that explicit instruction on metacognitive reading strategies improved students' reading comprehension abilities, as evidenced by their performance in post-test reading comprehension (Ahangari & Mohseni, 2016). In Thailand, studies focused on students' awareness of metacognitive strategies and their effectiveness in improving reading comprehension. Wichadee (2011) found that metacognitive strategy instruction enhanced first-year students' reading comprehension at a private university in Thailand.

Investigations into the awareness of reading strategies among first-year students in science and social science departments at Bangkok University showed that Thai students' reading abilities were limited despite their extended exposure to English

learning. Munsakorn (2012) recommended training students on applying various strategies in reading to improve their performance. Further research on metacognitive reading strategies in Thailand revealed that less successful tertiary-level students faced difficulties due to focusing on understanding each word instead of the broader context (Chutichaiwirath & Sitthitikul, 2017). Raising awareness of metacognitive strategies was proposed to address this issue. A study at King Mongkut's University of Technology in Northern Bangkok indicated that instruction based on reading strategies positively influenced engineering and science students' systematic thinking and reading comprehension. Teachers were advised to use direct explanation with modeling techniques for teaching reading strategies to improve English reading competence (Akkakoson & Setobol, 2009). More recently, Chumworatayee (2017) found that explicit reading strategy instruction positively impacted Thai EFL adult learners, contributing to their independence in learning. Thongwichit and Buripakdi (2021) examined MRSI in an ESP context using mixed-methods research. Students in a Tourism Business Management Program benefited from metacognitive reading strategies and thinking-aloud protocols. The study concluded that MRSI helped improve reading comprehension and students' attitudes towards instruction were positive. These findings suggested that students needed instruction in these strategies to apply them correctly in different reading situations, while teachers benefited from understanding the reading process.

Despite increasing research on MRSI in educational settings, limited studies in Thailand specifically addressed MRSI in ESP contexts. ESP, a mainstream approach in English teaching in the 21st century (Chen, 2018), required further exploration. This research aimed to provide valuable insights into MRSI in ESP classrooms, offering pedagogical implications for undergraduate students in non-English majors. These insights could guide teachers in ESP courses, helping them approach reading in the ESP context and apply these findings to their teaching practices.

2.14 Previous Studies on Metacognitive Reading Strategies Used by Proficient Readers and Non-Proficient Readers

Since the 1970s, there has been a growing body of research examining language learning strategies overall, with a specific focus on reading strategies. In this section,

we will outline some studies that investigate the reading strategies employed by both successful and unsuccessful readers.

An important study contributing to the investigation in this field is conducted by Block (1986). In this study, Block utilized the categories of "general comprehension" and "local linguistic," mirroring Hosenfeld's (1977) binary classification of strategies. The aim was to compare the reading comprehension strategies employed by native English speakers and ESL students enrolled in a remedial reading course at the university level. The strategies introduced were categorized into two types: general strategies and local strategies. Among the ESL students in the study, those with higher comprehension scores reported utilizing "general strategies" such as integrating new information in the text with existing knowledge, distinguishing between main ideas and details, drawing upon their background knowledge, and concentrating on the overall textual meaning. Conversely, readers with lower comprehension scores seldom differentiated between main ideas and details, rarely drew upon their background knowledge, infrequently focused on textual meaning, and seldom integrated information.

In the same year, Ebrahimi (2012) and Saeed et al., (2012) conducted separate studies aiming to explore the cognitive strategies employed by EFL graduate students while reading a hypermedia text. Ebrahimi's study involved 8 Persian students, while Saeed, Maedeh, and Mohsen's study involved 23 Persian students. Data from both studies, collected through methods such as think-aloud protocols, interviews, and questionnaires, revealed significant differences in the strategies utilized by groups with high and low reading proficiency. The proficient group predominantly employed strategies such as skimming and drawing upon prior knowledge. In contrast, the less proficient group relied more on paraphrasing, translating into their first language, and consulting a dictionary for unknown words. These findings align with the results of Jun Zhang (2001) and Yau's (2005) studies, which also observed significant differences between advanced and less advanced readers. Proficient readers demonstrated effective strategies such as monitoring comprehension, skimming for key ideas, and inferring meaning, while less advanced readers relied heavily on dictionaries for word meanings and translated passages from English into their native language. Similarly, Malcolm (2009) found comparable results when comparing the

reported academic reading strategies of medical students at Bahrain University with varying levels of English proficiency. The study revealed that students with lower English proficiency utilized more translation strategies and reported using fewer overall strategies compared to their higher-proficiency counterparts. Additionally, Alsheikh's (2011) study also highlighted the heavy reliance on translation among less proficient readers.

In the actual process of reading, proficient readers demonstrate superior performance compared to less skilled readers by employing metacognitive strategies. In studies conducted by Yin and Agnes (2001), Zhang and Seepho (2013), and Shikano (2013), the Metacognitive Awareness of Reading Strategies Inventory (MARSI) (Mokhtari & Richard, 2002) was utilized as a common instrument to gather data on readers' utilization of metacognitive strategies. Among these studies, Yin and Agnes (2001) found that proficient readers exhibited greater awareness of metacognitive knowledge and utilized metacognitive strategies more frequently compared to less skilled readers. Furthermore, research by Dhieb-Henia (2003), Swanson and De La Paz (1998), and Zhang (2001) on the use of strategies by proficient and less proficient readers highlighted that proficient readers tended to employ a higher number of metacognitive strategies while reading.

On the contrary, Shokrpour and Nasiri (2011), in their study examining the utilization of cognitive and metacognitive reading strategies among ninety-four Iranian academic IELTS test takers categorized as either proficient or less proficient, found no significant differences in the use of cognitive strategies between the two groups. Similarly, Shikano's (2013) research involving sixty Japanese university students also revealed no significant disparities between high- and low-reading-proficiency groups in terms of cognitive strategy employment. Furthermore, Zhang et al. (2013) conducted a study on twenty-two Chinese third-year English major undergraduate students and discovered that both high- and low-proficiency students exhibited similar levels of metacognitive strategy use at a medium level. These findings align with the results of Anderson (1991) and Yayli (2010), who observed that proficient and less proficient readers tended to employ similar types of strategies during reading activities. However, students with higher scores appeared to apply strategies more effectively and appropriately.

However, a study conducted by Oranpattanachi (2010) on ninety Thai engineering students revealed that both high and low proficiency readers encountered both distinct and common challenges in their reading processes. These differences were categorized into two aspects: the frequency of perceived strategy utilization and the frequency of perceived top-down strategy utilization. Additionally, similarities in their reading processes were categorized into two aspects: the rank ordering of perceived strategy utilization and the manner in which they processed text.

According to Auwalyah (2020) who investigated reading strategies used between proficient and low proficient readers, the proficient readers comprehended their tactics and the rationale for their use better than poor readers. While low readers might lack the capacity to identify and execute appropriate systems or use the most efficient procedures, they might nevertheless explain their own reading approaches, albeit less successfully. After exploring through various reading strategies, throughout the learning process, proficient readers often made greater use of global and supported techniques, whereas low readers mostly relied on support tactics. Even though both competent and low-proficient readers used "support reading strategies" such as highlighting, paraphrasing, taking notes, and referencing literature, they were less likely to use "problem reading strategies,"

In 2022, Li et al. conducted a study comparing reading strategy measures and readers' efficiency across different reading tasks. Their research focused on EFL readers at university levels, encompassing both proficient and less proficient individuals. The study revealed that these readers tended to favor six decoding procedures. However, the findings highlighted a notable gap between the awareness of various reading strategies and their actual implementation during reading tasks. Despite being cognizant of a wide range of reading strategies, participants in the study either overlooked most of these strategies or failed to utilize them to the extent they believed they did. This disparity was evident both in survey responses and verbal reports used to assess strategy use. Particularly in L2 reading, there existed a significant contrast between the strategies readers were aware of ("what they know") and those they actually applied.

In summary, across studies examining the strategies employed by successful and unsuccessful readers, most findings indicate differences in strategy usage between

these two groups. Researchers generally agree that readers with higher reading proficiency tend to employ a broader range of effective reading strategies more frequently, whereas those with lower proficiency use strategies less frequently and with lower effectiveness. Successful readers demonstrate a greater variety and frequency of strategies, which are more task-appropriate and thus more effective. However, some studies show no significant disparities in overall strategy usage between the two groups, particularly in terms of the total number of strategies employed. Instead, differences are observed in the types and frequency of strategies utilized. Proficient readers commonly use strategies such as integrating new information with existing knowledge, making inferences, predictions, and elaborations, as well as skimming and guessing. Conversely, less proficient readers often rely on less effective strategies like paraphrasing, translation into their first language, and consulting a dictionary for unknown words.

2.15 Chapter Summary

This chapter reviews metacognitive reading strategies, reading comprehension, and their link. Reading comprehension is essential for understanding text, with three models: bottom-up, top-down, and interactive. Reading strategies improve comprehension through metacognition, involving declarative, procedural, and conditional knowledge. Past research shows a connection between these strategies and comprehension. MRSI involves crucial stages, namely planning, monitoring, and evaluation. The chapter also covers the impact of MRSI in global and Thai contexts, emphasizing research gaps. Proficient readers excel in diverse materials, while non-proficient readers struggle with decoding and context. Differences in comprehension monitoring, especially for second language learners, warrant further study. The next chapter details research methods: design, participants, instruments, data collection, instruction, and analysis.

CHAPTER III
RESEARCH METHODS

This study aimed to investigate the effect of metacognitive reading strategy instruction (MRSI) on EFL engineering undergraduates' reading comprehension. Moreover, this study examined the ways in which this instruction helped improve their reading comprehension. Finally, the students' attitude towards metacognitive reading strategy instruction (MRSI) was also explored. This study was conducted for 3 hours a week, including 13 weeks, during the second semester of the 2022 academic year. This chapter describes the research design/paradigm, participants and setting, research instruments, data collection procedure, and data analysis.

3.1 Research Design/Paradigm

Employing mixed-methods research designs, this research examined the effect of metacognitive reading strategy instruction on the reading comprehension of undergraduate students at a public university in Thailand. Mixed methods research designs entail blending qualitative and quantitative research methods within a specific study. Incorporating postpositivist and interpretivist philosophical frameworks in mixed-method designs offers several advantages for addressing complex research inquiries (Fetters, 2016). Additionally, it furnishes a logical foundation, methodological flexibility, and a comprehensive comprehension of individual cases (Maxwell, 2016). Utilizing mixed methods empowers researchers to explore research questions with sufficient depth and breadth (Enosh, Tzafrir, & Stolovy, 2014), facilitating the generalization of findings and implications from the studied issues to the entire population. This approach embraces diverse perspectives and experiences (Greene, 2007). In this study, quantitative data were obtained from the reading comprehension pretest and posttest to investigate how MRSI helped improve their reading comprehension. Moreover, the participants' attitudes toward MRSI and their improved reading comprehension was also examined using an attitude questionnaire. Finally, qualitative data were obtained from a semi-structured interview to explore how mechanical engineering students used metacognitive reading strategies in enhancing their comprehension of ESP reading materials.

Moreover, this study adopted quasi-experimental research. A quasi-experiment refers to a practical intervention study aimed at gauging the causal influence of an intervention on a specific population without resorting to random assignment. While resembling traditional experimental designs or randomized controlled trials, quasi-experimental research notably lacks random assignment to treatment or control groups. Instead, it commonly involves the researcher directing the assignment to the treatment group based on criteria other than random selection, such as a predetermined eligibility threshold. This study investigated how MRSI (Metacognitive Reading Strategy Instruction) impacted the reading comprehension skills of Thai EFL undergraduate students. The research comprised two distinct groups of participants drawn from separate intact classes: a control group and an experimental group. The control group received conventional textbook-based instruction, while the experimental group received instruction focused on MRSI techniques.

3.2 Participants and Setting

Participants in the study were drawn from a pool of one hundred and forty-five Thai EFL engineering students. Subsequently, sixty-three students were assigned to the control group, while eighty-two students were assigned to the experimental group randomly. The control group received instruction through traditional reading methods, following the teacher's manual and the English Reading for Academic Purpose (ERAP) textbook. Traditional teaching involved presenting the social function, stages, and important language features of the texts being studied. Conversely, the experimental group underwent metacognitive reading strategies instruction (MRSI). All participants were second-year undergraduate students, aged between 18 and 22, enrolled in a Mechanical Engineering (EME) bachelor's degree program at a technology university situated in the northeastern region of Thailand. The students' English proficiency was relatively similar, as indicated by the mean score of their entrance exam (62.50 for the control group and 64.73 for the experimental group).

Before enrolling in the English Reading for Academic Purposes course, these Mechanical Engineering (EME) students underwent two prerequisite English courses: "00-000-031-101 English for Study Skills Development"and "00-000-031-102 English for Communication."Upon finishing these courses, the students were

equipped with knowledge about reading strategies, academic vocabulary, and various English structures essential for academic reading purposes.

The students covered a total of seven units during the course: Unit 1: Getting Started, Unit 2: Definition, Unit 3: Classification, Unit 4: Signs & Notices, Unit 5: Describing a Process, Unit 6: Comparison and Contrast, and Unit 7: Causes and Effects. Each of the seven units was tailored to provide students with opportunities to practice English reading comprehension skills and acquire knowledge through two teaching approaches: metacognitive reading strategy instruction and traditional reading instruction.

The setting of this study was the technology university in the northeastern region of Thailand, which was first established as a government university. Due to its technology qualification, this university has been focusing on providing practical programs for all faculties, including Engineering, Technical Education, and Business Administration. Students in these faculties are expected to be equipped with practical reading skills to understand various academic texts.

3.3 Research Instruments

The four research instruments used in this study were the Reading Comprehension A (Pre-test), Reading Comprehension B (Post-test), Students' Attitude toward MRSI Questionnaire, and a semi-structured interview. These instruments are described in detail below.

3.3.1 Reading Comprehension A (Pre-test) and Reading Comprehension B (Post-test)

Two sets of reading comprehension A (pre-test) included A1 and A2 with the following details.

Reading Comprehension A1

The Reading Comprehension Test: Version A1 was an assessment designed to evaluate participants' proficiency in English reading comprehension. It comprised 60 items and was divided into two sections, each with its unique set of instructions. Participants were allotted one hour to complete the test and were prohibited from taking any materials, including the booklet, out of the test room.

Section 1 focused on assessing participants' reading comprehension of various passages. Passage 1 (Items 1-5) presented a bar graph depicting the preferred snack

choices of students at a Thai university. Participants were required to study the graph and select the most appropriate answers. Passage 2 (Items 6-10) provides a survey table concerning housing types in Northeast Thailand, and participants must answer related questions. Passage 3 (Items 11-15) featured pie charts, and test-takers needed to complete a passage using the information from these charts. Passage 4 (Items 16-20) displayed a table comparing three states of Australia, and participants were expected to choose the best answers by examining this table.

Section 2 continued to evaluate participants' reading comprehension. Passage 5 (Items 21-25) required participants to choose the correct answers to complete a passage. Passage 6 (Items 26-28) included pie charts and a related passage on solid waste materials in Khon Kaen Municipality in 2020. Participants must answer questions based on this information. Passage 7 (Items 29-33) involved selecting the best answers to questions related to a given passage. Passage 8 (Items 34-38) required reading a passage and choosing the most appropriate answers. Passage 9 (Items 39-43) was about corrosion, where participants must read the passage and select the correct answers. Passage 10 (Items 44-46) focused on motorcycle accidents, with candidates choosing the appropriate answers after reading the passage. The test continued with Passage 11 (Items 47-51), where participants read a passage and selected the best answers based on it. Passage 12 (Items 51-55) provided instructions on how to move a heavy load, and participants were expected to choose the most appropriate answers after reading the passage. Lastly, Passage 13 (Items 56-60) discussed the possible causes of bushfires in Victoria, Australia. Participants needed to read the text and choose the correct answers. Overall, this test assessed a wide range of reading comprehension skills, including interpreting graphs, tables, and charts and understanding and responding to written passages on diverse topics. Participants were expected to be able to extract key information and make informed choices based on the provided content.

Reading Comprehension A2

The Reading Comprehension Test A2 was a language assessment aimed at evaluating participants' English reading comprehension. It comprised 60 items and was divided into two sections, each with specific instructions. Participants were given one hour to

complete the test and were not allowed to take any materials or related items outside the test room.

Section 1 assessed participants' language ability in reading through various passages. Passage 1 (Items 1-5) presented a table comparing three states in the United States of America, and participants must answer questions related to this table. Passage 2 (Items 6-10) provided a survey table concerning housing types in Northeast Thailand, and participants needed to answer questions based on this information. Passage 3 (Items 11-15) featured pie charts, and participants were required to complete a passage using the data from these charts. Passage 4 (Items 16-20) focused on favorite snacks for Thai people, presented as percentages, and participants were expected to answer questions based on this data.

Section 2 continued to evaluate participants' reading comprehension. Passage 5 (Items 21-25) required participants to read a passage and choose the best answers related to it. Passage 6 (Items 26-28) included pie charts and a related passage on solid waste materials in Khon Kaen Municipality in 2020. Participants must read the passage and answer questions based on the charts and text. Passage 7 (Items 29-33) involved selecting the best answers to questions related to a given passage. Passage 8 (Items 34-38) provided instructions on disconnecting a car battery, with a step-by-step process outlined. Participants were required to read the passage and choose the best answers based on the provided information. Passage 9 (Items 39-43) discussed corrosion, and participants must read the passage and select the best-related answers. Passage 10 (Items 44-46) marked the beginning of another section with several passages for participants to read. Passage 11 (Items 47-51) continued the second section, where participants read multiple passages and answer questions accordingly. Passage 12 (Items 51-55) provided instructions on how to move a heavy load, and participants must read the passage and choose the best answers based on this information. Finally, Passage 13 (Items 56-60) discussed the possible causes of bushfires in Victoria, Australia. Participants needed to read the text and choose the correct answers. In conclusion, this test assessed candidates' reading comprehension by presenting various data types, charts, and textual information across different topics. Participants must extract essential information, interpret it accurately, and make informed choices based on the content provided.

Reading Comprehension B1

The Reading Comprehension Test: Version B1 was designed to assess participants' English reading comprehension. This test comprised 50 items and was divided into three types of questions, each with specific instructions. Participants were given one hour to complete the test and could not take any materials or related items outside the test room.

In Passage 1 (Items 1-5), participants were instructed to examine the classification of Combustion Engines and choose the most appropriate answers based on the information provided. Passage 2 (Items 6-10) required the participants to match warnings with their possible results, testing their ability to connect different pieces of information. Passage 3 (Items 11-15) presented a diagram illustrating the manufacturing process of soft drinks. The participants needed to study the diagram and complete a process description based on their understanding. Passage 4 (Items 16-20) asked the participants to choose the best answers to complete a passage.

Passage 5 (Items 21-25) focused on matching data changes with the correct verb expressions, assessing participants' ability to associate data with appropriate actions. Passage 6 (Items 26-30) involved interpreting a graph depicting Thailand's automotive sales volume in 2021. The participants were required to identify TRUE or FALSE statements based on the information in the graph. Passage 7 (Items 31-35) discussed how to escape from a fire, and participants must read the passage and provide their answers. Passage 8 (Items 36-44) pertained to the Anglo-French Concorde and Boeing 747, with participants tasked with completing a table based on the passage and answering related questions. Passage 9 (Items 45-50) gave the participants climate causes and effects. The participants were instructed to read the passage and complete a table by writing specific letters (a, b, c, d, e, f, or g) based on the information in the text.

Overall, this test assessed a wide range of reading comprehension, including understanding diagrams and graphs, connecting warnings and consequences, interpreting manufacturing processes, and matching data changes with appropriate expressions. The participants were expected to demonstrate their ability to comprehend and synthesize information from various types of texts and visual materials.

Reading Comprehension B2

The Reading Comprehension Test: Version B2 was designed to assess the participants' English reading comprehension. The test consisted of 50 items and was divided into three types of questions, each with specific instructions. The participants were given one hour to complete the test and could not take any materials or related items outside the test room.

In Passage 1 (Items 1-5), the participants were required to examine the classification of electronic components and choose the most appropriate answers based on the information provided. Passage 2 (Items 6-10) required the participants to match warnings with their possible results, testing their ability to connect different pieces of information. Passage 3 (Items 11-15) presented a diagram illustrating the waste recycling process. The participants needed to study the diagram and complete a process description based on their understanding. Passage 4 (Items 16-20) asked the participants to choose the best answers to complete a given passage.

Passage 5 (Items 21-25) focused on matching data changes with the correct verb expressions, assessing the participants' ability to associate data with appropriate actions. Passage 6 (Items 26-30) involved interpreting a graph depicting Thailand's automotive sales volume in 2022. The participants were required to identify True or False statements based on the information in the graph. Passage 7 (Items 31-35) discussed how to escape from a fire, and the participants must read the passage and provide their own answers. Passage 8 (Items 36-44) involved the Anglo-French Concorde and Boeing 747, with the participants tasked with completing a table based on the passage and answering related questions. Passage 9 (Items 45-50) dealt with climate causes and effects. The participants were instructed to read the passage and complete a table by writing specific letters (a, b, c, d, e, f, or g) based on the information in the text.

Upon examination of the two reading comprehension tests, prominent distinctions in content and varying levels of difficulty became evident.

The following was a breakdown of the key differences among these four test levels.

Reading Comprehension A1:

- Proficiency Level: Beginner (A1 on the Common European Framework of Reference for Languages - CEFR)
- Number of Items: 60 items
- Sections: Two sections with various types of questions
- Content: Focuses on basic reading comprehension skills such as interpreting simple graphs, tables, and charts, as well as understanding and responding to written passages on straightforward topics.

Reading Comprehension A2:

- Proficiency Level: Beginner (A1 on the Common European Framework of Reference for Languages - CEFR)
- Number of Items: 60 items
- Sections: Two sections with questions related to graphs, tables, charts, and written passages
- Content: Builds on A1 and includes slightly more complex reading comprehension tasks, focusing on basic data interpretation and understanding written passages.

Reading Comprehension B1:

- Proficiency Level: Elementary (A2 on the CEFR)
- Number of Items: 50 items
- Sections: Three types of questions
- Content: Included tasks such as understanding diagrams, matching warnings with consequences, interpreting manufacturing processes, and matching data changes with appropriate expressions. Content is more challenging than A1 and A2.

Reading Comprehension B2:

- Proficiency Level: Elementary (A2 on the CEFR)
- Number of Items: 50 items
- Sections: Three types of questions
- Content: Similar to B1 but with increased complexity. Required candidates to understand complex diagrams, match warnings with

consequences, interpret advanced data in graphs, and handle more detailed and intricate textual information.

It is important to note that B1 and B2 reading comprehension tests were more difficult than A1 and A2 tests because they focused on assessing the participants at higher proficiency levels on the Common European Framework of Reference for Languages (CEFR). Several vital reasons contributed to the increased difficulty of B1 and B2 tests:

Language Complexity:

B1 and B2 tests included more complex vocabulary, sentence structures, and idiomatic expressions than A1 and A2. The participants at these levels were expected to have a broader and more understanding of the language.

Inference and Synthesis:

At the B1 and B2 levels, the participants were expected to make inferences, draw conclusions, and synthesize information from multiple sources. They needed to go beyond simple comprehension and demonstrate the ability to analyze and evaluate information.

Depth of Content:

The content in B1 and B2 tests covered more specialized or technical subjects, requiring the participants to understand various topics more deeply. This contrasted with the simpler and more general topics in A1 and A2 tests.

Question Complexity:

Questions in B1 and B2 tests involved more complex task types, such as matching warnings with consequences, completing process descriptions, and matching data changes with appropriate expressions. These tasks demanded higher-order thinking skills.

Length and Quantity:

B1 and B2 tests had fewer items when compared to A1 and A2, but the questions tended to be more involved and time-consuming. Participants must manage their time effectively to complete the tests within the allotted duration.

Overall Proficiency:

B1 and B2 represented intermediate and upper-intermediate proficiency levels, respectively, whereas A1 and A2 were considered beginner and elementary levels. As

participants progressed in their language learning journey, they were expected to handle more complex linguistic and cognitive challenges.

Assessment Criteria

The evaluation principle for the A1 and A2 tests, which comprised 60 questions each, categorized students' performance into Low, Moderate, and High groups based on their scores. In the A1 test, scores from 1 to 20 classified students into the Low group, reflecting foundational skills, while scores from 21 to 40 placed them in the Moderate group, indicating a moderate level of proficiency. Scores ranging from 41 to 60 categorized students into the High group, demonstrating proficiency in handling more complex tasks.

Similarly, in the B1 and B2 tests, which consisted of 50 questions each, students' scores determined their group placement. Scores from 1 to 16 in the B1 test indicated the Low Group, reflecting proficiency in fundamental skills, while scores from 17 to 32 placed students in the Moderate Group, signifying a moderate level of proficiency. Scores from 33 to 50 classified students into the High Group, indicating proficiency in handling more challenging tasks. This tiered scoring system provided a clear and objective assessment of students' proficiency levels across different skill sets, aiding in understanding their academic progress.

Test Format

Test format encompassed the structure and arrangement of a test, including question types, instructions, and layout, designed to evaluate knowledge, skills, or abilities. This study used various test formats, such as multiple choice, true/false, short answer, essay, matching, fill-in-the-blank, short response, and performance tasks, each suited for different assessment purposes and subjects.

In summary, as the participants advanced from A1 to B2 in reading comprehension tests, they encountered a gradual increase in complexity. The challenges intensified with more intricate tasks, including interpreting advanced graphical data and synthesizing information from various types of texts. These tests assessed participants' reading comprehension across a range of proficiency levels, encompassing those who were just beginning their language journey to those who had reached an upper-intermediate stage. The transition from A1/A2 to B1/B2 entailed a shift towards higher linguistic and cognitive demands, necessitating a deeper and

more understanding of the language. The participants at these levels were expected to navigate complex textual and graphical information with proficiency, signifying their development in reading comprehension and analytical abilities as they progressed through the CEFR proficiency scale.

Lastly, in terms of reading comprehension tests effects, these tests covered different complexity levels, starting with A1 and A2 for beginner and elementary proficiency levels, respectively, and advancing to B1 and B2 for intermediate and upper-intermediate proficiency levels. The choice of test versions directly impacted data interpretation, as higher levels (B1 and B2) demanded greater language complexity, including a broader vocabulary, intricate sentence structures, and idiomatic expressions. Additionally, B1 and B2 involved advanced tasks such as inferring, synthesizing information, and evaluating data from diverse sources, in contrast to the simpler comprehension tasks of A1 and A2. The quantity and type of questions also differed, with B1 and B2 focusing on complex tasks and specialized content, while A1 and A2 were more general and straightforward. These factors contributed to the comparative analysis of the participants' reading comprehension abilities, highlighting their progression across different proficiency levels.

3.3.2 Students' Attitudes toward MRSI Questionnaire (SAQ)

In this study, an attitude questionnaire (SAQ) was developed to examine the participants' attitudes towards the metacognitive reading strategies instruction. This questionnaire consisted of 30 items and a 5-point Likert scale. The questionnaire included two parts. Part 1 included personal information such as gender, age, program, year, and duration of learning English, and Part 2 consisted of specific questions about students' attitudes towards the metacognitive reading strategies instruction. Students were asked to answer each question using a scale ranging as follows;

1 = "I strongly disagree."

2 = "I disagree."

3 = "I neither agree nor disagree."

4 = "I agree."

5 = "I strongly agree."

Using the Likert Scale's scoring criteria and scale-ranging numbers, these data were decoded into the following average scores;

Average score	4.21 – 5.00	=	Very High
Average score	3.41 – 4.20	=	High
Average score	2.61 – 3.40	=	Moderate
Average score	1.81 – 2.60	=	Low
Average score	1.00 – 1.80	=	Very Low

The questionnaire underwent translation into Thai to avoid potential language barriers for students during its completion. Subsequently, five experts were asked to assess the reliability and validity of this instrument. The back-translation process was meticulously overseen by a qualified translator possessing more than ten years of experience in the field. Utilizing her profound knowledge of linguistic analysis and cross-cultural communication, the translator upheld the integrity and precision of the original text in the back-translated rendition. Appendices D and E presented the English and Thai iterations of the Students' Attitude Questionnaire (SAQ).

3.3.3 A Semi-Structured Interview

After the experiment, a semi-structured interview was used to obtain qualitative data on the participants' use of metacognitive reading strategies in comprehending English reading texts. Fifteen students were purposively selected to answer interview questions. Based on the reading comprehension scores as a selection criterion, five students were chosen from the high-level group, five from the middle-level group, and five from the low-level group. Five participants from the high-level group were coded H1, H2, H3, H4, and H5, while five participants from the middle-level group were coded M1, M2, M3, M4, and M5; finally, five participants from the low-level group were coded L1, L2, L3, L4, and L5. The interview sessions, conducted in Thai to avoid language barriers, took place simultaneously so that the researcher could conveniently record whatever the interviewees shared. Each interview lasted 30 minutes. The actual two versions, English and Thai, of the semi-structured interview and informed consent forms are shown in Appendix H, Appendix I, Appendix J and Appendix K, respectively.

3.4 Data Collection Procedure

This study comprised 145 participants selected from two intact classes. Participants in Class 1 were assigned as the control group, while participants in Class 2 were assigned as the experimental group. The control group, comprising 63 participants, underwent regular English classes without specific instruction on MRSI. In contrast, the experimental group, consisting of 82 participants, received explicit instruction on Metacognitive Reading Strategy Instruction (MRSI) based on the framework proposed by Mwaniki (2015). The study employed a pen-and-paper test format, with each part (i.e., each test) being systematically numbered and uniquely identified. Two separate tests (Reading Comprehension Test A1, 60 items for multiple choices and Reding Comprehension Test B1; 50 items for multiple choices, gap fillings, true or false, answering the questions, and matching) and (Reading Comprehension Test A2; 60 items for multiple choices and Reding Comprehension Test B2; 50 items for multiple choices, gap fillings, true or false, answering the questions, and matching) were administered to all participants at two distinct time points: a pretest conducted before the treatment and a posttest administered after the treatment. The participants were given one hour to complete the tests and could not take any materials or related items outside the test room. Data analysis included only participants who completed all tests. Those who did not participate in the examinations, either by providing patterned responses to multiple-choice questions, submitting blank tests, or having over 50% missing data, and those who wrote answers irrelevant to the questions, were excluded from the data analysis.

Both reading comprehension tests, A and B, were administered in the first week and the last week, and they were conducted on the same day for all participants. Furthermore, a 20-minute interval was incorporated between each test to mitigate participant fatigue. All participants received test instructions, explanations, and examples in their mother tongue, Thai.

A five-point Likert questionnaire, adapted from Mokhtari, K., & Reichard, C. (2002), examined their attitudes toward MRSI. Subsequently, it was translated into a Thai version and presented to participants after completing the tests—this questionnaire aimed to assess the attitudes of EFL undergraduate participants towards metacognitive reading strategy instruction.

Finally, fifteen participants were selected for a semi-structured interview, including five students from the high-level, middle-level, and low-level groups. The aim was to gather in-depth perspectives on using metacognitive reading strategies to help them comprehend the English reading texts.

A comprehensive overview of the data collection procedure is presented in Figure 2.

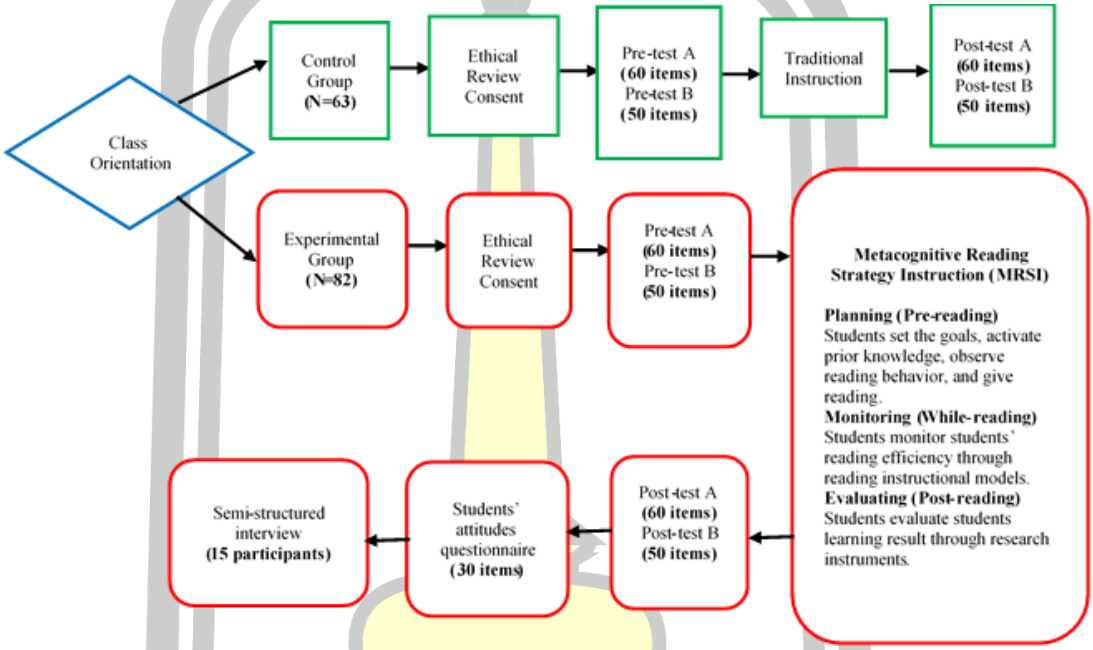


Figure 2 Data Collection Procedure

3.5 Lesson Plans

In Week 1 of the course "00-000-031-203 English Reading for Academic Purposes," students embark on their academic journey on a specified date. The course opens with Unit 1: Getting Started – Word Structure Clues, designed to unfold over three hours (180 minutes). This introductory unit targets undergraduate students to acquaint them with the basics of word analysis. It specifically focuses on understanding prefixes, stems (roots), and suffixes, alongside developing the skill to deduce the meanings of unfamiliar words by analyzing these word parts.

The lesson plan features a variety of activities to engage students and foster learning. It begins with an orientation, introducing students to the course structure and expectations. A Reading Comprehension Pretest follows this to assess initial reading skills, and a pre-MRSI questionnaire to evaluate metacognitive awareness of reading

strategies. Activities throughout the session include asking and answering questions, analyzing word structures, describing word meanings, and practicing with given examples. Additionally, group discussions facilitate collaborative learning, while class discussions aim to consolidate understanding of the concepts taught.

Materials required for the lesson encompass English Reading for Academic Purposes textbooks for both students and the teacher, worksheets for practice, and a Microsoft PowerPoint slide presentation for structured content delivery. The use of desktop or laptop computers, along with a projector and a whiteboard with markers, supports the digital and interactive aspects of the lesson. Internet access enhances the learning experience through the use of YouTube, multimedia resources, various applications, and mobile phones, making the lesson both engaging and informative.

The lesson plan outlines the teaching procedures for both control and experimental groups in a study focusing on the effectiveness of traditional reading instruction versus metacognitive reading strategy instruction (MRSI) in English Reading for Academic Purposes (ERAP).

In contrast, the experimental group undergoes a more structured and interactive approach through MRSI. This method is divided into distinct phases: Warm-up, Pre-reading, While-reading, and Post-reading, totaling a comprehensive session of 180 minutes.

Warm-up involves greeting students, providing an orientation about metacognitive reading strategy instruction, and administering a pretest and pre-questionnaire to assess their initial reading abilities and strategies.

Pre-reading focuses on planning and preparation. The teacher sets the objectives and engages students in discussing their prior knowledge of word structures. Following this, examples of prefixes, suffixes, and stem/roots are given and practiced, emphasizing pronunciation collectively and individually.

During the While-reading phase, students are monitored through interactive and collaborative activities. They complete worksheets individually, exchange these with peers for correction, and then engage in group discussions to identify word structures within given passages. The teacher facilitates, monitors, and provides feedback during these activities, culminating in a collective review of the answers and further explanation of the concepts.

The final phase, Post-reading, is focused on evaluating the students' learning. It begins with positive reinforcement through compliments, followed by assessments derived from worksheets, textbook practices, and an extension task for homework. These evaluations aim to measure the effectiveness of the MRSI model by assessing students' ability to apply metacognitive reading strategies.

In summary, the control group follows a traditional, teacher-led approach to learning about word structure clues in reading. In contrast, the experimental group experiences a dynamic and interactive MRSI model that emphasizes metacognitive strategies for understanding and applying knowledge of word structures in reading.

Since cognitive strategies were most likely enclosed within a subject area, metacognitive reading strategies were used to cover various topics. Therefore, this study was conducted through metacognitive reading strategies, which provided a step-by-step breakdown of the lesson content above. It listed tasks that students completed along with the instructional models. The teaching plan was derived from the English Reading for Academic Purposes (ERAP) textbook, which included seven topics covering 13 weeks of teaching.

This study included 13 lesson plans, with three hours allocated to each plan. Each plan consisted of a lecturer's name, week number, course title, date, topic, duration, objectives, level, activity, materials, teaching procedure (both in control and experimental groups), and evaluation. An example of the lesson plan for the unit Getting Started: Word Structure Clues. In this lesson, students were taught that they could sometimes guess the meaning of an unknown word by breaking it down into parts and then using each part to provide clues to the meaning of the whole word.

To understand the meaning of difficult words, there were three parts of English words: a prefix, a stem (root), and a suffix. This lesson focused on analyzing and building words, and students were taught how to analyze prefixes, suffixes, and stem/root). The prefixes included re- un-, while the suffixes lesson included -er, -or, -s, -es, -ion, -ive, -ing, -ed, -ic, -ful, -ly. Students were also taught about parts of speech. Classroom activities were included to motivate students to read for better reading comprehension.

In conclusion, for the control group, traditional teaching methods were utilized across three 60-minute sessions, focusing on specific topics like word structure clues, basic sentence structure, and punctuation marks, employing textbook materials, lectures, practice exercises, and group discussions for instruction and assessment. Conversely, the experimental group underwent a structured and interactive approach centered around metacognitive reading strategy instruction (MRSI), with a 180-minute session divided into warm-up, pre-reading, while-reading, and post-reading phases, incorporating activities such as collaborative worksheets, group discussions, and individual feedback from the teacher.

For the integration, metacognitive reading strategy instruction (MRSI) was integrated into the experimental group's instruction through a step-by-step breakdown of the lesson content, derived from the English Reading for Academic Purposes (ERAP) textbook. The teaching emphasized the analysis and understanding of prefixes, suffixes, and stems/roots, with classroom activities motivating students to improve reading comprehension by teaching them to analyze and build words using word parts. The teaching procedure involved three stages: pre-reading (planning), while-reading (monitoring), and post-reading (evaluating), with activities such as multiple-choice questions and gap-filling items aimed at reinforcing learning.

3.6 Data Analysis

In this study, the data were analyzed using different types of statistics. The analysis of the pretest and posttest scores was conducted through paired-samples t-tests, comparing the mean scores of participants before and after the instructional interventions. For both the experimental and control groups, separate paired-samples t-tests were performed on reading comprehension scores for versions A and B. These tests aimed to determine if there were significant differences in reading comprehension performance before and after the intervention. Effect sizes (Cohen's d) were also calculated to assess the magnitude of these differences. Results showed statistically significant improvements in reading comprehension scores from pre to post-test in both groups, with moderate to large effect sizes observed, indicating the effectiveness of the instructional interventions in enhancing reading comprehension among Thai EFL engineering students. The attitudes of Thai EFL engineering students towards Metacognitive Reading Strategy Instruction (MRSI) were analyzed

using mean, percentage and standard deviations. Finally, the data obtained from a semi-structured interview were analyzed using thematic analysis. A thematic analysis involved an initial examination, coding of data, identifying themes, and reporting the findings. This process in the study could be summarized into six steps. The first step was familiarization, where the researcher became acquainted with the data through reading, re-reading, and transcribing it. The aim of this step was to generate initial thoughts about potential themes, which could then be used to start assigning codes. The second step was coding. In thematic analysis, codes were utilized to pinpoint ideas and topics in the data for easy reference. The third step was identifying themes by grouping the results of the coding process, creating themes that linked the codes into meaningful categories. The fourth step was reviewing themes. Once the themes were established, the researcher reviewed them to ensure they accurately represented the coded data extracts. The fifth step was defining and naming themes. In this step, the researcher refined the themes and labeled them more precisely. The final step was writing up. Here, the researcher compiled a detailed report of the codes and themes, the underlying concepts and findings from the data, and any additional insights discovered during the analysis.

3.7 Establishing the reliability and validating of the research instruments

The content validity and reliability of the tests and the questionnaire were evaluated by a panel of five experts in English education. These experts collectively possessed over ten years of teaching experience in English within Thai EFL contexts, including expertise in English Language Teaching, Translation Teaching, and Statistics Teaching. The experts' opinions were gauged using a rating scale, where each expert provided assessments based on their expertise and experience.

+1 = The item is appropriate

0 = Not sure

-1 = The item is not appropriate

The IOC (Index of Item-Objective Congruence) was then used to measure the consistency of each item.

$$IOC = \frac{\sum R}{N}$$

IOC means the index of congruence

R means the total score from the experts' opinions

N means the number of experts

The evaluation of the tests and questionnaire involved assessments by a panel of five experts. Following the comprehensive evaluation process, revisions were made to both the tests and questionnaire based on the feedback provided by the experts. Items with an Index of Content Validity (IOC) value exceeding 0.5 were retained, while those scoring below 0.5 were excluded from the final versions.

The pilot study ensured that the language and layout of both tests were appropriate for the target participants. Specifically, it aimed to assess the suitability of the test and enhance its validity and reliability in preparation for the main study. The internal consistency reliability for all reading comprehension tests was computed through Cronbach's Alpha. The resulting reliability ranged from 0.89 to 0.94, signifying that the instruments employed demonstrated acceptable to high levels of reliability, consistent with the established cutoff point of 0.7 for ability tests. The Reading Comprehension Test A was ranked at 0.92, and Reading Comprehension Test B was ranked at 0.90. The instruments utilized demonstrated reliability within the acceptable to high range, meeting the established cutoff point of 0.7 for ability tests.

The reliability and validity of the test underwent a pilot phase involving 60 engineering students from a different field who were not part of the main study. The research instruments were subjected to pilot testing, and the scores obtained from the pilot test were analyzed to assess the test's reliability. Reliability, in this context, refers to the consistency of a test or a score, as defined by Mackey and Gass (2005). Cronbach's Alpha was employed to assess internal consistency and reliability, revealing high levels across the tasks and the questionnaire items. The Cronbach Alpha coefficient ranged from 0.89 to 0.94. According to DeVellis (2003), Cronbach's Alpha coefficient for a scale should surpass 0.70, and indicators of

internal consistency for a well-developed test should approach 0.80, as suggested by Dörnyei (2007). The observed coefficients in this study fall within the recommended range, affirming the reliability of the instruments. Moreover, the difficulty and discrimination index were analyzed for all tasks. The findings revealed that the item quality fell from 0.30 to 0.70 for the difficulty and discrimination index.

3.8 Pilot Study Results

This section presents the results from the reliability and validity measures of the English reading comprehension test and students' attitudes toward MRSI. Analysis related to the appropriateness of the items used is also presented.

3.8.1 The Pilot Results of the English Reading Comprehension Test

As part of strength testing for the new instruments, a pilot study was conducted to create robust test items for the English reading comprehension test. The pilot study examined the validity and reliability of the test. The content validity was assessed by five experts in the area of English education who had taught English in Thai EFL contexts for more than ten years. The test was piloted with 60 Thai EFL undergraduate students to determine its reliability. The item difficulty and discrimination were also analyzed to identify the best available items for the final form of the test.

The descriptive statistics in the pilot study consisted of the mean, standard deviation, skewness, and kurtosis. After that, the raw total test scores were converted into percentages.

Table 1 Descriptive statistics of the pilot results of the English reading comprehension test (N = 60)

	Min	Max	$\bar{x}$	Total (%)	SD	Skewness	Kurtosis
English reading comprehension version: A test	9	45	21.19	42.50	7.51	0.89	0.44
English reading comprehension version B test	6	38	15.41	36.86	6.37	0.85	0.96

The pilot results revealed that the participants knew less than half of the items for the English Reading Comprehension Version A test (42.50%) and English Reading Comprehension Version B (36.86%). The distribution of scores was examined for normality. Skewness and kurtosis were around 0 and less than 2.0 Kunnan, 1998).

Therefore, there was no violation of the statistical assumption of normal distribution (Larson-Hall, 2016).

3.8.2 Content Validity of the Attitude Questionnaire

Five raters, each with approximately ten years of experience teaching English as a foreign language (EFL) in Thailand, were asked to verify the content validity of the attitude questionnaire. The raters were required to rate the content validity of the instruments' items on an Index of Item-Objective Congruence (IOC) ranging from -1 to +1 across the two instruments. The raters were informed about rating -1 for responses that did not measure the targeted points, 0 for unsure or unclear responses, and +1 for responses that measured the targeted points. The retention threshold was greater than 0.5 (Lynn, 1986). The content validity analysis revealed that all means in all instruments were greater than 0.5, as shown in Table 2.

Table 2 Content validity by the IOC (five raters)

Instruments	$\bar{x}$	Items	Total of items
Students' attitudes toward the MRSI questionnaire	0.80	3, 5, 6, 8, 12, 13, 14, 19,28	9
	0.60	1,2,4,7,9,10,11,15,16,17, 18,20,21,22,23,24,25,26,27,29,30	21

3.8.3 Test Item Analysis of the English Reading Comprehension Test

To ensure that the best available items are used in the test, an analysis of test item difficulty and discrimination can be used to select and discard target items based on the difficulty and discrimination values (Hopkins & Antes, 1990). This analysis was used to identify and discern appropriate items for participants. The items were considered moderate in terms of difficulty, ranging from 0.20 to 0.80. The items were easier if the value was higher than 0.80 and more difficult if the value was lower than 0.20. In terms of item discrimination, the suitability range for the item property was 0.20 to 0.80. The items with values of 0.20 or 0.80 or less must be adjusted.

Table 3 Item difficulty and discrimination for the English reading comprehension test (N = 60)

Items	Difficulty index	Discrimination index	Total of items	Results
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60	0.20-0.80	0.20-0.80	60	moderate
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0.20-0.80	0.20-0.80	50	moderate

3.8.4 The Reliability of the Attitude Questionnaire

A Cronbach's Alpha measure of internal consistency and reliability was used to examine and verify the reliability of a test or a score (Mackey & Gass, 2005). According to DeVellis (2003), a scale's Cronbach's Alpha coefficient should be greater than 0.70, and internal consistency indicators for a well-developed test must be greater than 0.80 (Dörnyei, 2007). As shown in Table 4, the pilot results indicated that the internal consistency reliability estimates for instrument formats, e.i., the students' attitudes toward the MRSI questionnaire, were accepted (all Cronbach's values were ≥ 0.82).

Table 4 Test Reliability

Instruments	*N*	Cronbach's α
Students' attitudes toward the MRSI questionnaire	60	0.90

3.9 Ethical Considerations

The present research received endorsement and approval (Project No. 318-273/2565) from the Ethics Committee of Mahasarakham University. Authorization was also granted by the Vice-Rector of the university. The recruitment process for all participants adhered to a meticulously designed set of formal procedures. In preparation for the study, prospective participants were furnished with a Participant Information Sheet (PIS) elucidating the research details and a Consent Form (CF) outlining their involvement. These documents were made available in the Thai language and underwent translation from English under the auspices of the accredited

Center for Translation and Interpretation within the Faculty of Humanities and Social Sciences at Mahasarakham University.

Prior to their involvement, participants were actively sought to provide informed consent. The Consent Form (CF) and the Participant Information Statement (PIS) were disseminated to potential participants. These individuals were then requested to return the CF, indicating their willingness to participate in the study. Only those participants who submitted written informed consent forms bearing their signatures were subsequently included in the study. Strict confidentiality measures were employed for all collected participant data.

The written instructions were meticulously crafted to mitigate any potential psychological or emotional distress among participants. Specifically, in the unlikely event that task difficulty caused distress, participants were reassured with the following message: the study was not an evaluation of their personal attributes but solely an assessment of their language skills. Importantly, the study did not involve any considerations of physical harm.

3.10 Chapter Summary

In this study, two groups were involved: the experimental group, which received instruction in metacognitive reading strategies, and the control group, which followed the traditional teaching method based on the English textbook. Before the commencement of instruction, both groups underwent a series of preliminary assessments, including the completion of a Consent Form (CF), a Participant Information Statement (PIS), and a reading comprehension pretest. Following the instructional period of 13 weeks, all participants were again engaged in assessment activities, completing a students' attitudes questionnaire (SAQ) and a reading comprehension posttest. Furthermore, 15 participants from the experimental group were asked to participate in a semi-structured interview to gather deeper insights about their use of metacognitive reading strategies in comprehending English reading texts. The subsequent analysis of data derived from these research instruments provided valuable insights into the effectiveness of the different instructional approaches.

CHAPTER IV
QUANTITATIVE RESULTS

This chapter presents the results of the study through the analysis of descriptive and inferential statistics to answer RQ 1 and RQ3, which examined the effect of MRSI on reading comprehension among Thai EFL engineering students and their attitudes toward MRSI. The chapter consists of two main sections. The first section reports the effect of MRSI on Thai EFL engineering students' reading comprehension. The second section presents Thai EFL engineering students' attitudes about using MRSI to improve their reading comprehension.

4.1 Reading Comprehension in Thai EFL Engineering Students

This section addressed how MRSI affected reading comprehension in Thai EFL engineering students. Two parallel reading comprehension tests, consisting of two versions (A and B), were administered to assess the engineering students' reading comprehension after completing two different types of instruction over a 13-week duration. The tests were administered to the experimental and control groups before and after the instruction. The quantitative data were analyzed using descriptive and inferential statistics of the Statistical Package for the Social Sciences (SPSS) 26 software tool. The descriptive statistics included the mean, standard deviation, skewness and kurtosis. The raw scores were converted into percentages for comparison. The percentages were used to compare reading comprehension test scores, which differ between versions.

Table 5 illustrates the summary of descriptive statistics for the reading comprehension tests. The results showed that engineering participants in both groups scored higher at posttests than pretests at both Versions. Specifically, the participants in the experimental group achieved a mean score of 35.30% on reading comprehension version A (SD=12.90) before MRSI. In contrast, the participants in the control group achieved a mean score of 35.58% (SD=8.00). The participants in the experimental group obtained a mean score of 50.04% (SD=13.24), whereas the participants in the control group achieved a mean score of 43.28% (SD=9.75) after the instruction. Other relevant information is presented in Table 5.

The results from the reading comprehension test version B indicated improvements in reading comprehension for both the participants in the experimental group and those in the control group. More precisely, the participants in the experimental group obtained a mean score of 30.97% (SD=12.56) before the MRSI, whereas they gained a mean score of 43.41% (SD=13.87) after the MRSI. Similarly, the participants in the control group got a mean score of 31.39% (SD=11.50) before receiving the instruction, while they had a 6.76% increase after the instruction. These findings indicated that MRSI positively affected reading comprehension in Thai EFL engineering students.

Table 5 A summary of descriptive statistics of the reading comprehension test

Version	**Group**	**Time**	**Mean**	**(%)**	**SD**	**Skewness**	**Kurtosis**
A	Control (n=63)	Pre-test	21.67	35.58	8.00	0.112	-0.619
		Post-test	25.00	43.28	9.75	0.029	-0.945
	Experimental (n=82)	Pre-test	15.00	35.30	12.90	1.494	1.899
		Post-test	31.67	50.04	13.24	1.210	0.959
B	Control (n=63)	Pre-test	12.00	31.39	11.50	0.322	-0.738
		Post-test	18.00	37.90	11.23	-0.049	-0.711
	Experimental (n=82)	Pre-test	14.00	30.97	12.56	0.923	1.055
		Post-test	18.00	43.41	13.87	0.935	0.979

The distribution of scores was also examined for normality. Skewness and kurtosis were found to be normal across two test versions. As illustrated in Table 5, approximately 95% of case values lay within two standard deviations from the mean. Therefore, there appeared to be no violation of the statistical assumption of normal distribution (Larson-Hall, 2016). However, the overall scores of the participants in the control group on the version B test were slightly negatively skewed, indicating that the participant's scores in the version B test clustered closer towards higher scores.

A paired-samples t-test analysis was also conducted to determine whether there was any significant difference between reading comprehension test performance before and after receiving the instruction within the same group of participants. Effect sizes (d) were further conducted to calculate the strength of metacognitive reading strategy instruction.

As shown in Table 6, based on the scores of the participants of the experiment group, the two times (pre-test and post-test) of the reading comprehension version A were significantly different, indicating a large effect size ($t=29.15$, $p < 0.001$, $d=1.12$). The

two times (pre-test and post-test) of the reading comprehension version B were also statistically different, revealing a large effect size (t=19.76, p < 0.001, d=0.94). In contrast, the results of the controlled group only showed that there was just a significant difference between the pre-test and post-test in the reading comprehension version A with a large effect size (t=8.85, p < 0.01, d=0.86), and the two times (pretest and posttest) of reading comprehension version B were also statistically different, revealing a large effect size (t=15.24, p < 0.01, d=0.57).

Table 6 Comparisons between pre-test and post-test

	Pre-test		**Post-test**	***t*-value**	**Effect size (*d*)**
Experimental group (*n* = 82)	Read A	*VS*	Read A	29.15	1.12
	Read B	*VS*	Read B	19.76	0.94
Controlled group (*n* = 63)	ReadA	*VS*	ReadA	8.85	0.86
	Read B	*VS*	Read B	15.24	0.57

Notes: ***p < 0.001, **p < 0.01

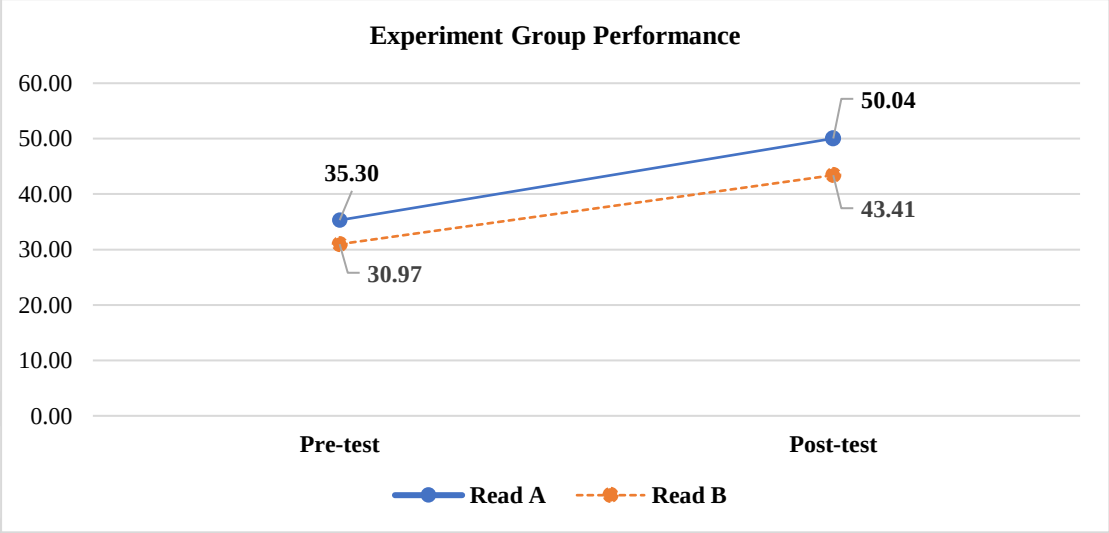


Figure 3 Experimental group performance

Figure 3 illustrates the summary of the paired-samples t-test analysis of the experimental group performance. The analyses of the results showed that reading comprehension version A and reading comprehension version B tests were significantly different with large effect sizes at both pre-test (reading comprehension version A versus reading comprehension version B; t=3.40, p < 0.001, d=3.27) and

post-test (reading comprehension version A versus reading comprehension version B; t=2.57, p < 0.001, d=0.43).

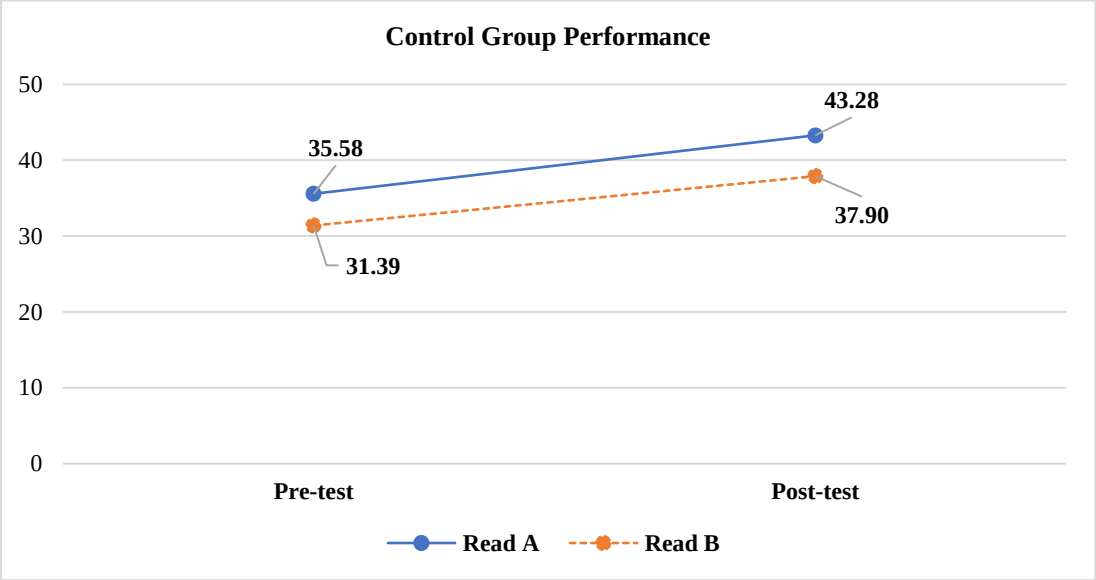


Figure 4 Control group performance

Figure 4 shows the analysis of the paired-samples t-test of the control group's performance. The results indicated that there was a significant difference with large effect sizes at both pre-test (reading comprehension version A versus reading comprehension version B; t=15.72, p < 0.001, d=3.27) and post-test (reading comprehension version A versus reading comprehension version B; t=14.57, p < 0.001, d=3.40).

An independent-samples t-test analysis was also performed to examine whether there were any significant differences between two groups of engineering participants (experimental and control) at two different points in time (pre-and-post times). The effect sizes were also calculated and presented.

The post-test results from Table 7 indicate a higher mean score in the experimental group for both Read A (M=3.40) and Read B (M=2.57) compared to the control group. The t-values of 0.58 for Read A and 0.43 for Read B suggest that the differences between the experimental and control groups are not statistically significant. However, the trend indicates potential benefits in reading comprehension for the experimental group, warranting further investigation into the efficacy of the experimental teaching methods.

Table 7 Comparisons between two experimental groups in the post-test

Groups	Tests	Post-test	
		t	***d***
Experiment Control	Read A Read A	3.40	0.58
Experiment Control	Read B Read B	2.57	0.43

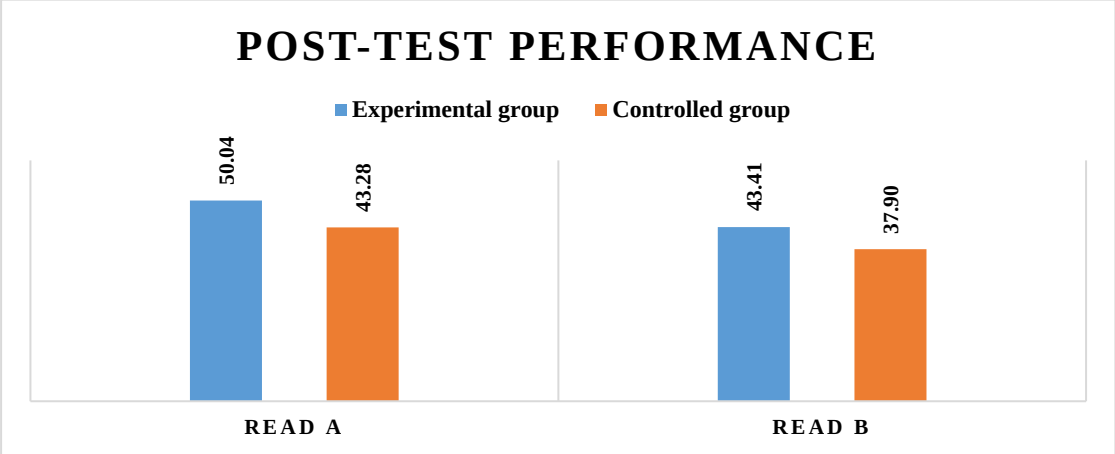


Figure 5 Post-test score between experimental and controlled groups

As illustrated in Figure 5, the analysis of the results showed that there were statistically significant differences and medium effect sizes on the reading comprehension version A test between experimental and control groups in the post-test ($t=3.40$, $p > 0.01$, $d=0.58$) and also on the reading comprehension version B test in the post-test ($t=2.57$, $p > 0.01$, $d=0.43$).

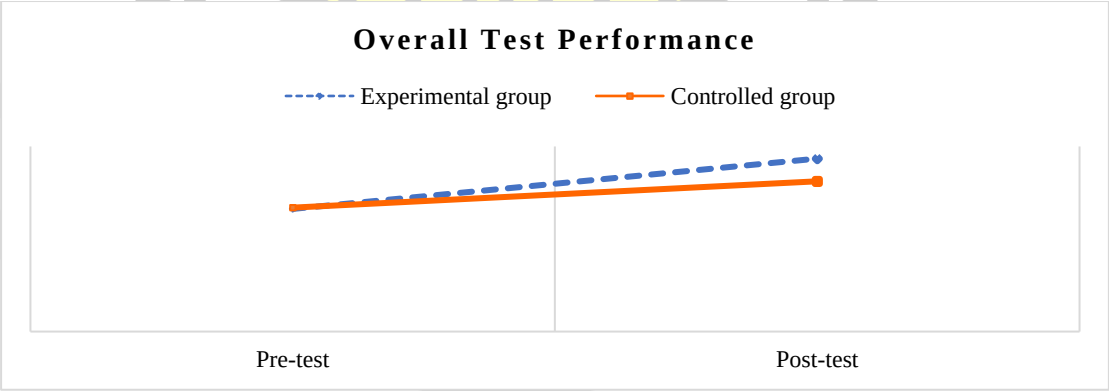


Figure 6 Comparison between experimental and controlled groups with the combined reading comprehension version A and reading comprehension version B tests

As shown in Figure 6, the comparison between experimental and control groups from the combined reading comprehension version A and reading comprehension version B tests was significantly different, revealing a large effect size ($t=26.55$, $p < 0.001$, $d=0.55$). More specifically, the participants of the experimental group scored better on reading comprehension version A at about 93.45% ($M=46.72$, $SD=12.48$) than the participants in the control group's scores of approximately 67.65% ($M=40.59$, $SD=9.18$). Following the treatment, it became evident that the participants in the experimental group obtained a higher score on the reading comprehension test compared to those in the control group, showing an increase of approximately 25.80%.

4.2 Participants' Attitudes towards MRSI

This section presents the results of the attitudes of Thai EFL engineering students towards MRSI to enhance their reading comprehension. The five-point Likert scale questionnaire was used to obtain quantitative data. The results were presented using the mean, standard deviation and percentage.

Table 8 The participants' attitudes towards MRSI

Metacognitive strategies	No. of items	Mean	%	SD	Meaning
Planning	10	4.22	84.32	0.65	very high
Monitoring	10	4.20	84.05	0.63	high
Evaluating	10	4.15	82.95	0.66	high
Total	30	4.19	83.77	0.65	high

Note: N=82

The results of MRSI aimed at improving the reading comprehension of Thai EFL engineering students are displayed in Table 8. The total mean score representing their attitudes towards MRSI was at 4.19 (equivalent to 83.77%), with a standard deviation of 0.64, indicating a strong agreement regarding MRSI. In particular, planning strategies obtained an average score of 4.22 (84.32%) among the participants, with a standard deviation of 0.65. Based on this data, the participants considered planning strategies beneficial in enhancing their reading comprehension. Likewise, with a mean score of 4.20 (84.05%) and a standard deviation of 0.63, the participants demonstrated a substantial degree of agreement regarding the advantageous nature of monitoring

tactics in enhancing reading comprehension. Furthermore, the efficacy of evaluation strategies in improving reading comprehension was also acknowledged, as indicated by the substantial degree of agreement expressed on the Likert scale survey (M=4.15 (82.95%), S.D.=0.66). To conclude, the present findings suggested that the explicit instruction of the metacognitive reading strategies (i.e., monitoring, evaluating, and planning) was beneficial for improving the reading comprehension of engineering students.

Table 9 The participants' attitudes towards planning strategies

Rank	Statement	Mean	%	SD	Meaning
1	Creating a detailed plan for my reading is an essential step that significantly improves my overall experience.	4.51	90.24	0.55	very high
2	Trying different planning strategies is an exciting way to explore and enrich my reading experience.	4.33	86.59	0.61	very high
3	I consistently take the time to plan my reading, finding it essential for a better understanding.	4.32	86.34	0.61	very high
4	Planning my reading provides structure and guidance, helping me stay focused on the reading material.	4.29	85.85	0.64	very high
5	Setting specific goals for my reading tasks is crucial to enhancing my comprehension.	4.28	85.61	0.65	very high
6	I consider that planning the reading strategies is so beneficial.	4.27	85.37	0.61	very high
7	I recognize the importance of planning my reading tasks and try not to skip this step.	4.26	85.12	0.68	very high
8	I adapt my reading strategy based on the type of material, ensuring a tailored approach for each.	4.02	80.49	0.75	high
9	Flexibility in planning approaches, allowing me to explore various methods.	3.95	79.02	0.65	high
10	I believe that planning impacts my overall reading experience.	3.93	78.54	0.73	high
	Total	**4.22**	**84.32**	**0.65**	**very high**

The data from Table 9 provides insightful details regarding participants' attitudes towards planning strategies for their reading endeavors. A resounding 84.32% of respondents collectively exhibit a very high level of appreciation for planning methodologies. Notably, the majority (90.24%) regard creating a detailed plan for their reading as an indispensable step, emphasizing its significant role in enhancing their overall experience. Furthermore, a substantial proportion (86.59%) expresses enthusiasm towards exploring diverse planning strategies, viewing it as an avenue to enrich their reading journey. This sentiment is echoed in the affirmation of 86.34% of

participants who find that planning imparts structure and guidance, aiding in maintaining focus on the reading material. Similarly, 85.85% assert that consistent planning is pivotal for achieving a deeper understanding of the content.

Moreover, 85.61% acknowledge the importance of not bypassing the planning stage, recognizing its inherent value in facilitating effective reading tasks. Setting specific goals for reading tasks is deemed crucial by 85.37% of respondents, underscoring the significance of goal-oriented approaches in bolstering comprehension. Additionally, a substantial portion (80.49%) emphasizes the necessity of adapting reading strategies based on the nature of the material, advocating for a tailored approach to optimize learning outcomes. Although a minority (78.54%) holds a contrasting belief, stating that planning significantly impacts their reading experience, the overwhelming consensus among participants towards planning strategies signifies a prevalent inclination towards structured methodologies to enhance reading comprehension and overall engagement.

Table 10 The participants' attitudes towards monitoring strategies

Rank	Statement	Mean	%	SD	Meaning
1	Monitoring my comprehension is a crucial aspect that significantly contributes to my overall reading satisfaction.	4.51	90.24	0.57	very high
2	Monitoring my comprehension enhances my overall reading achievement.	4.37	87.32	0.62	very high
3	Adjusting my reading pace based on comprehension is a practice I find valuable for a more effective reading experience.	4.29	85.85	0.53	very high
4	I consistently notice when I lose focus while reading and actively address it.	4.24	84.88	0.56	very high
5	I believe that being aware of time limitations contributes significantly to my reading.	4.21	84.15	0.64	very high
6	I actively consider the effectiveness of my reading strategies, reflecting on my approach to enhance comprehension.	4.18	83.66	0.67	high
7	I find it essential to adapt my reading pace based on the complexity of the material.	4.17	83.41	0.66	high
8	I am attentive to time constraints, ensuring I allocate my time wisely during reading sessions.	4.16	83.17	0.69	high
9	I consistently check my understanding as I progress through a text, ensuring a thorough grasp of the content.	3.95	79.02	0.65	high
10	Reflecting on my reading habits interest me; I prefer to read without analyzing my approach.	3.94	78.78	0.74	high
	Total	**4.20**	**84.05**	**0.63**	**high**

The findings from Table 10 elucidate participants' attitudes towards monitoring strategies within the context of reading comprehension research. Notably, the data underscores a pervasive recognition among participants of the paramount importance of monitoring comprehension, with an overwhelming majority (90.24%) endorsing its crucial role in fostering overall reading satisfaction. This sentiment is further corroborated by 87.32% of respondents who attribute their reading achievement to effective comprehension monitoring, indicating a widespread acknowledgment of its instrumental role in academic or personal reading goals.

Moreover, the high percentage (85.85%) of participants valuing the practice of adjusting reading pace based on comprehension underscores the integration of metacognitive awareness into reading strategies. This aligns with existing research highlighting the positive correlation between metacognitive monitoring and reading comprehension performance. Similarly, the proactive approach demonstrated by 84.88% of participants in addressing lapses in focus during reading sessions resonates with the literature on attentional control and its implications for reading comprehension.

Furthermore, the participants' emphasis on time management, with 84.15% acknowledging its significance in reading, reflects a cognizance of the temporal constraints inherent in reading tasks. Additionally, reflecting on reading strategies and adapting reading pace according to material complexity (83.66% and 83.41%, respectively) underscores the integration of self-regulatory processes into reading behaviors.

Overall, these findings provide valuable insights into the attitudes and behaviors of readers regarding monitoring strategies, highlighting their relevance within the broader research landscape on reading comprehension and metacognition.

Table 11 Engineering students' attitudes of evaluating strategies

Rank	Statement	Mean	%	SD	Meaning
1	Note taking is the appropriate strategy that promote reading comprehension.	4.48	89.51	0.61	very high
2	I see value in restating information in my own words to deepen my understanding of the content.	4.23	84.63	0.61	very high
3	I have confidence in the effectiveness of my reading strategies, believing they significantly impact my comprehension of the text.	4.22	84.39	0.61	very high

4	I recognize the importance of verifying whether I comprehend the content or task during reading.	4.17	83.41	0.64	high
5	I put my concentration on the text content for the appropriateness of the reading purposes.	4.16	83.17	0.64	high
6	Achieving reading goals and objectives is a priority for me, as it enhances my overall reading comprehension of the material being read.	4.15	82.93	0.74	high
7	I actively evaluate the success of my reading experiences, seeking continuous improvement.	4.13	82.68	0.68	high
8	Comparing the effectiveness of different reading strategies is a valuable practice that helps me refine my approach.	4.12	82.44	0.64	high
9	I regularly reflect on my reading skills and habits, engaging in self-assessment for continual growth.	3.98	79.51	0.68	high
10	I believe that evaluating my own performance and progress through reading tasks is important; I just read.	3.84	76.83	0.71	high
	Total	**4.15**	**82.95**	**0.66**	**high**

Table 11 reveals engineering students' attitudes towards evaluating strategies in their reading practices, demonstrating a notable emphasis on metacognitive engagement and comprehension verification. With a collective endorsement of 82.95%, participants predominantly value evaluation methodologies, highlighting a proactive approach to optimizing reading comprehension. Notably, the majority (89.51%) underscore the significance of self-testing and textual evidence verification, indicative of a strong commitment to ensuring understanding—a strategy aligned with cognitive psychology's emphasis on self-testing as a practical learning tool.

Moreover, participants prioritize restating material in their own terms (84.63%) and assessing confidence in understanding (84.39%), reflecting a metacognitive awareness of comprehension processes. This aligns with research suggesting that restructuring information aids comprehension and that metacognitive strategies enhance learning outcomes. Additionally, participants' recognition of stress cues (83.41%) and consistent assessment of reading efficacy (83.17%) further emphasize integrating affective and reflective components into reading comprehension, showcasing a holistic approach towards comprehension enhancement. Despite a minority expressing a higher priority for assessing performance (76.83%), the prevailing trend towards valuing evaluating strategies underscores their perceived importance in optimizing reading comprehension and learning outcomes among engineering students.

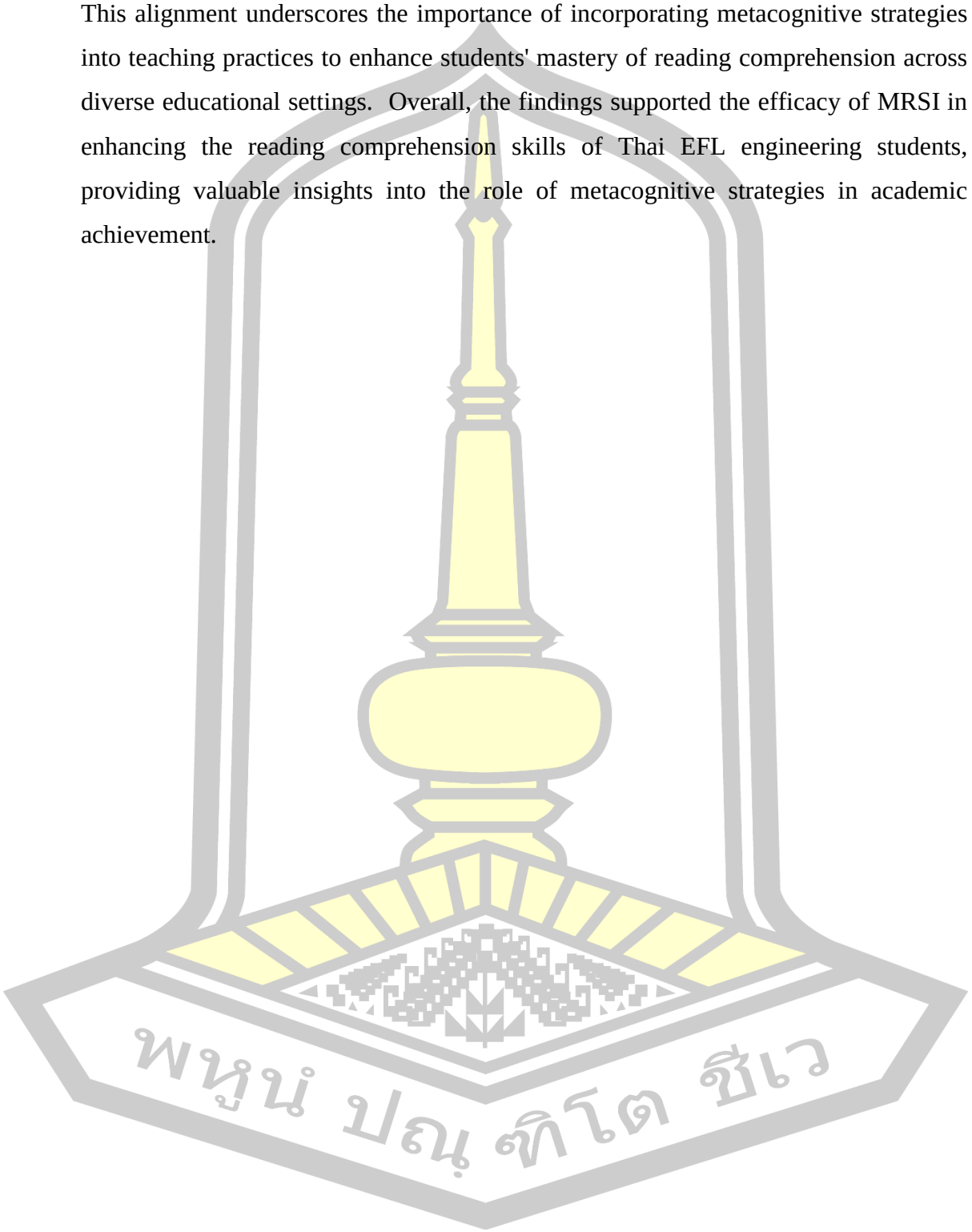
4.3 Chapter Summary

This chapter investigated the impact of Metacognitive Reading Strategy Instruction (MRSI) on the reading comprehension of Thai EFL engineering students. Two parallel reading comprehension tests (Versions A and B) were administered to experimental and control groups before and after 13 weeks of instruction. Descriptive and inferential statistics, including mean scores and standard deviations, were utilized to analyze the quantitative data. The results indicated significant improvements in reading comprehension for both groups following MRSI, with effect sizes indicating large to medium effects. Furthermore, the findings suggested a positive impact of MRSI on participants' attitudes towards reading comprehension strategies, with high levels of agreement regarding the effectiveness of planning, monitoring, and evaluating strategies. These results underscored the importance of metacognitive engagement in enhancing reading comprehension outcomes among engineering students.

The study also examined the distribution of scores for normality and conducted paired-samples t-tests to assess differences in comprehension performance before and after instruction within each group. Additionally, independent-samples t-tests compared performance between experimental and control groups at different time points, revealing potential benefits in reading comprehension for the experimental group. Effect sizes further demonstrated the strength of MRSI in improving comprehension outcomes. Moreover, the chapter presented detailed reading comprehension test scores analyses, highlighting statistically significant differences and medium to large effect sizes between experimental and control groups.

The results align with both the global and Thai contexts, indicating a convergence in recommendations regarding the integration of metacognitive reading strategies. According to the study of Aziz (2020), the findings endorse the practice of periodically assessing students' knowledge of metacognitive reading strategies and integrating instruction on these strategies into ESL classes. This resonates with the observed significant improvements in reading comprehension following MRSI, emphasizing the efficacy of metacognitive engagement in enhancing reading outcomes. Similarly, in the Thai context (Thongwichit and Buripakdi, 2021), the suggestion to integrate metacognitive reading strategies across various subjects

echoes the broader applicability of these strategies beyond English reading classes. This alignment underscores the importance of incorporating metacognitive strategies into teaching practices to enhance students' mastery of reading comprehension across diverse educational settings. Overall, the findings supported the efficacy of MRSI in enhancing the reading comprehension skills of Thai EFL engineering students, providing valuable insights into the role of metacognitive strategies in academic achievement.



CHAPTER V
QUALITATIVE RESULTS AND DISCUSSIONS

This chapter presents the findings of the qualitative analysis, addressing the third research question concerning the utilization of metacognitive reading strategies by the participants across three different proficiency levels: low, medium, and high. This study exclusively relied on interview data as the only qualitative source to explore answers to the research question. The chapter describes each emergent theme thoroughly before providing a summary. The qualitative research conducted in this study offers additional insights that the quantitative findings alone could not sufficiently capture. This supplementary perspective serves to validate the conclusions drawn from the quantitative data.

5.1 Identifying the thematic patterns of metacognitive reading strategies

This section aims to understand the nature of strategy use (i.e., metacognitive strategies) among Thai engineering undergraduates. In this section, the primary focus is the analysis of the interview data and the qualitative description of the 15 participants after receiving the MRSI to enhance reading comprehension skills. Based on the results of a reading comprehension posttest, the engineering students were categorized as having high, moderate, or low reading proficiency. The reading comprehension exam result of high proficiency (H) students was at least 70%. The reading comprehension test performance of the learners classified as low proficient (L) was at or below 40%. The reading comprehension test results of the learners classified as moderately skilled (M) ranged from 41% to 69%. The fundamental premise guiding these three participant groups was that individuals with greater competence levels would employ a greater variety and frequency of methods than those with lower proficiency levels. In Chapter 3, further pertinent reasons for the selection of these situations are detailed.

The essential qualities of the metacognitive methods are detailed in Table 12. Metacognition is comprised of three fundamental components: (1) formulating an action plan, (2) overseeing or regulating the plan, and (3) assessing the plan (Cohen, 1998; Pressley, 2002). Students devised a strategy before engaging with a given text. For instance, they might assess the precedence of their tasks. Then, while reading the

context, students supervise this course of action by employing metacognitive methods. They might consider what crucial details they should retain or what course of action they should pursue if they cannot comprehend the context. Ultimately, upon assessing their strategy, these pupils contemplate the potential applications of the reading strategies to additional reading challenges and determine whether any misunderstandings require further clarification. To summarize, metacognitive reading techniques can be classified into three key components: (1) strategies employed before reading (planning), (2) strategies monitored during reading, and (3) strategies applied after reading (evaluation). Thus, these three components guided the thematic analysis of the qualitative data in the current study.

Table 12 Taxonomic themes of metacognitive strategies used by Thai engineering students

Strategies	stages	Salient attributes/characteristics
Planning	Pre-reading strategies	• establishing and keeping reading goals • skimming and scanning and guessing what a text is about; overviewing • determining what and when to read; deciding which reading materials or documents are appropriate to the specific goals of the reading
Monitoring	While-reading strategies	• paying attention to key points by focusing on words and phrases • self-questioning or self-regulating • guessing meanings from context clues • problem-solving; rereading and adjusting the reading speed; using fix-up strategies for reading problems • translation; converting L2 to L1 for better comprehension. • using background knowledge
Evaluating	Post-reading strategies	• summarizing and checking comprehension; creating a concept mapping • judging the key message of the text, determining what is essential • retelling or synthesizing

The pre-reading strategies were associated with scanning and guessing what a text is about or predicting the subject matter of a text, as seen in Table 12. During this phase, students determined which reading materials and papers corresponded to the particular objectives of their reading. Once students have assessed the appropriateness of the reading materials, they may engage in self-inquiry, speculate on the information based on its context, and reflect on the subject matter.

The while-reading strategies involved self-questioning, self-reflection, self-monitoring and problem-solving. By asking themselves questions regarding the significance of the text or reading material, students engaged in self-questioning and focused on their reading. As part of self-monitoring, students assessed their comprehension and focus on their strategy. Students might additionally resolve their reading issues or problems through problem-solving techniques.

Post-reading strategies consisted of assessment and feedback on assessment. Students may assess their techniques by self-reflection regarding their reading objectives, the efficacy of their implementation, and additional considerations about the assigned reading passage. Each of these inquiries enabled them to assess the effectiveness of their proposed course of action and subsequently adjust their response.

5.2 The use of metacognitive strategies among engineering students

5.2.1 Pre-reading strategies used by engineering students with different proficiency levels

The study's data analysis showed that the participants actively used varied metacognitive strategies to understand their reading. More precisely, reading strategies that participants used included scanning the text, paying attention to the key points, determining the topic sentences, focusing on the keywords or phrases, using background knowledge, guessing meaning from contextual clues, consulting the dictionary, re-reading, summarizing after reading, translating English into Thai, and asking themselves questions related to the subject matter or topic. During the pre-reading stage, research participants employed supplementary themes, establishing and keeping reading goals, skimming and scanning for general information (overviewing texts), and determining what and when to read, as elaborated below.

Establishing and keeping reading goals

Engineering students across different levels of reading proficiency utilized various metacognitive strategies during pre-reading activities to enhance their comprehension of texts. These strategies seemed to align with their proficiency levels and reading goals.

Students with low reading proficiency tended to prioritize immediate comprehension tactics that assisted in quick understanding. Their planning stage often involved setting goals to read the questions to pinpoint answers directly or identify familiar words and guess their meaning from context. This approach was more about saving time and relying on direct clues within the text to build understanding. During the reading process, they may use strategies like scanning the text for specific information that matched the questions they had read beforehand. Their comprehension was likely to focus on whether they could find answers or recognized words rather than a deeper understanding of the text. The following excerpts could support these claims:

[1] *My **goal is to read the question first** to find the answers*. (L1)

[2] *I usually plan or set my goal before reading each time. This helps me read faster.* (L2)

[3] *I set **my reading goal to read the context first** and then **look for other supports.*** (L5)

Moderate proficiency readers displayed a more balanced approach in their metacognitive strategy use. Their planning included carefully considering the subject, visuals, and context before diving into questions. This indicated a shift from seeking immediate answers to understanding the broader context of the reading material. The following excerpts could support the above arguments:

[4] *I carefully **consider** the **subjects, visuals**, and **situations** before **making reading the questions** my primary priority to meet my reading objectives.* (M1)

[5] *I usually **read the context** first and then **check over the questions** to make sure I've met my **reading objectives**.* (M3)

[6] *I **read each sentence** carefully to get the major point in keeping with my reading objectives.* (M4)

High-proficiency students demonstrated a strategic approach to setting clear, subject-specific reading goals. Planning for these students involved establishing goals that guided their study sessions, helping them stay focused and motivated. Their monitoring strategies included staying on track with progress and ensuring their reading aligned with the established goals. This level of metacognitive strategy use

indicated a deep engagement with the text and a long-term commitment to improving reading skills. The following excerpts could argue the above assertations:

> [7] *I have set clear **reading objectives** for each topic, which has helped me stay focused and motivated. Establishing **reading goals** has been crucial because it guides my study sessions and keeps me on track with my progress.* (H1)
>
> [8] ***Reading goals** have been instrumental in my progress in providing a sense of direction and purpose to my study sessions. I've found that **setting specific reading goals** helps me stay motivated and accountable for my learning.* (H3)
>
> [9] *I always prioritize my reading goals for my learning journey, and they keep me motivated to achieve my objectives. I've affirmed that **setting and keeping reading goals** helps me stay disciplined and committed to improving my English skills*. (H5)

In summary, engineering students with varying levels of reading proficiency employed different metacognitive strategies in pre-reading activities based on their immediate and long-term reading goals. Low-proficiency students focused on quick comprehension tactics, moderate proficiency students balanced understanding the context with finding answers, and high-proficiency students emphasized setting clear, subject-specific goals for focused study sessions and motivation. This differentiation in the strategy used showcases the adaptive nature of metacognitive strategies to individual reading goals and proficiency levels.

Skimming and scanning for general information (Overviewing texts)

Engineering students employed varied metacognitive strategies in the pre-reading stage, adapting their approach according to their reading proficiency levels. These strategies, primarily skimming for a general overview and scanning for specific details, were critical for enhancing text comprehension and were distinctly utilized by students across different proficiency levels.

Students with low reading proficiency focused on immediate comprehension tactics. Their strategy involved a rudimentary level of skimming, where they aimed to identify the overall context and any familiar words that could help them grasp the text's meaning. This was often followed by a glance at the questions, aiming to save time by directly searching for answers within the text. They highlighted and underlined relevant information, indicating an initial scan for familiar words or phrases before attempting a deeper understanding. This approach suggested a

preference for straightforward, direct clues in the text that aid in building a basic level of comprehension.

> [10] *I **look for overall contexts** to find which words I can remember or **translate**, and I will know the meaning if I can **find keywords**.* (L1)
>
> [11] *I will **read** and **translate** the context first.* (L3)
>
> [12] *I will first examine the questions and **observe the paragraph** for some **familiar words**.* (L4)

Moderate reading proficiency students took a slightly more engaged approach. They enhanced their skimming by taking notes on unfamiliar words and paying attention to supplementary materials like pictures to understand the topic better. When scanning, these students exhibited a structured method by first understanding the context and then addressing the questions, underlining the answers they found. This method balanced grasping the general context and searching for specific details, showcasing a progression from simply identifying keywords to actively engaging with the text to extract meaningful information.

> [13] *I **take notes** on **unfamiliar words** and refer to **pictures** to understand the topic.* (M1)
>
> [14] *I read the context first, looked at the questions, and then **underlined** and **found the answers**.* (M3)
>
> [15] *I like looking at **pictures** and **gaining new vocabulary from games**.* (M5)

High-proficiency students demonstrated a sophisticated utilization of both skimming and scanning. They began with a quick skim to grasp the general structure and main ideas, showcasing an advanced understanding of how to overview a passage efficiently. This was followed by a focused scan for specific details required to answer questions, where they efficiently pinpointed keywords or phrases. This systematic search for information indicated a deep engagement with the text and a systematic approach to retrieving relevant sections swiftly. High proficiency students' strategy highlighted a strategic blend of gaining a broad understanding through skimming and delving into the specifics through scanning, reflecting a high level of reading comprehension and efficiency.

> [16] *Before delving into the text, I quickly **scan the questions** to understand the required information. **Skimming the passage** gives me a broad understanding of the main ideas, while **scanning helps me locate specific details** mentioned in the questions.* (H1)
>
> [17] *I get a general sense of the passage through a **quick skim**. Once I have an overview of the content, I **switch to scanning**, focusing on specific sections to extract key details.* (H3)

[18] *My reading process starts with a* ***glance by skimming****. To explore the details, I transitioned to* ***scanning for systematically searching*** *any specific information needed to answer questions.* (H4)

In summary, the metacognitive strategies of skimming and scanning played a pivotal role in how engineering students across varying levels of reading proficiency approached the pre-reading stage. While low-proficiency students prioritized quick comprehension by identifying keywords and direct answers, moderate-proficiency students engaged more deeply with the text by note-taking and analyzing visual aids. On the other hand, high-proficiency students employed a highly effective, strategic combination of skimming for overall understanding and scanning for detailed information. This adaptive utilization of pre-reading strategies enhanced comprehension and reflected the nuanced nature of metacognitive strategy application tailored to individual proficiency levels.

Determining What and When to Read

In engineering education, where students were inundated with many reading materials, adopting metacognitive strategies for optimizing reading comprehension was paramount. This research delved into how engineering students, categorized by their low, moderate, and high reading proficiency levels, employed metacognitive strategies to effectively determine what and when to read, aiming to enhance their academic success. The findings revealed distinct approaches used by each proficiency group. Low reading proficiency students prioritized a structured, sequential approach, beginning with examining topics and questions before delving into the contexts. Their strategies were characterized by skimming and scanning to identify relevant contexts and keywords and a significant emphasis on translating unfamiliar terms, indicating a careful planning phase and a focus on incremental comprehension improvement. Here are some examples of low proficient readers' strategy use:

[19] *I will* ***read the topic, question****, and* ***context****, respectively.* (L2)

[20] *I will* ***look at the questions*** *and then use skimming to see the related contexts.* (L3)

[21] *I will* ***find the familiar words first,*** *then* ***guess from the context clues*** *and use a translation tool for the words I can't translate.* (L4)

Moderate reading proficiency students, on the other hand, blended foundational tactics with more interactive learning strategies. Their approach included repetition, active engagement with the material, and using visual aids and language games to

expand vocabulary and solidify understanding. This group actively monitored their comprehension by underlining critical parts of the text and re-reading passages, reflecting a balanced method of engaging with reading materials. Below are moderate proficient readers' excerpts:

> [22] *I start by **reading the passage**, then **look at questions**, underline key parts, and find the answers.* (M3)
>
> [23] ***For questions, I read them first, find keywords**, and then **go through each sentence** to get the answer.* (M4)
>
> [24] ***I look at pictures and play language games to learn new words**, making it a fun way to expand my vocabulary.* (M5)

High reading proficiency students showcased advanced metacognitive strategies, emphasizing deep engagement with texts through summarization, visualization, and active recall exercises. These students employed a systematic approach to reading, starting with an overview of text structures such as headings and subheadings and paying close attention to bolded or italicized terms that signify essential concepts. Their strategies highlighted an advanced level of planning and a commitment to reinforcing memory and comprehension through discussions, teaching, and periodic material review.

> [25] *I **summarize each section to** solidify my understanding further. Once I've **grasped the main concepts**, I engage in active **recall exercises** to reinforce my memory.* (H1)
>
> [26] *To **remember content**, I often engage in discussions or teach the material to someone else. I **periodically review previously learned material** to maintain retention and prevent forgetting.* (H4)
>
> [27] ***Before diving into a text**, I preview headings, subheadings, and summaries to understand the structure and key points. **While reading,** I notice bolded or italicized words, which often indicate important terms or concepts.* (H5)

Low-proficiency students prioritized quick comprehension tactics, while moderate-proficiency students engaged more deeply with the text. High-proficiency students demonstrated a strategic approach, setting clear goals for focused study sessions. Similarly, in skimming and scanning for general information, low-proficiency students employed rudimentary techniques, while moderate-proficiency students enhanced their strategies with note-taking. High-proficiency students efficiently overviewed passages and pinpointed specific details. Overall, the students' strategies

reflected the adaptability of metacognitive approaches to individual reading goals and proficiency levels.

The study on pre-reading strategies among engineering students revealed a nuanced relationship between proficiency levels and metacognitive approaches, shaping reading comprehension outcomes. Low-proficiency students prioritize quick comprehension tactics, moderate-proficiency students balance understanding the context with finding answers, and high-proficiency students emphasize setting clear, subject-specific goals. This underscores the importance of tailored strategies for enhancing comprehension and academic success in engineering education.

5.2.2 While-reading strategies used by engineering students

Throughout the while-reading process, participants utilized additional themes: paying attention to the main points of a text (i.e., focusing on keywords and/or phrases), guessing meanings from context clues, self-questioning, problem-solving (i.e., rereading; adjusting reading speed, translation, and using background knowledge, as described below.

Paying attention to the main points of a text (i.e., focusing on keywords and/or phrases)

The engineering participants realized that locating the primary idea of a reading text is essential. The participants sought to identify the main idea while reading. Therefore, they highlighted the most important sentence, conveying each paragraph's central idea or crucial details. According to their account, they determined the key concept of a paragraph by examining its opening sentence, as instructed in the metacognitive approach training. When the initial sentence could not identify the central notion, the individual endeavored to conceive it independently. They examined the passage's supporting facts after locating it through the use of the Wh-Questions (i.e., who, what, where, when, how, and why) during the reading process, and they identified the key theme. They believed that knowing the supporting details enhanced their comprehension of the reading materials, whereas these WH questions helped them grasp the big picture.

The low reading proficiency students used to review the questions to efficiently guide the reading process, followed by locating answers in the text and underlining essential information. This approach reflected prioritizing time-saving techniques and reliance

on question-answer relationships for comprehension. The second strategy emphasized identifying familiar words within the text, supplemented by guesswork using context clues. Additionally, using a translation tool for unfamiliar vocabulary aided in understanding the main points of the passage. Both strategies underscored the importance of employing specific techniques to overcome comprehension challenges and extract essential information from the text.

> [28] *I will **look at the questions first** because I need to save time. Then, I **will find the answers** and then underline them.* (L2)
>
> [29] *I will find the familiar words first, then guess from the context clues and use a translation tool for the words I can't translate.* (L4)

For moderate reading proficiency students, several effective strategies for comprehending and remembering the main points of a text were identified. One strategy involved reading the text repeatedly and focusing on surrounding words to extract meaning from context. Another approach entailed reading the context first, examining questions and underlining relevant information to find answers. Additionally, some students adopted a question-driven method, analyzing questions, identifying keywords, and scrutinizing each sentence to determine the most suitable answer. These strategies emphasized active engagement with the text and the use of systematic techniques to enhance comprehension and retention of essential information.

> [30] *I find it beneficial to read repeatedly, **focusing on the surrounding words** to grasp meanings.* (M1)
>
> [31] *I will **read the context first**, **look at the questions** and **then underline and find the answers**.* (M3)
>
> [32] *I will **read the questions first,** then **find the keywords** and **look at each sentence** to see which one **should be the answer**.* (M4)

High reading proficiency students employed various effective strategies to comprehend and retain the main points of a text. They demonstrated a keen ability to recognize substitution or connection words, which enhanced their comprehension of the context and overall message. Additionally, these students emphasized focusing on the context and main ideas to grasp fundamental concepts and themes presented in the text thoroughly. They also utilized strategic techniques such as underlining important phrases or concepts while simultaneously considering the context, facilitating the

identification of crucial information. These approaches highlighted the advanced metacognitive awareness and skillful utilization of reading comprehension strategies among high reading proficiency students.

> [33] *I already **recognize substitution or connection words**, enabling me to comprehend the context more effectively enhancing my understanding of the overall message.* (H1)
>
> [34] *I **focus on the context and main ideas**, ensuring that I grasp the fundamental concepts and themes presented in the text*. (H2)
>
> [35] *I **underline important phrases** or **concepts** while simultaneously **focusing on the context without initially considering the topic**, thereby aiding in identifying crucial information.* (H4)

In conclusion, low reading proficiency students primarily relied on time-saving techniques, such as reviewing questions first and using familiar words supplemented by guesswork and translation tools. Moderate proficiency students actively engaged in repeated readings, examined context, and employed question-driven approaches to identify essential information systematically. In contrast, high-proficiency students demonstrated advanced metacognitive skills, recognizing substitution words, focusing on context and main ideas, and strategically underlining crucial information. These findings underscored the importance of tailored strategies to overcome comprehension challenges effectively, highlighting the progression in reading proficiency levels.

Guessing meanings from context clues

Participants in this study deduced the meaning of unfamiliar words by examining the relationships between the sentences in which these words appeared while reading. The participants consulted a dictionary when the terms were critical and required comprehension. However, when the question words were not essential, the students omitted them. Instead, they focused on the subject, verb, object, and complement forms of the sentences as the following statements from each student, which could be categorized into reading proficiency levels.

Low reading proficiency students primarily relied on recognizing familiar words and using context clues to guess the meanings of unfamiliar words. They often resorted to translation tools for assistance and focused on guessing the general idea of the text.

> [36] *I will find the familiar words first, then **guess from the context clues** and use a translation tool for the words I can't translate.* (L2)

[37] *If I don't know a word**, I look at the words around** it to guess what it means.* (L4)

[38] *When I see a new word, I **try to guess its meaning**.* (L5)

With moderate reading proficiency, students employed strategies, including guessing word meanings from the surrounding context and checking related sentences for clues. They actively engage with the text to infer meanings, occasionally using dictionary applications for verification.

[39] *I **guessed from the sentence that I didn't know the meanings** and then looked at the other sentences to **see the related contexts**.* (M1)

[40 *When I don't understand a word, I reread the sentence and **try to guess its meaning based on the other words**.* (M4)

[41] *If there's a word I don't know, I check for **other words nearby that give me a clue**.* (M5)

High reading proficiency students demonstrated advanced skills in deducing word meanings from context. They utilized sophisticated strategies such as skimming and scanning, examining word forms and structures, and paying attention to surrounding words to make educated guesses about unfamiliar vocabulary. Their approach emphasized a deep understanding of the text's context and linguistic features.

[42] *Indeed, **context clues, particularly word forms and structures**, often guide me in deducing meanings during reading.* (H2)

[43] *When faced with unfamiliar words, I read word by word, **relying on context clues and surrounding words** to make educated guesses about their meanings.* (H4)

[44] *When encountering a 'fire extinguisher,' I **notice words like 'fire' and 'safety equipment' nearby**. This helps me understand that it's probably a device to extinguish fire.* (H5)

Students across different reading proficiency levels demonstrated various strategies for guessing meanings from context clues. Low-proficiency students primarily relied on recognizing familiar words and utilizing translation tools. In contrast, students with moderate proficiency actively guessed by examining surrounding sentences and occasionally resorted to dictionary applications. In comparison, high-proficiency students employed advanced techniques such as skimming, scanning, and analyzing word forms and structures to infer meanings effectively. Their approach emphasized a deep understanding of the text's context and linguistic features, showcasing their advanced metacognitive skills in reading comprehension.

Self-questioning

The participants reported self-questioning to confirm comprehension before, during, and after the reading process. They posed queries to themselves to predict the subject matter of the textbook before reading. They then questioned themselves while reading to validate the integrity of their hypotheses. Furthermore, when they encountered difficulties comprehending lengthy, intricate sentences, they employed the who, what, when, where, why, and how inquiries to ascertain the passage's central argument. They reinforce their comprehension by asking themselves additional questions following the initial reading.

Low reading proficiency students primarily utilized self-questioning to maintain focus on the context and facilitate comprehension. They set their questions to guide their understanding of the material and ensure they extract relevant information from each paragraph.

> [45]. *I will **set my questions** for each paragraph to find the answers.* (L1)
>
> [46] ***I question myself** about what information is needed to answer the questions.* (L2)
>
> [47] ***Setting questions** helps me keep focusing on the context.* (L4)

Moderate reading proficiency students actively engaged in self-questioning to enhance comprehension and retention of key information. They created mental questions while reading, cross-checking their understanding by setting questions independently and verifying their responses with the text.

> [48]. ***I try to set the questions for exercises first** and then check my answers by rereading the context*. (M1)
>
> [49] ***I questioned myself** about whether I understood the main points. I create mental questions while reading to keep myself actively involved. It aids in better understanding and retention.* (M2)
>
> [50] *Before moving on to exercises**, I set the questions independently** and cross-check my responses with the text to ensure accuracy.* (M5)

High reading proficiency students demonstrated advanced self-questioning techniques to target essential information and ensure a thorough understanding of the text. They formulated questions both before and during reading, strategically guiding their comprehension process and contributing to improved reading efficiency.

> [51]. ***Formulating questions before and during reading** helps me target key information, ensuring a comprehensive understanding.* (H1)

[52] ***Self-questioning plays a pivotal role in my reading strategy,*** *ensuring I extract meaningful information and contributing to improved reading efficiency.* (H3)

[53] ***By formulating questions before and during reading****, I strategically target essential information, enriching my comprehension and ensuring a thorough understanding of the text.* (H5)

In summary, students employed self-questioning to enhance comprehension and reinforce understanding before, during, and after reading. While low-proficiency students used self-generated questions to focus on context and cope with reading problems, moderate-proficiency students actively engaged in mental questioning to stay involved and ensure comprehension. High-proficiency students utilized self-questioning as a pivotal tool to target essential information, enrich comprehension and contribute to improved reading efficiency. These findings underscored the importance of self-questioning as a metacognitive strategy that evolves with increasing reading proficiency.

Problem-solving (i.e., rereading, adjusting reading speed)

The theme of problem-solving, encompassing techniques like rereading and adjusting reading speed, is prevalent. Participants across different proficiency levels demonstrated problem-solving by relying on repeated readings to extract meaning from complex texts and adjusting reading speed based on the difficulty of the material. The interviews shed light on how these problem-solving strategies varied in complexity and efficiency among Thai engineering students, providing insights into their distinct approaches to enhance reading comprehension as the following statements;

Low reading proficiency students employed problem-solving strategies primarily through repeated readings to enhance understanding. They relied on rereading as a key technique to ensure comprehension and capture all the details presented in the text.

[54] ***I will read repeatedly*** *for reading because it helps me* ***understand better****.* (L1)

[55] *I often* ***go back and reread*** *to ensure* ***I capture all the details.*** (L2)

[56] ***Rereading is important*** *to ensure the context's information.* (L5)

Moderate reading proficiency: students demonstrated problem-solving skills by adjusting their reading speed based on the complexity of the material. They slowed

down or speeded up as needed to comprehend challenging passages effectively, employing rereading when necessary to grasp the content fully.

> [57] *My reading speed has increased, **aided by the strategies learned**, and I comprehend contexts more thoroughly when faced with unfamiliar words.* (M1)
>
> [58] *When dealing with challenging texts, I find it helpful **to adjust my reading speed** to ensure thorough comprehension.* (M3)
>
> [59] ***Sometimes, I need to slow down and reread sections** to understand them; other times, I can skim through familiar content.* (M5)

High reading proficiency students exhibited advanced problem-solving abilities by dynamically adjusting their reading speed and strategically rereading to dissect complex passages and extract essential information. They deliberately reviewed challenging sections to deepen comprehension and maintain focus, showcasing a sophisticated approach to problem-solving in reading.

> [60] ***I deliberately review passages that are difficult** for me and **dynamically modify my reading speed**. Using this method, I can ensure I understand the material and pick up on its subtleties.* (H1)
>
> [61] *Rereading is a strategic practice **I employ to dissect intricate passages** and **extract essential information**. **Adjusting my reading speed** accordingly allows me to maintain focus and comprehension.* (H2)
>
> [62] *A crucial component of my problem-solving strategy is **dynamically adjusting my reading speed and strategically rereading**. I can successfully explore hard books thanks to these strategies.* (H5)

To sum up, participants demonstrated problem-solving strategies in reading, including rereading and adjusting reading speed. Low-proficiency students relied on repeated readings to enhance understanding, while moderate-proficiency students adjusted their speed to comprehend challenging passages effectively. High-proficiency students employed advanced techniques such as dynamic speed adjustment and strategic rereading to dissect complex texts and maintain focus. These findings showed the varying levels of problem-solving skills among Thai engineering students and their distinct approaches to enhancing reading comprehension.

Translation

As reported by the participants, translation was employed in situations where their comprehension of the original English text was inadequate. As soon as the participants finished reading the English text, they translated it from English to Thai.

Additionally, they stated that they did not translate the text from English to Thai word for word but rather summarized the central meaning of the paragraph in Thai after reading it in its entirety. Nevertheless, they lamented that translating a chapter into Thai was a laborious process and disrupted their reading flow. They said it was unnecessary to translate the section if it had few difficult words and was straightforward.

When participants could not comprehend what they read directly in English, translation was reportedly utilized. The individuals engaged in a cognitive shift from English to Thai as they read. Additionally, they stated that they condensed the entire meaning of a paragraph into Thai after reading it in its entirety rather than translating it word for word from English to Thai. Although they did comment that translating a chapter into Thai was time-consuming and disrupted the flow of their reading, they did not elaborate. Furthermore, they stated that translation was unnecessary if the piece was simple and had few problematic terms.

Low reading proficiency students heavily relied on translation tools to overcome language barriers and enhance comprehension. They found value in translating contexts effectively and used dictionary applications to aid understanding when faced with unfamiliar words.

[63] ***I can translate the contexts*** *more effectively.* (L1)

[64] ***I can't translate some words****, so I use a dictionary application.* (L2)

[65] ***Translation tools are valuable*** *for me.* (L4)

With moderate reading proficiency, students utilized translation as a key strategy when encountering challenging English texts. They prioritized summarizing the main ideas in Thai after reading the passage rather than translating word-for-word to reinforce comprehension.

[66] *I* ***summarize the main ideas in Thai after reading*** *the passage* ***rather than translating word-for-word****.* (M1)

[67] ***Translation plays a key role when I struggle with certain English texts****. After reading the passage in English, I mentally switch to Thai.* (M2)

[68] *After reading the text in English,* ***I will translate the main points into Thai*** *to reinforce my comprehension.* (M4)

High reading proficiency students demonstrated a nuanced approach to translation, prioritizing summarizing the main ideas in Thai to ensure comprehension while

avoiding the disruption of translating every word. They strived to comprehend English texts directly but acknowledged the necessity of translation, especially with highly intricate passages.

> [69] *However, I **prioritize summarizing the main ideas** in Thai after reading the entire paragraph **rather than translating word-for-word**.* (H1)
>
> [70] *After reading the text, **I mentally summarize the main points** in Thai to ensure comprehension, although I find that translating every word disrupts the flow of my reading.* (H2)
>
> [71] *While I **strive to comprehend English texts without translation**, there are occasions when I find it necessary, especially with highly intricate passages.* (H4)

In conclusion, participants applied translation to enhance comprehension when faced with challenging English texts. Low-proficiency students preferred translation tools to overcome language barriers, while moderate-proficiency students prioritized summarizing main ideas in Thai after reading to reinforce comprehension. High-proficiency students demonstrated an approach that prioritizes summarizing main ideas in Thai while striving to comprehend English texts directly. These findings highlighted the varying approaches to translation among Thai engineering students and their strategies for overcoming comprehension challenges in English reading.

Using background knowledge

According to the participants, background knowledge or prior experience was crucial when reading English academic texts. The individuals could forecast the information contained when they previously knew the reading passage. They also readily understood the concepts of the English academic texts. Moreover, according to the participants, their personal experiences enhanced their comprehension of the idea conveyed in the book and piqued their interest in it. According to their findings, individuals who lacked prior information encountered reading challenges.

Regarding the utilization of prior knowledge, the individuals with limited competence in reading English expressed that they could comprehend the content of a given piece more effectively when this approach was implemented. As a result, individuals attempt to decipher a text and forecast the significance of unfamiliar words by drawing connections between the text and their personal experiences or prior knowledge. In contrast, individuals lacking prior knowledge or experience with the

subject matter would selectively read the portions of the text that aligned with their understanding, omitting unfamiliar words, phrases, and convoluted sentences. On the other hand, those with a high level of English reading competence recognized the criticality of prior knowledge and experiences when it came to their academic English reading, despite the fact that they also utilized alternative reading strategies to comprehend a book. The individuals claimed that when they lacked prior knowledge regarding a particular text, they employed diverse reading strategies, such as deducing meanings using contextual cues or examining grammatical structure. They reported that their prior knowledge enhanced their comprehension of the material and bolstered their enthusiasm for reading. Additionally, they stated that they might employ their prior knowledge to approximate its content when uncertain about the meaning of specific phrases.

Low reading proficiency students relied on personal experiences and background knowledge to comprehend English texts. They found that relating the material to their own lives makes the content more accessible and aids in navigating through challenging passages.

> [72] *I often **rely on my personal experiences** to try and grasp the meaning.* (L1)
>
> [73] *English texts become much easier when I can **relate the material to my background knowledge.*** (L2)
>
> [74] *I've found that **relying on my prior knowledge helps** me navigate challenging English passages.* (L5)

Moderate reading proficiency: students had learned to integrate background knowledge with other reading strategies when encountering complex English texts. They prioritized words they could relate to their experiences, improving their comprehension of academic English materials.

> [75] *I've learned **to blend my background knowledge with other reading strategies** when facing complex English texts.* (M1)
>
> [76] *When encountering unfamiliar vocabulary in English texts, I **try to prioritize words that I can relate to my experiences.*** (M2)
>
> [77] *Understanding academic English texts has improved **as I've learned to integrate my background knowledge** with other reading techniques.* (M3)

High reading proficiency students demonstrated a deep understanding of the importance of background knowledge in comprehending English texts. They seamlessly integrated prior experiences with other reading strategies, unlocking

deeper layers of meaning within the text and appreciating the significant impact of background knowledge on their comprehension skills.

> [78] ***Integrating my background knowledge with other reading strategies*** *has become second nature when tackling challenging English texts. It's like weaving together different threads of understanding.* (H1)
>
> [79] *I've found that* ***my prior experiences play a pivotal role in my ability to comprehend complex English passages****. Drawing on what I already know can unlock deeper layers of meaning within the text.* (H2)
>
> [80] *Reflecting on my reading journey, I've come to* ***appreciate the significant impact of background knowledge on my comprehension skills****. It's like having a solid foundation upon which to build my understanding.* (H4)

During the while-reading process, engineering students employed various strategies based on their proficiency levels. Low-proficiency students relied on time-saving techniques and translation tools, while moderate-proficiency students engaged in mental questioning and adjusted reading speed. High-proficiency students utilized advanced techniques like dynamic speed adjustment and strategic rereading. They also integrated background knowledge, with low-proficiency students heavily relying on personal experiences, while high-proficiency students seamlessly integrated prior experiences with other strategies. These findings showcased diverse while-reading approaches among Thai engineering students and their impact on comprehension across proficiency levels.

In summary, the study highlighted how while-reading strategies vary among engineering students based on their proficiency levels, influencing reading comprehension outcomes. Low-proficiency students relied on time-saving tactics and translation tools, hindering deeper understanding. Moderate-proficiency students engaged in active reading methods, leading to improved comprehension. High-proficiency students demonstrated advanced skills in recognizing context clues, facilitating comprehensive understanding. These findings underscored the correlation between tailored strategies and enhanced comprehension outcomes across proficiency levels among engineering students.

5.2.3 Post-reading Strategies Used Engineering Students

During the post-reading process, participants applied supplementary themes: summarizing, retelling or synthesizing, and judging the key message of the text, as outlined below.

Summarizing

The participants explored the reading strategies by summarizing, checking comprehension, and creating concept maps. Participants with different proficiency levels shared insights into how these strategies enhanced their understanding of complex academic English texts. They condensed information through summarizing and employing concept mapping as a visual aid to organize and consolidate information. Insights from low, moderate, and high-proficiency readers offer a comprehensive view of these strategies' impact on reading efficiency among Thai engineering students as follows;

Low reading proficiency students emphasized the value of summarizing in understanding complex English texts. They stated that summarizing helped them break down information and enhanced their comprehension of English materials.

[81] ***Summarizing is valuable*** *for me in understanding difficult English texts.* (L1)

[82] ***I've*** *found that* ***summarizing English texts helps*** *me break down the information.* (L4)

[83] ***Summarizing the information helps*** *me understand English texts.* (L5)

Moderate reading proficiency students highlighted the importance of summarizing as a powerful tool for organizing information from academic English texts. They viewed summarizing as a transformative strategy that guides them through the complexities of English reading.

[84] ***Summarizing English texts requires me to carefully select the most important information*** *by focusing on key points.* (M1)

[85] ***Summarizing is a powerful tool for*** *organizing information from academic English texts.* (M3)

[86] ***Summarizing has revolutionized how I approach studying English texts.*** *It's like creating a roadmap that guides me through the complexities.* (M5)

High reading proficiency students demonstrated a mastery of summarizing as a skill that facilitated a deeper understanding of complex English texts. They also emphasized checking comprehension and using concept maps to visualize connections between concepts, enhancing their comprehension and study approach.

[87] ***Summarizing English texts has become second nature to me***. *It's a skill that allows me to distil complex information into its essential components, facilitating deeper understanding.* (H1)

[88] *Checking comprehension is a critical step in my reading process. I employ various strategies****, including summarizing and paraphrasing****, to ensure I fully grasp the material.* (H2)

[88] *Using concept maps has improved my approach to studying English texts. It's like creating a blueprint that illuminates the structure* ***and summarizes my understanding of its complexities.*** (H5)

Students with various reading proficiency showed the importance of summarizing as a critical strategy in understanding complex academic English texts. Low-proficiency students found summarizing valuable in breaking down information, while moderate-proficiency students viewed it as a transformative tool for organizing materials. High-proficiency students mastered summarizing and utilizing additional strategies such as checking comprehension and using concept maps to enhance their overall comprehension and study approach. These findings highlighted the varied approaches to summarizing among Thai engineering students and their significant impact on their reading efficiency and comprehension of English materials.

Retelling or synthesizing

Retelling or synthesizing has been proven to be a useful strategy by students looking to strengthen their understanding of academic materials. Using this approach, important information must be painstakingly extracted from the text and presented in the author's own words. Students who participated in this reflective activity hope to improve their retention and general comprehension of the subject matter by internalizing and reinforcing the knowledge.

Low reading proficiency students emphasized the importance of retelling or synthesizing academic material to improve comprehension. They focused on extracting essential information from the text, aiding their understanding of complex concepts.

[89] ***Retelling has become an essential strategy*** *for me.* (L1)

[90] *I've discovered that* ***retelling academic material improves my ability*** *to comprehend it.* (L2)

[91] *When I* ***retell or synthesize academic texts****, I focus on extracting the most important information.* (L5)

With moderate reading proficiency, students integrated retelling or synthesizing into their study routines as a method of sense-making and clarification. They viewed this process as essential for deepening their understanding and strengthening their grasp of academic texts.

> [92] ***Writing summaries or summarizing academic content*** *has become essential to my study routine.* (M1)
>
> [93] *Retelling* ***or synthesizing is a sense-making process to clarify my understanding and strengthen my grasp.*** (M4)
>
> [94] ***Retelling or synthesizing academic materials is like weaving together threads of knowledge*** *that create my comprehension and retention.* (M5)

High reading proficiency students demonstrated a mastery of retelling or synthesizing as a reflective practice that enhances their learning. They articulated complex ideas in their own words, consolidating their understanding and internalizing the material. For them, retelling or synthesizing was not merely regurgitating information but a process of genuinely comprehending and owning the content.

> [95] ***Retelling or synthesizing academic materials has become second nature to me****. By articulating complex ideas in my own words, I deepen my understanding and solidify my grasp of the material.* (H1)
>
> [96] *I've found that* ***retelling or synthesizing is an effective way to consolidate my learning****. I reinforce key concepts and enhance my comprehension by reconstructing the content in my own words.* (H2)
>
> [97] ***Retelling or synthesizing academic texts allows me to engage with the material deeply.*** *I strengthen my understanding and retention by distilling complex information into clear and concise summaries.* (H3)

All participants emphasized the significance of retelling or synthesizing to strengthen their understanding of academic materials. Low-proficiency students focus on extracting essential information, while moderate-proficiency students integrate this practice into their routines for sense-making and clarification. High-proficiency students demonstrated a deep understanding of retelling or synthesizing as a reflective practice that enhances their learning and solidifies their grasp of complex concepts. These findings underscored the importance of retelling or synthesizing as a valuable tool for improving comprehension and retention among Thai engineering students.

Judging what is the key message of the text

Students use the post-reading technique of identifying the main idea in texts with skill. After their reading sessions, these students were adept at recognizing and grasping the main ideas, condensing the most important details for improved comprehension and memory. Their dedication to synthesizing knowledge and deriving significant insights from academic content was emphasized by this strategic approach according to these statements;

Low reading proficiency students emphasized the importance of identifying the main idea in texts as a crucial skill for comprehension. They consciously tried to recognize and grasp the central message after their reading sessions, significantly enhancing their understanding.

> [98] ***Identifying the main idea in texts*** *has become a crucial skill for me.* (L1)
>
> [99] *After my reading sessions, I made a point* ***of identifying the main idea.*** (L2)
>
> [100] ***Focusing on identifying the main idea*** *after reading sessions* ***boosts my understanding.*** (L5)

With moderate reading proficiency, students prioritized identifying the main idea of texts to strengthen their comprehension and gain deeper insights. They viewed this post-reading strategy as essential for synthesizing knowledge effectively and retaining key details long after completing their reading sessions.

> [101] ***Recognizing the main idea strengthens my comprehension*** *and* ***solidifies my understanding*** *of complex academic content.* (M1)
>
> [102] *I prioritize identifying* ***the text's main idea to synthesize knowledge effectively*** *and gain deeper insights.* (M2)
>
> [103] *Through practice, I've become adept at* ***identifying the main idea in texts to recall key details*** *long after reading.* (M5)

High reading proficiency students demonstrated a mastery of identifying the main idea in texts as a fundamental step in post-reading analysis. They effortlessly distilled the essence of the material, synthesizing key details to enhance comprehension and derive significant insights into complex academic content.

> [104] *For me****, identifying the main idea of a text*** *is a* ***fundamental step in post-reading analysis by synthesizing key details*** *into complex academic content.* (H1)
>
> [105] *After completing my reading sessions****, I effortlessly identify the text's main idea.*** *This* ***strategic approach allows me to synthesize knowledge effectively***. (H3)

> [106] ***I've mastered identifying the main idea in texts,*** *which has developed my approach to post-reading analysis.* ***I enhance my comprehension and gain deeper insights into academic content by synthesizing key details.*** (H5)

During the post-reading phase, engineering students applied various strategies to enhance their understanding of texts. They emphasized summarizing as a crucial tool, with low-proficiency students focusing on breaking down information, moderate-proficiency students viewing it as transformative, and high-proficiency students mastering it along with checking comprehension and using concept maps. Retelling or synthesizing was also valued, with all proficiency levels seeing it as essential for comprehension and retention. Lastly, identifying the key message of the text was highlighted, with students across proficiency levels recognizing its importance in strengthening comprehension and gaining deeper insights.

Post-reading strategies vary among Thai engineering students based on their proficiency levels, impacting reading comprehension outcomes. Low-proficiency students rely on summarizing to understand complex texts, while moderate-proficiency students integrate it for sense-making. High-proficiency students master summarizing as a reflective practice, deepening their understanding. Similarly, retelling or synthesizing progresses from basic comprehension aid to a reflective exercise, and identifying the main idea evolves from simple recognition to strategic synthesis. These findings highlight the adaptive nature of metacognitive strategies across proficiency levels, emphasizing their crucial role in enhancing comprehension and academic success among Thai engineering undergraduates.

5.3 Metacognitive strategies used by low, moderate, and high engineering students

The study of metacognitive strategy use among Thai engineering university students reveals insightful distinctions across various levels of reading proficiency. Through an analysis that incorporates participants' interviews, an understanding emerges of how students at different proficiency levels—high, moderate, and low—navigate through the stages of reading: pre-reading, while-reading, and post-reading, employing strategies that are intricately linked to their comprehension abilities.

Moreover, it examined how Thai engineering students of varying reading proficiency levels employed metacognitive strategies across different stages of reading. In the pre-

reading phase, low-proficiency readers focused on immediate comprehension, while moderate readers engaged more deeply with the context, and high-proficiency readers set clear, intentional goals. During reading, low-proficiency students employed straightforward strategies, while moderate and high proficiency readers demonstrated deeper comprehension through evolved techniques. Post-reading strategies showed a progression from basic to sophisticated approaches across proficiency levels, with high-proficiency readers exhibiting mastery over complex material. These findings highlighted the adaptive nature of metacognitive strategies and their role in enhancing comprehension and academic success in engineering education.

In the pre-reading phase, establishing and keeping reading goals varies significantly across the proficiency spectrum. Low-proficiency readers, such as those represented by excerpts from L1 and L2, focus on direct comprehension tactics, often aiming for immediate understanding through surface-level engagement with the text. For example, L1's strategy to "read the question first to find the answers" typifies a pragmatic approach aimed at efficiency rather than depth. Conversely, moderate proficiency readers, illustrated by M1's contemplative strategy to "carefully consider the subjects, visuals, and situations," display a more nuanced engagement that seeks to understand the broader context. As shown in H1's excerpt, high-proficiency readers exhibit a strategic approach by setting clear, subject-specific goals indicative of a deeper, more intentional engagement with the material.

During the reading process, attention to the main points and the ability to guess meanings from context clues highlight further distinctions. Low-proficiency students rely on straightforward strategies, exemplified by L2's focus on questions first for time-saving. In contrast, moderate and high proficiency readers demonstrate an evolved strategy use. M1's engagement with the text through repeated readings and H1's sophisticated analysis, recognizing "substitution or connection words," showcases a deeper comprehension and a strategic manipulation of text to glean meaning.

Post-reading strategies reveal a significant progression in the complexity and effectiveness of metacognitive strategy across proficiency levels. Summarizing, for instance, evolves from a simple breakdown of information by low-proficiency readers, as L1 finds summarizing helpful in understanding complex texts, to a

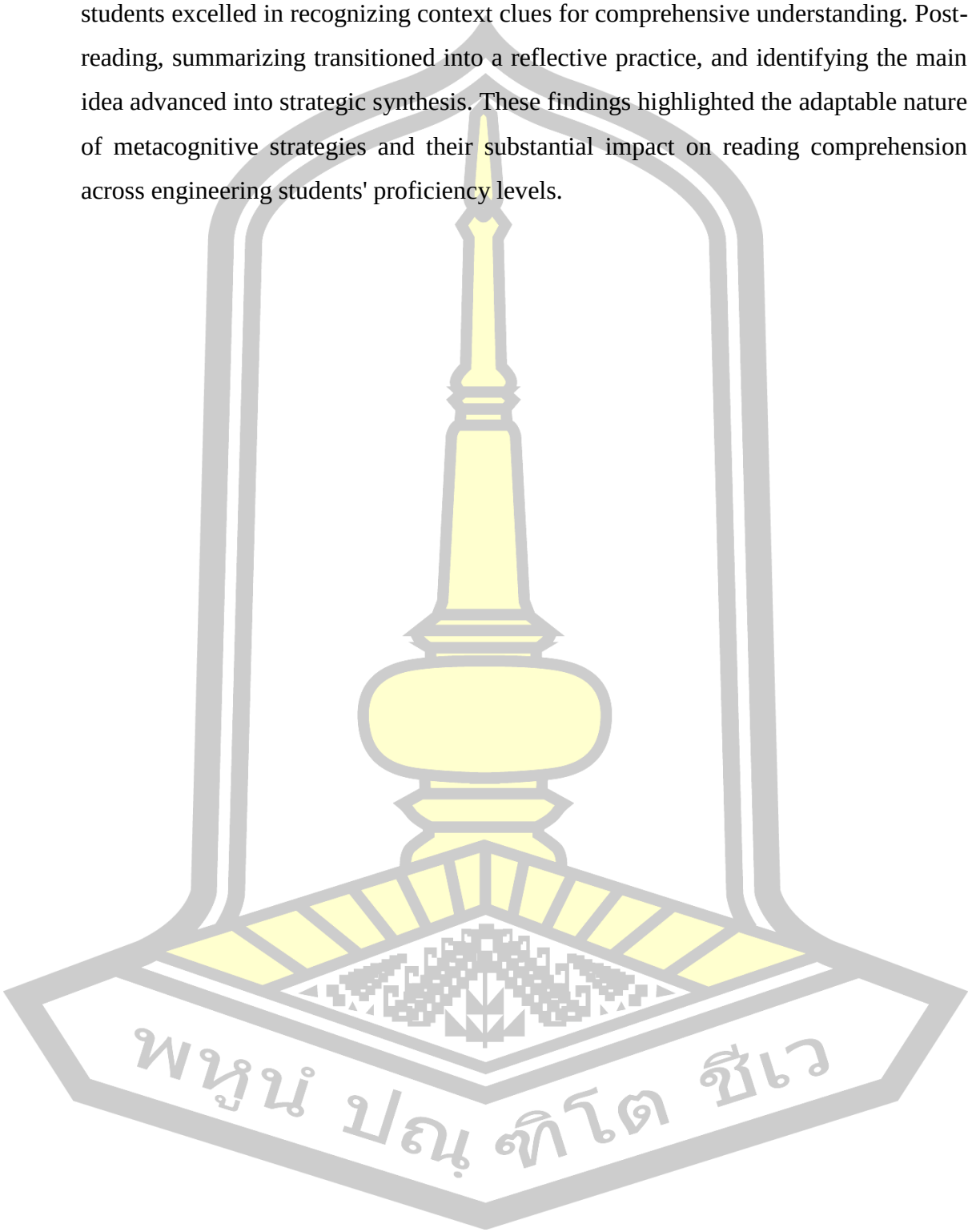
sophisticated analytical tool for high-proficiency readers. H1's approach to summarizing, allowing for the distillation of complex information, underscores a mastery over material that enhances comprehension. Similarly, retelling or synthesizing moves from a straightforward exercise for low-proficiency readers, aiming to improve comprehension by extracting key information, to a reflective practice for high-proficiency readers. H1's ability to articulate complex ideas in their own words deepens understanding and solidifies their grasp of the material. Identifying the main idea post-reading, from L1's basic recognition to H1's strategic synthesis, further illustrates the depth of comprehension achievable through advanced metacognitive strategies.

These findings illustrate the adaptive nature of metacognitive strategies across different reading proficiency levels among Thai engineering undergraduates. While low-proficiency readers prioritize immediate comprehension tactics, moderate-proficiency readers balance understanding context and seeking answers. On the other hand, high-proficiency readers demonstrate a sophisticated engagement with texts, employing strategic approaches that enrich comprehension and academic performance. This tailored approach to reading underscores the importance of metacognitive strategies in navigating the academic demands of engineering education, highlighting their role in enhancing comprehension and fostering academic success.

5.4 Chapter Summary

This chapter delves into the use of metacognitive strategies by Thai engineering undergraduates, segmented by their reading proficiency into high, moderate, and low levels. It emphasizes the structured approach to reading comprehension by employing pre-reading, while-reading, and post-reading strategies tailored to enhance students' understanding based on their proficiency levels. Metacognitive strategies significantly influenced reading comprehension among engineering students across proficiency levels. Low-proficiency individuals favored quick comprehension tactics prior to reading, while moderate-proficiency students aimed for a balance between understanding context and finding answers, and high-proficiency learners prioritized setting clear, subject-specific goals. During reading, low-proficiency students' reliance on time-saving methods impeded deeper understanding, unlike moderate-proficiency

students who utilized active reading for enhanced comprehension. High-proficiency students excelled in recognizing context clues for comprehensive understanding. Post-reading, summarizing transitioned into a reflective practice, and identifying the main idea advanced into strategic synthesis. These findings highlighted the adaptable nature of metacognitive strategies and their substantial impact on reading comprehension across engineering students' proficiency levels.



CHAPTER VI
DISCUSSIONS AND CONCLUSION

This chapter will delve into the research findings from both quantitative and qualitative perspectives. It will contextualize the results within the theoretical framework that guided the study, offering an interpretation of these findings while drawing comparisons with prior research to highlight any parallels or distinctions. The analysis of the present findings is expected to shed light on the effectiveness of instruction in metacognitive reading strategies in enhancing the reading comprehension skills of Thai EFL undergraduate students. Furthermore, this chapter intends to delve deeper into the qualitative data, providing a richer understanding of how students utilize metacognitive reading strategies and their perceptions of MRSI. It will also explore the broader implications of these findings and suggest directions for future research in this area.

6.1 The Effects of Metacognitive Reading Strategy Instruction (MRSI) on the Reading Comprehension

The study investigated the impact of Metacognitive Reading Strategy Instruction (MRSI) on the reading comprehension abilities of Thai EFL engineering undergraduate students, revealing significant improvements in reading comprehension following MRSI. Analysis of pretest and posttest scores showed substantial increases in reading comprehension for the experimental group, with significant differences and large effect sizes indicating the effectiveness of MRSI. While differences between the experimental and control groups' post-test scores were not statistically significant, the trend suggests MRSI's potential to enhance reading comprehension, meriting further exploration.

The experimental group's post-test performance demonstrated a significant enhancement in reading comprehension, with a substantial improvement in scores from the pretest to the posttest. This improvement highlights MRSI's role in enriching reading proficiency and suggests its ability to improve reading comprehension outcomes significantly. The findings align with existing research, emphasizing the benefits of cognitive and metacognitive strategy instruction in enhancing reading comprehension (Oranpattanachai, 2023; Ketworrachai & Sappapan, 2022). This body

of work supports the effectiveness of explicit strategy instruction and the positive impact of metacognitive strategies in fostering deeper text understanding and more effective reading practices, underlining the cognitive, social, and linguistic advantages of employing metacognitive strategies in the reading process.

The observed improvement in reading comprehension among study participants can largely be ascribed to the MRSI's instructional approach, which emphasized planning, monitoring, and evaluation as crucial components. In the planning stage, students were encouraged to strategize their reading through pre-reading, active reading, and post-reading phases. This stage involved anticipatory activities like considering the reading material's topic and remarkable elements to prepare a preliminary understanding of the text. Tools such as images, diagrams, titles, and subtitles played a critical role in this phase, helping students to hypothesize about the text's content.

During the reading (monitoring) phase, students practiced self-assessment to track their understanding and progress, employing a range of metacognitive reading strategies to navigate the text effectively. These strategies, which included connecting with the text, making predictions, inferring, recognizing textual structures, and using visual organizers, facilitated their ability to pinpoint and annotate critical information within the text. Fogarty (1994) observed that such strategies are pivotal in enhancing comprehension.

In the final evaluation phase, students critically reflected on their reading, evaluating the relevance, reliability, and utility of the information they gathered and reflecting on their engagement and development as readers. This reflective process, as described by Fries-Gaither (2012) and based on the frameworks by Zimmermann and Pons (1986), involved assessing the quality of one's reading and learning. A participating student, H1, noted the value of learning and applying these strategies in reading sessions, which facilitated overcoming reading challenges and improving comprehension scores. The methodology of explicitly teaching metacognitive reading strategies, followed by guiding students towards autonomous application, as recommended by Beers (2003), Collins (2005), and Yang & Wilson (2006), appears to boost engineering students' metacognitive strategy awareness significantly. This approach has shown a clear link with enhanced reading comprehension performance, demonstrating the effectiveness of MRSI in fostering better reading outcomes.

Additionally, the observable improvements in reading comprehension among the study's participants post-MRSI could be linked to the strategic emphasis on leveraging their existing knowledge base to enhance understanding and retention of the reading materials. Within the MRSI framework, educators deliberately involved students in exercises designed to tap into their prior knowledge of the subject before introducing new reading materials. This preparatory step encouraged students to mentally organize and predict the content and structure of upcoming texts, thereby priming them for a more effective engagement with the main ideas. Engaging in preliminary discussions about the text's title and analyzing any associated imagery helped students frame an initial comprehension of the core concepts they were about to encounter. Moreover, providing definitions and context for key vocabulary terms relevant to the upcoming content further prepared students for a deeper understanding of the material. Beginning sessions with the instructor reading the text aloud offered students a general overview of the text's main themes and content, setting a foundation for more detailed exploration. This approach is supported by existing literature, which posits that activating students' background knowledge before reading plays a crucial role in enhancing their organizational skills and overall comprehension of the material (Johnson & Keier, 2010; Marzano, 2004; Kintsch, 1998; Willingham, 2007). Reflecting on this, a participant identified as M1 shared, "*The method our teacher used to make us reflect on what we already knew about the topic and the vocabulary we were familiar with, before building on this base to understand the lesson's content, was effective for me.*" This indicates that strategies focused on prior knowledge activation and the structured teaching of metacognitive reading strategies significantly contribute to improved comprehension skills.

Thirdly, the study's duration and the structured reading tasks were deemed effective for applying MRSI. Student feedback indicated a steady improvement in reading comprehension throughout the study. The selected 13-week period for MRSI was effective in demonstrating significant enhancements, consistent with Chamot's (2005) findings on the necessity of integrating MRSI with ongoing instruction over a considerable timeframe. This observation is supported by research indicating that metacognitive skills enhance gradually with time, especially with direct instruction that encourages the independent use of metacognitive strategies (Hacker, 1998;

Livingston, 1997; Paris & Winograd, 1990). Additionally, the emphasis on the need for commitment and consistent effort in mastering these strategies was highlighted (Garner, 1992). For students not accustomed to strategic reading, creating tasks that are challenging yet achievable with effort can encourage the development of strategic reading habits (Garner, 1992; Veenman & Beishuizen, 2004).

In conclusion, evidence from both the reading comprehension assessments (Version A and B) and detailed interviews demonstrates that students exposed to the Metacognitive Reading Strategy Instruction (MRSI) exhibited notably higher advancements in their understanding and use of metacognitive strategies than those who did not receive this instruction. Developing metacognitive skills involves several phases, transitioning from conscious control to semi-automatic and finally to fully automatic application. Achieving automaticity in using these strategies is challenging, particularly within a brief timeframe and with minimal practice. Given that first language (L1) learners require considerable time to master and employ metacognitive reading strategies, second language (EFL/ESL) learners will understandably need even more time. Students require ample time to fully assimilate the metacognitive strategies that are explicitly taught through the instruction, enabling them to effectively oversee and guide their reading practices (Alvermann & Phelps, 2002). This process ultimately leads to enhanced reading comprehension skills.

Further depth is added to these findings through qualitative data obtained from semi-structured interviews and classroom observations, which elucidate the impact of MRSI across students of varying reading proficiencies. For instance, students identified as low-proficiency readers initially faced challenges with comprehension and engagement. Still, after the MRSI intervention, they reported significant improvements in their ability to understand and interact with texts. These students particularly benefited from the planning and monitoring phases of MRSI, which equipped them with strategies to approach reading materials more effectively and assess their comprehension in real-time (Fogarty, 1994).

Moderate-proficiency readers valued the evaluative component of MRSI, which encouraged them to critically assess the reading process and the authenticity and applicability of the information encountered. Activities designed to activate prior knowledge, such as discussing the text's title and examining related visuals, were

instrumental in deepening these students' engagement with and understanding of the reading materials (Johnson & Keier, 2010; Marzano, 2004).

High-proficiency readers already possessing strong reading skills found that MRSI further refined their metacognitive awareness and strategic reading practices. This group highlighted the advanced strategies and reflective practices introduced through MRSI, which enhanced their analytical capabilities and overall comprehension of complex texts. The targeted instruction in metacognitive strategies facilitated these students' ability to navigate academic texts with greater proficiency, thereby improving their academic performance (Beers, 2003; Collins, 2005).

The qualitative findings provide context to the quantitative improvements, illustrating how MRSI caters to the diverse needs of learners across different proficiency levels. This detailed account shows that MRSI, through its emphasis on planning, monitoring, and evaluating reading strategies, significantly contributes to the reading comprehension of EFL engineering students, supporting their academic success in a challenging discipline. By blending quantitative outcomes with qualitative insights, this research underscores the comprehensive impact of MRSI, affirming its effectiveness as an essential pedagogical approach for enhancing reading comprehension among EFL learners in engineering education (Alvermann & Phelps, 2002; Chamot, 2005).

6.2 Positive Attitudes Toward MRSI

The study on Metacognitive Reading Strategy Instruction (MRSI) among Thai EFL engineering undergraduate students showed a positive reception and attitudes towards this instructional method, underscored by the significant majority—over 80%—of students reporting favorable opinions towards planning, monitoring, and evaluating strategies. These findings highlight the effectiveness of MRSI in fostering an encouraging learning environment and improving reading comprehension skills.

The overwhelmingly positive response of Thai EFL engineering students towards Metacognitive Reading Strategy Instruction (MRSI) significantly highlights the crucial role student attitudes play in enhancing their reading comprehension skills. Through MRSI, students engage with metacognitive strategies—planning, monitoring, and evaluating—tailored to improve their approach to reading complex academic texts. This approach has resonated well with the engineering students, as

evidenced by their feedback, reflecting a keen appreciation for the structured support provided by MRSI in navigating their academic readings.

For instance, the planning phase of MRSI encourages students to actively think about the reading material before beginning the reading process. A student identified as ST7 (L2) noted the support and guidance provided by teachers in overcoming difficulties, which empowered them to communicate more openly and inquire further. This indicates that learners' initial planning and support in setting reading goals significantly bolster their confidence and willingness to engage with the reading material.

During the monitoring phase, students assess their understanding in real time, adjusting their reading strategies as needed. ST5 (M2) shared their excitement in recalling vocabulary taught during classroom activities, highlighting the joy and satisfaction derived from applying learned strategies to recognize and remember new words. This reflects the effectiveness of monitoring strategies in enhancing engineering students' engagement with the text and their ability to recall and understand the content better.

The evaluation phase allows students to reflect critically on their reading and the strategies employed. ST2 (H1) expressed how participating in group work and dividing tasks within the group helped them realize their significant contribution, instilling a sense of pride. This sentiment underscores the value of evaluating the effectiveness of strategies used and the contribution of collaborative learning to reinforcing comprehension skills.

Furthermore, the positive attitudes towards MRSI extend beyond individual strategy use, influencing students' overall engagement with English reading comprehension. For example, ST13 (L5) remarked on the boost in confidence and understanding gained through MRSI activities, even if their comprehension was not perfect. That is, the positive attitudes of engineering students towards using metacognitive reading strategies are instrumental in this process. As students grow more confident in their ability to manage and overcome reading challenges through these strategies, their motivation and engagement with reading tasks significantly improve. This positive feedback loop—wherein successful application of metacognitive strategies leads to enhanced comprehension, which in turn reinforces the value of these strategies—

cultivates a positive learning environment. This highlights the key benefit of MRSI in fostering a positive learning environment where students feel more confident and motivated to tackle reading challenges.

The feedback from these engineering students underscores a transformation in their approach to reading, moving from passive to active engagement, facilitated by their positive reception of metacognitive reading strategies. The structured nature of MRSI, coupled with the supportive role of teachers, has improved students' reading comprehension and encouraged a shift towards autonomous learning. As students like ST11 (L4) take pride in independently completing assignments, it is clear that MRSI has instilled a sense of ownership and responsibility towards their learning process.

In summary, the engineering students' excerpts serve as convincing evidence of the effectiveness of MRSI in enhancing reading comprehension through metacognitive strategies. These strategies, embraced with enthusiasm by the students, have led to significant improvements in their reading skills, as manifested in the quantitative results analysis, demonstrating the significant impact of positive attitudes towards metacognitive reading strategy instruction on academic success.

6.3 Conclusion

This comprehensive study delves into the effectiveness of Metacognitive Reading Strategy Instruction (MRSI) on Thai engineering university students, elucidating how different levels of reading proficiency among students significantly dictate their approach to and success in reading comprehension. The investigation reveals a spectrum of strategies employed by students across varying proficiency levels—low, moderate, and high—each utilizing metacognitive strategies differently, from direct comprehension to analytical engagement and strategic intentionality. This understanding of student approaches underscores the necessity for pedagogical interventions tailored to meet the diverse needs of learners, enhancing their comprehension and engagement with academic texts.

The study further demonstrates the positive impact of MRSI on students' reading comprehension abilities. Through a 13-week instructional period, significant differences were noted between the experimental group, which received MRSI, and the control group, which underwent conventional reading instruction. This difference was not only quantitative, reflected in the pretest and posttest scores, but also

qualitative, with students expressing a positive shift in attitude towards the use of metacognitive reading strategies. Such attitudes were distinct among students of varying proficiency levels, who reported employing a range of metacognitive strategies from global to problem-solving strategies, indicating the adaptability and effectiveness of MRSI across different learner profiles.

The qualitative findings, supported by student excerpts, provide a rich narrative of how MRSI fosters a proactive and strategic approach to reading among engineering students. By emphasizing planning, monitoring, and evaluating phases, MRSI encourages students to actively control their reading process, leading to improved comprehension and a more positive attitude towards reading in English. The instructional focus on metacognitive strategies not only aids in overcoming linguistic barriers but also enhances students' cognitive engagement with texts, thereby improving their academic and emotional well-being.

Moreover, the application of MRSI extends beyond the realm of EFL classrooms, offering substantial benefits in any learning setting where reading is pivotal. The findings advocate for integrating metacognitive reading strategies across disciplines, suggesting that such instructional techniques can significantly bolster students' comprehension skills, regardless of their subject matter. This broader application of MRSI promises to enhance academic outcomes across various fields of study, reinforcing the value of metacognitive strategies in fostering more effective and engaged learners.

In conclusion, this study reaffirms the critical role of metacognitive strategies in academic success and provides actionable insights for educators, curriculum designers, and policymakers in engineering education and beyond. By embracing the principles of MRSI, a potent opportunity exists to elevate students' reading comprehension, academic performance, and overall success. As evidenced by this study, the strategic development of metacognitive capabilities emerges as a critical factor in overcoming challenges associated with reading in a second language, ultimately fostering a generation of more autonomous, strategic, and proficient learners.

6.4 Implications

This study offers significant insights into the effectiveness of Metacognitive Reading Strategy Instruction (MRSI) in enhancing the reading comprehension skills of Thai EFL engineering undergraduate students. The findings underscore the importance of metacognitive strategies in foreign language reading, aligning with and enriching existing theories (Lawrence, 2007; Pressley & Gaskins, 2006). Such strategies facilitate reading comprehension and empower students to become independent readers while fostering their critical thinking abilities.

6.4.1 Implications for Curriculum Designers

For curriculum designers, the findings highlight the importance of systematically incorporating metacognitive strategies into reading instruction. This integration should be an essential part of foundational program curricula and backed by thorough teacher training. Curriculum materials should gradually introduce these strategies to ensure students can develop higher-order thinking skills from the outset.

6.4.2 Implications for Teachers

English language teachers, on the other hand, should focus on educating students about the purpose, timing, and relevance of various reading strategies. Emphasizing metacognitive strategies can positively impact students' learning attitudes and significantly contribute to their reading goals. Effective teaching involves not only training students but also raising awareness of the benefits of these strategies. It's crucial to model the cognitive processes behind metacognitive strategies, which may require repetition and tailored feedback based on individual comprehension levels. Encouraging active student participation in these modeling activities, whether in group or individual settings, can provide valuable insights and enhance peer understanding.

6.4.3 Implications for Engineering Students

For Thai engineering students, the study underscores the vital role of metacognitive reading strategies in improving their reading comprehension, especially when learning English as a foreign language. By embedding these strategies into the curriculum, educators can help students become independent readers and cultivate their critical thinking skills. Integrating metacognitive strategies into English language instruction can greatly benefit Thai engineering students, enabling them to better navigate

complex academic texts and enhancing their overall academic performance. Furthermore, providing comprehensive training and support for teachers to implement these strategies ensures that students receive the necessary guidance and resources to effectively develop their reading skills.

6.5 Limitations and Recommendations for Future Studies

The study faces limitations due to its modest sample size, affecting the findings' generalizability. Future research could benefit from a larger, more diverse sample to enhance the study's credibility. Expanding the study to include students from various disciplines and universities could offer a more comprehensive understanding of metacognitive strategy used across different academic contexts. The reliance on self-assessment for determining proficiency also presents a limitation; future studies might incorporate a more robust proficiency examination. Given that the research instruments were explicitly tailored to engineering content, future studies should consider customizing content to match the participant's field of study, ensuring relevance and effectiveness in assessing reading comprehension across disciplines.

Building on the foundation laid by this study, future research should aim to explore the impact of MRSI across a broader range of disciplines and educational contexts. Investigating the application and effectiveness of metacognitive reading strategies among students in various academic fields could provide valuable insights into enhancing reading comprehension universally. Such research would contribute to a deeper understanding of metacognitive strategies' role in educational success and inform pedagogical practices that support students' development as proficient, autonomous readers.

6.6 Concluding Remark

This study provides substantial insights into the efficacy of Metacognitive Reading Strategy Instruction (MRSI) in enhancing reading comprehension among Thai EFL engineering undergraduates, offering a compelling reaffirmation of the significance of metacognitive strategies within foreign language reading contexts (Lawrence, 2007; Pressley & Gaskin, 2006). The positive outcomes observed across varying levels of reading proficiency highlight the transformative potential of metacognitive strategies in fostering not only improved comprehension but also greater learner autonomy and critical thinking.

The implications of these findings are manifold, particularly for curriculum designers and educators in the realm of EFL education. For curriculum designers, the study underscores the necessity of embedding metacognitive strategy instruction within reading curricula to achieve educational objectives effectively. Such integration requires a thoughtful approach, ensuring that teachers are well-equipped with the necessary skills and knowledge to implement these strategies effectively. This entails professional development and the careful design of teacher guides and student materials that progressively introduce and reinforce metacognitive strategies within reading instruction. Given the complex nature of these strategies, which aim to engage higher-order thinking, initial reading sessions must be thoughtfully planned to allow students ample opportunity to grasp and apply these strategies meaningfully.

For teachers, the study reinforces the importance of demystifying the use of metacognitive strategies for students, guiding them on when, how, and why to employ various strategies across different reading phases. This guidance can catalyze a positive shift in students' learning attitudes and significantly impact their reading achievement. Teachers play a crucial role in modeling these strategies, elucidating the cognitive processes involved, and facilitating students' understanding and application of these strategies through active involvement in the learning process. This can include group or individual activities that encourage students to share and reflect on their use of strategies, further enriching the learning experience for the entire class.

However, the study has limitations, primarily stemming from its modest sample size and the reliance on self-assessment for determining reading proficiency. Future research could address these limitations by involving a larger, more diverse sample and employing more robust proficiency measures. Additionally, expanding the study to include students from various disciplines and universities could offer a broader understanding of the impact of MRSI across different academic contexts. Tailoring research instruments to the specific fields of study of participants could further enhance the relevance and effectiveness of future studies.

In conclusion, this study illuminates the path forward for enhancing reading comprehension among Thai EFL engineering students through metacognitive reading strategy instruction. By embracing the insights offered, educators and curriculum designers can make significant strides in improving academic outcomes for students,

equipping them with the skills necessary to navigate complex academic texts and thrive in their educational and professional endeavors.

REFERENCES

REFERENCES

Abd Ali, Z. K., Bashar, A., & Khonamri, F. (2023). The Effect of Metacognitive Strategy Training on Reading Comprehension among the Iraqi Female Students. *Resmilitaris, 13*(1), 768-782.

Abu-Snoubar, T. K. (2017). English as a Foreign Language Learners' Major and Meta-Cognitive Reading Strategy Use at Al-Balqa Applied University. *English Language Teaching, 10*(9), 69-85.

Acar-Erdol, T., & Akin-Arikan, Ç. (2022). Gender gap in reading achievement: The mediating role of metacognitive strategies and reading-related attitudes. *Social Psychology of Education, 25*(2-3), 537-566.

Acmed-Ismael, F. (2021). Metacognitive learning strategies: Their effects on the reading comprehension performance of grade five pupils. *International Journal of Linguistics, Literature and Translation, 4*(5), 107-117.

Adams, W. R., & Patterson, B. (2001). *Developing Reading Versatility* (8th ed.). Fort Worth: Harcourt College Publishers.

Adunyarittigun, D. (2021). Metacognitive awareness of reading and reading strategy use by nonproficient college readers. *rEFLections, 28*(1), 82-106.

Aebersold, J. A., & Field, M. L. (2002). *From reader to reading teacher: Issues and strategies for second language classrooms.* Cambridge University Press.

Aebersold, J. A., & Field, M. L. (2004). *From Reader to Reading Teacher: Issues and Strategies for Second Language Classrooms. Cambridge:* Cambridge University Press. pp. 5–18.

Afflerbach, P., Pearson, P. D., & Paris, S. G. (2008). Clarifying differences between reading skills and reading strategies. *The Reading Teacher, 61*(5), 364-373.

Aghaie, R., & Zhang, L. J. (2012). Effects of explicit instruction in cognitive and metacognitive reading strategies on Iranian EFL students' reading performance and strategy transfer. *Instructional Science, 40*(6), 1063-1081.

Aghajani, M. (2019). The Effect of Background Music on Reading Comprehension Regarding Extroverts/Introverts Personality Dimensions. *Contemporary Research in Education and English Language Teaching, 1*(2), 19-24.

Ahangari, S., & Mohseni, F. (2016). The effect of awareness raising through metacognitive strategy-based instruction on ESP learners' reading comprehension. *Journal of English Language Pedagogy and Practice, 9*(18), 65-77.

Ahmadi, M. R., & PourhoseiinGilakjani, A. (2012). Reciprocal teaching strategies and their impacts on English reading comprehension. *Theory and Practice in Language Studies, 2*(10), 2053-2060. http://dx.doi.org/10.4304/tpls.2.10.2053-2060.

Ahmadi, M. R., Ismail, H. N., & Abdullah, M. K. K. (2013). The importance of metacognitive reading strategy awareness in reading comprehension. *English Language Teaching, 6*(10), 235-244.

Ahmadian, M., & Pasand, P. G. (2017). EFL learners' use of online metacognitive reading strategies and its relation to their self-efficacy in reading. *The Reading Matrix: An International Online Journal, 17*(2), 117-132.

Ahmed, I., Ali, K., Fatima, I., Ali, Z., & Hasan, S. W. (2024). Improving reading comprehension skill through post-reading strategies: An experimental study on secondary school students' English reading skill in Pakistan. *Voyage Journal of Educational Studies, 4*(1), 24-33.

Ajideh, P. (2009). Autonomous Learning and Metacognitive Strategies Essentials in ESP Class. *English Language Teaching, 2*(1), 162-168.

Ajideh, P., Zohrabi, M., & Pouralvar, K. (2018). The effect of explicit instruction of metacognitive reading strategies on ESP reading comprehension in an academic setting. *International Journal of Applied Linguistics and English Literature, 7*(4), 77-86.

Akbari, M., Seifoori, Z., & Ahour, T. (2018). Enhancing comprehension and production of argumentation through critical thinking awareness-raising. *Linguæ &-Rivista di lingue e culture moderne, 16*(2), 111-130.

Akkakoson, S. (2012). Raising strategic awareness of Thai EFL students of science and technology disciplines through metacognitive strategy training. *3L: Southeast Asian Journal of English Language Studies, 18*(4).

Akkakoson, S., & Setobol, B. (2009). Thai EFL students' use of strategies in reading English texts. *The Journal of KMUTNB, 19*(3), 329-342.

Ali, A. M., & Razali, A. B. (2019). A review of studies on cognitive and metacognitive reading strategies in teaching reading comprehension for ESL/EFL learners. *English Language Teaching, 12*(6), 94-111.

Alıcı, H. İ., & Serdaroğlu, İ. C. (2016). The relationship between metacognitive awareness of reading strategies and success of science of the 5th grade students in secondary school. *Participatory Educational Research, 6*(2), 61–70. https://doi.org/10.17275/per.16.spi.2.7.

Alsheikh, N. (2011). Three readers, three languages, three texts: The strategic reading of multilingual and multiliterate readers. *The Reading Matrix, 11*(1), 34-53.

Alsheikh, N. O., & Mokhtari, K. (2011). An examination of the metacognitive reading strategies used by native speakers of Arabic when reading in English and Arabic.

Al-Sobhani, Y. A. (2013). Metacognitive reading strategies use by Yemeni EFL undergraduate university students. *Frontiers of Language and Teaching, 4*(1), 121-130.

Alvermann, D. E., & Phelps, S. F. (2002). Assessment of students. In P. A. Richard-Amato & M. A. Snow (Eds.), *Academic success for English language learners: Strategies for K-12 mainstream teachers* (pp. 103-110).

Amir, A., Hasanuddin, W. S., & Atmazaki. (2019). The contributions of reading strategies and reading frequencies toward students' reading comprehension skills in higher education. *International Journal of Engineering and Advanced Technology, 8*(6 Special Issue 3), 593–597. https://doi.org/10.35940/ijeat.F1105.0986S319.

Anderson, J. R. (2005). *Cognitive psychology and its implications.* Macmillan.

Anderson, N. J. (1991). Individual differences in strategy use in second language reading and testing. *Modern Language Journal, 75*(4), 460-472.

Anderson, N. J., & Cheng, X. (1999). *Exploring second language reading: Issues and strategies* (pp. 53-56). Boston, MA: Heinle & Heinle.

Ardhani, R. R. (2016). The effectiveness of bottom-up and top-down approaches in the reading comprehension skills for junior high school students. *Journal of English and Education, 5*(2), 80–89. https://doi.org/10.20885/jee.vol5.iss2.art6.

Ashworth III, A. R., Vuong, Q. C., Rossion, B., & Tarr, M. J. (2008). Recognizing rotated faces and Greebles: What properties drive the face inversion effect? *Visual Cognition, 16*(6), 754-784.

Askar, I. D. (2021). The effects of metacognitive strategy instruction on Arabic and English reading comprehension in Lebanese public high schools.

Auerbach, R. E., & Paxton, D. (1997). It's not the English thing: Bringing reading research into the ESL classroom. *TESOL Quarterly, 31*(2), 237-261.

Auwalyah, N. (2020). Investigating reading strategies used by proficient readers and low readers. *Jurnal Penelitian, Pendidikan, dan Pembelajaran, 15*(21).

Azevedo, R., & Hadwin, A. F. (2005). Scaffolding self-regulated learning and metacognition–Implications for the design of computer-based scaffolds. *Instructional Science, 33*(5/6), 367-379.

Aziz, I. N. (2020). The use of CIRC strategy on students' reading comprehension skill. *Journal of English Education and Technology.*

Azmuddin, R. A., Nor, N. F. M., & Hamat, A. (2017). Metacognitive online reading and navigational strategies by science and technology university students. *GEMA Online® Journal of Language Studies, 17*(3), 16-36. https://doi.org/10.17576/gema-2017-1703-02.

Babashamsi, P., Bolandifar, S., & Shakib, N. (2013). Various models for reading comprehension process. *International Journal of Applied Linguistics and English Literature, 2*(6), 150-154.

Babashamasi, P., Kotamjani, S. S., & Noordin, N. B. (2022). The effect of explicit training of metacognitive reading strategies on online reading comprehension. *Arab World English Journal.*

Babayiğit, S., & Stainthorp, R. (2011). Modeling the relationships between cognitive–linguistic skills and literacy skills: New insights from a transparent orthography. *Journal of Educational Psychology, 103*(1), 169.

Bachman, L. F., & Palmer, A. S. (1996). Language testing in practice: *Designing and developing useful language tests* (Vol. 1). Oxford University Press.

Baker, L. (1989). Metacognition, comprehension monitoring, and the adult reader. *Educational Psychology Review, 1*(1), 3-38.

Baker, L. (1991). Metacognition, reading, and science education. In C. Santa & D. Alvermann (Eds.), *Science Learning Processes and Applications* (pp. 2-13). Newark, DE: International Reading Association (IRA).

Baker, L. (2008). Metacognition in comprehension instruction. In C. C. Block & S. R. Parris (Eds.), *Comprehension instruction: What we've learned since NRP* (2nd ed., pp. 65-79). New York: Guilford.

Baker, L., & Brown, A. L. (1984). Metacognitive skills and reading. In *Handbook of Reading Research* (pp. 353-394). New York: Longman.

Banditvilai, C. (2020). The effectiveness of reading strategies on reading comprehension. *International Journal of Social Science and Humanity, 10*(2), 46-50.

Batang, B. L. (2015). Metacognitive strategy awareness and reading comprehension of prospective pre-service secondary teachers. *Asia Pacific Journal of Multidisciplinary Research, 3*(4), 62-67.

Batha, K., & Carroll, M. (2007). Metacognitive training aids decision making. *Australian Journal of Psychology, 59*(2), 64-69.

Bećirović, S., Brdarević-Čeljo, A., & Sinanović, J. (2017). The use of metacognitive reading strategies among students at International Burch University: A Case Study. *European Journal of Contemporary Education, 6*, 645-5655. https://doi.org/10.13187/ejced.2017.4.645.

Beer, R. D. (2003). The dynamics of active categorical perception in an evolved model agent. *Adaptive Behavior, 11*(4), 209-243.

Belachew, M. (2020). A needs analysis of ESP in textile engineering profession in Ethiopian context. *PASAA: Journal of Language Teaching and Learning in Thailand, 59,* 181-203.

Bernhardt, E. B. (2005). Progress and procrastination in second language reading. *Annual Review of Applied Linguistics, 25,* 133-150.

Bernhardt, E. B., & Kamil, M. L. (1995). Interpreting relationships between L1 and L2 reading: Consolidating the linguistic threshold and the linguistic interdependence hypotheses. *Applied Linguistics, 16*(1), 15-34.

Berthiaume, K. S., Lorch, E. P., & Milich, R. (2010). Getting clued in: Inferential processing and comprehension monitoring in boys with ADHD. *Journal of Attention Disorders, 14*(1), 31-42.

Best, R. M., Rowe, M., Ozuru, Y., & McNamara, D. S. (2005). Deep-level comprehension of science texts: The role of the reader and the text. *Topics in Language Disorders, 25*(1), 65-83.

Billmeyer, R. (2006). *Strategies to Engage the Mind of the Learner: Creating Strategic Learners* (2nd ed.). Omaha, NE: Rachel & Associates.

Bilokcuoğlu, H. (2011). The effects of pre-reading activities in EFL classes on students' reading comprehension. *LAÜ Sosyal Bilimler Dergisi, 2*(2), 79-97.

Block, E. (1986). The comprehension strategies of second language readers. *TESOL Quarterly, 20*(3), 463-494.

Bloom, B. S. (1956). *Taxonomy of educational objectives, handbook I: Cognitive domain*. New York: McKay.

Bloome, D., & Green, J. (1984). Directions in the sociolinguistic study of reading. In *Handbook of Reading Research* (Vol. 1, pp. 395-422).

Brantmeier, C. (2002). Second language reading strategy research at the secondary and university levels: Variations, disparities, and generalizability. *The Reading Matrix, 2*(3).

Brown, A. L. (1980). Metacognitive development and reading. In R. J. Spiro, B. C. Bruce, & W. T. Brewer (Eds.), Theoretical Issues in Reading Comprehension. Hillsdale, NJ: Erlbaum.

Brown, A. L. (1987). Metacognition, executive control, self-regulation, and other more mysterious mechanisms. In F. E. Weinert & R. H. Kluwe (Eds.), *Metacognition, Motivation, and Understanding* (pp. 65-116). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Brown, A. L., Palincsar, A. S., & Armbruster, B. B. (1984). Instructing comprehension-fostering activities in interactive learning situations. In Learning and Comprehension of Text (pp. 255-286).

Brunfaut, T., & McCray, G. (2015). Looking into test-takers' cognitive processes whilst completing reading tasks: A mixed-method eye-tracking and stimulated recallstudy.

Butler, D. L. (1998). Metacognition and learning disabilities. *Learning about Learning Disabilities, 2,* 277-307.

Cabinda, M. (2016). Purported use and self-awareness of cognitive and metacognitive foreign language reading strategies in tertiary education in Mozambique. *Afrika Focus, 29*(1), 25-47.

Carrell, P. L. (1995). L2 reading strategy training: What is the role of metacognition? Paper presented at the 30th TESOL Annual Convention, Chicago, 26–30 March.

Carrell, P. L., & Eisterhold, J. C. (1983). Schema theory and ESL reading pedagogy. *TESOL Quarterly, 17*(4), 553-573.

Carrell, P. L., Pharis, B. G., & Liberote, J. C. (1989). Metacognitive strategy training for ESL reading. *TESOL Quarterly, 23*(4), 647-678

Chamot, A. U. (2005). Language learning strategy instruction: Current issues and research. *Annual Review of Applied Linguistics, 25*, 112-130.

Chamot, A. U., & O'Malley, J. M. (1990). Learning strategies in second language acquisition. Oxford, UK: Oxford University Press.

Chanprasert, V. (2013). Metacognitive reading strategies to improve reading comprehension and performance. *Sripatum Review of Humanities and Social Sciences, 13*(2), 94-105.

Chen, S. (2018). An empirical study of scaffolding instruction in ESP teaching. *The Asian EFL Journal Quarterly, 20*(9.2), 70.

Chomphuchart, N. (2007). A cognitive-based study of Thai EFL graduate students' reading strategy use. *Journal of Studies in the English Language, 3.*

Chomphuchart, N. (2015). Thai EFL business majors' metacognitive awareness when reading online texts. *University of the Thai Chamber of Commerce Journal Humanities and Social Sciences, 35*(1), 182-209.

Chumworatayee, T. (2012). Thai Adult EFL Learners' Metacognitive Awareness of Reading Strategies. *International Journal of Interdisciplinary Social Sciences, 6*(9).

Chumworatayee, T. (2017). The effect of reading strategy instruction on Thai EFL adult learners' reading strategy awareness. *LEARN Journal Language Education and Acquisition Research Network, 10*(1), 135-148.

Chutichaiwirath, K., & Sitthitikul, P. (2017). The metacognitive awareness of reading strategies in Thai EFL learners. *Journal of Nusantara Studies (JONUS), 2*(2), 1-14.

Cohen, D. (1998). Culture, social organization, and patterns of violence. *Journal of Personality and Social Psychology, 75*(2), 408.

Collins, C. (2005). A smuggling approach to the passive in English. *Syntax, 8*(2), 81-120. Çubukcu, F. (2008). How to enhance reading comprehension through metacognitive strategies. *Journal of International Social Research, 1*(2).

Cummins, J. (1991). Interdependence of first- and second-language proficiency in bilingual children. In E. Bialystok (Ed.), *Language processing in bilingual children.* Cambridge, U.K.: Cambridge University Press.

Dabarera, C., Renandya, W. A., & Zhang, L. J. (2014). The impact of metacognitive scaffolding and monitoring on reading comprehension. *System, 42,* 462-473.

Darjito, H. (2019). Students' metacognitive reading awareness and academic English reading comprehension in EFL context. *International Journal of Instruction, 12*(4), 611-624.

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science, 24*(2), 97-140. https://doi.org/10.1080/10888691.2018.1537791.

DeGennaro, D. N. (2018). *The relationship between metacognitive strategies and reading comprehension in fifth-grade students* (Doctoral dissertation, University of West Georgia).

Deliany, Z., & Cahyono, B. Y. (2020). Metacognitive reading strategies awareness and metacognitive reading strategies use of EFL university students across gender. *Studies in English Language and Education, 7*(2), 421-437.

Demmrich, A. (2005). Improving reading comprehension by enhancing metacognitive competences: An evaluation of the reciprocal teaching method (Unpublished doctoral dissertation). Universität Potsdam.

Desoete, A., Roeyers, H., & De Clercq, A. (2003). Can offline metacognition enhance mathematical problem solving? *Journal of Educational Psychology, 95*(1), 188-197.

DeVellis, R. F. (2003). *Scale Development: Theory and Applications.* Thousand Oaks, CA: Sage.

DeWaelsche, S. A. (2015). Critical thinking, questioning, and student engagement in Korean university English courses. *Linguistics and Education, 32,* 131-147. https://doi.org/10.1016/j.linged.2015.10.003.

Dhieb-Henia, N. (2003). Evaluating the effectiveness of metacognitive strategy training for reading research articles in an ESP context. *English for Specific Purposes, 22*(4), 387-417.

Dhieb-Henia, N. (2006). Applying Metacognitive Strategies to Skimming Research Articles in an ESP Context. *English Teaching Forum, 44*(1), 2-7. US Department of State. Bureau of Educational and Cultural Affairs, Office of English Language Programs, SA-5, 2200 C Street NW 4th Floor, Washington, DC 20037.

Diaz, I. (2015). Training in metacognitive strategies for students' vocabulary improvement by using learning journals. *Profile: Issues in Teachers' Professional Development, 17*(1), 87-102.

Divrik, R., Pilten, P., & Tas, A. M. (2020). Effect of Inquiry-Based Learning Method Supported by Metacognitive Strategies on Fourth-Grade Students' Problem-Solving and Problem-Posing Skills: A Mixed Methods Research. *International electronic journal of elementary education, 13*(2), 287-308.

Djamàa, S. (2016). Reading the book versus 'reading' the film: Cinematic adaptations of literature as a catalyst for EFL students' critical thinking dispositions. *Journal of Language Teaching & Research, 7*(2), 252-263. https://doi.org/10.17507/jltr.0702.03.

Dole, J. A., Nokes, J. D., & Drits, D. (2014). Cognitive strategy instruction. In *Handbook of Research on Reading Comprehension* (pp. 347).

Donker, A. S., De Boer, H., Kostons, D., Van Ewijk, C. D., & Van der Werf, M. P. (2014). Effectiveness of learning strategy instruction on academic performance: A meta-analysis. *Educational Research Review, 11,* 1-26.

Dönyei, Z. (2007). Research methods in applied linguistics. New York, NY: Oxford University Press.

Duke, N. K., & Martin, N. (2008). Comprehension instruction in action. In *Comprehension instruction: Research-based best practices* (pp. 241-257).

Dumlao, R. P., Himmapan, K., Kueasnou, I., & Wanakprakobkul, J. (2019). *Metacognitive awareness in reading English language text: A perspective from EFL undergraduate students in Thailand*. Online Submission.

Ebrahimi, S. S. (2012). Reading strategies of Iranian postgraduate English students living at ESL context in the first and second language. In *International Conference on Education and Management Innovation* (Vol. 30, No. 2, pp. 95-199).

Efklides, A. (2001). Metacognitive experiences in problem solving: Metacognition, motivation, and self-regulation. In *Trends and prospects in motivation research* (pp. 297-323). Dordrecht: Springer Netherlands.

Eilers, L. H., & Pinkley, C. (2006). Metacognitive strategies help students to comprehend all text. *Reading Improvement, 43*(1), 13-30.

Elinwa, U. K., & Agboola, O. P. (2013). Beyond BIM–a classroom approach to virtual design education. *Procedia-Social and Behavioral Sciences, 83,* 393-397.

Elleman, A. M., & Oslund, E. L. (2019). Reading comprehension research: Implications for practice and policy. *Policy Insights from the Behavioral and Brain Sciences, 6*(1), 3-11.

ElMekawy, A. (2014). *Metacognitive awareness of reading strategies in freshmen university students* (Unpublished master's thesis, The British University in Dubai).

Enosh, G., Tzafrir, S. S., & Stolovy, T. (2014). The development of client violence questionnaire (CVQ). *Journal of Mixed Methods Research, 9*(3), 273–290.

Eskey, D. E. (2005). Reading in a second language. In *Handbook of research in second language teaching and learning* (pp. 563-579). Routledge.

Erler, L., & Finkbeiner, C. (2007). A review of reading strategies: Focus on the impact of the first language. In *Language learner strategies* (pp. 187-206).

Fahim, M., & Sa'eepour, M. (2011). The impact of teaching critical thinking skills on reading comprehension of Iranian EFL learners. *Journal of Language Teaching & Research, 2*(4), 867-874. https://doi.org/10.4304/jltr.2.4.867-874.

Farahian, M., & Rezaee, M. (2015). Language awareness in EFL context: An overview. *International Journal of Language, Literature and Culture, 2*(2), 19-21.

Fetters, M. D. (2016). “Haven’t we always been doing mixed methods research?” Lessons learned from the development of the horseless carriage. *Journal of Mixed Methods Research, 10*(1), 3-11.

Fitrisia, D., Tan, K. E., & Yusuf, Y. Q. (2015). Investigating metacognitive awareness of reading strategies to strengthen students' performance in reading comprehension. *Asia Pacific Journal of Educators and Education, 30*(1), 15-30.

Flavell, J. H. (1976). Metacognitive aspects of problem-solving. In L. B. Resnick (Ed.), *The Nature of Intelligence* (pp. 231-235). Hillsdale, NJ: Lawrence Erlbaum Associates.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906.

Fogarty, R. (1994). How to teach for metacognition. Palatine, IL: IRI/Skylight Publishing.

Follmer, D. J., & Sperling, R. A. (2018). Interactions between reader and text: Contributions of cognitive processes, strategy use, and text cohesion to comprehension of expository science text. *Learning and Individual Differences, 67,* 177-187.

Fries-Gaither, J. (2012). Evaluating in reading and science. Beyond Weather and the Water Cycle. Retrieved from http://beyondweather.ehe.osu.edu/issue/we-study-earths-climate/evaluating-in-reading-and-science.

Garner, R. (1992). Learning from school texts. *Educational Psychologist, 27*(1), 53-63.

Gernsbacher, M. A. (1997). Attenuating interference during comprehension: The role of suppression. In *Psychology of Learning and Motivation* (Vol. 37, pp. 85-104). Academic Press.

Ghaith, G., & El-Sanyoura, H. (2019). Reading comprehension: The mediating role of metacognitive strategies. *Reading in a Foreign Language, 31*(1), 19.

Ghwela, M., Rosniah, M., & Noorizah, M. N. (2017). Metacognitive reading strategies of EFL Libyan university learners. *International Journal of Social Sciences and Humanities Research, 5,* 332–339.

Goh, C. C., & Vandergrift, L. (2021). *Teaching and learning second language listening: Metacognition in action.* Routledge.

Gooden, S. H. (2012). Comprehension strategies teachers use when they read. *Journal of Reading Education, 37*(2), 16-20.

Gorowara, S., & Lynch, R. (2019). A comparative study of grade 6 science students' academic achievement under teacher-centered learning method and inquiry-based learning method at Panchasap School, Bangkok, Thailand. *Scholar: Human Sciences, 11*(2), 153-153.

Gough, P. B. (1972). One second of reading. *Visible Language, 6*(4), 291-320.

Grabe, M., & Mann, S. (1984). A technique for the assessment and training of comprehension monitoring skills. *Journal of Reading Behavior, 16*(2), 131-144.

Grabe, W. (1991). Current developments in second language reading research. *TESOL Quarterly, 25*(3), 375-406.

Grabe, W. (2001). *Teaching and Researching Reading: Applied Linguistics in Action.* Pearson.

Grabe, W., & Stoller, F. (2002). *Teaching and Researching Reading.* Harlow: Pearson Education.

Grabe, S. (2012). An empirical examination of women's empowerment and transformative change in the context of international development. *American Journal of Community Psychology, 49,* 233-245.

Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass.

Griffith, P. L., & Ruan, J. (2005). What is metacognition and what should be its role in literacy instruction? In S. E. Israel, C. C. Block, K. L. Bauserman, & K. Kinnucan-Welsch (Eds.), *Metacognition in Literacy Learning* (pp. 3–18). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Guo, L. (2018). Modeling the relationship of metacognitive knowledge, L1 reading ability, L2 language proficiency and L2 reading. *Reading in a Foreign Language, 30*(2), 209-231.

Guterman, E. (2003). Integrating written metacognitive awareness guidance as a 'psychological tool' to improve student performance. *Learning and Instruction, 13*(6), 633-651.

Gutiérrez Martínez, A., & Ruiz de Zarobe, Y. (2017). Comparing the benefits of a metacognitive reading strategy instruction program between CLIL and EFL primary school students. *Estudios de Lingüística Inglesa Aplicada, 17,* 71-92.

Habibian, M. (2015). The impact of training metacognitive strategies on reading comprehension among ESL learners. *Journal of Education and Practice, 6*(28), 61-69.

Hacker, D. J. (1998). Self-regulated comprehension during normal reading. In Metacognition in educational theory and practice (pp. 165-191). Routledge.

Hacker, D. J., Dunlosky, J., & Graesser, A. C. (Eds.). (1998). *Metacognition in Educational Theory and Practice*. Routledge.

Hairul, N. I., Ahmadi, M. R., & Pourhosein Gilakjani, A. (2012). The Role of Reciprocal Teaching Strategy as an Important Factor of Improving Reading Motivation. *Elixir Edu. Tec, 53*(3), 11836-11841.

Hapsari, A. D. (2019). Metacognitive strategy training in the teaching of reading comprehension: Is it effective in EFL classroom. *LangEdu Journal, 14.*

Henter, R. (2012, May). Metacognitive training for awareness of reading strategies. Paper presented at the International Conference of Scientific Paper AFASES.

Hong-Nam, K., & Leavell, A. G. (2006). Language learning strategy use of ESL students in an intensive English learning context. *System, 34*(3), 399-415.

Hopkins, C. D., & Antes, R. L. (1990). *Classroom management and evaluation* (3rd ed.). F.E. Pencock Publishing, Inc.

Hosseini, N. (2006). *On the metacognitive awareness of reading strategies and the reading comprehension of Iranian non-English major university students* (Unpublished master's thesis, Al-Zahra University, Tehran, Iran).

Hosenfeld, C. (1977). A preliminary investigation of the reading strategies of successful and nonsuccessful second language learners. *System, 5*(2), 110-123.

Hsueh-Chao, M. H., & Nation, P. (2000). Unknown vocabulary density and reading comprehension.

Hudson, T, (2007). *Teaching Second Language Reading.* Oxford University Press.

Hung, D. M., & Phan Thu Ngan, V. (2015). Investigating reading strategies used by EFL students at Dong Thap University. *Asian Journal of Educational Research, 3*(4), 10-20.

Ikeda, M., & Takeuchi, O. (2003). Can strategy instruction help EFL learners to improve their reading ability? An empirical study. *JACET Bulletin, 37*(4), 49-60.

Imtiaz, S. (2004). Metacognitive strategies of reading among ESL learners. *South Asian Language Review, 14*(1 & 2).

Ismail, N. M., & Tawalbeh, T. E. I. (2015). Effectiveness of a metacognitive reading strategies program for improving low achieving EFL readers. *International Education Studies, 8*(1), 71-87.

Israel, S. E. (2007). *Using metacognitive assessments to create individualized reading instruction.* Newark, DE: International Reading Association.

Iwai, Y. (2011). The effects of metacognitive reading strategies: Pedagogical implications for EFL/ESL teachers. *Reading, 11*(2), 150-159.

Jafari, S. M., & Shokrpour, N. (2012). The reading strategies used by Iranian ESP students to comprehend authentic expository texts in English. *International Journal of Applied Linguistics and English Literature, 1*(4), 102-113.

Jaengsaengthong, W. (2016). Metacognitive reading strategies used by Thai EFL university students. *Journal of Graduate Studies in Northern Rajabhat Universities, 6*(11), 1-14.

Janzen, J., & Stoller, F. L. (1998). Integrating strategic reading in L2 instruction. *Reading in a Foreign Language, 12*(1), 251-268.

Johnson, P., & Keier, K. (2010). *Catching readers before they fall: Supporting readers who struggle, K-4.* Portland, ME: Stenhouse Publishers.

Joseph, E. (2005). Engagement tracing: using response times to model student disengagement. *Artificial Intelligence in Education: Supporting Learning through Intelligent and Socially Informed Technology, 125,* 88.

Juliebö, M., Malicky, G., & Norman, C. (1998). Metacognition of young readers in an early intervention programme. *Journal of Research in Reading, 21*(1), 24-35.

Karbalaei, A. (2010). A comparison of the metacognitive reading strategies used by EFL and ESL readers. *The Reading Matrix, 10*(2).

Kashef, S. H., Damavand, A., & Viyani, A. (2012). Strategies-based ESP instruction (SBI) of reading comprehension: Male vs. female students. *International Journal of Education, 4*(2), 171-180.

Ketworrachai, C., & Sappapan, P. (2022). The Relationship between Test-Taking Strategies and Thai Students' Reading Comprehension Test Performance. *Arab World English Journal (AWEJ), 13.*

Khellab, F., Demirel, Ö., & Mohammadzadeh, B. (2022). Effect of Teaching Metacognitive Reading Strategies on Reading Comprehension of Engineering Students. *SAGE Open, 12*(4), 21582440221138069. https://doi.org/10.1177/21582440221138069.

Khoshsima, H., & Samani, E. A. (2015). The most frequent metacognitive strategies used in reading comprehension among ESP learners. *Advances in Language and Literary Studies, 6*(1), 180-188.

Kintsch, W. (1998). *Comprehension: A paradigm for cognition.* New York, NY: Cambridge University Press.

Kočiský, T. (2017). *Deep learning for reading and understanding language* (Doctoral dissertation, University of Oxford).

Koda, K. (2005). *Insights into second language reading: A cross-linguistic approach.* Cambridge University Press.

Kongduang, T. (2020). Applying metacognition into reading comprehension. *International Journal of Arts, Humanities, and Social Sciences Studies, 5*(6), ISSN 2582-1601. Retrieved from http://www.ijahss.com/.

Korotaeva, I. V. (2012). Metacognitive strategies in reading comprehension of education majors. *Procedia-Social and Behavioral Sciences, 69,* 1895-1900.

Kuhn, D. (2000). Theory of mind, metacognition, and reasoning: A life-span perspective. In *Children's reasoning and the mind* (pp. 301-326).

Kulaç, D., & Walters, J. (2016). The Effect of Contextual Inferencing Strategies on EFL Learners' Attitudes towards Reading. *Procedia-Social and Behavioral Sciences, 232,* 486-493.

Kung, L. Y., & Aziz, A. A. (2020). An action research on metacognitive reading strategies instruction to improve reading comprehension. *International Journal of English Language and Literature Studies, 9*(2), 86-94.

Kunnan, A. J. (1998). An introduction to structural equation modelling for language assessment research. *Language Testing, 15*(3), 295-332.

Larson-Hall, J. (2016). *A guide to doing statistics in second language research using SPSS and R* (2nd ed.). New York: Routledge.

Lawrence, L. J. (2007). Cognitive and metacognitive reading strategies revisited: Implications for instruction. *The Reading Matrix, 7*(3).

Lee, C. D. (2020). Social and cultural diversity as a lens for understanding student learning and the development of reading comprehension. In *Handbook of Reading Research, Volume V* (pp. 37-56). Routledge.

Lee, I., & Mak, P. (2018). Metacognition and metacognitive instruction in second language writing classrooms. *TESOL Quarterly, 52*(4), 1085-1097.

Li, H., & Wilhelm, K. H. (2008). Exploring pedagogical reasoning: Reading strategy instruction from two teachers' perspectives. *Reading, 8*(1).

Li, M., Kirby, J. R., Geva, E., Koh, P. W., & Zhang, H. (2022). Profiles of poor decoders, poor comprehenders, and typically developing readers in adolescents learning English as a second language. *Journal of Learning Disabilities, 55*(4), 306-324.

Lien, H. Y. (2016). Effects of EFL individual learner variables on foreign language reading anxiety and metacognitive reading strategy use. *Psychological Reports, 119*(1), 124-135.

Lin, Z. J., & Zhang, J. (2011). Ethical awareness of Chinese business managers and accountants and their views on the use of off-book accounts. *Advances in Accounting, 27*(1). https://doi.org/10.1016/j.adiac.2011.04.004.

Livingston, J. A. (1997). Metacognition: An overview. Retrieved June 24, 2004, from http://www.gse.buffalo.edu/fas/shueell/cep564.

Louiza, C., & Fadhila, A. (2022). Metacognitive awareness and perceived use of reading strategies in academic reading comprehension: Case of Algerian EFL students. *ElQuari'e Journal of Literary, Critical and Linguistic Studies, 5*(1), 750–763.

Luo, H. (2010). *English reading text comprehension strategies by EFL university students* (Doctoral dissertation, School of English Institute of Social Technology, Suranaree University of Technology).

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35*(6), 382-386.

Maasum, T. N. R. T. M., & Maarof, N. (2012). Empowering ESL readers with metacognitive reading strategies. *Procedia-Social and Behavioral Sciences, 69,* 1250-1258.

Mackey, A., & Gass, S. (2005). *Second language research: Methodology and design*. Mahwah, NJ: Lawrence Erlbaum.

MacSwan, J. (2017). A multilingual perspective on translanguaging. *American Educational Research Journal, 54*(1), 167–201. https://doi.org/10.3102/0002831216683935.

Madaoui, R. (2013). Effects of pre-reading activities on EFL reading comprehension by Moroccan college students. *Higher Education of Social Science, 4*(3), 9-19.

Madhumathi, P., & Ghosh, A. (2012). Awareness of reading strategy use of Indian ESL students and the relationship with reading comprehension achievement. *English Language Teaching, 5*(2), 131-140.

Malcolm, D. (2009). Reading strategy awareness of Arabic-speaking medical students studying in English. *System, 37*(4), 640-651.

Manh Do, H., & Le Thu Phan, H. (2021). Metacognitive awareness of reading strategies on second language Vietnamese undergraduates. *Arab World English Journal (AWEJ), 12*(1), 90-112. https://doi.org/10.24093/awej/vol12no1.7.

Maryam, I. S., Ihrom, S. M., & Nurlaelawati, I. (2019, June). The correlation between metacognitive reading strategies and reading comprehension among 1st-year EFL students at a public university in West Java. In *Eleventh Conference on Applied Linguistics (CONAPLIN 2018)* (pp. 436-446). Atlantis Press.

Marzano, R. J. (2004). *Building background knowledge for academic achievement: Research on what works in schools.* ASCD.

Maxwell, J. A. (2016). Expanding the history and range of mixed methods research. Journal of Mixed Methods Research, 10(1), 12–27. https://doi.org/10.1177/1558689815571132.

Mayer, R. E. (1996). Learning strategies for making sense out of expository text: The SOI model for guiding three cognitive processes in knowledge construction. *Educational Psychology Review, 8,* 357-371.

McNamara, D. S., & Kendeou, P. (2011). Translating advances in reading comprehension research to educational practice. *International Electronic Journal of Elementary Education, 4*(1), 33-46.

McNamara, D. S., & Kintsch, W. (1996). Working memory in text comprehension: Interrupting difficult text. In *Proceedings of the Eighteenth Annual Meeting of the Cognitive Science Society* (pp. 104-109). Hillsdale, NJ: Erlbaum.

Mehrdad, A. G., Ahghar, M. R., & Ahghar, M. (2012). The effect of teaching cognitive and metacognitive strategies on EFL students' reading comprehension across proficiency levels. *Procedia-Social and Behavioral Sciences, 46,* 3757-3763.

Memis, A. D., & Kandemir, H. (2019). The relationship between the study habits and attitudes and metacognitive reading comprehension self-awareness, reading comprehension, reading attitudes. *World Journal of Education, 9*(4), 133-145.

Meniado, J. C. (2016). Metacognitive reading strategies, motivation, and reading comprehension performance of Saudi EFL students. *English Language Teaching, 9*(3), 117-129.

Miller, K., & Merdian, H. (2020). “It’s not a waste of time!” Academics’ views on the role and function of academic reading: A thematic analysis. *Journal of University Teaching & Learning Practice, 17*(2), 3.

Mohseni, F., Seifoori, Z., & Ahangari, S. (2020). The impact of metacognitive strategy training and critical thinking awareness-raising on reading comprehension. *Cogent Education, 7*(1), 1720946. https://doi.org/10.1080/2331186X.2020.1720946.

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology, 94*(2), 249. https://doi.org/10.1037/0022-0663.94.2.249.

Mokhtari, K., & Sheorey, R. (2002). Measuring ESL students' awareness of reading strategies. *Journal of Developmental Education, 25*(3), 2-10.

Mokhtari, K., Dimitrov, D. M., & Reichard, C. A. (2018). Revising the Metacognitive Awareness of Reading Strategies Inventory (MARSI) and testing for factorial invariance. *Studies in Second Language Learning and Teaching, 8*(2), 219-246. https://doi.org/10.14746/ssllt.2018.8.2.3.

Mokhtari, K., Reichard, C. A., & Sheorey, R. (2008). Metacognitive awareness and use of reading strategies among adolescent readers. In *Reading Strategies of First- and Second-Language Learners: See How They Read* (pp. 99-112).

Mol, S. E., & Bus, A. G. (2011). To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin, 137*(2), 267.

Muhid, A., Amalia, E. R., Hilaliyah, H., Budiana, N., & Wajdi, M. B. N. (2020). The effect of metacognitive strategies implementation on students' reading comprehension achievement. *International Journal of Instruction, 13*(2), 847–862. https://doi.org/10.29333/iji.2020.13257a.

Muñiz-Swicegood, M. (1994). The effects of metacognitive reading strategy training on the reading performance and student reading analysis strategies of third grade bilingual students. *Bilingual Research Journal, 18*(1&2).

Munsakorn, N. (2012). Awareness of reading strategies among EFL learners at Bangkok University. *International Journal of Cognitive and Language Sciences, 6*(5), 821-824.

Nadea, A. B. (2021, October). Bottom-up or Top-down Reading Strategies: Reading Strategies Used by EFL Students. In *2nd International Conference on Education, Language, Literature, and Arts (ICELLA 2021)* (pp. 30-36). Atlantis Press.

Nation, P., & Wang, K. (1999). Graded readers and vocabulary. *Reading in a Foreign Language, 12*(2), 355-380.

Nebila, D. (2003). Evaluating the effectiveness of metacognitive strategy training for reading research articles in an ESP context. *English for Specific Purposes, 22,* 387-413.

Nejad, B., & Mahmoodi-Shahrebabaki, M. (2015). Effects of metacognitive strategy instruction on the reading comprehension of English language learners through the Cognitive Academic Language Learning Approach (CALLA). *International Journal of Languages' Education and Teaching, 3*(2).

Nelson, J. M., & Manset-Williamson, G. (2006). The impact of explicit, self-regulatory reading comprehension strategy instruction on the reading-specific self-efficacy, attributions, and affect of students with reading disabilities. *Learning Disability Quarterly, 29*(3), 213-230.

Nelson, T. O., & Narens, L. (1990). Metamemory: A theoretical framework and new findings. *The Psychology of Learning and Motivation, 26,* 125-141.

Ningsih, M. (2019). Using Think, Predict, Read, and Connect strategy in teaching reading comprehension of narrative text at State Islamic Senior High School 2 Model Pekanbaru (Doctoral dissertation, Universitas Islam Negeri Sultan Syarif Kasim Riau).

Norris, J. A. (1998). I could read if I just had a little help: Facilitating reading in a wholelanguage context. In C. Weaver (Ed.), *Current issues in whole language* (pp. 157-196). Urbana, IL: NCTE.

Numan, D. (2003). Practical English Language Teaching. New York: McGraw-Hill.

Okasha, M. A. (2020). Using strategic reading techniques for improving EFL reading skills. *Arab World English Journal (AWEJ), 11*.

Okkinga, M., van Steensel, R., van Gelderen, A. J., & Sleegers, P. J. (2018). Effects of reciprocal teaching on reading comprehension of low-achieving adolescents: The importance of specific teacher skills. *Journal of Research in Reading, 41*(1), 20-41.

O'Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in second language acquisition.* Cambridge University Press.

Oranpattanachi, P. (2010). Perceived reading strategies used by Thai pre-engineering students. *ABAC Journal, 30*(2), 26-42.

Oranpattanachai, P. (2023). Relationship between the Reading Strategy, Reading Self-Efficacy, and Reading Comprehension of Thai EFL Students. *LEARN Journal: Language Education and Acquisition Research Network, 16*(1), 194-220.

Organisation for Economic Co-operation and Development (OECD). (forthcoming). *PISA 2015 technical report.* Paris: Author.

Oxford, R. L. (1990). Language Learning Strategies: *What Every Teacher Should Know*. Boston: Heinle & Heinle.

Oxford, R. L. (2011). Strategies for learning a second or foreign language. *Language Teaching, 44*(2), 167-180.

Özenç, E. G., & Saat, F. (2022). Effect of self-evaluation-based oral reading method in elementary school on reading fluency and reading comprehension. *Participatory Educational Research, 9*(2), 437-462.

Padeliadu, S., Botsas, G., & Sideridis, G. (2000). Metacognitive awareness and reading strategies: Differences between average and reading disabled students. *Εισιήγηση στο,* 14.

Pae, T. I. (2018). Effects of task type and L2 proficiency on the relationship between L1 and L2 in reading and writing: An SEM approach. *Studies in Second Language Acquisition, 40*(1), 63-90.

Pammu, A., Amir, Z., & Maasum, T. N. R. T. M. (2014). Metacognitive reading strategies of less proficient tertiary learners: A case study of EFL learners at a public university in Makassar, Indonesia. *Procedia-Social and Behavioral Sciences, 118,* 357-364.

Pang, K. (2008). *The metacognitive expertise assessment tool: A predictive scale for academic achievement across disciplines.* (Doctoral dissertation, UMI No. AAT 3304568).

Pangsapa, N. A. M. I. D. A. (2012). *A study of English reading problems and strategies of Thai editorial staff* (Master's project, MA [English]). Graduate School, Srinakkharinwirot University. Bangkok, Thailand.

Paris, S. G., Lipson, M. Y., & Wixson, K. K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology, 8*(3), 293-316.

Paris, S. G., & Winograd, P. (1990). Promoting metacognition and motivation of exceptional children. *Remedial and Special Education, 11*(6), 7-15.

Park, Y. H. (2010). A relationship between reading comprehension and reading strategy use: Meta-analysis. *English Teaching, 65*(3).

Pei, L. (2014). Does metacognitive strategy instruction indeed improve Chinese EFL learners' reading comprehension performance and metacognitive awareness? *Journal of Language Teaching and Research, 5*(5), 1147-1154.

Phaiphimai, J., & Meesri, R. (2015). Differences in metacognitive awareness of reading strategies of the third year undergrad students among English major and non-English major students. *An Online Journal of Education, 10*(1), 344-357.

Phakiti, A. (2003). A close look at the relationship of cognitive and metacognitive strategy use to EFL reading achievement test performance. *Language Testing Journal, 20*(1), 26-56.

Piaget, J. (1952). *The origins of intelligence in children*. New York, NY: International Universities Press.

Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory Into Practice, 41*(4), 219-225.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451-502). Academic Press.

Pookcharoen, S. (2009). *Metacognitive online reading strategies among Thai EFL university students* (Unpublished master's thesis). Indiana University.

Prasansaph, S. (2013, March). Effects of metacognitive reading strategy instruction on EFL tenth-grade students' reading comprehension and reading strategy awareness. In *Society for Information Technology & Teacher Education International Conference* (pp. 3551-3557). Association for the Advancement of Computing in Education (AACE).

Pressley, M. (1998). *Reading instruction that works: The case for balanced teaching.* New York: Guilford.

Pressley, M. (2002). Metacognition and self-regulated comprehension. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), What research has to say about reading instruction (3rd ed., pp. 291-309). International Reading Association.

Pressley, M., & Gaskins, I. W. (2006). Metacognitively competent reading comprehension is constructively responsive reading: How can such reading be developed in students? *Metacognition and Learning, 1,* 99-113.

Pressley, M., Johnson, C. J., Symons, S., McGoldrick, J. A., & Kurita, J. A. (1989). Strategies that improve children's memory and comprehension of text. *The Elementary School Journal, 90*(1), 3-32.

Rafidi, T. Y. Q. (2021). The effect of CALLA-based learning strategies on developing Palestinian students' reading and their satisfaction towards English. 407-420, 16(16), بحوث فى تدريس اللغات.

Rahman, A. (2022). The effect of literature circle on varied reading comprehension. *Journal of Teaching and Education for Scholars, 1*(1), 7-14.

Ramesh, R. (2009). *Metacognitive Strategies for Enhancing Second Language Acquisition.* Manonmaniam Sundaranar University. Thirunelveli-627 012, India.

Rastegar, M., Kermani, E. M., & Khabir, M. (2017). The relationship between metacognitive reading strategies use and reading comprehension achievement of EFL learners. *Open Journal of Modern Linguistics, 7*(2), 65-75.

Rianto, A. (2021). Indonesian EFL university students' metacognitive online reading strategies before and during the Covid-19 pandemic. *Studies in English Language and Education, 8*(1), 16-33.

Rosnaeni, R., Dj, M. Z., & Nur, H. (2020). Students' metacognitive awareness and reading comprehension of narrative texts. *IJEE (Indonesian Journal of English Education), 7*(1), 74-86.

Rumelhart, D. E. (1977). Understanding and summarizing brief stories. In D. LaBerge & S. J. Samuels (Eds.), *Basic processes in reading: Perception and comprehension*. Hillsdale, NJ: Erlbaum.

Saeed, K., Maedeh, M., & Mohsen, R. (2012). Hypermedia reading strategies used by Persian graduate students in TEFL: A think-aloud study. *Reading Matrix: An International Online Journal, 12*(1), 39-49.

Saeidi, M., & Ahmadi, H. (2016). The Effects of Watching Videos in Pre-Reading on EFL Learners' Reading Comprehension and Attitudes. *TESOL International Journal, 11*(2), 15-44.

Saengpakdeejit, R., & Intaraprasert, C. (2014). Reading strategies in foreign language academic reading: A qualitative investigation. *Theory and Practice in Language Studies, 4*(12), 2599-2608.

Salataci, R., & Akyel, A. (2002). Possible effects of strategy instruction on L1 and L2 reading. *Reading in a Foreign Language, 14,* 1-17.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science, 26*(1), 113-125.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*(4), 460-475.

Schraw, G. (2001). Promoting general metacognitive awareness. In Metacognition in learning and instruction: *Theory, research, and practice* (pp. 3-16). Dordrecht: Springer Netherlands.

Seedanont, C., & Pookcharoen, S. (2019). Fostering metacognitive reading strategies in Thai EFL classrooms: A focus on proficiency. English Language Teaching, 12(7), 75-86.

Seifoori, Z. (2018). Postgraduate English students' metacognitive awareness of reading strategies and their reading comprehension: A comparative study. *Journal of Applied Linguistics and Discourse Analysis, 3*(1). doi:10.22049/JALDA.2018.13690.

Semtin, S. A., & Maniam, M. (2015). Reading Strategies among ESL Malaysian Secondary School Students. International *Journal of Evaluation and Research in Education, 4*(2), 54-61.

Serin, H. (2018). A comparison of teacher-centered and student-centered approaches in educational settings. *International Journal of Social Sciences & Educational Studies, 5*(1), 164-167.

Shaaban, K. A. (2014). Assessment of critical thinking skills through reading comprehension. *International Journal of Language Studies, 8*(2).

Shang, H. F. (2017). Exploring metacognitive strategies and hypermedia annotations on foreign language reading. *Interactive Learning Environments, 25*(5), 610-623.

Sheorey, R., & Mokhtari, K. (2001). Differences in the metacognitive awareness of reading strategies among native and non-native readers. *System, 29*(4), 431-449.

Shih, H. C. J., & Huang, S. H. C. (2018). The development of EFL learners' metacognition in a flipped classroom. In *Proceedings of the 8th Centre for Language Studies International Conference* (pp. 263-279).

Shikano, M. (2013). A quantitative survey on metacognitive awareness of reading strategy use in English by Japanese university students. *International Education Center Journal, 14,* 11–24.

Shokrpour, N., & Nasiri, E. (2011). The use of cognitive and metacognitive reading strategies by Iranian IELTS test takers in the reading section of the test. *European Journal of Social Science, 22*(1), 126-134.

Slaouti, D., Onat-Stelma, Z., & Motteram, G. (2013). Technology and adult language teaching. In G. Motteram (Ed.), *Innovations in learning technologies for English language teaching.* British Council.

Stanovich, K. E. (1980). Toward an interactive-compensatory model of individual differences in the development of reading fluency. *Reading Research Quarterly, 16*(1), 32-71.

Stanovich, K. E. (2000). *Progress in Understanding Reading: Scientific Foundations and New Frontiers.* Guilford Press.

Steinagel, L. O. (2005). The effects of reading and reading strategy training on lower proficiency level second language learners. Unpublished doctoral dissertation, Brigham Young University.

Sudachit, O. (2005). The role of peer collaborative interaction in a small group reading activity on EFL reading comprehension. *วารสาร ศิลปศาสตร์ มหาวิทยาลัยธรรมศาสตร์, 5*(2), 180-200.

Suraprajit, P. (2019). Bottom-up vs top-down model: The perception of reading strategies among Thai university students. *Journal of Language Teaching and Research, 10*(3), 454-460. https://doi.org/10.17507/jltr.1003.10.

Surlitasari, D., & Premini, D. (2018). Exploring the relationship between metacognitive strategies and reading comprehension among senior high school students. *ANGLO-SAXON, 9*(2), 156–163.

Susanto, H. (2020). Reading Theories and Reading Comprehension; Review and Discussed. *E-Structural, 2*(2), 153–159. https://doi.org/10.33633/es.v2i2.3231.

Sutiyatno, S., & Sukarno. (2019). A survey study: The correlation between metacognitive strategies and reading achievement. *Theory and Practice in Language Studies, 9*(4), 11.

Sweet, A. P., & Snow, C. (2002). Reconceptualizing reading comprehension. In C. C. Block & M. Pressley (Eds.), *Improving comprehension instruction* (pp. 17-53). Jossey-Bass.

Tabataba'ian, M. S., & Zabihi, R. (2011). Strategies used by four Iranian EFL learners in reading ESP and GPE texts: A think-aloud case study. *World, 1*(1).

Tavakoli, H. (2014). The effectiveness of metacognitive strategy awareness in reading comprehension: The case of Iranian university EFL students. *Reading, 14*(2), 314-336.

Tavakoli, H., & Koosha, M. (2016). The effect of explicit metacognitive strategy instruction on reading comprehension and self-efficacy beliefs: The case of Iranian University EFL students. *Journal of Psycholinguistic Research, 45*(5), 1073–1088.

Tawarik, O., Ikhsanudin, I., Wajdi, M., & Latip-Yusoph, S. (2021). Effect of CALLA metacognitive strategy instruction on reading comprehension and reading awareness. *Journal of Applied Studies in Language, 5*(2), 309.

Teng, F. (2020). The role of metacognitive knowledge and regulation in mediating university EFL learners' writing performance. *Innovation in Language Learning and Teaching, 14*(5), 436-450.

Terzić, B. B. (2015). Metacognitive awareness of reading strategies among ESP students regarding their prior education. *Journal of Teaching English for Specific and Academic Purposes, 3*(2), 257-268.

Thapankaew, W. (2018). English reading comprehension strategies used by students from Faculty of Agriculture and Technology, Nakhon Phanom University. *Graduate Studies Journal, 15*(71), October – December 2018.

Thongwichit, N. (2018). Metacognitive reading strategies with Southern Thai university students. *Suranaree Journal of Social Science, 12*(1), 1-16.

Thongwichit, N., & Buripakdi, A. (2021). A Glimpse of Metacognitive Reading Strategy Instruction through Modeling Technique in ESP Class at the Tertiary Level. LEARN Journal: *Language Education and Acquisition Research Network, 14*(1), 118-145.

Tofade, T., Elsner, J., & Haines, S. T. (2013). Best practice strategies for effective use of questions as a teaching tool. *American Journal of Pharmaceutical Education, 77*(7), 155.

Tsai, Y. R., & Chang, Y. (2014). Enhancing engineering students' reading comprehension of English for science and technology with the support of an online cumulative sentence analysis system. *SAGE Open, 4*(3), 2158244014550610.

Tse, S. K., Hui, S. Y., Ng, H. W., & Lam, W. I. (2015). The reading attainment of Hong Kong primary four students: A study of literacy achievements and its implications. *Education Journal, 43,* 35–58.

Turnbull, B., & Sweetnam Evans, M. (2017). L1 and L2 group discussions in L2 reading comprehension. *Reading in a Foreign Language, 29*(1), 133–154.

Ur, P. (2012). *A course in language teaching: Practice and theory.* Cambridge University Press.

Veenman, M. V. (2016). Assessing metacognition in reading processes. In M. T. McCrudden, L. S. L. Siegel, & D. L. McLeod (Eds.), *Improving reading comprehension through metacognitive reading strategies instruction* (pp. 51-68). Routledge.

Veenman, M. V., & Beishuizen, J. J. (2004). Intellectual and metacognitive skills of novices while studying texts under conditions of text difficulty and time constraint. *Learning and Instruction, 14*(6), 621-640.

Veenman, M. V., & Spaans, M. A. (2005). Relation between intellectual and metacognitive skills: Age and task differences. *Learning and Individual Differences, 15*(2), 159-176.

Veeravagu, J., Muthusamy, C., Marimuthu, R., & Michael, A. S. (2010). Using Bloom's Taxonomy to Gauge Students' Reading Comprehension Performance/Utiliser La Taxonomie De Bloom Pour Evaluer Les Performances De Comprehension Ecrite Des Eleves. *Canadian Social Science, 6*(3), 205.

Wahyuni, Z., Ratmanida, R., & Marlina, L. (2018). The relationship of students' metacognitive reading strategies awareness and reading comprehension: The case of the sixth semester student of English Department Universitas Negeri Padang (UNP). *Journal of English Language Teaching, 7*(3), 399-413.

Walter, C. (2007). First-to second-language reading comprehension: Not transfer, but access 1. *International Journal of Applied Linguistics, 17*(1), 14-37.

Wannathong, N., & Danvivath, U. (2020). Enhancing reading comprehension of Thai EFL undergraduates using a reading strategy instructional model. *College of Asian Scholars Journal, 10*(3), 23-30.

Watson, J. B. (1913). Psychology as the behaviorist views it. *Psychological Review, 20*(2), 158.

Weganofa, R., Pratiwi, N., Liskinasih, A., & Sulistyo, G. H. (2020). The effectiveness of pre-reading activities on gifted students: A case on low achievement students. *Journal for the Education of Gifted Young Scientists, 8*(1), 501-513.

Whitehurst, J. (2019). *The interactive reading model. Anais and the Guardian.* Retrieved from https://www.anaisandtheguardian.com/the-interactive-reading-model/.

Wichadee, S. (2011). The effects of metacognitive strategy instruction on EFL Thai students' reading comprehension ability. *Journal of College Teaching & Learning (TLC), 8*(5), 31-40.

Wichadee, S. (2018). Significant predictors for effectiveness of blended learning in a language course. *JALT Call Journal, 14*(1), 25-42.

Wikandari, Y. D. (2020). Metacognitive reading strategies, motivation, and understanding performance in reading of EFL learners. *EDUTEC: Journal of Education And Technology, 4*(2), 289-306.

Willingham, D. T. (2007). Critical thinking: Why is it so hard to teach? *American Federation of Teachers Summer 2007,* 8–19.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277–304). Mahwah, NJ: Lawrence Erlbaum Associates.

Yalcin, S. K., & Sengul, M. (2004). A model proposal prepared for developing reading and comprehension skills. *Journal of National Education, 164.*

Yang, L., & Wilson, K. (2006). Second language classroom reading: A social constructivist approach. *The Reading Matrix, 6*(3), 364-372.

Yapp, D. J., de Graaff, R., & van den Bergh, H. (2021). Improving second language reading comprehension through reading strategies: A meta-analysis of L2 reading strategy interventions. *Journal of Second Language Studies, 4*(1), 154-192.

Yau, J. C. (2005). Two Mandarin readers in Taiwan: Characteristics of children with higher and lower reading proficiency levels. *Journal of Research in Reading, 28*(2), 108-124.

Yayli, D. (2010). A think-aloud study: Cognitive and metacognitive reading strategies of ELT department students. *Eurasian Journal of Educational Research, 38*(3), 234-251.

Yesim, O., & Muharrem, C. (2006). A study on the use of cognitive reading strategies by ELT students. *Asian EFL Journal*, 1-26.

Yildrim, Z., Ozden, M. Y., & Asku, M. (2001). Comparison of hypermedia learning and traditional instruction on knowledge acquisition and retention. *The Journal of Educational Research, 94*(4), 207-214.

Yin, W. M., & Agnes, C. S. (2001). Knowledge and use of metacognitive strategies. National Institute of Education Singapore. [Online] Available: http://www.aare.edu.au/01pap/won01419.html.

Yoshida, M. (2008). Think-aloud protocols and type of reading task: The issue of reactivity in L2 reading research. In *Selected Proceedings of the 2007 Second Language Research Forum* (Vol. 199209).

Yüksel, İ., & Yüksel, İ. (2012). Metacognitive awareness of academic reading strategies. *Procedia-Social and Behavioral Sciences, 31,* 894-898.

Yukselir, C. (2014). An investigation into the reading strategy use of EFL prep-class students. *Procedia-Social and Behavioral Sciences, 158*, 65-72.

Zare-ee, A. (2008). The relationship between cognitive and meta-cognitive strategy use and EFL reading achievements. *Faculty of Foreign Language and Literature, Islamic Azad University, Roudehen Branch, Tehran, Iran. In The first regional conference on English language teaching and literature (ELTL-1).*

Zhang, L. F. (2010). Do thinking styles contribute to metacognition beyond self-rated abilities? *Educational Psychology, 30*(4), 481-494.

Zhang, L. J., & Wu, A. (2009). Chinese senior high school EFL students' metacognitive awareness and reading-strategy use.

Zhang, L., & Seepho, S. (2013). Metacognitive strategy use and academic reading achievement: Insights from a Chinese context. *Electronic Journal of Foreign Language Teaching, 10*(1).

Zhao, X., & Zhu, L. (2012). Schema Theory and College English Reading Teaching. *English Language Teaching, 5*(11), 111-117.

Zhou, J., Jiang, Y., & Yao, Y. (2015). The investigation on critical thinking ability in EFL reading class. *English Language Teaching, 8*(1), 83-94. https://doi.org/10.5539/elt.v8n1p83.

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13-39). Academic Press.

Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299-315). Routledge.

Zimmerman, B. J., & Pons, M. M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal*, *23*(4), 614-628.

APPENDICES

APPENDIX A: Reading Comprehension Test: Version A1

This test is designed to measure candidates' language ability in English reading comprehension. This booklet has three types of questions, with specific instructions for each type.

Instructions

1. The booklet consists of 60 items
2. There is only one most appropriate answer for each item
3. The booklet, including related stuff, is not allowed to take outside of the test room
4. Only an hour is allotted for this test

DO NOT OPEN THIS QUESTION BOOKLET UNTIL INSTRUCTED TO DO SO

This test is used only for the research project No. 318-273/2565

The English Language Teaching Programme

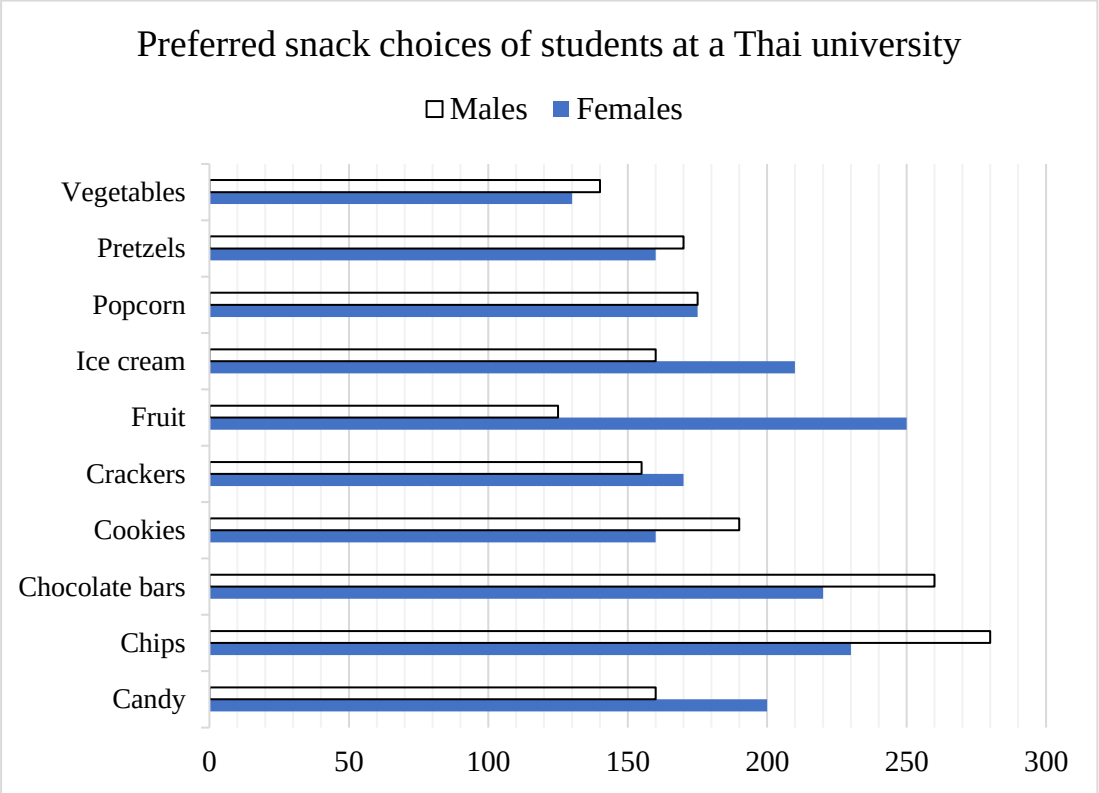
Faculty of Humanities and Social Sciences

Mahasarakham University

Section 1: This section is designed to measures' candidates' language ability in reading.
Instructions: In this section, candidates will read several passages.

Passage 1: Items 1-5

Instructions: Study the given bar graph and choose the best answer.



1. What does the bar graph intend to show the reader about?

A. A comparison of snacks by gender

B. A lot of preferred snacks of college students

C. A difference in colors of students' preference

D. A large number of students who prefer snacks

2. Which of the following snack food is the least preferred by girls?

A. Fruit

B. Vegetables

C. Pretzels

D. Candy

3. Which of the following is **NOT** true, according to the bar graph?

A. The preferred snack choice of chips between males and females is the most different.

B. Two snacks preferred by most students are chips and chocolate bars.

C. A substantial number of more males than females preferred chips.

D. The graph shows preferred snack choices among teenagers.

4. Which of the following is **TRUE**, according to the bar graph?

A. Fruit is the snack food most preferred by males.

B. Males seem to prefer vegetables, chocolate bars, and pretzels more than females do.

C. The same number of males and females preferred popcorn as their snack food choice.

D. Chips and fruit are the two snack foods least preferred by both males and females.

5. What kind of snacks did females prefer more than males?

A. Popcorn, candy, fruit and chips

B. Ice cream, crackers, and vegetables

C. Chips, fruit, chocolate bars and popcorn

D. Candy, crackers, fruit and ice cream

Passage 2: Items 6-10

Instructions: Below is the survey table on housing types in Northeast of Thailand.

Province	Separate house	Terrace house/ Townhouse	Apartment	Total
Khon Kaen	1705.3 (76%)	183.4 (8%)	343.9 (16%)	2232.6
Maha Sarakham	1344.8 (81%)	98.8 (6%)	212.7 (13%)	1656.3
Surin	985.0 (82%)	54.9 (5%)	150.7 (13%)	1190.6
Korat	457.0 (78%)	93.0 (16%)	35.4 (6%)	585.4
Roi-Et	521.3 (82%)	71.1 (11%)	45.1(6%)	637.5
Northeast	**5300.7 (80%)**	**527.9 (8%)**	**832.5 (12%)**	**6661.1**

Number of dwellings by Province, 2019

6. Among all types of housing in the Northeast, the most popular one is the _____.

A. townhouse B. terrace house

C. separate house D. apartment

7. The province that has the largest number of apartments is _____.

A. Roi-Et B. Khon Kaen

C. Korat D. Maha Sarakham

8. We learn from the survey that _____ is the second most populated area in the Northeast.

A. Roi-Eet
B. Surin
C. Korat
D. Maha Sarakham

9. According to the survey, people in Roi-Et _____.

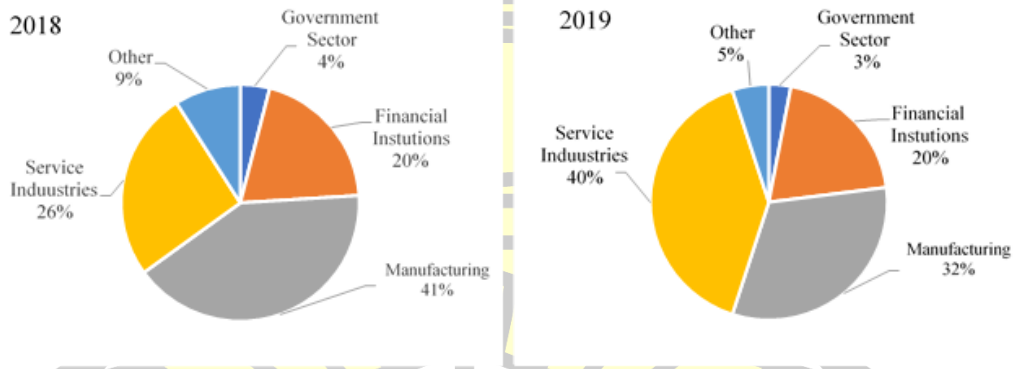
A. prefer living in apartments
B. own fewer townhouses than those in Surin.
C. avoid living in townhouses
D. mostly have separate houses of their own

10.In _____, the number of townhouses is almost three times larger than that of apartments.

A. Surin
B. Khon Kaen
C. Korat
D. Roi-Et

Passage 3: Items 11-15

Instructions: Study the given pie charts and complete the following passage



These charts compare the working backgrounds of 100 university students entering the engineering program in 2018 and 2019. The number of students with financial backgrounds _____11_____. Those with manufacturing experience _____12_____ those with experience in service industries in 2018, but _____13_____ in 2019. While the number with manufacturing backgrounds _____14_____, the number with service backgrounds _____15_____ in 2019.

11. A. remained the same
B. was much lower
C. increased slightly
D. showed a significant change

12. A. overcame
B. outweighed
C. overestimated
D. outnumbered

13. A. there were just as many
B. this situation was reversed
C. more were accepted
D. their experience was changed

14. A. increased by only one
B. dropped to 26
C. grew from 32 to 41
D. fell by nine

15. A. rose to 40
B. doubled between 2018 and
C. stayed steady throughout
D. decreased to 26 after

Passage 4: Items 16-20

Instructions: From the table below shows the comparison of three states of Australia. Study the table and choose the best answer.

	New South Wales	Victoria	Western Australia
Foundation	February 7th 1788	July 1st 1851	June 18th 1829
Population	6,682,000	4,911,400	1,950,000
Area	801,600 km^2	227,600 km^2	2,525,500 km^2
Average temperature (Jan / Jul)	22 °C / 12 °C (Sydney)	20 °C / 10 °C (Melbourne)	24 °C / 13 °C (Perth)
Average rainfall (Jan / Jul)	102 mm / 10 mm (Sydney)	47 mm / 48 mm (Melbourne)	8 mm/174 mm (Perth)
coastline	1,900 km	1,800 km	12,500 km

16. In terms of area, New South Wales is bigger than Victoria but, _____ than Western Australia.

A. populated
B. smaller
C. recent
D. bigger

17. With more than six million inhabitants, New South Wales is more_____ than the other two states.

A. populated
B. smaller
C. recent
D. bigger

18. In January, Perth is a lot_____ than Sydney, but in July, it's more wet with 174 mm of rainfall.

A. bigger
B. wetter
C. smaller
D. drier

19. The coastline of New South Wales is much _____ than the Western of Australia.

A. shorter
B. smaller
C. longer
D. bigger

20. The foundation of Victoria is more _____ than the other two states.

A. later
B. recent
C. longer
D. faster

Section 2: This section is designed to measure candidates' language ability in reading.

Passage 5: Items 21-25

Instructions: Choose the best answer to complete the following passage.

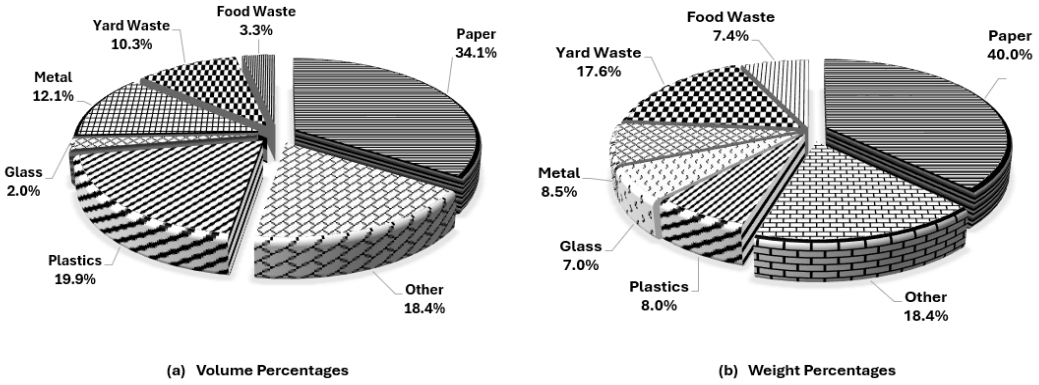
There is an old story about an engineering professor who meets up with a former student ten years _____21_____ the student graduated. _____22_____ professor is wearing the same old jacket he always wore. The student is wearing beautiful new clothes and _____23_____ an expensive car. The professor says, "You were _____24_____ student I ever taught. How come you have done so well for yourself?" The student replies: "I went into the _____25_____ car business. Now I buy a car for $1,500 then I sell it for $3,000 and there's my ten percent."

21.	A. for	B. when	C. after	D. since
22.	A. A	B. The	C. Another	D. One
23.	A. driving	B. driven	C. drive	D. drove
24.	A. the worst	B. a worse	C. a bad	D. the bad
25.	A. using	B. uses	C. used	D. use

Passage 6: Items 26-28

Instructions: Look at the pie charts, read the passage, and answer the questions below.

Solid Wastes Materials in Khon Kaen Municipality by Volume and Weight (2020)



Khon Kaen people are facing the most serious problem with **degradable** materials in solid waste landfills. These pie graphs show waste materials both by volume and by weight. You can see that paper is the biggest parts both by volume (34.1%) and by weight (40.0%). By volume, plastic is the second (19.9%) and other are the third (18.4%). In terms of weight, other comes the second (18.4%), followed by yard waste (17.6%) as the third. Glass is the least landfill either by volume (2.0%) or weight (7.0%).

26. From this passage, Khon Kaen people are facing the most serious problem with **degradable** materials in solid waste landfills. What does "**degradable**" mean?

A. Able to delay
B. Able to demote
C. Able to decent
D. Able to delude

27. By volume percentage, what is the least used material?

A. Food waste for two percent
B. Food waste for about three percent
C. Glass for two percent
D. Glass for about three percent

28. How much difference in wasted glass between by volume and by weight?

A. Five percent
B. Fifth percent
C. Four percent
D. Fourth percent

Passage 7: Items 29-33

Instructions: Choose the best answer for the questions.

The Internet is a **beneficial** means of communication, but it may do us harm. Nowadays, people all over the world can share any topic of knowledge and information through the Internet, which is viewed as a huge **global** computer that has shrunken the world. Electronic messages can be sent to anywhere in the world within a few seconds. That is known as second E-mails. Despite its great advantages, the Internet many be harmful, too. The information on the Internet is unlimited and because of that it allows people to find knowledge unsuitable for them. A bad person may find out how to make weapons and where to get drugs. Children may see pornography through the Internet. Finally, by accepting new culture through the Internet and ignoring their own, people may lose their own local identities.

29. The passage is mainly about_____.

A. advantages of the Internet
B. disadvantages of using computers
C. harms from the Internet
D. advantages and disadvantages of the Internet

30. The main idea of the passage is _____.

A. the Internet may be very advantageous for users.
B. it is easy to get information through the Internet.
C. despite its great advantages, the Internet may be harmful.
D. although the Internet is harmful, people should still use it.

31. One disadvantage of using the Internet is_____.

A. sending E-mails
B. sharing knowledge
C. getting information
D. seeing pornography

32. The word "**beneficial**" is closest in meaning to the word_____.

A. dangerous B. harmful C. advantageous D. suitable

33. The word "**global**" is closest in meaning to the word_____.

A. moving around B. very useful C. very big D. worldwide

Passage 8: Items 34-38

Instructions: Read the following passage and choose the best answer.

We recommend you try resetting the remote control by the following steps;

- 1st Step: **Remove** the batteries from the remote control.
- 2nd Step: **Press** the Power button on the remote control for three seconds.
- 3rd Step: **Reinsert** the batteries with the correct polarity (-/+).
- 4th Step: If the issue is not **resolved**, remove the batteries again for about one minute and then reinsert the batteries.

34. The word "**Remove**" in the first step refers to_____.

A. turn something into solid.
B. change the position of something.
C. stick the objects together.
D. melt something in the pot.

35. The word "**Press**" in the second step refers to_____.

A. move by means of pressure.
B. move by means of traction.
C. move by means of pulling.
D. move by means of lifting.

36. The word "**Reinsert**" in the third step refers to_____.

A. indirect something again
B. insert something again
C. inject something again
D. input something again

37. The word "**Resolved**" in the fourth step refers to_____.

A. find a direction.
B. find a construction.
C. find a solution.
D. find a position.

38. This passage is mainly about_____.

A. Four steps to repair the TV screen
B. Four steps to remove batteries
C. Four steps to reset the TV remote control
D. Four steps to fix the batteries

Passage 9: Items 39-43

Instructions: Read the following passage and choose the correct answer.

Corrosion

Corrosion is a common problem in the long-term use of any objects made of iron or steel. Corrosion is any deterioration in the metal's appearance or physical properties. Corrosion occurs when a metal changes state as a result of interaction with its environment. Corrosion is likely, where water is present as either a liquid or vapor. It becomes worse when impurities are present in damp conditions. It never starts inside a material, and there will always be surface evidence that indicates corrosion exists. A common example of corrosion is the **rusting** of steel. A change in iron causes it to turn into a mixture of oxides and other compounds. This not only changes the appearance of the metal but also results in a decrease in its cross-section. There are many factors to prevent its progress. For example, aluminium and its alloys can produce a film of oxide to protect the metal from further attack when exposed to air and water. Therefore, that corrosion **halts**.

39. In corrosion, metals change state because of_____.

A. the interaction of the metal with its environment

B. the deterioration in metal's appearance

C. the present impurities

D. many factors that prevent its progress

40. Which two factors cause corrosion?

A. Metal's appearance and physical properties B. Liquid and vapor

C. Water and impurities D. Oxides and other compounds

41. This **not only** changes the appearance of the metal **but also** results in a decrease in its cross-section. The underlined words are used to show_____.

A. an exemplification B. contrasting information

C. additional results D. a cause

42. Which word ***does not*** mean the same as the word "**rusting**"?

A. oxidizing B. increasing C. corroding D. reacting

43. The word **"halts"** is close in meaning to the word_____.

A. occurs B. starts C. falls D. stops

Passage 10: Items 44-46

Instructions: Read the following passage and choose the correct answer.

Motorcycle Accidents

There are many different causes for motorcycle accidents in Khon Kaen. Sometimes accidents are caused by bad weather. Heavy rain can make roads dangerous. Accidents also can result from problems with the motorcycle. Even a small problem like a flat tire can be serious. Bad roads are another cause of accidents. Some accidents happen because the drivers break the traffic regulations; for example, carrying more than two people or riding on the wrong side of the road. Finally, some accidents are caused by drinking too much alcohol. In fact, this is one of the most important causes of accidents.

44. According to this passage, the cause of motorcycles accident from bad weather is?

A. hot weather
B. heavy heat
C. frozen weather
D. heavy rain

45. According to this passage, which problem with a motorcycle can cause accidents?

A. leaked tire
B. inflated tire
C. deflated tire
D. swallowed tire

46. According to this passage, several traffic regulations are breaking **EXCEPT** _____.

A. Riding a motorcycle with more than two people.
B. Riding through a red light.
C. Riding on the wrong side of the road.
D. Drinking too much alcohol

Passage 11: Items 47-51

Instructions: Read the following passage and choose the best answer.

There were seven children in the family when we set out with mother for Khon Kaen. Scott was the baby and was train sick all the way from Saraburi to Nakhon Ratchasima. Judy, the next to the youngest, had broken a bone in her foot three weeks before and had to stay in her berth. Mother was expecting another baby in three months and did not always feel too well herself.

The chance to return with her children to her parents' home meant more to mother than any of us realized, and she was worried to show us off in the best possible light and to have her family approve of us.

47. The family was travelling to _____.

A. Khon Kaen
B. Nakhon Ratchasima
C. see a doctor
D. the hospital

48. Judy was the _____child of the family.

A. oldest
B. youngest
C. sixth
D. second

49.The person telling this story is probably _____.

A. the father
B. the mother
C. the grandmother
D. an older child

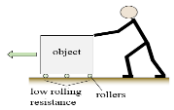
50.We can assume from this passage that _____.

A. Judy was the last child in the family
B. Mother's family had never seen the children before
C. Mother's relatives visited the family regularly
D. Judy was the most misbehaved child on the train

Passage 12: Items 51-55

Instructions: Read the following passage and choose the best answer.

How to move a heavy load



It should be ensured that there are enough rollers. At least three rollers of the same diameter are required. If more are used, the load can be moved faster as there is no delay when the roller is transferred from the back to the front.

The load is to be supported with a flat plate, if its weight cannot be supported by the load itself at any point along its base. It must be remembered that the plate must be thick enough to support the load. When the rollers are to be placed under the load, four blocks of wood of identical thickness that are thicker than the rollers must be selected.

The load should be lifted with a crowbar and should be placed on the blocks. The required number of rollers should be placed under the load. The complete load should be lifted with crowbars, the wooden blocks should be removed, and the load should be lowered evenly on to the rollers.

51. Which of the following should be used to move a heavy thing?

A. diameter B. rollers C. load D. crowbar

52. The load can be moved faster if the rollers are_____.

A. less used B. not used C. more used D. slower used

53. A flat plate must be _____ to support the load.

A. shorter B. longer C. thicker D. thinner

54. From the passage, crowbar is used to_____.

A. open the rollers B. lift the rollers C. open the load D. lift the load

55. Finally, the wooden blocks should be_____.

A. lifted B. rolled C. removed D. released

Passage 13: Items 56-60

Instructions: Below is the text about the possible causes of bushfires in Victoria, Australia. Read the text and choose the correct answer.

Causes of Bushfires

The causes of bushfires can be placed into two groups: natural causes and those caused by human activities.

Natural Causes

Lightning strikes are the cause of virtually all naturally occurring bushfires. Approximately 26% of all bushfires on public land are due to lightning strikes. There are, on average, more fires started by lightning than any other individual cause.

Human Activities

All other bushfires on public land are started as a result of human activity approximately 74% of all bushfires on public land are caused by people. These include both deliberate and accidental ignitions. Some examples of human caused fire are discussed below.

Campfires

On average, campfires cause approximately 10% of bushfires that start on public land. These bushfires burn, on average, around 1,500 hectares of public land each year. When the campfire is left unattended or not properly extinguished, most of these fires start.

Burning Off / Agricultural Burns

Farmers may burn vegetation on their properties for a variety of reasons including weed control, burning of crop debris and the removal of rubbish. Agricultural burns can

accidentally lead to fires on public land. These fires cause over 15% of bushfires on average each year. Unattended burns are most likely to ‘escape’ and become bushfires.

Equipment / Machinery

Any equipment or machinery that generates heat or sparks is a potential cause of bushfires. Examples of such machinery include chainsaws, slashers, welders, grinders, and exhaust from vehicles. On average, fires originating from equipment or machinery result in approximately 2,500 hectares of fires on public land each year.

Deliberate

One reason for bushfires is deliberate. This category includes all fires which are deliberately lit and result in bushfires on public land. Examples include children playing with matches or experimenting with fire, farmers deliberately lighting fires without necessary permits or authority or maliciously lit fires (fires lit with an intention to damage or destroy property).

56. What is the cause of “74% of all bushfires on public land”?

A. Natural cause
B. Human activity
C. Campfire
D. Deliberate

57. What is the cause of “approximately 26% of all bushfires on public land”?

A. Natural cause
B. Human activity
C. Campfire
D. Deliberate

58. What is the effect of “Campfires”?

A. Bushfires on public land are due to lightning strikes.
B. Burning of crop debris and the removal of rubbish.
C. Burning around 1,500 hectares of public land each year.
D. Lighting fires without permits.

59. What is the effect of “Equipment / Machinery”?

A. Bushfires on public land are due to lightning strikes.
B. Burning around 1,500 hectares of public land each year
C. Burning around 2,500 hectares of public land each year
D. Bushfires on public land are due to thunderstorms.

60. What is the cause of “over 15% of bushfires on average each year”?

A. Campfire
B. Deliberate
C. Equipment / Machinery
D. Burning Off / Agricultural Burns

---------- Test Ends ----------

APPENDIX B: Reading Comprehension Test: Version A2

This test is designed to measure candidates' language ability in English reading comprehension. This booklet has three types of questions, with specific instructions for each type.

Instructions

1. The booklet consists of 60 items
2. There is only one most appropriate answer for each item
3. The booklet, including related stuff, is not allowed to take outside of the test room
4. Only an hour is allotted for this test

DO NOT OPEN THIS QUESTION BOOKLET UNTIL INSTRUCTED TO DO SO

This test is used only for the research project No. 318-273/2565

The English Language Teaching Programme

Faculty of Humanities and Social Sciences

Mahasarakham University

Section 1: This section is designed to measure candidates' language ability in reading.

Passage 1: Items 1-5

Instructions: The table below compares three states of the United States of America.

	California	Florida	New Jersey
Foundation	9th September 1850	3rd March 1845	18th December 1787
Population	39,500,000	21,400,000	1,950,000
Area	423,970 km²	170,304 km²	22,608 km²
Average temperature (Jan - Aug)	14 °C / 21 °C	16 °C / 28 °C	8 °C / 17 °C
Average rainfall	22.2″	54.5″	47.1″
coastline	1,350 km	2,170 km	227 km

1. In terms of area, Florida is bigger than New Jersey but _____ than California.
A. populated B. smaller
C. recent D. bigger

2. With almost forty million residents, California is more_____ than the other two states.
A. populated B. smaller
C. recent D. bigger

3. In January, California is _____ than Florida, but in August, it is warmer than New Jersey.
A. warmer B. wetter
C. colder D. drier

4. The coastline of New Jersey is much _____ than the other two states.
A. shorter B. smaller
C. longer D. bigger

5. The foundation of New Jersey is more_____ than the other two states.
A. later B. recent
C. longer D. faster

Passage 2: Items 6-10

Instructions: Below is the survey table on housing types in Northeast of Thailand.

Province	Separate House	Terrace house/ Townhouse	Apartment	Total
Khon Kaen	1705.3 (76%)	183.4 (8%)	343.9 (16%)	2232.6
Udon Thani	1344.8 (81%)	98.8 (6%)	212.7 (13%)	1656.3
Kalasin	985.0 (82%)	54.9 (5%)	150.7 (13%)	1190.6
Mukdahan	457.0 (78%)	93.0 (16%)	35.4 (6%)	585.4
Amnat Charoen	521.3 (82%)	71.1 (11%)	45.1(6%)	637.5
Northeast	5300.7 (80%)	527.9 (8%)	832.5 (12%)	6661.1

Number of dwellings by Province, 2019

6. Among all types of housing in the Northeast, which province has the highest number of house possession ratio?

A. Udon Thani
B. Khon Kaen
C. Kalasin
D. Amnat Charoen

7. The province that has the smallest number of terrace houses is _____.

A. Kalasin
B. Mukdahan
C. Khon Kaen
D. Amnat Charoen

8. We learn from the survey that _____ is the third most populated area in the Northeast.

A. Khon Kaen
B. Amnat Charoen
C. Kalasin
D. Mukdahan

9. According to the survey, people in Mukdahan _____.

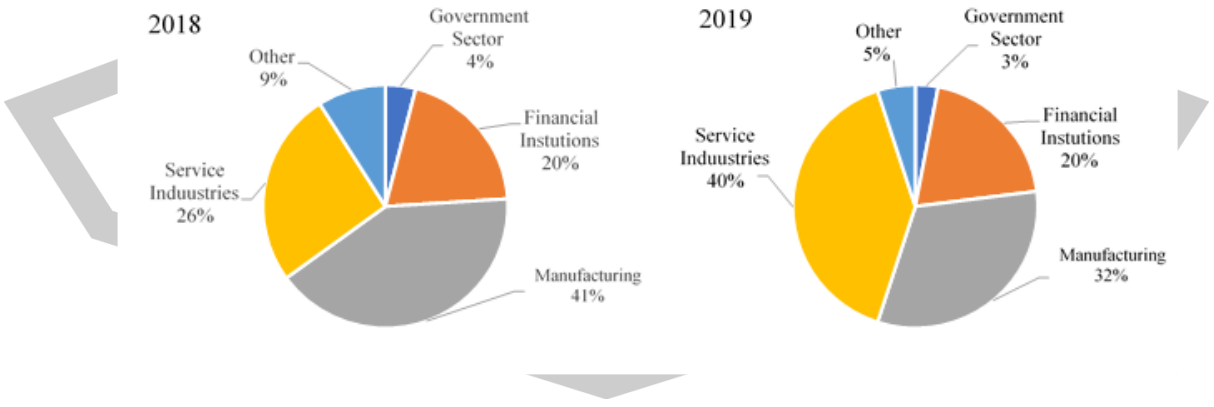
A. prefer living in a townhouse
B. mostly have townhouses than the other provinces
C. avoid living in townhouses
D. mostly have an apartment of their own

10. In _____, the number of townhouses is half of apartments.

A. Mukdahan
B. Khon Kaen
C. Amnat Charoen
D. Udon Thani

Passage 3: Items 11-15

Instructions: Study the given pie charts and complete the following passage.



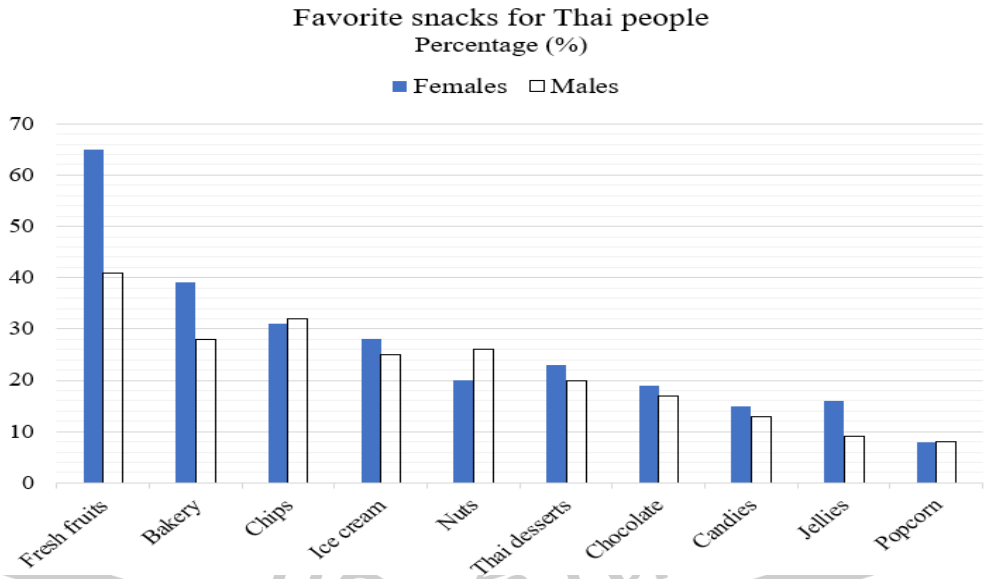
These charts compare the working backgrounds of 100 university students entering the engineering program in 2018 and 2019. The number of students with financial backgrounds _____11_____. Those with manufacturing experience _____12_____ those with

experience in service industries in 2018, but _____13_____ in 2019. While the number with manufacturing backgrounds _____14_____, the number with service backgrounds _____15_____ in 2019.

11. A. remained the same
    B. was much lower increased slightly
    C. showed a significant change
    D. change much lower
12. A. outnumbered
    B. overestimated
    C. outweighed
    D. overcame
13. A. there were just as many
    B. this situation was reversed
    C. more were accepted
    D. their experience was changed
14. A. grew from 32 to 41
    B. fell by nine
    C. increased by only one
    D. dropped to 26
15. A. stayed steady throughout
    B. rose to 40
    C. decreased to 26 after
    D. doubled between 2018 and

Instructions: In this section, candidates will read several passages

Passage 4: Items 16-20



16. What does the above graph show to the readers?

A. A difference in colors of students' preference.

B. A comparison of snacks by gender.

C. A trend of Thai people's favorite snacks.

D. A number of Thai people who love snacks.

17. Which of the following snack is the least preferred by men?

A. Jellies B. Fruits

C. Popcorn D. Nuts

18. Which of the following is **NOT** true, according to the graph?

A. The preferred snack choice of chips between males and females is the most different.

B. The most preferred snack is the fresh fruit.

C. Women prefer to have snacks more than men do.

D. The graph shows preferred snack choices among both genders.

19. Which of the following is **TRUE**, according to the above information?

A. Fruit is the snack food most preferred by females only.

B. Males seem to prefer, chocolate, candies and jellies more than females do.

C. The same number of males and females preferred popcorn as their snack food choice.

D. Fresh fruit is the snack that has least preferred by both genders.

20. What kind of snacks did males prefer more than females?

A. Thai desserts and chocolate

B. Chips, chocolate, and candies

C. Chips and nuts

D. Candy, candies, and popcorn

Section 2: This section is designed to measure candidates' language ability in reading.

Passage 5: Items 21-25

Instructions: Read the following passage

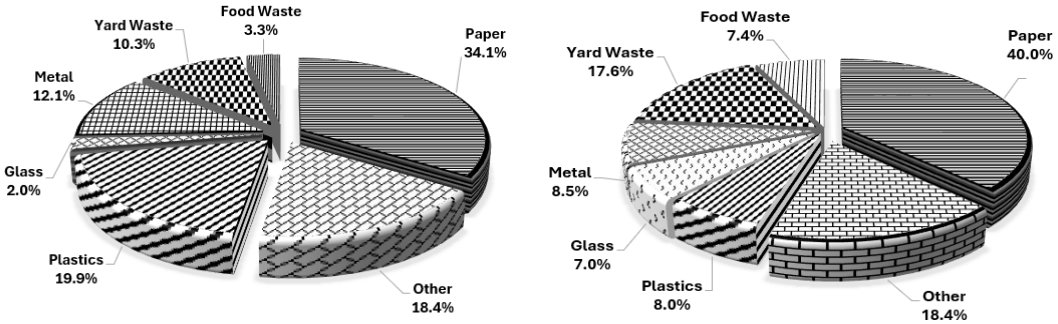
Engineering is the application of scientific, economic, social, _____21_____ practical knowledge in order to design, build, maintain, and improve structures, machines, devices, systems, materials, and processes. _____22_____ is a field that encompasses a wide range of disciplines, including mechanical, electrical, civil, chemical, and aerospace engineering. Engineers use their expertise to_____23_____ complex problems, improve existing technology, and create_____24_____ innovations. They play a crucial role in shaping the world_____25_____us, from designing buildings and bridges to developing new medical technologies and exploring space.

21. A. for
    B. but
    C. and
    D. also
22. A. They
    B. The
    C. It
    D. A
23. A. solve
    B. solving
    C. solved
    D. solves
24. A. the oldest
    B. a oldest
    B. the newest
    D. a newest
25. A. among
    B. around
    C. above
    D. about

Passage 6: Items 26-28

Instructions: Look at the pie charts, read the passage, and answer the questions below.

Solid Wastes Materials in Khon Kaen Municipality by Volume and Weight (2020)



Khon Kaen people are facing the most serious problem with **degradable** materials in solid waste landfills. These pie graphs show waste materials both by volume and by weight. You can see that paper is the biggest part by volume (34.1%) and weight (40.0%). By volume, plastic is the second (19.9%), and others are the third (18.4%). In terms of weight, the other comes second (18.4%), followed by yard waste (17.6%) as the third. Glass is the least landfill either by volume (2.0%) or weight (7.0%).

26. What is the best description of the above reading passage?

A. Categories of solid waste in Khon Kaen area.

B. The information about the volume and weight of solid waste in Khon Kaen.

C. The comparison between gradable and degradable wastes in Khon Kaen.

D. The sizes of solid waste materials in Khon Kaen Municipality area.

27. From this passage, Khon Kaen people are facing the most serious problem with **degradable** materials in solid waste landfills. What does "**degradable**" mean?

A. Able to delay

B. Able to demote

C. Able to decent

D. Able to delude

28. By weight, what is the smallest used waste material in weight?

A. Plastic for eight percent

B. Glass for about seven percent

C. Metal for about eight percent

D. Food waste for seven percent

Passage 7: Items 29-33

Instructions: Choose the best answer for the questions.

The Internet is a beneficial means of communication, but it may do us **harm**. Nowadays, people worldwide can share any topic of knowledge and information through the Internet, which is viewed as a huge global computer that has shrunken the world. Electronic messages can be sent anywhere in the world within a few seconds, and that is known as the second E-mail. Despite its great advantages, the Internet may be harmful, too. The information on the Internet is unlimited, and because of that, it allows people to find knowledge **unsuitable** for them. A bad person may discover how to make weapons and where to get drugs. Children may see pornography on the Internet. Finally, people may lose their local identities by accepting new cultures through the Internet and ignoring their own.

29. The passage is mainly about_____.

A. advantages of the Internet

B. disadvantages of using computers

C. harms from the Internet

D. advantages and disadvantages of the Internet

30. The main idea of the passage is _____.

A. the Internet may be very advantageous for users.

B. it is easy to get information through the Internet.

C. despite its great advantages, the Internet may be harmful.

D. although the Internet is harmful, people should still use it.

31. One advantage of using the Internet is _____.

A. getting information about weapons
B. getting drugs
C. sharing knowledge
D. seeing pornography

32. What is the best description of the word "**harm**"?

A. Giving benefits to someone.
B. Causing damage to someone.
C. Making communication with someone.
D. Giving things to someone.

33. The word "**unsuitable**" is closest in meaning to the word_____.

A. improper B. important C. impartible D. immaculate

Passage 8: Items 34-38

Instructions: Read the following passage and choose the best answer.

These steps are the ways to disconnect a car battery;

- 1st Step: **Turn off** your car ignition.
- 2nd Step: **Find** the car battery's negative terminal.
- 3rd Step: **Loosen** the nut on the negative terminal with a wrench.
- 4th Step: Remove the negative connector and then **repeat** with the positive terminal.

34. **Turn off** your car ignition. The word "Turn off" in the first step is referred to as_____.

A. start something on turning.
B. activate by turning a control.
C. function by the process of turning.
D. stop by the process of turning.

35. **Find** the car battery's negative terminal. The word "Find" in the second step is referred to as_____.

A. come upon by searching.
B. leave something undone.
C. failure to obtain something.
D. move by means of hiding.

36. **Loosen** the nut on the negative terminal with a wrench. The word "Loosen" in the third step is referred to_____.

A. release from a high place.
B. release from restraint.
C. relieve from stress.
D. relieve from a restricted area.

37. Then **repeat** with the positive terminal. The word "**repeat**" in the fourth step is referred to_____.

A. use again in a different way.
B. perform again.
C. compete with someone again.
D. find a position.

38. This passage is mainly about?

A. Four steps to repair the car battery.
B. Four steps to fix the car battery.
C. Four steps to remove the car battery.
D. Four steps to turn the car battery off.

Passage 9: Items 39-43

Instructions: Read the following passage and choose the best answer.

Corrosion

Corrosion is a common problem in the long-term use of any objects made of iron or steel. Corrosion is any deterioration in the metal's appearance or physical properties. Corrosion occurs when a metal changes state due to interaction with its environment. Corrosion is likely, where water is present as either a liquid or vapor. It becomes worse when impurities are present in damp conditions. It never starts inside a material, and there will always be surface evidence that indicates corrosion exists. A common example of corrosion is the **rusting** of steel. A change in iron causes it to turn into a mixture of oxides and other compounds. This not only changes the appearance of the metal but also results in a decrease in its cross-section. There are many factors to prevent its progress. For example, aluminium and its alloys can produce a film of oxide to protect the metal from further attack when exposed to air and water. Therefore, that corrosion **halts**.

39. In corrosion, why do metals change state?

A. Because of the interaction of the metal with its surroundings.
B. Because of the deterioration in metal's appearance.
C. Because of the present impurities.
D. Because of many factors that prevent its progress.

40. Which two factors cause corrosion?

A. Metal's appearance and physical properties
B. Liquid and vapor
C. Water and impurities
D. Oxides and other compounds

41. This **not only** changes the appearance of the metal **but also** results in a decrease in its cross-section. The underlined words are used to show_____.

A. an exemplification
B. contrasting information
C. additional results
D. a cause

42. Which word means the ***same as*** the word "**damp**"?

A. oxidation
B. moisture
C. corroding
D. dryness

43. The word **"decrease"** is closet in the meaning to the word_____.

A. growing up
B. growing higher
C. growing away
D. growing less

Passage 10: Items 44-46

Instructions: In this section, candidates will read several passages.

Car Accidents

Car accidents are, unfortunately, a common occurrence on the roads today. They can happen for a variety of reasons, such as distracted driving, speeding, and driving under the influence of drugs or alcohol. Car accidents can cause serious injuries or even fatalities and result in significant property damage. It's important for all drivers to be aware of the risks and to take steps to minimize them, such as driving defensively, following traffic laws, and avoiding distractions while driving.

44. According to this passage, there are several car accidents **except**?

A. speeding
B. distracted driving
C. alcohol
D. bad weather

45. According to this passage, which serious situation comes from car accidents **except**?

A. fatalities
B. damages
C. injuries
D. drugs

46. Which step **is** the one that the drivers should be aware of to minimize accidents?

A. Driving aggressively.
B. Avoiding traffic regulations.
C. Following traffic regulations.
D. Facing distractions while driving.

Passage 11: Items 47-51

Instructions: In this section, candidates will read several passages.

There were seven children in the family when we set out with Mother for Khon Kaen. Scott was the baby and was train sick all the way from Saraburi to Nakhon Ratchasima. Judy, the next to the youngest, had broken a bone in her foot three weeks before and had to stay in her berth. Mother was expecting another baby in three months and did not always feel too well herself.

The chance to return with her children to her parents' home meant more to mother than any of us realized, and she was worried to show us off in the best possible light and to have her family approve of us.

47. The family was travelling by _____.

A. a train
B. an airplane
C. a car
D. a bus

48. Judy had to rest in the train's _____.

A. seat
B. sofa
C. bunk
D. mat

49. The person telling this story is probably _____.

A. the father
B. the mother
C. the grandmother
D. an older child

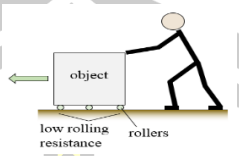
50. We can assume from this passage that _____.

A. Judy was the last child in the family
B. Mother's family had never seen the children before
C. Mother's relatives visited the family regularly
D. Judy was the most misbehaved child on the train

Passage 12: Items 51-55

Instructions: Read the following passage and choose the best answer.

How to move a heavy load



It should be ensured that there are enough rollers, and at least three rollers of the same diameter are required. If more are used, the load can be moved faster as there is no delay when the roller is transferred from the back to the front. The load is to be supported with a flat plate if the load itself cannot support its weight at any point along its base. It must be remembered that the plate must be thick enough to support the load. When the rollers are to be placed under the load, four blocks of wood of identical thickness that are thicker than the rollers must be selected. The load should be lifted with a crowbar and placed on the blocks. The required number of rollers should be placed under the load. The complete load should be lifted with crowbars, the wooden blocks should be removed, and the load should be lowered evenly to the rollers.

51. Which of the following should be used to move a heavy thing?

A. diameter B. rollers C. load D. crowbar

52. The load can be moved faster if the rollers are_____.

A. less used B. not used C. more used D. slower used

53. A flat plate must be thick enough to _____the load.

A. carry B. lift C. elevate D. ride

54. From the passage, _____is used to lift the load.

A. flat plate B. crowbar C. block D. wood

55. Finally, the wooden blocks should be_____.

A. lifted B. rolled C. removed D. released

Passage 13: Items 56-60

Instructions: Below is the text about the possible causes of bushfires in Victoria, Australia.

Causes of Bushfires

The causes of bushfires can be placed into two groups: natural causes and those caused by human activities.

Natural Causes

Lightning strikes are the cause of virtually all naturally occurring bushfires. Approximately 26% of all bushfires on public land are due to lightning strikes. There are, on average, more fires started by lightning than any other individual cause.

Human Activities

All other bushfires on public land are started as a result of human activity approximately 74% of all bushfires on public land are caused by people. These include both deliberate and accidental ignitions, and some examples of human-caused fires are discussed below.

Campfires

On average, campfires cause approximately 10% of bushfires that start on public land. These bushfires burn, on average, around 1,500 hectares of public land each year. Most of these fires start when the campfire is left unattended or not properly extinguished.

Burning Off / Agricultural Burns

Farmers may burn vegetation on their properties for various reasons, including weed control, burning of crop debris and removing rubbish. Agricultural burns can accidentally lead to fires on public land, and these fires cause over 15% of bushfires on average each year. Unattended burns are most likely to ‘escape’ and become bushfires.

Equipment / Machinery

Any equipment or machinery that generates heat or sparks is a potential cause of bushfires, and such machinery includes chainsaws, slashers, welders, grinders, and exhaust from vehicles. On average, fires originating from equipment or machinery result in approximately 2,500 hectares of fires on public land each year.

Deliberate

One reason for bushfires is deliberate. This category includes all deliberately lit fires that result in bushfires on public land. Examples include children playing with matches or experimenting with fire, farmers deliberately lighting fires without necessary permits or authority or maliciously lit fires (fires lit to damage or destroy property).

56. What is the cause of “26% of all bushfires on public land”?

A. Natural cause
B. Human activity
C. Campfire
D. Deliberate

57. What is the cause of “approximately 74% of all bushfires on public land”?

A. Natural cause
B. Human activity
C. Campfire
D. Deliberate

58. What is the effect of “Agricultural Burns”?

A. Bushfires on public land are due to lightning strikes
B. Burning of crop debris and the removal of rubbish.
C. Burning around 1,500 hectares of public land each year.
D. Lighting fires without permits.

59. Which one is the potential cause of bushfires from “Equipment / Machinery”?

A. Lightning strikes.
B. Improper extinguishing.
C. Heat and spark.
D. Lighting fires without any permissions.

60. What is the cause of “2,500 hectares of fires on public land each year”?

A. Campfire
B. Deliberate
C. Equipment / Machinery
D. Burning Off / Agricultural Burns

---------- Test Ends ----------

APPENDIX C: Reading Comprehension Test: Version B1

This test is designed to measure candidates' language ability in English reading comprehension. This booklet has three types of questions, with specific instructions for each type.

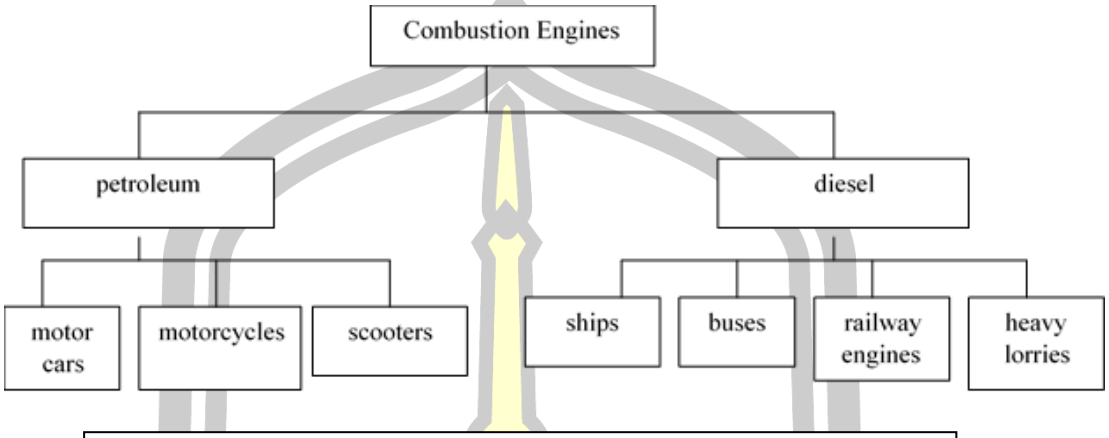
Instructions

1. The booklet consists of 50 items
2. There is only one most appropriate answer for each item
3. The booklet, including related stuff, is not allowed to take outside of the test room
4. Only an hour is allotted for this test

DO NOT OPEN THIS QUESTION BOOKLET UNTIL INSTRUCTED TO DO SO

This test is used only for research project No. 318-273/2565
The English Language Teaching Programme
Faculty of Humanities and Social Sciences
Mahasarakham University

Passage 1: Items 1-5
Instructions: Look at the classification of Combustion Engines, then choose the best answer.



a. Examples	b. classified	c. railway engines
d. including	e. groups	f. motorcycles

Combustion engines can be (1) _____into two (2) _____: petroleum and diesel. Petroleum is (3) _____ motor cars, motorcycles and scooters. (4) _____of diesel are ships, buses, (5) _____, and heavy lorries.

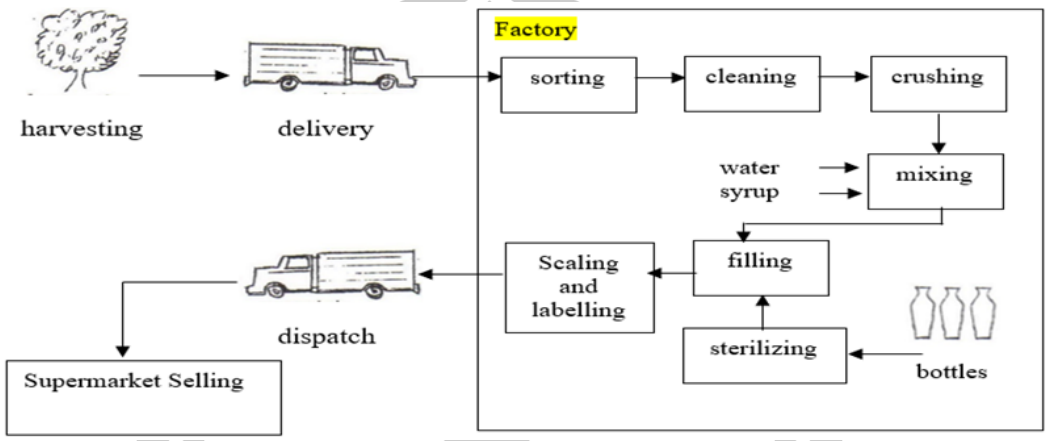
Passage 2: Items 6-10
Instructions: Match each warning with its possible result.

warning	possible result
6. Watch out! There's no guard on the machine.	a. You might burn your hands.
7. Danger! There are live wires on the wall.	b. You could injure your back.
8. Take care! It's very heavy.	c. You might result in a fire accident.
9. Look out! The glass is very hot.	d. You could get an electric shock.
10. Do not smoke near the gas station.	e. You might trap your hand in the machine.

(6) _____ (7) _____ (8)_____ (9) _____ (10)_____

Passage 3: Items 11-15

Instructions: Study the diagram below that shows the manufacturing process of soft drinks. Then, complete the process description.



a. filled	b. delivered	c. shipped
d. harvested	e. mixed	f. brought

There are various steps in the manufacturing process of soft drinks. First, the fruits are (11) _____ from the garden. Second, they are (12) _____ to the factory where they are sorted, cleaned and crushed to extract the juice. After that, the juice is (13) _____ with water and syrup. This creates the final drink. In the meantime, bottles are sterilized. Next, they are (14) _____ before scaling and labeling simultaneously. Finally, the finished product is (15) _____to the supermarket to be sold.

Passage 4: Items 16-20

Instructions: Choose the best answer to complete the passage below.

a. cooled	b. packed	c. pasteurized
d. separated	e. delivered	f. melted

Milk is produced on dairy farms. The milk is (16) _____ _____ to a factory by tanker. At the factory, the milk is weighed and then it is tested. Next, the milk is (17) _____ into cream and milk. After this, the milk is (18) _____ at a temperature of 220₀ C. Then, it is (19) _____ Next, the milk is bottled. After this, the bottles of milk are (20) _____ into crates. Then, the milk is delivered to customers. Finally, the milk is consumed.

Passage 5: Items 21-25

Instructions: Match the data **changes** with the correct **expression** (verb).

a. rise	b. decrease	c. fluctuate
d. recover	e. expand	f. remain stable

(21) _____ 

(22) _____ 

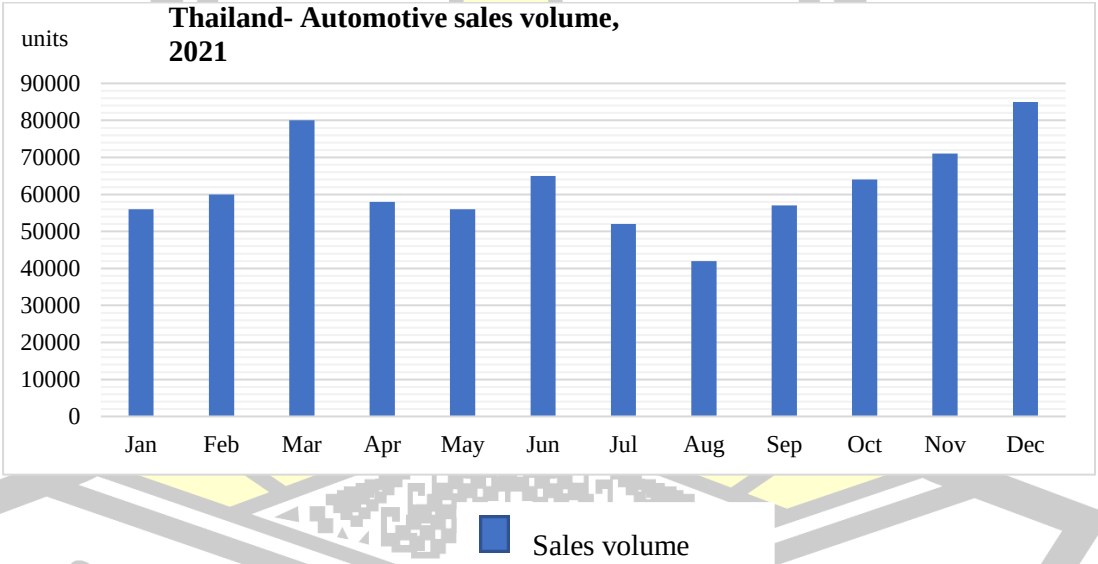
(23) _____ 

(24) _____ 

(25) _____ 

Passage 6: Items 26-30

Instructions: Study the graph below and write **TRUE** or **FALSE** statements.



26. The automotive sales volume in January 2021 is about 65,000 units. _____

27. The highest automotive sales volume of 2021 is in December. _____

28. The sales volume in December increased from November to 20,000 units. _____

29. The sales volume from March to May decreased by 25,000 units. _____

30. The lowest automotive sales volume of 2021 is in July. _____

Passage 7: Items 31-35

Instructions: Read the passage, then write your answer.

How to Escape from a Fire

40 % of the time people die in fires. It's because they just stay in their room and hide in their closet or even under their bed. A fire cannot happen without the three parts of the fire triangle: heat, oxygen, and fuel. Follow these steps to escape.

First, plan a fire escape route and practice it once a year. Secondly, change the smoke alarm batteries twice a year, and test your smoke alarm monthly. Thirdly, listen to the smoke alarm. After it rings, don't stay in your room, you must get out immediately.

Next, go close to your door with your backhand, not your palm. If it is cool, open it slowly while facing the door and looking at where you're going. If it's hot, dial 911. If there is no phone in the room, get a flashlight or something light-colored and wave it at the window, signaling for help. Then, crawl down on the floor after opening it. The cleanest air is found at the bottom. Get out of where the fire is and leave the house. After that, go to a neighbor's house and call 911. Finally, wait until the fire department comes.

31. Why do people die in fires?

_____

_____

32. What are the three parts of the fire triangle?

_____

_____

33. How often should you test your smoke alarm?

_____

_____

34. What should you do to signal for help if you don't have a phone?

_____

_____

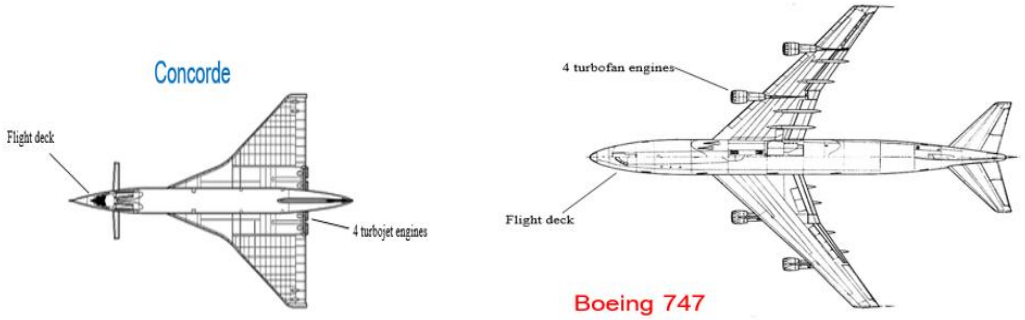
35. Why do you need to crawl down off the floor?

_____

_____

Passage 8: Items 36-44

Instructions: Read the passage below to complete the table and write your answer for the questions.



Anglo-French Concorde and Boeing 747

The Boeing 747 is the largest passenger jet airliner in the world. It is 70.51 meters long with a wing span of about 60 meters. Its cabin is 6.1 meters wide, and cable of taking up to ten seats and two aisles. Its wide body soon earned the name of 'Jumbo Jet'. In comparison, the Anglo-French Concorde is much thinner and sleeker in appearance, with a far narrower cabin allowing for only four seats across and one aisle down the middle. In many other ways too, the Boeing is completely different from the Concorde. The Concorde, for example, is smaller than the Boeing 747, its total length being 62 meters and its wing span is 26 meters. The Boeing 747 takes up to 500 passengers while Concorde's normal capacity is 144. Moreover, unlike the Concorde, the Boeing 747 has a small upstairs lounge. The Boeing's flight deck is also on the second floor in front of the lounge. Both aircraft are similar in that they have four powerful engines. However, while there are two turbofan engines at the front of each of the Boeing's wings, there are two turbojet engines at the rear of each of the Concorde's delta-shaped wings. The Concorde's great advantage is its speed. It is capable of flying long distances at supersonic speed. Its maximum cruising speed, for example, is 2,333 km/h, compared with the Boeing 747's 978 km/h. Thus, the Concorde can halve the time normally taken for journeys by the Boeing 747 and other conventional aircraft.

Keywords	Anglo-French Concord	Boeing 747
36. length		
37. wing span		
38. max. passengers		
39. max. speed		
40. cabin		
41. engines		

42. Why did the Boeing 747 get the name 'Jumbo Jet'?

_____

_____

43. How much is the Boeing 747 longer than the Anglo-French Concord?

_____

_____

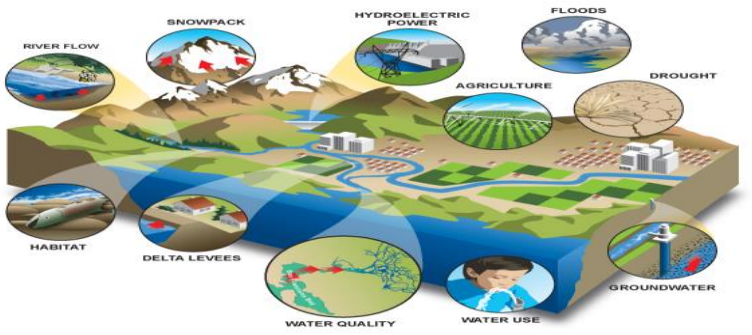
44. How fast is the Concord?

_____

_____

Passage 9: Items 45-50

Instructions: Read the passage, then complete the table below. Write only a, b, c, d, e, f and g in the table.



CLIMATE

For the last hundred years, the climate has been growing much warmer. *This has had a number of* ***different effects***. Since the beginning of the 20th century, *glaciers have been melting very rapidly*. ***For example***, the Muir glacier *in Alaska* has retreated 2 miles in 10 years. Secondly, rising temperatures ***have been causing*** the snowline to retreat on the

mountain all over the world. In Peru, ***for example***, it has risen as much as 2700 feet in 60 years.

As a result of this, vegetation has also been changing. *In Canada*, the agricultural crop line has shifted 50 to 100 miles northward. In the same way, *cool climate trees* like birches and spruce have been dying over large areas of Eastern Canada. *In Sweden,* the tree line has moved up the mountains as much as 65 feet since 1930.

The distribution of wildlife ***has also been affected***, with many European animals moving northwards into Scandinavia. Since 1918, 25 new species of birds have been seen *in Greenland*, and in *the United States,* birds have moved their nests to the north.

Finally, *the sea has been rising rapidly* increasing rate ***due to*** the causes mentioned above, *the melting of glaciers*. In the last 18 years, it has risen by 6 inches, which is about four times the average rate of rise over the last 9000 years.

a) Cool climate trees die.
b) Sea level rises rapidly by 6 inches.
c) The Muir glaciers in Alaska have retreated 2 miles in 10 years.
d) Snowlines on mountains retreated around the world.
e) Crop line in Canada shifts 50-100 miles northward.
f) Tree line in Sweden moved 65 feet since 1930.
g) European animals move to Scandinavia.

Cause	Effect	Examples
Climate has been growing warmer	Glaciers melt very rapidly.	(45) _____
	(46) _____	Snowlines of mountains in Peru have risen 2700 feet in 60 years.
	Vegetation changes	(47) _____ (48) _____
	(49) _____	- Many animals move northward. - New birds are seen in Greenland. - Birds in the US move to the north.
	(50) _____	

---------- **Test Ends** ----------

APPENDIX D: Reading Comprehension Test: Version B2

This test is designed to measure candidates' language ability in English reading comprehension. This booklet has three types of questions, with specific instructions for each type.

Instructions

1. The booklet consists of 50 items
2. There is only one most appropriate answer for each item
3. The booklet, including related stuff, is not allowed to take outside of the test room
4. Only an hour is allotted for this test

DO NOT OPEN THIS QUESTION BOOKLET UNTIL INSTRUCTED TO DO SO

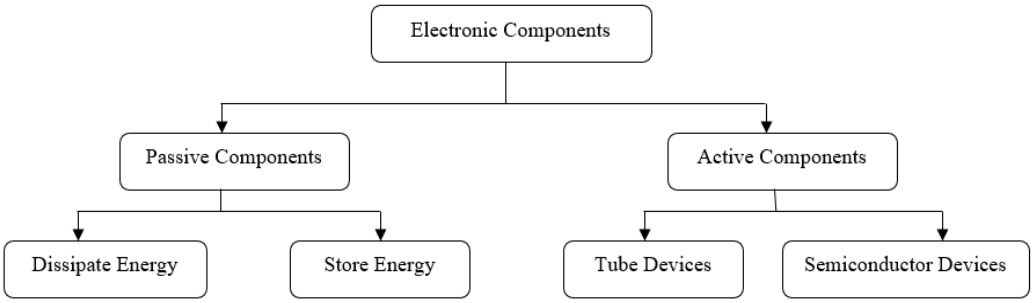
This test is used only for research project No. 318-273/2565

The English Language Teaching Programme

Faculty of Humanities and Social Sciences

Mahasarakham University

Passage 1: Items 1-5
Instructions: Look at the classification of Electronic Components and then choose the best answer.



a. Examples	b. classified	c. active components
d. tube devices	e. types	f. dissipate energy

Electronic components can be (1) _____into two (2) _____: passive and active components. Passive components include (3) _____ and store energy. (4)_____ are (5)_____ and semiconductor devices.

Passage2: Items 6-10

Instructions: Match each warning with its possible result.

warning	possible result
6. Take care! It's very heavy.	a. You might burn your hands.
7. Do not smoke near the gas station.	b. You could injure your back.
8. Watch out! There's no guard on the machine.	c. You might result in a fire accident.
9. Look out! The glass is very hot.	d. You could get an electric shock.
10. Danger! There are livewires on the wall.	e. You might trap your hand in the machine.

(6) _____ (7) _____ (8)_____ (9) _____ (10)_____

Passage3: Items 11-15

Instructions: Study the diagram below that shows the waste recycling process. Then complete the process description.

a. processed	b. delivered	c. recycled
d. sorted	e. picked up	f. reported

There are several steps of waste recycling process. First, the wastes are (11) _____. Second, it is (12) _____ to the receiving waste management factory. After that, the wastes are (13) _____ at the factory to separate the usual and hazard wastes. Next, they are (14) _____ to have the new objects from wastes. Finally, the (15) _____ objects report will be settled and reported.

Passage4: Items 16-20

Instructions: Choose the best answer to complete the passage below.

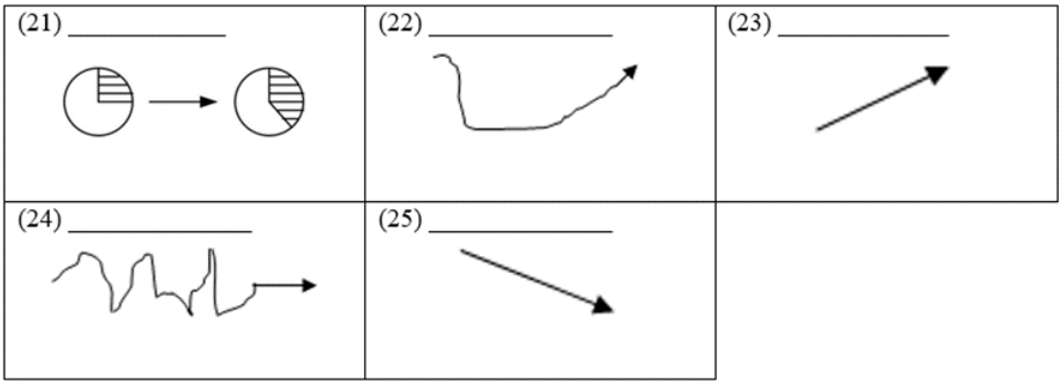
a. diesel fuel	b. processes	c. useful
d. liquids	e. boiled	f. turned into

How is crude oil turned into finished products? The crude oil is (16) _____ into different (17) _____and gases. These liquids are used to make petrol, paraffin, and (18) _____. The heavier liquids are in less demand from customers so are turned into lighter products that are in demand. One of the (19) _____ is called catalytic cracking. It breaks down some of the heavy liquids from the distillation column. The heavy liquids are changed into simple and more (20) _____ liquids and gases. Cracking is just one of many chemical changes in an oil refinery.

Passage5: Items 21-25

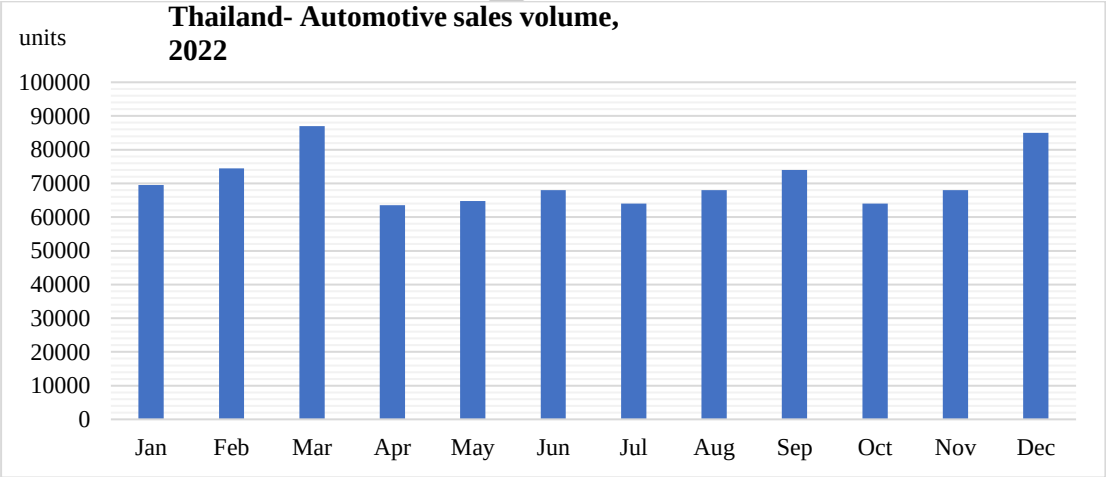
Instructions: Match the data **changes** with the correct **expression** (verb).

a. rise	b. decrease	c. fluctuate
d. recover	e. expand	f. remain stable



Passage6: Items 26-30

Instructions: Study the graph below and write **True** or **Fals**e statements.



26. The automotive sales volume in January 2022 is about 69,000 units. _____

27. The highest automotive sales volume of 2022 is in December. _____

28. The sales volume in November decreased from September to 10,000 units. _____

29. The sales volume from January to March increased by 17,500 units. _____

30. The lowest automotive sales volume of 2022 is in July. _____

Passage7: Items 31-35

Instructions: Read the passage, then write your answer.

How to Escape from a Fire

40 % of the time people die in fires. It's because they just stay in their room and hide in their closet or even under their bed. A fire cannot happen without the three parts of the fire triangle: heat, oxygen, and fuel. Follow these steps to escape.

First, plan a fire escape route and practice it once a year. Secondly, change the smoke alarm batteries twice a year, and test your smoke alarm monthly. Thirdly, listen to the smoke alarm. After it rings, don't stay in your room, you must get out immediately.

Next, go close to your door with your backhand, not your palm. If it is cool, open it slowly while facing the door and looking at where you're going. If it's hot, dial 911. If there is no phone in the room, get a flashlight or something light-colored and wave it at the window, signaling for help. Then, Crawl down on the floor after opening it. The cleanest air is found at the bottom. Get out of where the fire is and leave the house. After that, go to a neighbor's house and call 911. Finally, wait until the fire department comes.

31. Why do people die in fires?

_____

_____

32. What are the three parts of the fire triangle?

_____

_____

33. What should you do after the smoke alarm rings?

_____

_____

34. If the door is cold, how should you open it?

_____

_____

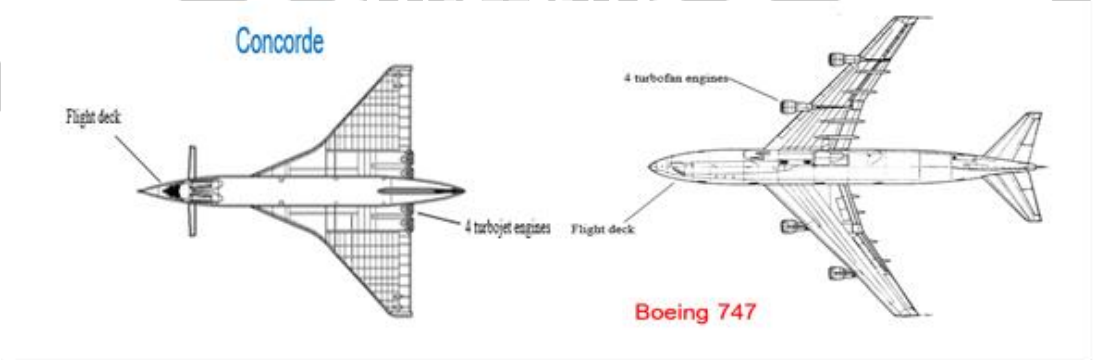
35. Why do you need to crawl down off the floor?

_____

_____

Passage8: Items 36-44

Instructions: Read the passage below to complete the table and write your answer to the questions.



Anglo-French Concorde and Boeing 747

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The Boeing's flight deck is also on the second floor in front of the lounge. Both aircraft are similar in that they have four powerful engines. However, while there are two turbofan engines at the front of each of the Boeing's wings, there are two turbojet engines at the rear of each of the Concorde's delta-shaped wings. The Concorde's great advantage is its speed. It is capable of flying long distances at supersonic speed. Its maximum cruising speed, for example, is 2,333 km/h, compared with the Boeing 747's 978 km/h. Thus, the Concorde can halve the time normally taken for journeys by the Boeing 747 and other conventional aircraft.

Keywords	Anglo-French Concord	Boeing 747
36. length		
37. wing span		
38. max. passengers		
39. max. speed		
40. cabin		
41. engines		

42. Why did the Boeing 747 get the name 'Jumbo Jet'?

_____

_____

43. How much is the Boeing 747 longer than the Anglo-French Concord?

_____

_____

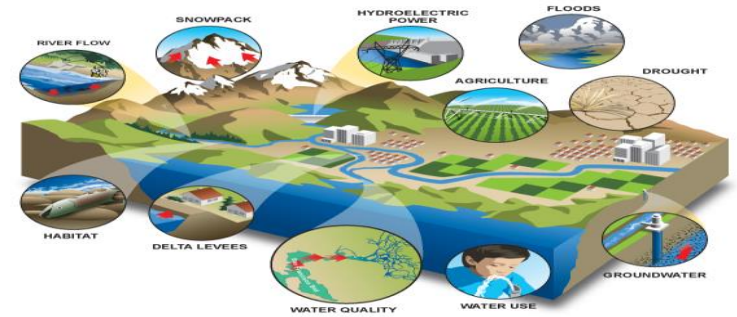
44. How fast is the Concord?

_____

_____

Passage9: Items 45-50

Instructions: Read the passage, then complete the table below. Write only a, b, c, d, e, f and g in the table.



CLIMATE

For the last hundred years, the climate has been growing much warmer. *This has had a number of* ***different effects***. Since the beginning of the 20th century, *glaciers have been melting very rapidly*. ***For example***, the Muir glacier *in Alaska* has retreated 2 miles in 10 years. Secondly, rising temperatures ***have been causing*** the snowline to retreat on the mountain all over the world. In Peru, ***for example***, it has risen as much as 2700 feet in 60 years.

As a result of this, vegetation has also been changing. *In Canada*, the agricultural crop line has shifted 50 to 100 miles northward. In the same way, *cool climate trees* like birches and spruce have been dying over large areas of Eastern Canada. *In Sweden*, the tree line has moved up the mountains as much as 65 feet since 1930.

The distribution of wildlife ***has also been affected***, with many European animals moving northwards into Scandinavia. Since 1918, 25 new species of birds have been seen *in Greenland*, and in *the United States*, birds have moved their nests to the north.

Finally, *the sea has been rising rapidly* increasing rate ***due to*** the causes mentioned above, *the melting of glaciers*. In the last 18 years, it has risen by 6 inches, which is about four times the average rate of rise over the last 9000 years.

a) European animals move to Scandinavia.

b) The Muir glaciers in Alaska have retreated 2 miles in 10 years.

c) Sea level rises rapidly by 6 inches.

d) Treeline in Sweden moved 65 feet since 1930.

e) Crop line in Canada shifts 50-100 miles northward.

f) Snowlines on mountains retreated around the world.

g) Cool climate trees die.

Cause	Effect	Examples
Climate has been growing warmer	Glaciers melt very rapidly.	(45) _____
	(46) _____	Snowlines of mountains in Peru have risen 2700 feet in 60 years.
	Vegetation changes	(47) _____ (48) _____
	(49) _____	- Many animals move northward. - New birds are seen in Greenland. - Birds in the US move to the north.
	(50) _____	

---------- Test Ends----------

APPENDIX E: Student Attitudes Questionnaire (SAQ) (English Version)

INSTRUCTIONS:

This student attitudes questionnaire is designed for 30 statements to examine the engineering undergraduates' attitudes on metacognitive reading strategies instruction based on their opinions. Students are instructed to mark a single checkbox corresponding to their opinion in the provided space, using the following criteria:

1 means "I strongly disagree."

2 means "I disagree."

3 means "I neither agree nor disagree."

4 means "I agree."

5 means "I strongly agree."

Student responses are considered to be not correct or wrong and will not affect their academic scores in any way. Students are free to respond, and these answers will be valuable for metacognitive reading strategies instruction development and will be most beneficial if students provide the most possible true answers.

Part 1: Personal Information

Name – Surname_____

Gender_____ Age_____ Program / Year _____

Part 2: Attitudes Questions Towards Metacognitive Reading Strategies Instruction

After reading each statement, do a checkmark on the number (1, 2, 3, 4, or 5) to show the frequencies of the actual attitudes.

No.	STATEMENT	SCALE				
1	I consistently take the time to plan my reading, finding it essential for a better understanding.	1	2	3	4	5
2	Setting specific goals for my reading tasks is a crucial step that enhances my comprehension.	1	2	3	4	5
3	Trying different planning strategies is an exciting way to explore and enrich my reading experience.	1	2	3	4	5
4	Planning my reading provides structure and guidance, helping me stay focused on the reading material.	1	2	3	4	5
5	Creating a detailed plan for my reading is an essential step that significantly improves my overall experience.	1	2	3	4	5
6	I consider that planning the reading strategies is so beneficial.	1	2	3	4	5
7	Flexibility in planning approaches, allowing me to explore various methods.	1	2	3	4	5

No.	STATEMENT	SCALE				
8	I recognize the importance of planning my reading tasks, and I make an effort not to skip this step.	1	2	3	4	5
9	I adapt my reading strategy based on the type of material, ensuring a tailored approach for each.	1	2	3	4	5
10	I believe that planning significantly impacts my overall reading experience.	1	2	3	4	5
11	I am attentive to time constraints, ensuring that I allocate my time wisely during reading sessions.	1	2	3	4	5
12	Monitoring my comprehension is a crucial aspect that significantly contributes to my overall reading satisfaction.	1	2	3	4	5
13	I consistently check my understanding as I progress through a text, ensuring a thorough grasp of the content.	1	2	3	4	5
14	Adjusting my reading pace based on comprehension is a practice I find valuable for a more effective reading experience.	1	2	3	4	5
15	I actively consider the effectiveness of my reading strategies, reflecting on my approach to enhance comprehension.	1	2	3	4	5
16	I believe that being aware of time limitations contributes significantly to my reading.	1	2	3	4	5
17	Monitoring my comprehension enhances my overall reading achievement.	1	2	3	4	5
18	I consistently notice when I lose focus while reading, and I actively address it.	1	2	3	4	5
19	I find it important to adapt my reading pace based on the complexity of the material.	1	2	3	4	5
20	Reflecting on my reading habits interest me; I prefer to read without analysing my approach.	1	2	3	4	5
21	I actively evaluate the success of my reading experiences, seeking continuous improvement.	1	2	3	4	5
22	Achieving reading goals and objectives is a priority for me, as it enhances my overall reading comprehension of the material being read.	1	2	3	4	5
23	I have confidence in the effectiveness of my reading strategies, believing they significantly impact my comprehension of the text.	1	2	3	4	5
24	I regularly reflect on my reading skills and habits, engaging in self-assessment for continual growth.	1	2	3	4	5
25	Comparing the effectiveness of different reading strategies is a valuable practice that helps me refine my approach.	1	2	3	4	5
26	I recognize the importance of verifying whether I comprehend the content or task during reading.	1	2	3	4	5
27	Note taking is the appropriate strategy that promote reading comprehension.	1	2	3	4	5
28	I see value in restating information in my own words to deepen my understanding of the content.	1	2	3	4	5
29	I put my concentration on the text content for the appropriateness of the reading purposes.	1	2	3	4	5
30	I believe that evaluating my own performance and progress through reading tasks is important; I just read.	1	2	3	4	5

APPENDIX F: แบบวัดเจตคติที่มีต่อการสอนกลวิธีการอ่านแบบอภิปัญญา (ฉบับภาษาไทย)

คำชี้แจง:

แบบวัดเจตคตินี้เป็นแบบสอบถามเพื่อตรวจสอบความคิดเห็นเจตคติต่อการสอนกลวิธีการอ่านแบบอภิปัญญาของนักศึกษาคณะวิศวกรรมศาสตร์ในระดับปริญญาตรีจำนวน 30 ข้อ ให้นักศึกษาพิจารณาตามข้อที่กำหนดให้ที่ตรงกับความคิดเห็นของนักศึกษา โดยการทำเครื่องหมายกากบาทลงในช่องว่างที่กำหนดให้เพียงข้อละ 1 ช่อง ซึ่งมีเกณฑ์ดังต่อไปนี้

5 หมายความว่า “เห็นด้วยอย่างยิ่ง”

4 หมายความว่า “เห็นด้วย”

3 หมายความว่า “ไม่แน่ใจ”

2 หมายความว่า “ไม่เห็นด้วย”

1 หมายความว่า “ไม่เห็นด้วยอย่างยิ่ง”

การตอบคำถามของนักศึกษาไม่มีการตัดสินว่าถูกหรือผิด และไม่มีผลต่อคะแนนเรียนของนักศึกษาแต่ประการใด นักศึกษามีอิสระในการตอบอย่างเต็มที่ คำตอบของนักศึกษาจะมีประโยชน์อย่างยิ่งต่อการปรับปรุงวิธีการสอนกลวิธีการอ่านแบบอภิปัญญา และจะมีคุณค่ามากที่สุดเมื่อนักศึกษาตอบคำถามตรงกับความเป็นจริงมากที่สุด

ส่วนที่ 1: ข้อมูลส่วนตัว

ชื่อ-สกุล

_____

เพศ_____ อายุ_____ สาขาวิชา/ชั้นปี_____

ส่วนที่ 2: คำถามเกี่ยวกับเจตคติที่มีต่อการสอนกลวิธีการอ่านแบบอภิปัญญา

หลังจากอ่านคำบรรยายแต่ละส่วน **ทำเครื่องหมายกากบาทไปยังตัวเลข** (1, 2, 3, 4, หรือ 5) แสดงความถี่การแสดงเจตคติที่ตนเองมีตามความจริง

ข้อที่	เนื้อหา	ระดับ				
1	ฉันวางแผนการอ่านของฉันเพื่อทำให้เข้าใจได้ดียิ่งขึ้นอยู่เสมอ	1	2	3	4	5
2	การกำหนดเป้าหมายเพื่อการอ่านของฉันนั้น ถือเป็นขั้นตอนสำคัญในการเพิ่มความเข้าใจ	1	2	3	4	5
3	การใช้กลยุทธ์การวางแผนที่หลากหลาย เป็นวิธีการที่น่าตื่นเต้นที่เสริมสร้างประสบการณ์การอ่านของฉัน	1	2	3	4	5
4	การวางแผนการอ่าน ช่วยให้ฉันเห็นโครงสร้างและวิธีการที่ช่วยให้ฉันจดจ่อกับสิ่งที่อ่าน	1	2	3	4	5

ข้อที่	เนื้อหา	ระดับ				
5	การวางแผนในการอ่านอย่างละเอียดเป็นขั้นตอนที่สำคัญที่ช่วยส่งเสริมประสบการณ์ในการอ่านอย่างยิ่ง	1	2	3	4	5
6	ฉันคิดว่าการวางแผนใช้กลยุทธ์การอ่านนั้นมีประโยชน์	1	2	3	4	5
7	ฉันชอบความยืดหยุ่นในการวางแผนการอ่าน เพื่อทำให้ฉันสำรวจวิธีการอ่านอย่างหลากหลาย	1	2	3	4	5
8	ฉันตระหนักถึงความสำคัญในการวางแผนการอ่าน และฉันพยายามไม่ข้ามขั้นตอน	1	2	3	4	5
9	ฉันปรับใช้กลยุทธ์การอ่านตามประเภทของเนื้อหา เพื่อให้ได้มาซึ่งกลยุทธ์ที่เหมาะสม	1	2	3	4	5
10	ฉันเชื่อว่าการวางแผนการอ่าน ช่วยส่งเสริมประสบการณ์การอ่านได้	1	2	3	4	5
11	ฉันตระหนักถึงข้อจำกัดทางด้านเวลา เพื่อให้มั่นใจว่าฉันใช้เวลาในการอ่านอย่างเหมาะสม	1	2	3	4	5
12	การสังเกตการอ่านเพื่อความเข้าใจ เป็นขั้นตอนที่สำคัญเพื่อช่วยให้ฉันเกิดความพึงพอใจในการอ่าน	1	2	3	4	5
13	ฉันตรวจสอบความเข้าใจของฉันอย่างต่อเนื่อง เพื่อทำให้มั่นใจว่าฉันเข้าใจเนื้อหาของสิ่งที่อ่านอย่างแท้จริง	1	2	3	4	5
14	การปรับความเร็วในการอ่านได้ตามความเข้าใจ เป็นแนวปฏิบัติที่มีคุณค่าและส่งเสริมประสบการณ์ในการอ่านอย่างมีประสิทธิภาพ	1	2	3	4	5
15	ฉันให้ความสำคัญกับการพิจารณาประสิทธิภาพในการใช้กลยุทธ์ในการอ่าน ซึ่งสะท้อนวิธีในการอ่านเพื่อความเข้าใจของตนเอง	1	2	3	4	5
16	ฉันเชื่อว่าการตระหนักด้านข้อกำจัดของเวลาช่วยพัฒนาการอ่านของฉัน	1	2	3	4	5
17	การเฝ้าสังเกตการณ์ความเข้าใจในการอ่านส่งเสริมผลสัมฤทธิ์ในการอ่านของฉัน	1	2	3	4	5
18	ฉันสังเกตเมื่อฉันไม่จดจ่อกับการอ่านและรีบจัดการทันที	1	2	3	4	5
19	ฉันคิดว่าการปรับความเร็วในการอ่านเนื้อหาที่มีความซับซ้อนต่างกันมีความสำคัญ	1	2	3	4	5
20	ฉันสนใจการสะท้อนนิสัยในการอ่านของตนเอง ฉันชอบอ่านโดยไม่ต้องวิเคราะห์ว่าใช้วิธีการอ่านแบบใด	1	2	3	4	5

ข้อที่	เนื้อหา	ระดับ				
21	ฉันมักประเมินความสำเร็จในประสบการณ์อ่านของตนเอง เพื่อให้เกิดการพัฒนาอย่างต่อเนื่อง	1	2	3	4	5
22	ฉันให้ความสำคัญกับการบรรลุเป้าหมายและวัตถุประสงค์ในการอ่าน เพราะสิ่งเหล่านี้ช่วยให้ฉันมีความมั่นใจ	1	2	3	4	5
23	ฉันมั่นใจในประสิทธิภาพของการใช้กลยุทธ์ทางด้านการอ่านของฉัน และเชื่อว่าสิ่งเหล่านี้ช่วยพัฒนาความเข้าใจในการอ่าน	1	2	3	4	5
24	ฉันมักจะสะท้อนทักษะและนิสัยในการอ่านของฉัน เพื่อการประเมินและการพัฒนาตนเองอย่างต่อเนื่อง	1	2	3	4	5
25	การเปรียบเทียบประสิทธิภาพของกลยุทธ์การอ่านที่แตกต่างกันนั้น ถือเป็นการฝึกฝนที่มีประโยชน์และช่วยให้ฉันสามารถปรับกลวิธีในการอ่านได้	1	2	3	4	5
26	ฉันให้ความสำคัญกับการตรวจสอบความเข้าใจในเนื้อหาขณะกำลังอ่าน	1	2	3	4	5
27	การจดบันทึกเป็นวิธีการที่เป็นประโยชน์ และเพื่อส่งเสริมความเข้าใจในการอ่าน	1	2	3	4	5
28	ฉันเห็นคุณค่าของการจดบันทึกความเข้าใจของตนเอง	1	2	3	4	5
29	ฉันให้ความสำคัญกับการพิจารณาเนื้อหาของสิ่งที่อ่าน เพื่อความเหมาะสมกับวัตถุประสงค์ในการอ่าน	1	2	3	4	5
30	ฉันคิดว่าการประเมินความสามารถและความก้าวหน้าในการอ่านมีความสำคัญ ฉันเพียงต้องอ่านเท่านั้น	1	2	3	4	5

APPENDIX G: INTERVIEW

Low reading proficiency students

Students 1 (L1)

T: How do you establish reading goals?
S: My goal is to read the question first in order to find the answers.

T: Can you describe your reading approaches for general information?
S: I look for overall contexts to find which words I can remember, and I will know the meaning if I can find keywords.

T: How do you determine what sections of a text to read and when to read them?
S: I read through each paragraph one-by-one.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I focus on remembering the main words and understanding the overall meaning after class.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: Like this one "fire extinguisher", I will look at "fire" first or this sign "triangle" as my context clues.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: I will set my own questions for each paragraph to find the answers.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: For reading, I will read repeatedly because it helps me to understand better.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: When I can translate the contexts more effectively.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: I often rely on my personal experiences to try and grasp the meaning.

T: After finishing a text, how do you typically go about summarizing its main points?
S: Summarizing is valuable for me in understanding difficult English texts.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: When retelling has become an essential strategy for me.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: Identifying the main idea in texts has become a crucial skill for me.

T; OK, thank you for your interview.
S: Thank you.

Students 7 (L2)

T: How do you establish reading goals?
S: I aim to read the questions first because I need to save my time.

T: Can you describe your reading approaches for general information?
S: I will look at the questions first because I need to save my time. Then I will find the answers and then underline.

T: How do you determine what sections of a text to read and when to read them?
S: I will read the topic, question, and contexts respectively.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I will look at the questions first because I need to save my time. Then I will find the answers and then underline.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: I will find the familiar words first then guess from the context clues and use translation tool for the words that I can't translate.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: I question myself about what information is needed to answer the questions.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: I often go back and reread to ensure I capture all the details.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: When I can't translate some words, I use a dictionary application.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: English texts become much easier when I can relate the material to my own background knowledge.

T: After finishing a text, how do you typically go about summarizing its main points?
S: I understand the material, such as summarizing and rephrasing key points.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: I've noticed that when I retell what I've read, it helps me understand it better. It's like I'm actively participating in the material.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: After my reading sessions, I make it a point to identify the main idea.

T: How do you feel about the activities that the teacher led you to do?
S: Teachers will consistently offer guidance and support whenever I encounter difficulties. Empower me to muster the confidence to communicate openly and inquire further.

T; OK, thank you for your interview.
S: Thank you.

Students 9 (L3)

T: How do you establish reading goals?
S: My reading goal is to read the question first.

T: Can you describe your reading approaches for general information?
S: I will read and translate the context first.

T: How do you determine what sections of a text to read and when to read them?
S: I will look at the questions first and then use the skimming technique to see the related contexts.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I usually read through the whole passages.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: I will look at the surrounding words.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: I set my own questions for each part of the context.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: If I don't understand the contexts, I could look at them again to find the main ideas.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: When I use translation tools for the words that I can't translate.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: I approach English texts by drawing connections to things I already know.

T: After finishing a text, how do you typically go about summarizing its main points?
S: Summarizing has been instrumental in helping me organize information from complex.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: To me, the process of retelling academic texts involves focusing on the essential concepts.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: I've learned to recognize the main ideas in texts.

T; OK, thank you for your interview.
S: Thank you.

Students 11 (L4)

T: How do you establish reading goals?
S: My reading goal is to find the familiar words first then guess from the context clues.

T: Can you describe your reading approaches for general information?
S: I will look at the questions first and observe the paragraph for some familiar words.

T: How do you determine what sections of a text to read and when to read them?
S: I will find the familiar words first then guess from the context clues and use translation tool for the words that I can't translate.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I will find the main points from the context to look for some wh-questions.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: If I don't know a word, I look at the words around it to guess what it means.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: Setting questions helps me keep focusing on the contexts.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: I will go back to rereading again and again if I don't know the contexts well.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: When I know that translation tools are valuable for me.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: For me, background knowledge is crucial for understanding English academic texts.

T: After finishing a text, how do you typically go about summarizing its main points?
S: I've found that summarizing English texts helps me break down the information.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: I found that retelling or synthesizing is really helpful. It's like a reflective process that allows me to engage deeply with the contexts.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: Identifying the main idea of a text is like finding the puzzle pieces.

T: What would you like to say about this course?
S: The homework assigned by teachers after a lesson prompts me to review what I've learned. I take pride in completing it independently, without needing to rely on friends to copy or submit the work for me. This sense of accomplishment comes from being able to deliver my assignments personally.

T; OK, thank you for your interview.
S: Thank you.

Students 13 (L5)

T: How do you establish reading goals?
S: I set my reading goal to read the context first and then look for any other supports.

T: Can you describe your reading approaches for general information?
S: I will read the context first, then look at the symbols, and underline and highlight.

T: How do you determine what sections of a text to read and when to read them?
S: I will read the questions and observe the context.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I use underlining and highlight techniques for unfamiliar words.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: When I see a new word, I try to guess what it's talking about.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: I will set my own questions to cope with any reading problems.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: Rereading is important to ensure the contexts information.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: When translation tools allow me to overcome language barriers.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: I've noticed that relying on my prior knowledge has been really helpful. It gives me a starting point to understand difficult passages.

T: After finishing a text, how do you typically go about summarizing its main points?
S: Summarizing the information helps me understand English texts.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: When I retell or synthesize academic texts, I focus on extracting the most important information.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: Focusing on identifying the main idea after reading sessions significantly boosts my understanding.

T: What do you get after completing this course?
S: Previously, I struggled with reading and comprehending English. However, engaging in activities has boosted my confidence, even though my understanding may not be perfect.

T; OK, thank you for your interview.
S: Thank you.

Moderate reading proficiency students

Students 3 (M1)

T: How do you establish reading goals?
S: I carefully consider the subjects, visuals, and situations before making reading the questions my primary priority in order to meet my reading objectives.

T: Can you describe your reading approaches for general information?
S: I take notes on unfamiliar words, and I refer to pictures to understand the topic.

T: How do you determine what sections of a text to read and when to read them?
S: Reading a passage multiple times while paying attention to nearby words helps me understand better.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I find it beneficial to read repeatedly, focusing on the surrounding words to grasp meanings.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: I guessed from the sentence that I didn't know the meanings and then I looked at the other sentences to see the related contexts.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: For exercises, I try to set the questions first and then check my answers by reading the context again.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: I've seen some improvements lately. My reading speed has increased, and I find myself understanding unfamiliar words and contexts better.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: I try to summarize the main ideas in Thai after reading the entire passage, rather than translating word-for-word.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: I've learned to blend my background knowledge with other reading strategies when facing complex English texts

T: After finishing a text, how do you typically go about summarizing its main points?
S: Summarizing English texts requires me to carefully select the most important information by focusing on key points.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: Writing summaries or retelling academic content has become an essential part of my study routine.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: Recognizing the main idea strengthens my comprehension and solidifies my understanding of complex academic content.

T: What do you get after completing this course?
S: I recall my teacher's lessons on word analysis, where I learned about prefixes, suffixes, and their meanings. For instance, "er" often indicates a person or machine. The word "un" at the beginning is the opposite of the meaning of the word. When encountering unfamiliar words, I apply this knowledge to break down the word and understand its components, which helps me comprehend the sentence or content better.

T; OK, thank you for your interview.
S: Thank you.

Students 5 (M2)

T: How do you establish reading goals?
S: To be sure, I start with the questions and actively look for the answers in order to meet my reading goals.

T: Can you describe your reading approaches for general information?
S: It is like whenever I read English firstly, I was confused and did not know how to read, but after the course, I can read with flow.

T: How do you determine what sections of a text to read and when to read them?
S: Reading English used to be confusing, but after the course, it's become easier and more fluent.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?

S: I will read the questions first and observe the paragraph for some familiar words.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: Yes, I do it very often. Sometimes I guessed it wrong, so I checked by the dictionary application.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: I question myself about whether I understood the main points. I create mental questions while reading to keep myself actively involved. It aids in better understanding and retention.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: I read word by word repeatedly, relying on context clues and surrounding words to make educated guesses about their meanings.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: When I suggest that translation plays a key role for me when I struggle with certain English texts. After reading the passage in English, I mentally switch to Thai.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: When I encounter unfamiliar vocabulary in English texts, I try to prioritize words that I can relate to my own experiences.

T: After finishing a text, how do you typically go about summarizing its main points?

S: I use various techniques, such as summarizing and self-questioning, to ensure I've grasped the material accurately.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: I've found that summarizing or synthesizing the information really helps me get a deeper understanding. It's like I'm piecing everything together, which makes it easier to grasp the concepts.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: I make it a priority to identify the main idea of the text to synthesize knowledge effectively and gain deeper insights.

T: How do you feel about the activities that the teacher led you to do?
S: Upon encountering vocabulary outside of class or during assessments, I find myself recalling the words taught by my teacher during our classroom activities. This fills me with joy and excitement as I realize that I am able to remember and recognize these words. Although my understanding of their meanings might not be entirely precise, the ability to recall them brings me great satisfaction.

T; OK, thank you for your interview.
S: Thank you.

Students 10 (M3)

T: How do you establish reading goals?
S: I usually read the context first and then check over the questions to make sure I've met my reading objectives.

T: Can you describe your reading approaches for general information?
S: I read the context first, looked at the questions, and then underlined and found the answers.

T: How do you determine what sections of a text to read and when to read them?
S: I start by reading the passage, then look at questions, underline key parts, and find the answers.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I will read the context first, look at the questions and then underline and find the answers.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: I will look at the surrounding words. I will recall the vocabulary and look at the pictures if any.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: I often pause while reading to question myself about the meaning of specific words or phrases. It ensures better comprehension.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: When dealing with challenging texts, I find it helpful to adjust my reading speed to ensure thorough comprehension.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: I've found that translation into Thai is helpful when English passages are difficult to comprehend. After reading the paragraph, I mentally translate it into Thai.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: My ability to understand academic English texts has improved as I've learned to integrate my background knowledge with other reading techniques.

T: After finishing a text, how do you typically go about summarizing its main points?

S: Summarizing serves as a powerful tool for me in organizing information from academic English texts.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: Retelling or synthesizing academic texts allows me to take ownership of the material.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: My perception to learning has changed as a result for identifying books' key concepts

T; OK, thank you for your interview.
S: Thank you.

Students 12 (M4)

T: How do you establish reading goals?
S: In keeping with my reading objectives, I read each sentence carefully to get the major point.

T: Can you describe your reading approaches for general information?
S: I will guess from the surrounding words.

T: How do you determine what sections of a text to read and when to read them?
S: For questions, I read them first, find keywords, and then go through each sentence to get the answer.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I will read the context first, look at the questions and then underline and find the answers.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: When I don't understand a word, I read the sentence again and try to guess its meaning based on the other words.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: Setting questions for myself is a habit. It helps me stay engaged and reinforces my understanding of the material.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: When faced with challenging passages, I adjust my reading speed accordingly, if I encounter unfamiliar terms or complex sentences.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: After reading the text in English, I will translate the main points in Thai to reinforce my comprehension.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: Over time, I've realized the importance of leveraging my prior experiences to enhance my comprehension of English texts.

T: After finishing a text, how do you typically go about summarizing its main points?
S: I will use summarizing as a powerful tool in organizing information from academic English texts.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?
S: Retelling or synthesizing is a process of sense-making. It helps clarify my understanding and strengthens my comprehension.

T: What factors do you take into account and how do you assess a text's main point of significance?
S: Figuring out a text's core idea is like finding the thread that connects everything. I can do it better because of this planned post-reading strategy.

T: What would you like to say about this course?
S: I enjoy group work assignments where teachers provide homework related to topics that interest us, particularly tasks involving the production process. The teacher organizes each group to collaboratively review and refine their previous work. The following week, we present our work for evaluation. The teacher provides feedback, noting whether it's correct or needs improvement. If correct, the teacher records a video clip and sends it promptly. This process not only enhances our ability to work in groups but also teaches us to create and present our work in English. Collaborating with friends, we learn new skills and tackle tasks we've never encountered before.

T; OK, thank you for your interview.
S: Thank you.

Students 15 (M5)

T: How do you establish reading goals?
S: Prioritizing reading the questions over exploring the circumstances is a regular practice that supports my reading objectives.

T: Can you describe your reading approaches for general information?
S: Looking at the pictures and gaining new vocabulary from games.

T: How do you determine what sections of a text to read and when to read them?
S: To learn new words, I look at pictures and play language games, making it a fun way to expand my vocabulary.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?
S: I use skimming to find the answers from each sentence.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?
S: If there's a word that I don't know, I will check if there are other words nearby that give me a clue.

T: Could you explain how you engage in self-questioning to enhance your comprehension?
S: Before moving on to exercises, I set the questions independently, then cross-check my responses with the text to ensure accuracy.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?
S: Sometimes I need to slow down and reread sections to fully understand them, while other times I can skim through familiar contents.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?
S: Translation into Thai becomes necessary for me when English passages pose comprehension challenges.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?
S: I've developed a strategy of using my background knowledge as a foundation for understanding English.

T: After finishing a text, how do you typically go about summarizing its main points?
S: Summarizing has revolutionized how I approach studying English texts. It's like creating a roadmap that guides me through the complexities.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: Retelling or synthesizing academic materials is like weaving together threads of knowledge that create my comprehension and retention.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: Through practice, I've become adept at identifying the main idea in texts to recall key details long after I've finished reading.

T; OK, thank you for your interview.

S: Thank you.

High reading proficiency students

Students 2 (H1)

T: How do you establish reading goals?

S: I always set clear reading objectives for myself. It keeps me focused and motivated throughout my study sessions. Having these goals helps me track my progress and ensures I'm actively engaging with the material.

T: Can you describe your reading approaches for general information?

S: I quickly scan the questions to understand what information is required before delving into the text. Skimming the passage gives me a broad understanding of the main ideas, while scanning helps me locate specific details mentioned in the questions.

T: How do you determine what sections of a text to read and when to read them?

S: I summarize each section to solidify my understanding further. Once I've grasped the main concepts, I engage in active recall exercises to reinforce my memory.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?

S: I recognize substitution or connection words, enabling me to comprehend the context more effectively, thereby enhancing my understanding of the overall message.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: Yes, I employed skimming and scanning, focusing on the questions first and underlining unfamiliar words to deduce their meanings, typically examine suffixes and context clues as my strategy to infer the meanings of unfamiliar words.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: Formulating questions before and during reading helps me target key information, ensuring a comprehensive understanding.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: I deliberately review passages that are difficult for me and dynamically modify my reading speed. By using this method, I can make sure I understand the material and pick up on its subtleties.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: I prioritize summarizing the main ideas in Thai after reading the entire paragraph, rather than translating word-for-word.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: Integrating my background knowledge with other reading strategies has become second nature to me when tackling challenging English texts. It's like weaving together different threads of understanding.

T: After finishing a text, how do you typically go about summarizing its main points?

S: Summarizing English texts has become second nature to me. It's a skill that allows me to distill complex information into its essential components, facilitating deeper understanding.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: Retelling or synthesizing academic materials has become second nature to me. By articulating complex ideas in my own words, I deepen my understanding and solidify my grasp of the material.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: For me, identifying the main idea of a text is a fundamental step in post-reading analysis by synthesizing key details into complex academic content.

T: How do you feel about the activities that the teacher led you to do?

S: Participating in group work has been a learning experience for me, especially since English isn't my strongest subject. Through group activities, I've come to understand my responsibilities better. The division of tasks within our group has made me realize my significance and contribution, which fills me with pride.

T; OK, thank you for your interview.

S: Thank you.

Students 4 (H2)

T: How do you establish reading goals?

S: Setting reading goals has been transformative for me. It has helped me overcome my fear of English and stay committed to improving. Keeping reading goals in mind during exercises and exams has enhanced my concentration and determination to succeed.

T: Can you describe your reading approaches for general information?

S: Before diving deep into the text, I skim through to grasp the overall structure and main ideas. Scanning helps me pinpoint keywords or phrases mentioned in the questions, which guides me to the relevant sections of the passage.

T: How do you determine what sections of a text to read and when to read them?

S: In addition to focusing on main ideas, I make a conscious effort to note any supporting details that strengthen my comprehension. After analyzing the context, I create mental summaries to connect the information.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?

S: I focus on the context and main ideas, ensuring that I grasp the fundamental concepts and themes presented in the text.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: Indeed, context clues, particularly word forms and structures, often guide me in deducing meanings during reading.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: Setting self-questions before engaging with the context keeps me actively involved, fostering a deeper understanding.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: Rereading is a strategic practice I employ to dissect intricate passages and extract essential information. Adjusting my reading speed accordingly allows me to maintain focus and comprehension.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: After reading the text, I mentally summarize the main points in Thai to ensure comprehension, although I find that translating every word disrupts the flow of my reading.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: I've found that my prior experiences play a pivotal role in my ability to comprehend complex English passages. By drawing on what I already know, I can unlock deeper layers of meaning within the text.

T: After finishing a text, how do you typically go about summarizing its main points?

S: Checking comprehension is a critical step in my reading process. I employ a range of strategies, including summarizing and paraphrasing, to ensure I've fully grasped the material.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: I've found that retelling or synthesizing is an effective way to consolidate my learning. By reconstructing the content in my own words, I reinforce key concepts and enhance my comprehension.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: Recognizing the main idea in texts comes naturally to me now. After reading, I quickly condense important details to grasp the central message.

T; OK, thank you for your interview.

S: Thank you.

Students 6 (H3)

T: How do you establish reading goals?

S: Setting reading goals has been crucial for me. It gives me direction and purpose in my study sessions. I've found that having specific goals keeps me motivated and accountable for my learning, which has contributed to my progress.

T: Can you describe your reading approaches for general information?

S: I start by getting a general sense of the passage through a quick skim. Once I have an overview of the content, I switch to scanning, focusing on specific sections to extract key details.

T: How do you determine what sections of a text to read and when to read them?

S: Alongside word memorization techniques, I practice visualization to deepen my understanding of abstract concepts. I find it helpful to create personal connections to remember complex terms and ideas.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?

S: I usually use skimming as a quick method to grasp the overall structure and content, and if the context is numbered, I swiftly navigate through the key points for efficient comprehension.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: My go-to strategy involves memorization, especially before exams. I review the text, take notes, and pay attention to context clues to guess word meanings.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: Self-questioning plays a pivotal role in my reading strategy ensuring I extract meaningful information, contributing to improved reading efficiency.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: Whether faced with dense sections or familiar content, I adapt my reading speed accordingly to ensure optimal comprehension and then reread them again.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: Though I prefer to engage directly with English texts, there are instances where translation into Thai becomes necessary for full comprehension.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: When faced with unfamiliar concepts in English texts, I rely on my background knowledge to fill in the gaps. It's like having a toolkit of strategies to overcome comprehension challenges.

T: After finishing a text, how do you typically go about summarizing its main points?

S: Creating visual summaries helps me see connections between concepts and reinforces my understanding.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: Retelling or synthesizing academic texts allows me to engage with the material on a deeper level. By distilling complex information into clear and concise summaries, I strengthen my understanding and retention.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: After completing my reading sessions, I effortlessly identify the main idea of the text. This strategic approach allows me to synthesize knowledge effectively.

T: What do you get after completing this course?

S: My teacher advised me that when reading English sentences, it's normal not to understand every word. They suggested skipping unfamiliar words and focusing on the surrounding context. Following their advice, I skip unknown words and try to grasp the overall meaning as best as I can. Later, I make sure to look up these words in the dictionary to verify their accuracy.

T; OK, thank you for your interview.

S: Thank you.

Students 8 (H4)

T: How do you establish reading goals?

S: My reading objectives have been a game-changer since it keeps me focused during reading sessions and ensures I make consistent progress. I've realized the importance of establishing clear reading goals to keep me motivated and help me measure my improvement over time.

T: Can you describe your reading approaches for general information?

S: My reading process starts with a quick glance by skimming. To explore the details, I transition to scanning for systematically searching any specific information needed to answer questions.

T: How do you determine what sections of a text to read and when to read them?

S: In my efforts to remember content, I often engage in discussions or teach the material to someone else. I dedicate time to reviewing previously learned material periodically to maintain retention and prevent forgetting.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?

S: I underline important phrases or concepts while simultaneously focusing on the context without initially considering the topic, thereby aiding in the identification of crucial information.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: When faced with unfamiliar words, I read word by word, relying on context clues and surrounding words to make educated guesses about their meanings.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: Setting my own inquiries as checkpoints during reading reinforces my grasp on the material and elevates my reading efficiency.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: It's important for me to dynamically adjust my reading speed. I accomplish this by slowing down on thick passages and accelerating on topics I already know.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: While I strive to comprehend English texts without translation, there are occasions where I find it necessary, especially with highly intricate passages.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: Reflecting on my reading journey, I've come to appreciate the significant impact of background knowledge on my comprehension skills. It's like having a solid foundation upon which to build my understanding.

T: After finishing a text, how do you typically go about summarizing its main points?

S: On my experience, I've found that summarizing is not just about condensing the text but about extracting key insights. It's like uncovering the underlying meaning to deepen my comprehension.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: For me, retelling or synthesizing is not just about regurgitating information but about truly understanding it. By rephrasing the content in my own words, I internalize the material and make it my own.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: Identifying the main idea of a text is like distilling the essence of the material for me to derive significant insights and strengthen my understanding of complex concepts.

T; OK, thank you for your interview.

S: Thank you.

Students 14 (H5)

T: How do you establish reading goals?

S: I always set my reading goals as my first priority for my learning journey and keeps me motivated to achieve my objectives. I've affirmed that setting and keeping reading goals helps me stay disciplined and committed to improving my English skills.

T: Can you describe your reading approaches for general information?

S: To start, I take a quick skim at the passage to understand its general content. Once I have a basic understanding, I focus on scanning, searching for information that will assist in answering questions.

T: How do you determine what sections of a text to read and when to read them?

S: Before diving into a text, I preview headings, subheadings, and summaries to get a sense of the structure and key points. While reading, I pay attention to bolded or italicized words, as they often indicate important terms or concepts.

T: While reading, what methods do you use to pay attention to the main points of a text such as focusing on key words or phrases?

S: I will find the keywords strategically, especially when pressed for time or unsure about the relevance of the entire sentence, allowing me to extract pertinent information swiftly and efficiently.

T: When encountering unfamiliar words or concepts, how do you guess their meanings from context clues?

S: When encountering 'fire extinguisher,' I pay attention to words like 'fire' and 'safety equipment' nearby. This helps me understand it's probably a device used to put out fire.

T: Could you explain how you engage in self-questioning to enhance your comprehension?

S: By formulating questions both prior to and during reading, I strategically target essential information, which enriches my comprehension and ensures a thorough understanding of the text.

T: Can you provide an example of how you employ problem-solving strategies like rereading or adjusting your reading speed to overcome comprehension challenges?

S: A crucial component of my problem-solving strategy is dynamically adjusting my reading speed and strategically rereading. I can successfully explore hard books thanks to these strategies.

T: Which situations do you find yourself using translation as a strategy to aid in understanding?

S: After reading, I summarize the main ideas in Thai to reinforce comprehension, although I am mindful of maintaining the flow of my reading.

T: How do you utilize your background knowledge to enhance your understanding of a text as you read?

S: Utilizing my background knowledge has become an intuitive part of my reading process. It's like having a compass that guides me through the complexities of English academic texts.

T: After finishing a text, how do you typically go about summarizing its main points?

S: Using concept maps has improved my approach to studying English texts. It's like creating a blueprint that illuminates the structure and summarizes my understanding of its complexities.

T: Could you describe a time when you've used retelling or synthesizing as a strategy to reinforce your understanding of a text after reading?

S: Retelling or synthesizing academic materials is a reflective practice for me. By summarizing key points in my own words, I deepen my understanding and build a strong foundation of knowledge.

T: What factors do you take into account and how do you assess a text's main point of significance?

S: I've mastered how to identify the main idea in texts, which has developed my approach to post-reading analysis. By synthesizing key details, I enhance my comprehension and gain deeper insights of academic content.

T: What would you like to say about this course?

S: Each group is presented in front of the class, enabling us to identify both the strengths and weaknesses of their work. We engage in self-evaluation as well as peer evaluation, utilizing clear scoring criteria. Each group is responsible for rating the performance of the other groups, fostering a structured and constructive feedback process.

T; OK, thank you for your interview.

S: Thank you.

APPENDIX H: Consent Form (CF) (English Version)

MAHASARAKHAM UNIVERSITY ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS

Certificate of Approval

Approval number: 318-273/2022

Title : The Effects of Metacognitive Reading Strategy Instruction on Reading Comprehension, Metacognitive Reading Strategies Awareness, and Attitudes of Thai EFL Undergraduate Students.

Principal Investigator : Miss. Jiraporn Noipa
Responsible Department : Faculty of Humanities and Social sciences
Research site : Rajamangala University of Technology Isan Khon Kaen Campus.

Review Method : Expedited Review

Date of Manufacture : 23 September 2022 **expire :** 22 September 2023

This research application has been reviewed and approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University, Thailand. Approval is dependent on local ethical approval having been received. Any subsequent changes to the consent form must be re-submitted to the Committee.

Ratree S.

(Asst. Prof. Ratree Sawangjit)
Chairman

Approval is granted subject to the following conditions: (see back of this Certificate)

APPENDIX I: Consent Form (CF) (Thai Version)

คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยมหาสารคาม

เอกสารรับรองโครงการวิจัย

เลขที่การรับรอง : 318-273/2565

ชื่อโครงการวิจัย (ภาษาไทย) ผลของการสอนอ่านแบบเน้นกลวิธีอภิปัญญาต่อการอ่านเพื่อความเข้าใจ การตระหนักเชิงอภิปริชานของกลวิธีการอ่าน และเจตคติของนักศึกษาระดับปริญญาตรีไทยที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ

ชื่อโครงการวิจัย (ภาษาอังกฤษ) The Effects of Metacognitive Reading Strategy Instruction on Reading Comprehension, Metacognitive Reading Strategies Awareness, and Attitudes of Thai EFL Undergraduate Students.

ผู้วิจัย : นางสาวจิราพร น้อยภา

หน่วยงานที่รับผิดชอบ : คณะมนุษยศาสตร์และสังคมศาสตร์

สถานที่ทำการวิจัย : มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน วิทยาเขตขอนแก่น

ประเภทการพิจารณาแบบ : แบบเร่งรัด

วันที่รับรอง : 23 กันยายน 2565 **วันหมดอายุ** : 22 กันยายน 2566

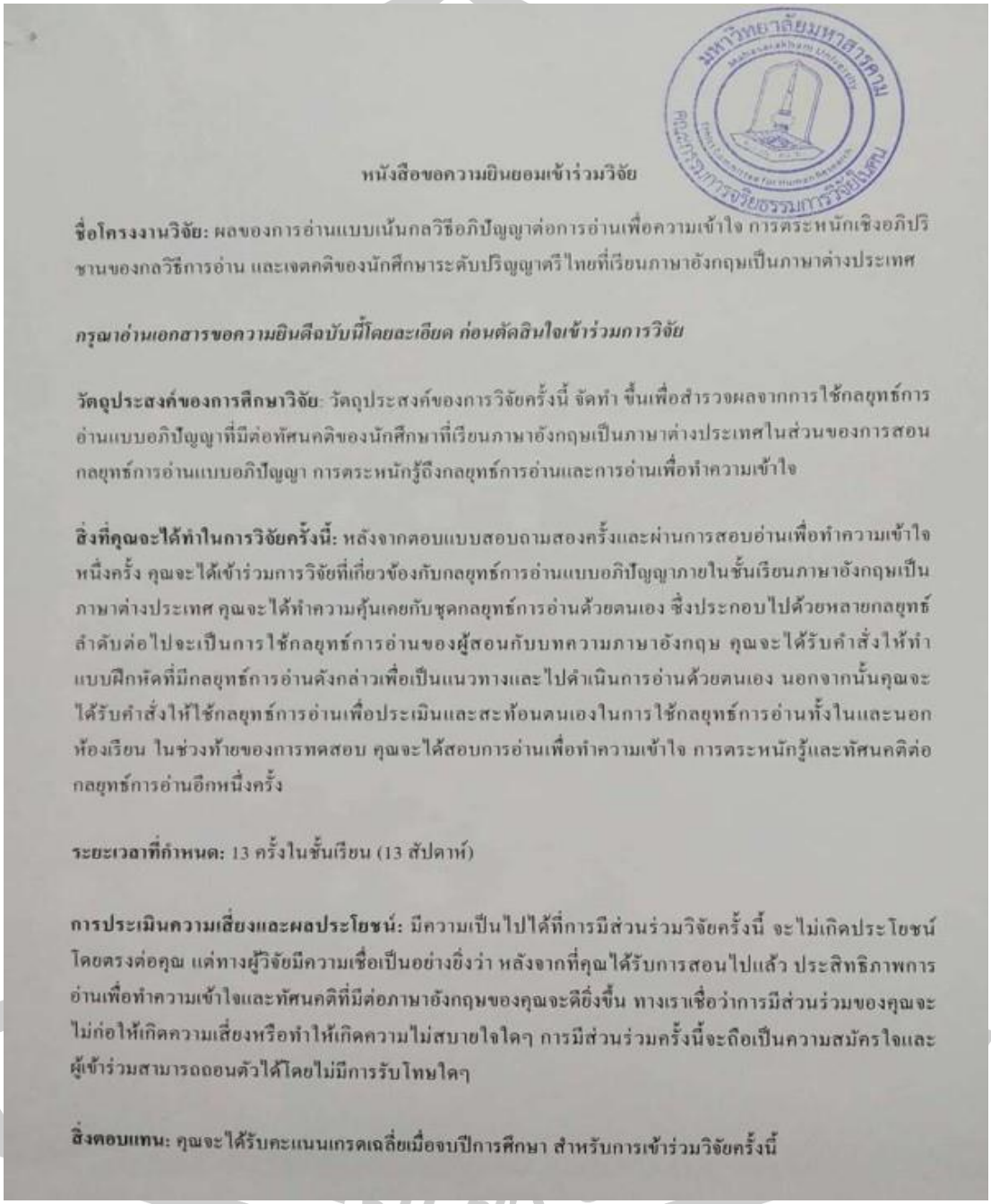
ข้อเสนอการวิจัยนี้ ได้รับการพิจารณาและให้ความเห็นชอบจากคณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยมหาสารคามแล้ว และอนุมัติในด้านจริยธรรมให้ดำเนินการศึกษาวิจัยเรื่องข้างต้นได้ บนพื้นฐานของโครงร่างงานวิจัยที่คณะกรรมการฯ ได้รับและพิจารณา เมื่อเสร็จสิ้นโครงการแล้วให้ผู้วิจัยส่งแบบฟอร์มการปิดโครงการและรายงานผลการดำเนินงานมายังคณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยมหาสารคาม หรือหากมีการเปลี่ยนแปลงใดๆ ในโครงการวิจัย ผู้วิจัยจักต้องยื่นขอรับการพิจารณาใหม่

(ผู้ช่วยศาสตราจารย์ เภสัชกรหญิงราตรี สว่างจิตร)
ประธานคณะกรรมการจริยธรรมการวิจัยในคน
มหาวิทยาลัยมหาสารคาม

ทั้งนี้ การรับรองนี้มีเงื่อนไขดังที่ระบุไว้ด้านหลังทุกข้อ (ดูด้านหลังของเอกสารรับรองโครงการวิจัย)

APPENDIX J: Participant Information Statement (PIS)

(Thai Version)



หนังสือขอความยินยอมเข้าร่วมวิจัย

ชื่อโครงงานวิจัย: ผลของการอ่านแบบเน้นกลวิธีอภิปัญญาต่อการอ่านเพื่อความเข้าใจ การตระหนักเชิงอภิปริชานของกลวิธีการอ่าน และเจตคติของนักศึกษาระดับปริญญาตรีไทยที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ

กรุณาอ่านเอกสารขอความยินดีฉบับนี้โดยละเอียด ก่อนตัดสินใจเข้าร่วมการวิจัย

วัตถุประสงค์ของการศึกษาวิจัย: วัตถุประสงค์ของการวิจัยครั้งนี้ จัดทำ ขึ้นเพื่อสำรวจผลจากการใช้กลยุทธ์การอ่านแบบอภิปัญญาที่มีต่อทัศนคติของนักศึกษาที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศในส่วนของการสอนกลยุทธ์การอ่านแบบอภิปัญญา การตระหนักรู้ถึงกลยุทธ์การอ่านและการอ่านเพื่อทำความเข้าใจ

สิ่งที่คุณจะได้ทำในการวิจัยครั้งนี้: หลังจากตอบแบบสอบถามสองครั้งและผ่านการสอบอ่านเพื่อทำความเข้าใจหนึ่งครั้ง คุณจะได้เข้าร่วมการวิจัยที่เกี่ยวข้องกับกลยุทธ์การอ่านแบบอภิปัญญาภายในชั้นเรียนภาษาอังกฤษเป็นภาษาต่างประเทศ คุณจะได้ทำความคุ้นเคยกับชุดกลยุทธ์การอ่านด้วยตนเอง ซึ่งประกอบไปด้วยหลายกลยุทธ์ ลำดับต่อไปจะเป็นการใช้กลยุทธ์การอ่านของผู้สอนกับบทความภาษาอังกฤษ คุณจะได้รับคำสั่งให้ทำแบบฝึกหัดที่มีกลยุทธ์การอ่านดังกล่าวเพื่อเป็นแนวทางและไปดำเนินการอ่านด้วยตนเอง นอกจากนั้นคุณจะได้รับคำสั่งให้ใช้กลยุทธ์การอ่านเพื่อประเมินและสะท้อนตนเองในการใช้กลยุทธ์การอ่านทั้งในและนอกห้องเรียน ในช่วงท้ายของการทดสอบ คุณจะได้สอบการอ่านเพื่อทำความเข้าใจ การตระหนักรู้และทัศนคติต่อกลยุทธ์การอ่านอีกหนึ่งครั้ง

ระยะเวลาที่กำหนด: 13 ครั้งในชั้นเรียน (13 สัปดาห์)

การประเมินความเสี่ยงและผลประโยชน์: มีความเป็นไปได้ที่การมีส่วนร่วมวิจัยครั้งนี้ จะไม่เกิดประโยชน์โดยตรงต่อคุณ แต่ทางผู้วิจัยมีความเชื่อเป็นอย่างยิ่งว่า หลังจากที่คุณได้รับการสอนไปแล้ว ประสิทธิภาพการอ่านเพื่อทำความเข้าใจและทัศนคติที่มีต่อภาษาอังกฤษของคุณจะดียิ่งขึ้น ทางเราเชื่อว่าการมีส่วนร่วมของคุณจะไม่ก่อให้เกิดความเสี่ยงหรือทำให้เกิดความไม่สบายใจใดๆ การมีส่วนร่วมครั้งนี้จะถือเป็นความสมัครใจและผู้เข้าร่วมสามารถถอนตัวได้โดยไม่มีการรับโทษใดๆ

สิ่งตอบแทน: คุณจะได้รับคะแนนเกรดเฉลี่ยเมื่อจบปีการศึกษา สำหรับการเข้าร่วมวิจัยครั้งนี้

การเก็บรักษาความลับ: ข้อมูลส่วนตัวของคุณจะถูกเก็บเป็นความลับตามข้อกฎหมายที่กำหนด คุณต้องใส่ข้อมูลเป็นตัวเลขรหัส ข้อมูลที่เชื่อมโยงชื่อของคุณเป็นตัวเลขดังกล่าว จะถูกเก็บเป็นความลับโดยจัดทำเป็นเอกสารเข้ารหัส เพื่อนำไปเก็บไว้ ณ สำนักงานคณะของที่ปรึกษางานวิจัย เมื่อการวิจัยนี้เสร็จสิ้นและทำการวิเคราะห์ข้อมูลแล้ว ผู้จัดทำจะนำ ข้อมูลดังกล่าวไปทำลาย จะไม่มีการนำ ชื่อของคุณไปใช้กับรายงานวิจัยอื่นใด

การเข้าร่วมโดยสมัครใจ: การเข้าร่วมงานวิจัยของคุณในครั้งนี้เป็นไปด้วยความสมัครใจโดยสมบูรณ์ จะไม่มีการลงโทษใดๆหากไม่ต้องการเข้าร่วม

สิทธิในการถอนตัวจากงานวิจัย: คุณมีสิทธิที่จะถอนตัวจากการวิจัยครั้งนี้ได้ทุกเมื่อโดยไม่มีผลใดๆ

บุคคลที่สามารถติดต่อได้ หากมีคำถามในการวิจัยครั้งนี้:

นางสาวจิราพร น้อยภา นักศึกษาปริญญาเอก อาคารศูนย์การเรียนรู้พัฒนาภูมิปัญญาท้องถิ่น ตำบลขามเรียง อำเภอกันทรวิชัย จังหวัดมหาสารคาม โทรศัพท์ + (66) 0821238035, + (66) 0898467342

อีเมล์ jnoipa@hotmail.com

อ.ดร.พิลานุช ภูษาวิโสธน์ ผู้สอนนักศึกษาปริญญาเอก อาคารศูนย์การเรียนรู้พัฒนาภูมิปัญญาท้องถิ่น ตำบลขามเรียง อำเภอกันทรวิชัย จังหวัดมหาสารคาม โทรศัพท์ +(66) 0630144660 อีเมล์ pilanut.p@msu.ac.th

บุคคลที่สามารถติดต่อได้ หากต้องการถามถึงสิทธิในการเข้าร่วมงานวิจัยครั้งนี้:

อาคารศูนย์การเรียนรู้พัฒนาภูมิปัญญาท้องถิ่น ตำบลขามเรียง อำเภอกันทรวิชัย จังหวัดมหาสารคาม โทรศัพท์ + (66) 0-4375-4369 0-4375-4361 ต่อ 4735 4703 โทรสาร +(66) 0-4375-4369 อีเมล์: human.msu.contact@gmail.com เว็บไซต์ (ภาษาไทย): http://human.msu.ac.th/ เว็บไซต์ (ภาษาอังกฤษ): http://human.msu.ac.th/en/

ข้อตกลง:

ข้าพเจ้าได้อ่านขั้นตอนที่กล่าวเอาไว้ด้านบนแล้ว ข้ามเจ้ายินยอมที่จะเข้าร่วมขั้นตอนดังกล่าวโดยสมัครใจ และได้รับสำเนาเอกสารหนังสือขอความยินยอมฉบับนี้แล้ว

ผู้เข้าร่วม:_____ วันที่:_____

ผู้วิจัยหลัก:_____ วันที่:_____

APPENDIX K: Participant Information Statement (PIS)

(English Version)

Informed Consent

Protocol Title: The Effects of Metacognitive Reading Strategy Instruction on Reading Comprehension, Metacognitive Reading Strategies Awareness and Attitudes of Thai EFL Undergraduate Students

Please read this consent document carefully before you decide to participate in this study.

Purpose of the research study: The purpose of this study is to examine the effects of integrating metacognitive reading strategies on EFL Undergraduates' students' attitudes toward metacognitive reading strategy instruction, reading strategy awareness and reading comprehension.

What you will be asked to do in the study: Following by the two questionnaires and one reading comprehension test, you will be participating into a study which incorporates metacognitive reading strategies into your EFL classes. A package of reading strategies will be given to you to familiarize yourself with these reading strategies. Following the teacher modeling on those reading strategies use into English reading text, you will be asked to practice on those reading strategies into you guide and independent reading. You will also be asked to keep a reading strategic journal for self-evaluating and self-reflecting on your reading strategies use in and out of the classroom. At the conclusion of the test session, you will again be tested for reading comprehension, reading strategy awareness and attitudes.

Time required: 13 class hours

Risks and Benefits: It is possible that participation in this study may not directly benefit you, but I strongly believe that once you are taught a more efficiency way your English reading comprehension and attitude will improve. I believe that your participation will present no risk or discomfort to you. Participation is voluntary and participants are free to withdraw without penalty.

Compensation: You will get one grade point on average in the end of semester for participating in this research.

Confidentiality: Your identity will be kept confidential to the extent provided by law. Your information will be assigned a code number. The list connecting your name to this number will be kept in a locked file in my faculty supervisor's office. When the study is completed and the data have been analyzed, the list will be destroyed. Your name will not be used in any report.

Voluntary participation: Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study: You have the right to withdraw from the study at any time without consequence.

Whom to contact if you have questions about the study:

Jiraporn Noipa, PhD. student, Learning Center and Local Wisdom Development Building, Khamriang Sub-district, Kantarawichai District, Mahasarakham Province, Tel. +(66) 0821238035, 0898467342, Email: jnoipa@hotmail.com

Pilanut Phusawisot. Ph.D. lecturer, Learning Center and Local Wisdom Development Building, Khamriang Sub-district, Kantarawichai District, Mahasarakham Province, Tel. +(66) 0630144660, Email: pilanut.p@msu.ac.th

Whom to contact about your rights as a research participant in the study:

Learning Center and Local Wisdom Development Building, Khamriang Sub-district, Kantarawichai District, Mahasarakham Province, Tel. +(66) 0-4375-4369, 0-4375-4361 ext. 4735, 4703, Fax. +(66) 0-4375-4369

Email: human.msu.contact@gmail.com

Website (TH): http://human.msu.ac.th/, Web site (EN): http://human.msu.ac.th/en/

Agreement:

I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description.

Participant:_____Date:_____

Principal Investigator:_____Date:_____

BIOGRAPHY

NAME	Miss Jiraporn Noipa
DATE OF BIRTH	18 November 1981
PLACE OF BIRTH	Khon Kaen, Thailand
ADDRESS	233/1, Moo 10, Pralub Sub-District, Muaeng District, Khon Kaen, Thailand, 40000
POSITION	Teacher
PLACE OF WORK	Rajamangala University of Technology Isan, Khan Kaen Campus. 150 Srichan Road, Nai Muaeng Sub-District, Muaeng District, Khon Kaen, Thailand, 40000
EDUCATION	2004 Bachelor of Arts B.A. (English for International Communication), Rajamangala Institute of Technology Isan, Khon Kaen Campus 2009 Master of Education M.A. (Curriculum and Instruction (English Teaching), Khon Kaen University 2024 Doctor of Philosophy in English Language Teaching (Ph.D.), Mahasarakham University