

**A STUDY OF READING STRATEGIES OF EMI  
IN SCIENCE PROGRAM THAI LEARNERS**



**Miss Namfar Boonkor**

**An Independent Study Submitted in Partial Fulfillment of the  
Requirements  
for the Degree of Master of Arts in English as an International Language  
Inter-Department of English as an International Language  
GRADUATE SCHOOL  
Chulalongkorn University  
Academic Year 2021  
Copyright of Chulalongkorn University**

การศึกษากลวิธีการอ่านของนักเรียนวิทยาศาสตร์ที่ศึกษาอยู่ในบริบทการเรียนการสอนโดยใช้  
ภาษาอังกฤษเป็นสื่อกลาง



สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต  
สาขาวิชาภาษาอังกฤษเป็นภาษานานาชาติ สหสาขาวิชาภาษาอังกฤษเป็นภาษานานาชาติ

บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2564

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Independent Study Title      A STUDY OF READING STRATEGIES  
OF EMI IN SCIENCE PROGRAM THAI  
LEARNERS  
By                                      Miss Namfar Boonkor  
Field of Study                      English as an International Language  
Thesis Advisor                      Assistant Professor PORNPIMOL  
SUKAVATEE, Ph.D.

---

Accepted by the GRADUATE SCHOOL, Chulalongkorn  
University in Partial Fulfillment of the Requirement for the  
Master of Arts

INDEPENDENT STUDY COMMITTEE

..... Chairman  
(Assistant Professor Ruedeerath  
Chusanachoti, Ph.D.)

..... Advisor  
(Assistant Professor PORNPIMOL  
SUKAVATEE, Ph.D.)

..... Examiner  
(Assistant Professor MANEERAT  
EKKAYOKKAYA, Ph.D.)

CHULALONGKORN UNIVERSITY

น้ำฟ้า บุญก่อ : การศึกษากลวิธีการอ่านของนักเรียนวิทยาศาสตร์ที่ศึกษาอยู่ในบริบทการเรียนการสอนโดยใช้  
ภาษาอังกฤษเป็นสื่อกลาง. ( A STUDY OF READING STRATEGIES OF EMI  
IN SCIENCE PROGRAM THAI LEARNERS) อ.ที่ปรึกษาหลัก : ผศ. ดร.พรพิมล สุขะ  
วาทิ

งานวิจัยนี้มีจุดประสงค์เพื่อ 1) ศึกษาพฤติกรรมการอ่านโดยรวมของนักเรียนวิทยาศาสตร์ที่ศึกษาอยู่ในบริบทการเรียน  
การสอนโดยใช้ภาษาอังกฤษเป็นสื่อกลาง 2) ศึกษาความคิดเห็นของนักเรียนที่มีต่อการใช้พฤติกรรมการอ่านในบริบทการเรียนการ  
สอนโดยใช้ภาษาอังกฤษเป็นสื่อกลาง ผู้เข้าร่วมวิจัยประกอบด้วยนักเรียนระดับชั้นมัธยมศึกษาตอนปลายจำนวน 71 คน จาก  
โรงเรียนกำเนิดวิทย์ ซึ่งเป็นโรงเรียนวิทยาศาสตร์ระดับชั้นมัธยมศึกษาตอนปลาย จังหวัดระยอง ประเทศไทย เครื่องมือที่ใช้ใน  
การเก็บรวบรวมข้อมูลประกอบด้วยแบบสอบถามพฤติกรรมการอ่าน และการสัมภาษณ์เชิงกึ่งโครงสร้าง การวิเคราะห์ข้อมูล  
ประกอบด้วยสถิติเชิงพรรณนาและการวิเคราะห์เนื้อหา ผลการวิจัยจากแบบสอบถามพบว่านักเรียนรายงานความถี่ในการใช้  
พฤติกรรมการอ่านภาษาอังกฤษในระดับปานกลาง โดยพฤติกรรมการอ่านที่นักเรียนใช้มากที่สุด ได้แก่ พฤติกรรมการอ่านเชิงปริชาน พฤติ  
กรรมการอ่านที่นักเรียนใช้รองลงมา ได้แก่ พฤติกรรมการอ่านเชิงอภิปริชาน โดยพฤติกรรมการใช้น้อยที่สุด ได้แก่ พฤติกรรมการอ่านเชิง  
สนับสนุน นอกจากนี้ ผลการวิจัยจากการสัมภาษณ์พบว่านักเรียนคิดว่าพฤติกรรมการอ่านหลายวิธีมีประโยชน์ต่อการอ่านของ  
นักเรียน และนักเรียนมีการใช้กลวิธีเพิ่มเติมในการอ่านเพื่อเพิ่มความเข้าใจเนื้อหาในหนังสือเรียน ทั้งนี้ งานวิจัยนี้ยังนำเสนอและ  
อภิปรายข้อเสนอแนะในการจัดการเรียนการสอนของครู และการเพิ่มประสิทธิภาพการอ่านของนักเรียนในบริบทการเรียนการ  
สอนโดยใช้ภาษาอังกฤษเป็นสื่อกลาง



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

สาขาวิชา            ภาษาอังกฤษเป็นภาษานานาชาติ  
ปีการศึกษา        2564

ลายมือชื่อนิสิต .....

ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

# # 6388008920 : MAJOR ENGLISH AS AN INTERNATIONAL LANGUAGE

KEYWORD reading strategies, English Medium Instruction, science program

D: students

Namfar Boonkor : A STUDY OF READING STRATEGIES OF EMI  
IN SCIENCE PROGRAM THAI LEARNERS. Advisor: Asst. Prof.  
PORNPIMOL SUKAVATEE, Ph.D.

This study aims to 1) explore the reading strategies of EMI in science program Thai learners 2) explore students' opinions towards the use of reading strategies in EMI context. Participants include 71 students studying at Kamnoetvidya Science Academy, the science high school located in Rayong, Thailand. The research instruments consisted of the Reading Strategies Questionnaire and the semi-structure interview. The data were analyzed through descriptive statistics and content analysis. The results from the questionnaire showed that the students reported overall medium frequency of reading strategy use. The most used reading strategies were cognitive strategies, followed by metacognitive strategies, while the least used strategies included support strategies. Moreover, results from the interview showed that students considered several strategies useful for their reading in EMI context. Additional reading strategies were also found from the students' interview. Pedagogical implication was presented and discussed as guidelines for teachers who are in the program in enhancing students' reading of texts in EMI.



Field of Study:	English as an International Language	Student's Signature
Academic Year:	2021	.....
		Advisor's Signature
		.....

## ACKNOWLEDGEMENTS

I would like to take this opportunity to express my gratitude to people whose contribution, support, and assistance have made to the success completion of this study.

First and foremost, I would like to express my sincere gratitude to my advisor, Assistant Professor Dr. Pornpimol Sukavatee, for her valuable guidance and supervisor throughout my study. Her kindness, empathy, and dedication have greatly inspired me. My study would not have been accomplished without her support and encouragement.

My gratitude is also extended to my committee members, Assistant Professor Dr. Ruedeerath Chusanachoti and Assistant Professor Dr. Maneerat Ekkayokkaya for their constructive comments and suggestions, which could indeed enhance the quality of my research. I would like to also thank to Associate Professor Dr. Sumalee Chinokul, Associate Professor Dr. Chaleosri Pibulchol, and Dr. Banchakarn Sameephet for their contribution on validating my research instruments.

My heartfelt thanks go to the KVIS principal, Dr. Thongchai Chewprecha, who granted the official permission to collect data from the students at KVIS. I would like to also thank to KVIS teachers, Dr. Jane Kanjanaphoomin and Dr. Gidja Tanomsingha, for devoting their time to help me throughout the data collection process. Without their support, this study would not have succeeded. I would also like to thank you all students who participates in my study.

I am also thankful to my EIL classmates in Batch 19, my senior EIL fellows, as well as EIL staff for their kind suggestion, support and encouragement. Last but not least, I would like to extend my gratitude to my family for their unconditional love and support throughout my academic journey in EIL.

Namfar Boonkor

# TABLE OF CONTENTS

	<b>Page</b>
.....	iii
ABSTRACT (THAI) .....	iii
.....	iv
ABSTRACT (ENGLISH).....	iv
ACKNOWLEDGEMENTS .....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES .....	viii
1. Introduction .....	1
1.1 Background of the study .....	1
1.2 Research Questions.....	2
1.3 Research Objectives.....	2
1.4 Significance of The Study .....	2
1.5 Definition of Terms .....	3
2. Literature Review .....	3
2.1 English Medium Instruction (EMI) .....	3
2.1.1 English Medium Instruction in Thailand .....	4
2.1.2 English Medium Instruction in The Present Study.....	5
2.2 The Importance of Reading in EMI Context.....	5
2.3 Reading Strategies .....	6
2.3.1 Reading Strategies and Reading Comprehension.....	6
2.3.2 Reading Strategies Classification .....	6
2.4 Previous Studies .....	8
3. Methodology .....	10
3.1 Research Design .....	10
3.2 Participants .....	10

3.3 Research Instruments .....	10
3.3.1 Reading Strategies Questionnaire.....	10
3.3.2 Semi-Structure Interview .....	11
3.4 Data Collection.....	11
3.5 Data Analysis .....	11
4. Results.....	12
4.1 Reading Strategies of EMI in Science Program Thai Learners.....	12
4.1.1 The Most Frequently Used Reading Strategy of EMI in Science Program Thai Learners .....	14
4.2 Students' Opinions Towards the Use of Reading Strategies .....	16
4.2.1 Metacognitive Strategies.....	16
4.2.2 Cognitive Strategies.....	17
4.2.3 Support Strategies.....	17
4.2.4 Additional Reading Strategies.....	18
5. Discussion and Recommendations .....	20
5.1 Summary of The Study .....	20
5.2 Discussion .....	20
5.2.1 The Use of Reading Strategies .....	20
5.2.2 The Use of Individual Strategy.....	21
5.2.3 Additional Reading Strategies Use in EMI Context.....	21
5.2.4 Pedagogical Implications .....	22
5.3 Recommendation for Further Studies .....	23
REFERENCES.....	24
APPENDICES.....	27
VITA.....	35



## LIST OF TABLES

	<b>Page</b>
Table 1: List of reading strategies .....	7
Table 2: The mean scores and standard deviation of the reading strategies used by the participants .....	12
Table 3: The rank of the students' use of reading strategy categories .....	14
Table 4: The five most frequently used reading strategies among the participants ...	15



# 1. Introduction

## 1.1 Background of the study

It is acknowledged that reading is a crucial skill for English as foreign language (EFL) students (Anderson, 1991). Due to the globalization, English has become world's lingua franca and has been used as a medium of communication in several domains, including education, business, science and technology (Tardy, 2004). There has been a rich source of information and knowledge available in English nowadays. Thus, reading is a fundamental tool which allows EFL students to acquire new information and expand their academic knowledge. Despite the important of reading, it is reported that EFL students have encountered challenges when reading texts in English. Therefore, reading strategies, which can be defined as “the processes controlled by readers to solve reading problem” (Grabe, 2009), are crucial means for solving reading difficulties and enhancing reading comprehension. In addition, research has concluded that applying effective reading strategies not only strengthen EFL students reading comprehension, but also allow them to make greater progress in their learning and ensure their academic achievement (Carrell, 1989; Sheoreya & Mokhtari, 2001).

Not only reading strategies can assist EFL students in better understanding English texts, the strategies are extremely significant for students in English medium instruction (EMI) context, where English is used immensely throughout the curriculum. The main objective of EMI is on the development of the academic content while English language is considered a medium in classroom teaching and learning. EMI students are expected to learn academic contents, along with reading academic textbooks and course materials in English. However, implementing EMI can pose several challenges for students. Since this concept is typically applied to secondary and tertiary education, the shift to learn content subjects in English is sudden (Arkin & Osam, 2015). It is reported that students who enter the EMI program often struggle to learn the subject contents due to their English proficiency (Belhiah & Elhami, 2015). Another major concern is that students are required to learn content subjects with little or no instructional support in comprehending these academic contents in English. This could cause challenges in students' learning outcome and their grades (Roussel et al. 2017).

Apart from the difficulties in understanding academic contents in English, students in EMI program have to confront with considerable amount of reading materials used in the program. In EMI program, students rely heavily on reading materials to gain knowledge in academic content. However, EMI textbooks and reading materials differ from other educational contexts since it is authentic and content-focused (Macaro, 2015). According to Owen et al. (2021), English-medium textbooks significantly contains more academic vocabularies than the EFL texts. The

abundance of technical and academic terms presented in EMI textbooks could hinder students' comprehension in their reading. In order to cope with this highly demanding task in understanding texts, reading strategies clearly become a necessity for students in EMI program to better comprehend conceptually challenging contents in the textbooks and reading materials, thus obtain mastery of the content knowledge and survive in the program.

The important of reading strategies in enhancing the comprehension of texts has led numerous researchers to investigate the strategies used among EFL learners. However, there is a limited number of literatures on the strategies applied by students in an English-medium context. The present study therefore sought to address this gap by investigating reading strategies used by students in EMI program. Considering the aforementioned challenges that EMI students have encountered, it would be beneficial to explore how they applied strategies in order to overcome the difficulties in reading content materials and texts in English.

### **1.2 Research Questions**

1. What reading strategies of EMI are used by science program Thai learners?
2. What are students' opinions towards the use of reading strategies in EMI context?

### **1.3 Research Objectives**

1. To investigate the reading strategies of EMI used by science program Thai learners
2. To explore students' opinions towards the use of reading strategies in EMI context

### **1.4 Significance of The Study**

The results of the study could offer the insights into the reading strategies employed by Thai students who are studying in EMI program. This could also contribute to the research in EMI field which still have few studies in students' use of strategies. Also, the results of the study could provide useful implications and guidelines for content teachers in their instructional design, as well as in selecting appropriate reading materials which suite with the students. As of the English language teachers in EMI program, they would be more aware of what strategies students usually employed and what difficulties they have in reading. Thus, they could equip students in EMI program with those reading strategies, and assist them to have less difficulties in reading.

## 1.5 Definition of Terms

**1. Reading strategies:** refers to the processes that are consciously controlled by readers to solve reading problem. The classification of the strategies in the present study was adapted from the classification of Sheorey and Mokhtari (2001), and Lin and Yu (2015), which includes Metacognitive Strategies (MET), Cognitive Strategies (COG) and Support Reading Strategies (SUP). Metacognitive Strategies (MET) refers to the techniques that students purposively plan in order to manage their reading, such as having an objective in mind, using typographical aids and tables and figures. Cognitive Strategies (COG) refers to the methods that the students use directly when reading texts, such as rereading and guessing the meaning of unknown words. Support Reading Strategies (SUP) refers to the basic support aimed at enhancing the comprehension of texts, such as using dictionary and taking notes.

**2. Science program Thai learners:** refers to the students who are studying at high school level at Kamnoetvidya Science Academy in Rayong, Thailand. The school provides education with an emphasis on science and technology to students. Also, the school follows the Thai Basic Education Core Curriculum B.E. 2551, as set by the Ministry of Education, with EMI being implemented in teaching and learning all science subjects.

**3. English Medium Instruction (EMI):** refers to the use of English language to teach academic subjects in countries or jurisdictions where the first language of the majority of the population is not English. As of the school in this study, Kamnoetvidya Science Academy, EMI is implemented in teaching all science disciplines, namely Physics, Chemistry, and Biology. In addition, the English-medium textbooks and course materials are applied in teaching all science subjects.



## 2. Literature Review

### 2.1 English Medium Instruction (EMI)

English Medium Instruction (EMI) is defined as “the use of English language to teach academic subjects in countries or jurisdictions where the first language of the majority of the population is not English.” Those academic subjects include science, mathematics, geography, and medicine (Macaro et al., 2019). EMI has been growing rapidly due to the role of English as an international lingua franca in several domain including education, business, science and technology. A number of literatures have attempted to define characteristics of EMI setting. However, its characteristics are not absolute uniformity and are implemented differently across countries. Certain core characteristics of EMI stated in previous studies are described below.

First is regarded to the use of English language in the instruction. In an ideal EMI setting, English is viewed as the language used for instructional purpose (Macaro

et al., 2019). However, in the actual context, the program could be seen as both “full and partial EMI” (Pecorari & Malmström, 2018). In the full EMI contexts, the instruction of all courses is conducted in English. On the other hand, partial EMI offers the instruction with the support of the L1 usage. For instance, certain subjects are delivered in the first language while the other subjects are taught in English (Poon, 2013). Another example is the use of the first language in oral lecture and textbooks in English (Pecorari et al., 2011).

The second characteristic is that the English language itself is not the subject to be taught since the primary focus of the teaching is on the mastery of the academic content, language development is not included as an explicit aim. This differentiates EMI from other models such as content and language integrated learning (CLIL), which put the clear objectives in the development of both academic content and language (Macaro et al., 2019). Nevertheless, in the actual circumstances, policy-makers and stakeholders often expect that the use of English throughout the program provide the opportunity for students to improve communication, writing and research skills and thus will naturally promote students’ English language development (Ali, 2013).

The third feature, which is closely related to the second point, is that EMI do not emphasize on the language development. Theoretically, EMI solely focuses on the mastery of the academic content as a learning, and English language development is not included as the learning outcomes at all. Despite not being explicitly included as the learning outcome, language development is often view as an ‘expected’ outcome in EMI curriculum (Dearden, 2018). For instance, policy-makers and stakeholders often assume that the use of English throughout the program provide the opportunity for students to improve communication, writing and research skills and thus will naturally (and incidentally) promote students’ English language development (Ali, 2013).

EMI is a growing global phenomenon in both public and private education in all stages, from primary to tertiary. Possible reasons of introducing EMI include developing English language proficiency, and open up the possibility for students to work and study abroad. (Dearden, 2014). Also, policy makers and stakeholders consider EMI as a way to internationalize their education and create opportunities for students to join a global academic and business community.

### **2.1.1 English Medium Instruction in Thailand**

In Thailand, English-medium instruction in is usually referred to as “English Program.” Even though the Thai Ministry of Education set the regulations regarding the format of EMI in school levels, there are no official guidelines on administration of EMI, including selection criteria of students, classroom teaching and learning, textbooks/materials, and assessments which are specifically designed for EMI

context. Consequently, the implementation of EMI is highly inconsistent across institutions. For instance, in some educational programs, English medium textbooks are employed, while lectures are delivered in Thai (Hengsadeeikul et al., 2010). As of the textbooks/materials, some schools produce their own textbooks, while others opt for textbooks from other countries (Chanjavanakul, 2013).

### **2.1.2 English Medium Instruction in The Present Study**

The present study was conducted at the EMI school named Kamnoetvidya Science Academy. As the emphasis of the school is on science and technology, English is used as a medium of teaching all science disciplines, namely Physics, Chemistry, and Biology. Also, English-medium textbooks and course materials are applied in teaching the above-mentioned subjects. The school follows the Thai Basic Education Core Curriculum B.E. 2551, as set by the Ministry of Education, with additional courses in science subjects being taught in English to optimize the potential of these students.

## **2.2 The Importance of Reading in EMI Context**

As an increasing number of countries have adopt EMI into their tertiary and secondary education, several studies have investigated the challenges students may encounter. It was found that the content teachers in EMI programs view reading as the most required skill for students. (İnan Karagül et al., 2012). This is due to the fact that students are expected to read and understand academic texts and articles written in English. (Dearden, 2014; İnan Karagül et al., 2012).

Concerning possible challenges in EMI reading, previous study reported that students in EMI program view reading as one of the most challenging skills to master (Aizawa et al., 2020). This is because reading material in EMI differs from other educational contexts since the texts are content-focused. Therefore, not only the language but also the academic content presented in the texts make reading even more difficult for EMI students to comprehend. According to Owen et al. (2021), English-medium textbooks significantly contains more academic vocabularies than the EFL texts. This could cause some challenges to students who may not be prepared to read the academic contents in English, particularly in the cognitive demanding subjects, including science and mathematics. As of the assessment of students, unlike EFL contexts where the assessment focus on proficiency English in general, the EMI assessment primarily measures the academic subject competence. Thus, challenges in reading can have a possible effect on students' academic achievement (Roussel et al., 2017).

As students in EMI program are expected to be active readers in order to comprehend the academic content, reading strategies are considered very crucial for EMI students. Research shows that reading strategies can assist students'

comprehension in academic contents (Grabe, 2009). Therefore, applying appropriate reading strategies when dealing academic texts can foster the students' content literacy and allow them to make greater progress in their EMI courses, which will result in their academic success.

## **2.3 Reading Strategies**

Several scholars attempted to define reading strategies. According to Anderson (1991), strategies are “deliberate, cognitive steps that learners can take to assist in acquiring, storing, and retrieving new information.” Grabe (2009), described reading strategies as “the processes that are consciously controlled by readers to solve reading problem”. Koda (2005) concluded that reading strategies can be characterized by three major components: deliberate, goal/problem oriented, and reader-initiated/controlled. She also pointed out that reading strategies allow readers to elaborate, organize, and evaluate information derived from text.

### **2.3.1 Reading Strategies and Reading Comprehension**

Koda (2005) pointed out that processing skills alone do not make readers proficient. Comprehension is a complex process which involves interaction between readers and texts to create meaning. Thus, every reader would encounter comprehension obstacle when reading texts, particularly those conceptually challenge materials. To overcome this comprehension breakdown, reading strategies obviously become a necessity for successful reading comprehension despite the complex nature of the reading process (Anderson, 1991). For students in EMI context, reading strategies clearly become a necessity for them to better comprehend conceptually challenging contents in the textbooks and reading materials, resulting in their greater progress in their learning throughout the program.

### **2.3.2 Reading Strategies Classification**

From the literature review of reading strategy research published between 1991 to 2021, several scholars classified strategies which are crucial for academic reading. The categories of reading strategies are varied across literatures, due to researchers' viewpoints and experience towards reading processes and strategies. However, it should be noted that there are distinctions between L1 and L2 reading strategies. Research in L2 reading strategies thus covers some aspects that are not included in L1 reading strategies, including the mental translation and the L1 transfer (Grabe, 2009). This study, therefore, mainly focuses on L2 reading strategies since it is suitable for the context of the study.

After the review of previous literatures regarding the categories of reading strategies, the present study decided to adapt the classification of reading strategies based on Sheorey and Mokhtari (2001), and Lin and Yu (2015) due to its appropriateness for the context of the present study. According to Sheorey and

Mokhtari (2001), the categories of reading strategies are suitable to be applied with non-native English students when reading academic materials in English they regularly encountered in secondary school and college. The strategies included three main categories;

**1. Metacognitive strategies** refer to the intentional and carefully planned techniques that readers manage or monitor their reading i.e., setting purposes for reading, and using typographical features.

**2. Cognitive strategies** refer to the actions and steps that readers use while working directly with the text. These strategies are focused techniques applied when problem develop in understanding textual information i.e., rereading, and guessing the meaning of unknown words.

**3. Support strategies** refer to basic support mechanism readers employed to assist their comprehension of the text i.e., using dictionary, and taking notes.

Table 1 shows most frequent strategies researchers agree that they are important for L2 reading (Anderson, 1991; Sheorey & Mokhtari, 2001; Pressley & Gaskin, 2006; Brown; 2007; Block & Duffy, 2008; Grabe, 2009; Grabe & Stoller, 2013; Lin & Yu, 2015; Terzj, 2015; Owen et al., 2021; Yu et al., 2021). These strategies are adopted in the present study as a research instrument to explore the participants' reading strategies.

*Table 1: List of reading strategies*

Category	Sub-Reading Strategies
<b>1. Metacognitive strategies (MET)</b>	1.1 Set purposes for reading
	1.2 Preview text before reading
	1.3 Predict or guess text content
	1.4 Connect text to background knowledge
	1.5 Use text features e.g., tables, figures, and pictures in text to increase understanding
	1.6 Use typographical features e.g., bold face and italics to identify key information
	1.7 Critically evaluate the information in the text
	1.8 Check whether the text content fits reading purpose
	1.9 Link ideas together to understand the whole content
<b>2. Cognitive strategies (COG)</b>	2.1 Identify the main points of the author
	2.2 Identify supporting details
	2.3 Reread the text to increase understanding
	2.4 Read slowly and carefully in informative and important sections



Category	Sub-Reading Strategies
	2.5 Skim and scan the text
	2.6 Pause and think about reading or particular ideas
	2.7 Guess meaning of unknown words from context
	2.8 Make inferences
	2.9 Visualize information to represent ideas described in the text
	2.10 Try to stay focused on reading
<b>3. Support strategies (SUP)</b>	3.1 Translate information from English to Thai (mental translation)
	3.2 Underline, mark, or highlight information in the text
	3.3 Take notes
	3.4 Use dictionary or other references
	3.5 Paraphrase or restate ideas in your own words
	3.6 Ask oneself questions about the text
	3.7 Read aloud
	3.8 Summarize the information in the text
	3.9 Try to search and clarify technical terms in the text
	3.10 Consult online resources for more information to better understand difficult terminologies in the text
	3.11 Read other textbooks/materials written in Thai on the same content to increase comprehension
	3.12 Ask academic content teachers for clarification of the text
	3.13 Ask classmates for clarification of the text

## 2.4 Previous Studies

### Research on EMI Students' Reading Strategies

To date, there is a limited number of research into the reading strategies students used in an attempt to cope with their reading in EMI courses, and their perceptions and challenges towards reading EMI textbooks or course materials. The following are some literatures which attempted to investigate the students' use of learning and reading strategies in EMI program.

Soruç and Griffiths (2017) were among the pioneer researchers who explored the difficulties faced by Turkish students who were in EMI courses, as well as the strategies they applied to deal with difficulties in EMI classroom. The results showed that students identified a number of difficulties related to vocabulary e.g., not being able to understand vocabularies and terminologies used in the class. In order to deal with vocabulary challenges, students reported using several strategies, namely guessing from context, using a dictionary, translating, and using visual.

Yu et al. (2021) investigated the strategies used by students to cope with EMI in a higher education context in Macau. The findings revealed that the students' use of strategies fell in four major themes included 1) L1-mediated strategy e.g., read Chinese translations textbook on the same subjects and translate teachers' PowerPoint slides from English to Chinese, 2) L2-related strategy e.g., read English material to boost academic learning, 3) tool-mediated strategy e.g., use a dictionary to look up words in the lesson, and search for the information of unfamiliar theories/terms online, and 4) Community mediated strategy e.g., seek the support from native teachers, ask classmates for help after class.

Regarding the study that specifically focused on EMI students' reading strategies, Owen et al. (2021) examined academic reading in two EMI universities in Nepal and Sweden, as well as the challenges students encountered when studying in a language other than their mother tongue. The data was collected from reading logs, questionnaire, and a semi-structure interview. They concluded that the most frequently used strategies among students in both locations are 1) reading to understand the main points the author makes, 2) linking ideas together to understand the whole argument, 3) linking information to existing knowledge, 4) read a section multiple times to ensure the understanding of text. In addition, it was found that the used of strategies were different across locations. Swedish students were more likely to try to infer meaning of unknown words from context, and would consult dictionary only if this strategy was not successful. On the other hands, Nepalese students reported using dictionary to look up unfamiliar words. Findings from the interview revealed that the majority of students in EMI contexts read from a diverse range of sources, including academic books, journal articles, reference works, online sources, and lecture notes. Also, majority of language learning strategies reported by participants were bottom-up, lexis-focus strategies. The interviewees reported using strategies such as identifying unknown words from context, consulting classmates, dictionary, online videos, or Google translate. As for the strategies used for retaining the content being read, students reported rereading the text, and taking notes.

### **Research on Students' Reading Strategies in Thailand**

Through an extensive review of literatures, previous research works on reading strategies mainly conducted with Thai students in tertiary education. However, there is a limited number of studies on the use of reading strategies among Thai students who are in EMI context.

Saengpakdeejit (2009) carried out the survey research to investigate the types of reading strategy employed by science undergraduate students in Thai public universities. The results show that the students' overall frequency use of reading strategies was at a medium level. Also, the science students employ reading strategies

significantly according to their genders, field of study and level of reading proficiency.

In addition, (Phonhan, 2017) explored the frequent used of academic reading strategies among Thai chemistry students in university level, and to examined the relationships between students' frequency of reading strategy use and their reading proficiency. Findings from the questionnaire and academic reading test showed that students reported overall moderate level of reading strategies used. In addition, there was no significant correlation between students; frequency of reading strategy use and their reading proficiency.

### **3. Methodology**

#### **3.1 Research Design**

This study utilized both quantitative and qualitative research method to explore EMI reading strategies of science program Thai EFL learners. Two research instruments include questionnaire and semi-structured interview.

#### **3.2 Participants**

The participants in this study were 71 students studying in grade 12 in academic year 2021 at Kamnoetvidya Science Academy in Rayong, Thailand. The school applies partial EMI concept in its curriculum. That is, English is used as a medium of teaching science subjects namely, Physics, Chemistry, and Biology, while other subjects including Social Studies, Arts, and Physical Education are taught in Thai. Their average age was 17 years old. All students took part in the questionnaire. In additional, six of them had been purposively selected to participate in the semi-structure interview, the selection of participants for the interview was based on the recommendation from the teachers who have experienced teaching the students to identify the interviewees who could offer critical responses to the interview.

#### **3.3 Research Instruments**

This study employed both quantitative and qualitative methods to address the two research questions. The research instruments included reading strategies questionnaire and a semi-structure interview.

##### **3.3.1 Reading Strategies Questionnaire**

The questionnaire was developed to assess students' use of reading strategies and their frequency of the strategy use. The lists of strategies were accumulated from previous literatures in L2 reading published between 1991 to 2021 (Anderson, 1991; Sheorey & Mokhtari, 2001; Pressley & Gaskin, 2006; Brown, 2007; Block & Duffy, 2008; Grabe, 2009; Grabe & Stoller, 2013; Lin & Yu, 2015; Terzj, 2015; Owen et al., 2021; Yu et al., 2021). The strategies were grouped into three major categories of

reading strategies, which are metacognitive strategies (MET), cognitive strategies (COG), and support strategies (SUB). The survey items required students to rate their frequency of use when reading academic texts, with a 4-point Linkert scales ranging from 4 (always or almost always) to 1 (never or almost never).

To evaluate the validity of the questionnaire, three experts in Thailand participated in the evaluation of the questionnaire items. After validation of the questionnaire, two items were removed from the list according to the suggestions of the experts to better suit the Thai context. In total, the reading strategies consisted of three major strategy categories (MET, COG, and SUB), and thirty sub-strategies (see appendix A).

### **3.3.2 Semi-Structure Interview**

The semi-structure interview (see appendix B) consists of 5 questions. The questions were designed to elicit students' opinions towards their use of reading strategies when reading academic texts in EMI program. The interview permitted the researcher to access more in-depth information about students' viewpoints and reasons for their use of each reading strategy, as well as generate more of their use of strategies to deal with difficulties in reading.

The combination of the two research instruments allowed the researcher to obtain comprehensive information to fully understand the use of reading strategies among participants in the present study.

### **3.4 Data Collection**

After receiving the official permission from the school administrators, the data collection was carried out during the second semester of academic year 2021, the questionnaires were distributed to 71 students in hard copies. Before responding to the questionnaire, the participants were informed about the purpose of the study. After collecting all copies of the questionnaire, the semi-structure interview sessions of 6 students were conducted through Zoom program with students at their convenient time, and the videos were recorded.

### **3.5 Data Analysis**

To answer the two research questions, both quantitative and qualitative data analysis were performed. The quantitative data obtained from the questionnaires was analyzed using descriptive statistic, including mean score and standard deviation. The qualitative data from the semi-structured interview was analyzed using content analysis.

In order to analyze the quantitative data, the mean scores of the strategies use were conducted to find out the most frequently used EMI reading strategy and to

compare the frequent use of each strategy. The 4-point Linkert scales in the questionnaire were categorized as follows (Intaraprasert, 2000):

Mean Score	Interpretation
1.00 to 1.99	low strategy use
2.00 to 2.99	moderate strategy use
3.00 to 4.00	high strategy use

## 4. Results

This chapter presented the results of the study regarding the reading strategies of EMI in science program Thai learners. The first part of this chapter presented the descriptive statistic of the reading strategies of EMI in science program Thai learners. The mean value and S.D. of the students were presented. Next, the results of the students' interview were discussed to probe more information regarding the students' opinions towards the use of reading strategies in EMI context.

### 4.1 Reading Strategies of EMI in Science Program Thai Learners

Research question 1: What reading strategies of EMI are used by science program Thai learners?

This research question aimed to explore the overall use of reading strategies among science program Thai learners in EMI context. The research instrument used to answer this research question was the reading strategies questionnaire. As of the reading strategies questionnaire, the participants were asked to rate their frequency of strategies used when reading academic texts on 4-point Linkert scales ranging from 4 (always or almost always) to 1 (never or almost never). The results from the questionnaire were analyzed using mean scores and standard deviation. The interpretation scales of mean scores for the reading strategies questionnaire were further analyzed as low strategy use ( $\bar{x} = 1.00$  to 1.99), moderate strategy use ( $\bar{x} = 2.00$  to 2.99) and high strategy use ( $\bar{x} = 3.00$  to 4.00). Table 2 showed the mean scores and standard deviation of the participants' use of reading strategies items.

*Table 2: The mean scores and standard deviation of the reading strategies used by the participants*

Item	Reading Strategies	Mean	SD	Meaning
<b>Metacognitive Strategies (MET)</b>		<b>3.01</b>	<b>0.37</b>	<b>High</b>
1	Set purposes for reading	2.65	0.93	Moderate
2	Preview text before reading	2.77	1.02	Moderate

Item	Reading Strategies	Mean	SD	Meaning
3	Predict or guess text content	2.99	0.95	Moderate
4	Connect text to background knowledge	3.42	0.75	High
5	Use text features e.g., tables, figures, and pictures in text to increase understanding	3.54	0.71	High
6	Use typographical features e.g., bold face and italics to identify key information	2.97	0.86	Moderate
7	Critically evaluate the information presented in the text	2.90	0.74	Moderate
8	Check whether the text content fits reading purpose	2.45	0.95	Moderate
9	Link ideas together to understand the whole content	3.44	0.73	High
<b>Cognitive Strategies (COG)</b>		<b>3.03</b>	<b>0.35</b>	<b>High</b>
10	Identify the main points the author makes	3.03	0.79	High
11	Identify additional supporting details	2.80	0.82	Moderate
12	Reread the text to increase understanding	3.11	0.80	High
13	Read slowly and carefully in informative and important sections	3.32	0.79	High
14	Skim and scan the text	2.76	0.90	Moderate
15	Pause and think about reading or particular ideas	2.97	0.86	Moderate
16	Guess meaning of unknown words from context	3.21	0.88	High
17	Make inferences	2.92	0.77	Moderate
18	Visualize information to represent ideas described in the text	3.07	0.85	High
19	Try to stay focused on reading	3.13	0.77	High
<b>Support Strategies (SUP)</b>		<b>2.29</b>	<b>0.45</b>	<b>Moderate</b>
20	Translate information from English to mother tongue	2.18	1.02	Moderate
21	Underline, mark, or highlight information in the text	2.10	1.02	Moderate
22	Take notes	1.76	0.82	Low

Item	Reading Strategies	Mean	SD	Meaning
23	Use dictionary or other references	2.55	0.87	Moderate
24	Paraphrase or restate ideas in your own words	2.21	0.84	Moderate
25	Ask oneself questions about the text	2.48	1.09	Moderate
26	Try to Search and clarify technical terms in the text	3.15	0.80	High
27	Consult online resources for more information to better understand difficult terminologies in the text	2.86	0.99	Moderate
28	Read other textbooks/materials written in Thai on the same content to increase comprehension	1.92	0.94	Low
29	Ask academic content teachers for clarification of the text	1.63	0.80	Low
30	Ask classmates for clarification of the text	2.30	0.95	Moderate
<b>Overall Reading Strategies</b>		<b>2.78</b>	<b>0.87</b>	<b>Moderate</b>

As Table 2 illustrated, the means of individual strategies item ranged from a high of 3.54 to a low of 1.63. The overall mean score of students' use of reading strategies is 2.78, which indicated the moderate use of reading strategies according to the established criteria described above.

#### 4.1.1 The Most Frequently Used Reading Strategy of EMI in Science Program Thai Learners

The overall mean scores of the three main reading strategies obtained from the questionnaire were also compared in order to find out the most employed category among participants. Table 3 illustrated the mean scores and the rank of the three reading strategy categories.

*Table 3: The rank of the students' use of reading strategy categories*

Strategy Category	Mean	Frequency Use Level	Rank
Cognitive	3.03	High	1
Metacognitive	3.01	High	2
Support	2.29	Moderate	3

As shown in table 3, the result revealed that the overall uses of three categories are 3.03, 3.01, and 2.29 for cognitive, metacognitive, and support strategies respectively. The cognitive strategy was the most frequently used, which was slightly higher than metacognitive strategies, while the support strategy was the least used by the participants.

In addition, the mean scores of the individual strategies from the questionnaire were ranked from the highest mean score to the lowest mean score in order to find out the most frequently used individual strategies among the participants. Table 4 showed the top five reading strategies which were the most favored by the students with mean scores and standard deviation.

*Table 4: The five most frequently used reading strategies among the participants*

<b>Strategy</b>	<b>Mean</b>	<b>Category</b>	<b>Rank</b>
5. Use text features e.g., tables, figures, and pictures in text to increase understanding	3.54	MET	1
9. Link ideas together to understand the whole content	3.44	MET	2
4. Connect text to background knowledge	3.42	MET	3
13. Read slowly and carefully in informative and important sections	3.32	COG	4
16. Guess meaning of unknown words from context	3.21	COG	5

As shown in Table 4, the most frequently used strategy was strategy (5) use text features e.g., tables, figures, and pictures in text to increase understanding, with the highest mean score of 3.54. The second rank was strategy (9) link ideas together to understand the whole content (mean score = 3.44). The third rank was strategy (4) connect text to background knowledge (mean score = 3.42), followed by strategy (13) read slowly and carefully in informative and important sections, and strategy (16) guess meaning of unknown words from context' (mean scores = 3.32 and 3.21 respectively). Overall, the top three strategies from the rank were strategies in metacognitive category, followed by the two strategies from cognitive category.



## 4.2 Students' Opinions Towards the Use of Reading Strategies

Research question 2: What are students' opinions towards the use of reading strategies in EMI context?

This research question aimed to explore the students' opinions towards the use of reading strategies in EMI context. The semi-structure interview was employed in order to answer this research question. In addition, the interview permitted the researcher to further explore students' reasons for their use of each reading strategy, as well as generate more of their use of strategies in order to deal with difficulties in reading. The data collected from the interview were categorized according to the three main reading strategy categories (MET, COG, and SUB). Moreover, the additional categories of reading strategies were also reported in this part.

### 4.2.1 Metacognitive Strategies

Most interviewees reported that they were positive towards the use of metacognitive strategy category. This could be support by their report that using the two main strategies from metacognitive category could increase comprehension. First, the strategy of 'using text features e.g., tables, and figures in text' could help them understand the key information in the text.

I always read information presented in tables and figures to increase understanding. I think they are the keys information that the author wanted to highlight in the text.

(Students 3)

I often read tables, and figures along with reading the narrative part to increase my understanding of the text content.

(Students 4)

Another strategy from metacognitive category that all interviewees reported using frequently in dealing with difficult vocabularies in terminologies in the text is the strategy of 'guessing meaning of unknown words from context' Some interviewees reported that they preferred using this strategy then consulting dictionary, as it allowed them to read more smoothly.

I always guess meaning of unknown words from context. In textbooks, when there are the difficult words, usually they provide you with other simple words with similar meaning along with contexts. This allows me to directly make meaning out of them without looking for the meaning from dictionary.

(Student 1)

When I encounter unknown words in text, most of the time I try to guess the meaning of them from context. Yet, if the words I encounter are too difficult to guess their meaning from context, I then turn to search for their meaning using dictionary.

(Student 2)

#### 4.2.2 Cognitive Strategies

The interviewees reported that the strategies from cognitive category could assist their reading, for example, 'reading at a slower pace' and 'rereading the text to increase understanding'. They also reported using these strategies particularly when they encountered difficult vocabularies or contents during reading, as well as when they came across the important part in the text.

I usually read slowly, especially when I come across difficult parts of the content.

(Student 1)

I usually read slowly and carefully, particularly in the parts that are highlighted by the author, which means that the information in those parts must be important.

(Student 2)

I tend to read slowly or even reread when I encounter difficult vocabularies, especially the key words or main terminologies. Also, I often reread to recheck if my understanding of the content is correct. Usually, when I read for the first time I read word by word, trying to make meaning of each vocabulary. Then, the second round I try to make meaning of the whole chunk of paragraphs to increase my comprehension.

(Student 5)

#### 4.2.3 Support Strategies

Most interviewees reported that the reading strategy in support category could assist their comprehension, particularly the strategy of 'using dictionary'. The results from the interview showed that students used this strategy very frequently once they first entered the EMI program. However, some interviewees reported that overusing this strategy could interrupt their comprehension of texts. Also, when students became more proficient, they would employ this strategy only when the vocabularies are too difficult and their meaning could not be derived from context.

When I first entered the school, I looked up the meaning of words in dictionary very often. Now, I gain more vocabularies knowledge so I do not use this strategy anymore because it consumes too much time.

(Student 1)

At first, I did not have any strategies in reading at all, so I ended up looking for the meaning of almost every vocabulary in the text. I also feel that this interrupt my comprehension of text a lot since I had to stop to look for their meanings all the time.

(Student 4)

There are also some specific and difficult terminologies which I cannot infer the meaning from the context. So, I have to search for their definitions.

(Student 5)

#### **4.2.4 Additional Reading Strategies**

Apart from the above three strategy categories, interviewees also reported that there were additional strategies that could be useful for their reading text in EMI.

##### **L1 & L2 Mediated Strategies**

It should be noted that some interviews also reported using the strategies which rely on their native language (L1) to increase comprehension, for example, reading other textbooks or materials written in Thai on the same content, translate information from English to Thai, and take note or write a summary in Thai.

I read other textbooks or materials written in Thai on the same content to increase comprehension, particularly with the contents that I do not like.

(Student 4)

I write a brief summary of the main idea in each paragraph in Thai. This helps a lot since I could easily get back to my written summary if I forget the contents after reading.

(Student 5)

When I do not understand the contents of the texts, e.g., in Chemistry. I also read course materials which are translated in Thai along with reading English texts to increase comprehension. I think reading text in Thai together with English text could fulfill my understanding of the content.

(Student 6)

On the other hands, other interviewees reported that L1-mediated strategies hindered their comprehension. Therefore, they mainly used English and not relying on their L1.

I do not like to read Thai textbook because usually it was translated from English versions. It may lose originality in the contents.  
(Students 1)

I write all notes from the text I read in English, because it helps me improve my English proficiency as well.  
(Student 2)

I do not translate information from English to Thai because it causes confusion. Usually, I would choose to focus on only English language.  
(Student 3)

### **Affective Strategies**

It should also be highlighted that the interviewees reported using the additional strategies in order to increase their motivation and concentration in reading. They considered this one of the important strategies that are required for students in EMI program.

It has to start with having passion in what you are reading. If you are passionate in the texts, you would read them with enjoyment. On the other hands, if you are not passionate in what you are reading, you may not able to comprehend and complete your reading.  
(Student 1)

I do not put too much effort when reading academic texts. I think if we focus too much, we might end up being too stressful and may not be able to finish reading the whole contents. I think this could reduce our capability in reading.  
(Student 2)

I think reading without pressure is very important. I used to put myself too much and focused on every single detail in the text, and I believe this is not a good idea. I also think that we do not need to know the meaning of every single word in the text and we do not need to understand the content 100%.  
(Student 4)

The important strategy for academic reading is putting our feeling into reading the texts. I always set the positive mood when I am going to read texts. I would think that I am going to explore the text contents, not just read to learn or to prepare for the test. For example, I would try to make a connection to the authors by thinking what they want to tell us in each paragraph. Thus, when I read textbooks, I feel like I am reading a novel and I always have fun and feel more motivated when reading.

(Student 6)

## **5. Discussion and Recommendations**

This chapter presented that summary of the study, discussion of the findings, and recommendation for future research.

### **5.1 Summary of The Study**

The present study explored the reading strategies of EMI in science program Thai learners and their opinions towards the use of reading strategies in EMI context. Participants included 71 students studying in grade 12 in the academic year 2021 at Kamnoetvidya Science Academy in Rayong, Thailand. The research instruments included reading strategies questionnaire and the semi-structure interview. The data obtained were analyzed using descriptive statistics and content analysis.

The results indicated that the participants in this study reported overall use of reading strategies at a moderate level. The participants employed cognitive strategies more frequently than other strategies. Meanwhile, support strategies were found to be the least frequently used by the participants. In addition, the top five reading strategy items which were most frequently used by participants including (1) use text features e.g., tables, figures, and pictures in text to increase understanding, (2) link ideas together to understand the whole content, (3) connect text to background knowledge, (4) read slowly and carefully in informative and important sections, and (5) guess meaning of unknown words from context. Apart from the provided lists of reading strategies, there were additional reading strategies that participants also employed when reading texts in EMI program.

### **5.2 Discussion**

#### **5.2.1 The Use of Reading Strategies**

The mean score of students' overall reading strategies use was 2.87, which indicated that students employed reading strategies at moderate level in overall. The result also revealed that students most frequently used reading strategy categories were cognitive strategies. The result agrees with Terzj (2015) and Owen et al. (2021),

revealing that students employed cognitive strategies while reading academic texts when they encountered problems. On the contrary, this result is inconsistent with Lin & Yu (2015), which found that the students most frequently used support strategies when reading texts in English.

### **5.2.2 The Use of Individual Strategy**

Regarding the use of individual strategies, it was found that the result was partially consistent with the previous literatures. First, the students' most used strategy among all items was using text features e.g., tables, figures, and pictures in text to increase understanding, with the highest mean score of 3.54. However, previous studies of Terzj (2015) reported that this strategy has moderate to low level of usage among students. This is possibly because the nature of textbooks that students read in the present study are science-related, thus the content might usually be illustrated through tables, and figures. As the result from students' interview also revealed that the information presented in tables and figures contains the key point that the author wanted to highlight in the text.

As of the other most used strategy items reported by students in the present study, including (1) link ideas together to understand the whole content, (2) connect text to background knowledge, and (3) guess meaning of unknown words from context. This is fairly consistent with the previous studies of Owen et. al. (2021) and Soruç and Griffiths (2017), which reported that most students in EMI program reported linking idea together and linking their reading to existing knowledge from texts they have read before. Similarly, most of them also infer meaning of unknown lexis from context.

### **5.2.3 Additional Reading Strategies Use in EMI Context**

It should also be highlighted that there are two additional categories of reading strategies emerged from the findings from the semi-structure interview.

#### **L1 & L2 Mediated Strategies**

The results from the semi-structure interview revealed that some students also use the strategies which rely on their native language (L1) to increase comprehension, for example, reading other textbooks or materials written in Thai on the same content, translate information from English to Thai, and take note or write a summary in Thai. This was because for some students, their former schools were Thai-medium school. Students mainly used Their native language and did not often read textbooks in English. Hence, they reported that the used of their L1 could assist their reading of the text in EMI program. This is consistent with Yu et al. (2021) in that to cope with learning in EMI program, students' L1 play a remedial role in assisting their learning. For instance, students would read L1 translation of the original textbooks or translate

teachers' presentation slides to their L1 to gain more extensive knowledge of the contents. On the other hands, other students reported that this L1 mediated strategies caused them confusion and hindered their comprehension of the English textbooks. Instead, they preferred using L2 mediated strategies to increase their comprehension, for example, reading higher level textbooks in English to confirm understanding, or write the summary of the texts in English to increase understanding. As Yu et al. (2021) also concluded that some students considered the use of L2 (English) as a way to improve their literacy learning in EMI program, thus they went on reading content materials in English.

### **Affective Strategies**

It should be highlighted that majority of interviewees in this study reported using the additional strategies in order to increase their motivation in reading. Having been in the EMI program, students have to encounter the texts in English all the time. Hence, they reported that being passionate and motivated in reading was very crucial since they might not be able to understand the text at all if they are not willing to read. The students' report of the above strategies use could be referred to one of Oxford's language learning strategies, which are 'affective strategies.' According to (Oxford, 2001), the affective strategies demonstrate a significant correlation with L2 proficiency. This is because negative attitudes can reduce learners' motivation and harm language learning, while positive attitudes can do the opposite. Moreover, Evans and Morrison (2011) pointed out that the EMI students dealt with their daunting challenges through a combination of strong motivation, hard work, and effective learning strategies.

### **5.2.4 Pedagogical Implications มหาวิทยาลัย**

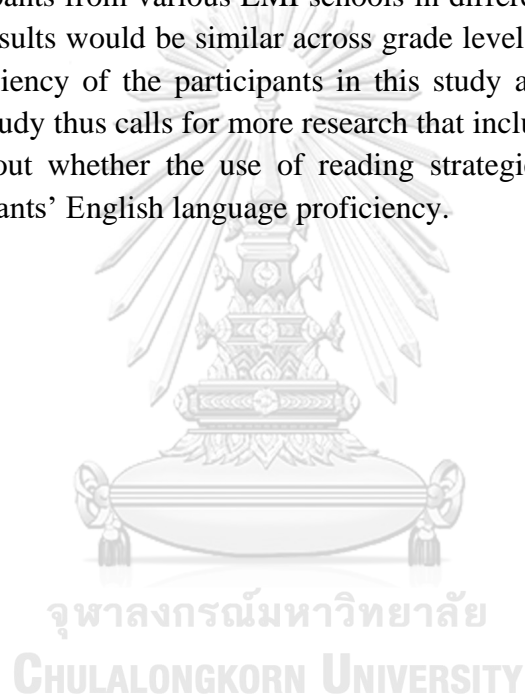
Since reading strategies could be beneficial for students in EMI context. Therefore, the use of strategies could be taught by English language teachers who are in EMI program in order to increase students' ability in comprehending texts, particularly the above-mentioned strategies the students in this study reported that they often use to enhance their understanding. For instance, the strategy of guessing the meaning of unknown words from context could be developed since students' major challenge in EMI reading is related to unfamiliar and difficult vocabularies and terminologies. To implement this strategy, teachers could introduce the use of context clues, such as reference pronouns, synonyms and antonyms, the punctuation and transition words (Phonhan, 2017).

In addition, as students have to encountered a considerable amount of EMI textbooks once they entered the program. Hence, those students who have always been in Thai program might feel overwhelmed and demotivated to read the texts. Teachers could support the students by selecting the texts or reading materials which

suit their level of language competence, or providing the simplified versions of the text content to students. This is also support by Krashen's comprehensible input hypothesis (Krashen, 2004) in that reading materials which are far beyond students' comprehension will overwhelm and cause them discouragement. Materials that are simplified to meet the students' need is a good source of comprehensible input, which allow students to be more encourage and thus can enhance their reading abilities.

### **5.3 Recommendation for Further Studies**

The present study contains some limitations. First, the participants in the study are grade 12 students at Kamnoetvidya Science Academy. Therefore, the results may not well represent all EMI students. Future research could be conducted with larger number of participants from various EMI schools in different grades, in order to find out whether the results would be similar across grade levels and institutes. Moreover, the English proficiency of the participants in this study are only at intermediate to high levels. The study thus calls for more research that include students in other levels in order to find out whether the use of reading strategies would be diverse with regards to participants' English language proficiency.





## REFERENCES

- Aizawa, I., Rose, H., Thompson, G., & Curle, S. (2020). Beyond the threshold: Exploring English language proficiency, linguistic challenges, and academic language skills of Japanese students in an English medium instruction programme. *Language Teaching Research*, 0(0), 1362168820965510. <https://doi.org/10.1177/1362168820965510>
- Ali, N. L. (2013). A changing paradigm in language planning: English-medium instruction policy at the tertiary level in Malaysia. *Current Issues in Language Planning*, 14(1), 73-92. <https://doi.org/10.1080/14664208.2013.775543>
- Anderson, N. J. (1991). Individual Differences in Strategy Use in Second Language Reading and Testing. *The Modern Language Journal*, 75(4), 460-472. <https://doi.org/10.2307/329495>
- Arkin, E., & Osam, N. (2015). English-medium higher education: A case study in a Turkish university context.
- Belhiah, H., & Elhami, M. (2015). English as a medium of instruction in the Gulf: When students and teachers speak. *Language Policy*, 14(1), 3-23. <https://doi.org/10.1007/s10993-014-9336-9>
- Block, C. C., & Duffy, G. G. (2008). Research on teaching comprehension: Where we've been and where we're going. In *Comprehension instruction: Research-based best practices, 2nd ed.* (pp. 19-37). The Guilford Press.
- Brown, H. D. (2007). *Teaching by Principles: An Interactive Approach to Language Pedagogy*. Pearson Education. <https://books.google.co.th/books?id=ZE4CAgAACAAJ>
- Carrell, P. L. (1989). Metacognitive Awareness and Second Language Reading. *The Modern Language Journal*, 73(2), 121-134. <https://doi.org/10.2307/326568>
- Chanjavanakul, N. (2013). *Medium of Instruction in Thai Science Learning*. University of California, Los Angeles. <https://books.google.co.th/books?id=6vmUAQAACAAJ>
- Dearden, J. (2014). English as a medium of instruction - a growing global phenomenon.
- Dearden, J. (2018). The Changing Roles of EMI Academics and English Language Specialists.
- Evans, S., & Morrison, B. (2011). Meeting the challenges of English-medium higher education: The first-year experience in Hong Kong. *English for Specific Purposes*, 30(3), 198-208. <https://doi.org/https://doi.org/10.1016/j.esp.2011.01.001>
- Grabe, W. (2009). *Reading in a Second Language: Moving from Theory to Practice*. Cambridge University Press. [https://doi.org/DOI: 10.1017/CBO9781139150484](https://doi.org/DOI:10.1017/CBO9781139150484)
- Grabe, W., & Stoller, F. L. (2013). *Teaching and researching reading, second edition* [Book]. <https://doi.org/10.4324/9781315833743>
- Hengsadeekul, C., Hengsadeekul, T., Koul, R., & Kaewkuekool, S. (2010). English as a medium of instruction in Thai universities: A review of literature.
- İnan Karagül, B., Yuksel, D., & Gürkan, S. (2012). Expectations of Department Lecturers and/or Professors from Prep School Education and Preparatory English Language Lessons. *Procedia - Social and Behavioral Sciences*, 46. <https://doi.org/10.1016/j.sbspro.2012.06.030>
- Intaraprasert, C. (2000). Language learning strategies employed by engineering students

- learning English at the tertiary level in Thailand.
- Koda, K. (2005). *Insights into Second Language Reading: A Cross-Linguistic Approach*. Cambridge University Press. <https://doi.org/DOI:10.1017/CBO9781139524841>
- Krashen, S. (2004). The Power of Reading: Insights from the Research.
- Lin, L. C., & Yu, W. Y. (2015). A think-aloud study of strategy use by EFL college readers reading Chinese and English texts. *Journal of Research in Reading*, 38(3), 286-306. <https://doi.org/https://doi.org/10.1111/1467-9817.12012>
- Macaro, E. (2015). English Medium Instruction: Time to start asking some difficult questions. *BioTechniques*, 24, 4-7.
- Macaro, E., Hultgren, A. K., Kirkpatrick, A., & Lasagabaster, D. (2019). English medium instruction: Global views and countries in focus: Introduction to the symposium held at the Department of Education, University of Oxford on Wednesday 4 November 2015. *Language Teaching*, 52(2), 231-248. <https://doi.org/10.1017/S0261444816000380>
- Nuttall, C. (1996). *Teaching reading skills in a foreign language* (2nd edition ed.). Heinemann.
- Owen, N., Shrestha, P. N., & Hultgren, A. K. (2021). Researching Academic Reading in Two Contrasting English as a Medium of Instruction Contexts at a University Level. *ETS Research Report Series*, n/a(n/a). <https://doi.org/https://doi.org/10.1002/ets2.12317>
- Oxford, R. L. (2001). Language learning strategies. In D. Nunan & R. Carter (Eds.), *The Cambridge Guide to Teaching English to Speakers of Other Languages* (pp. 166-172). Cambridge University Press. <https://doi.org/DOI:10.1017/CBO9780511667206.025>
- Pecorari, D., & Malmström, H. (2018). At the Crossroads of TESOL and English Medium Instruction. *TESOL Quarterly*, 52(3), 497-515. <https://doi.org/https://doi.org/10.1002/tesq.470>
- Pecorari, D., Shaw, P., Irvine, A., & Malmström, H. (2011). English for Academic Purposes at Swedish universities: Teachers' objectives and practices. *Iberica*, 22, 55-78.
- Phonhan, P. (2017). Academic English Reading Strategies Employed by Thai Chemistry Students at Undergraduate Level with Different Reading Proficiency. *Kasetsart Journal - Social Sciences*, 33, 1-12.
- Poon, A. Y. K. (2013). Will the new fine-tuning medium-of-instruction policy alleviate the threats of dominance of English-medium instruction in Hong Kong? *Current Issues in Language Planning*, 14(1), 34-51. <https://doi.org/10.1080/14664208.2013.791223>
- Pressley, M., & Gaskins, I. (2006). Metacognitively competent reading comprehension is constructively responsive reading: How can such reading be developed in students? *Metacognition and Learning*, 1, 99-113. <https://doi.org/10.1007/s11409-006-7263-7>
- Roussel, S., Joulia, D., Tricot, A., & Sweller, J. (2017). Learning subject content through a foreign language should not ignore human cognitive architecture: A cognitive load theory approach. *Learning and Instruction*, 52, 69-79. <https://doi.org/https://doi.org/10.1016/j.learninstruc.2017.04.007>
- Sheorey, R., & Mokhtari, K. (2001). Differences in the metacognitive awareness of

- reading strategies among native and non-native readers. *System*, 29, 431-449. [https://doi.org/10.1016/S0346-251X\(01\)00039-2](https://doi.org/10.1016/S0346-251X(01)00039-2)
- Soruç, A., & Griffiths, C. (2017). English as a medium of instruction: students' strategies. *ELT Journal*, 72(1), 38-48. <https://doi.org/10.1093/elt/ccx017>
- Tardy, C. (2004). The role of English in scientific communication: lingua franca or Tyrannosaurus rex? *Journal of English for Academic Purposes*, 3(3), 247-269. <https://doi.org/https://doi.org/10.1016/j.jeap.2003.10.001>
- Terzj , 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, 257-268.
- Yu, S., Wang, Y., Jiang, L., & Wang, B. (2021). Coping with EMI (English as a medium of instruction): Mainland China students' strategies at a university in Macau. *Innovations in Education and Teaching International*, 58(4), 462-472. <https://doi.org/10.1080/14703297.2020.1784248>



## APPENDICES

### Appendix A: Reading Strategies Questionnaire

#### Section 1: General information

1. Gender: \_\_\_\_\_
2. Class: \_\_\_\_\_
3. Average grade in English subjects \_\_\_\_\_

#### Section 2: Reading strategies questionnaire

The purpose of this survey is to collect information about the strategies you use when reading school-related academic materials in English.

**Instruction:** Please read the following statements and tick (✓) in the box which best describe how often you perform each activity when you are reading text in English.

The criteria for the response are as follows:

- '1' means that 'I **never or almost never** do this'.
- '2' means that 'I **sometimes** do this'.
- '3' means that 'I **usually** do this'.
- '4' means that 'I **always or almost always** do this'.

**Remarks:** There are no right or wrong responses to any of the items on this survey.

No.	Reading strategies	Frequency of your reading strategy use			
		Always/ almost always	Usually	Sometimes	Never/ almost never
		4	3	2	1
1.	Set purposes for reading				
2.	Preview text before reading				
3.	Predict or guess text content				
4.	Connect text content to background knowledge				

No.	Reading strategies	Frequency of your reading strategy use			
		Always/ almost always	Usually	Sometimes	Never/ almost never
		4	3	2	1
5.	Use text features e.g., tables, figures, and pictures to increase understanding				
6.	Use typographical features e.g., boldface and italics to identify key information				
7.	Critically evaluate the information in the text				
8.	Check whether text content fits reading purpose				
9.	Link ideas together to understand the whole content				
10.	Identify the main point of the author				
11.	Identify supporting details				
12.	Reread the text to increase understanding				
13.	Read slowly and carefully in informative and important sections				
14.	Skim and scan the text				
15.	Pause and think about reading or particular ideas				
16.	Guess meaning of unknown words from context				
17.	Make inferences				
18.	Visualize information to represent ideas described in the text				
19.	Try to stay focused on reading				

No.	Reading strategies	Frequency of your reading strategy use			
		Always/ almost always	Usually	Sometimes	Never/ almost never
		4	3	2	1
20.	Translate information from English to Thai (mental translation)				
21.	Underline, mark, or highlight information in the text				
22.	Take notes				
23.	Use dictionary or other references				
24.	Paraphrase or restate ideas in your own words				
25.	Ask yourself questions about the text				
26.	Try to search and clarify technical terms in the text				
27.	Consult online resources for more information to better understand difficult terminologies				
28.	Read other textbooks/materials written in Thai on the same content to increase comprehension				
29.	Ask academic content teachers for clarification of the text				
30.	Ask classmates for clarification of the text				

No.	Reading strategies	Frequency of your reading strategy use			
		Always/ almost always	Usually	Sometimes	Never/ almost never
		4	3	2	1
31.	Other strategies, please specify _____ _____ _____ _____				

### Appendix B: Semi-Structured Interview Questions

The purpose of the interview is to better understand the reading strategies students employ when reading the academic texts and find out more about the opinions of students towards the use of reading strategies, as well as challenges they have encountered while reading texts in EMI courses.

#### Interview questions

1. How is reading important for your study in the program?
2. What are the difficulties that you have encountered when reading academic texts or course materials in English?
3. From the provided lists, what strategies do you often use to solve problems when reading academic texts or course materials in English?
4. What strategies do you think are important for academic reading?
5. Apart from the provided lists, are there any other strategies that you also apply when reading academic texts or course materials?

### Appendix C: The Research Instruments Evaluation Form

#### Individual Study Topic: A Study of Reading Strategies of EMI in Science Program Thai Learners

**Description:** Please put a tick (✓) in the rating box that best describes your opinion on each item.

1 = The item is appropriate

0 = Not sure

-1 = The item is NOT appropriate

#### Reading Strategies Questionnaire

No.	Reading strategies	Rating			Comments
		1	0	-1	
1.	Set purposes for reading				
2.	Preview text before reading				
3.	Predict or guess text content				
4.	Connect text content to background knowledge				
5.	Use text features e.g., tables, figures, and pictures to increase understanding				
6.	Use typographical features e.g., boldface and italics to identify key information				
7.	Critically evaluate the information in the text				
8.	Check whether text content fits reading purpose				
9.	Link ideas together to understand the whole content				
10.	Identify the main points of the author				
11.	Identify supporting details				
12.	Reread the text to increase understanding				
13.	Read slowly and carefully in informative and important sections				
14.	Skim and scan the text				



No.	Reading strategies	Rating			Comments
		1	0	-1	
15.	Pause and think about reading or particular ideas				
16.	Guess meaning of unknown words from context				
17.	Make inferences				
18.	Visualize information to represent ideas described in the text				
19.	Try to stay focused on reading				
20.	Translate information from English to Thai (mental translation)				
21.	Underline, mark, or highlight information in the text				
22.	Take notes				
23.	Use dictionary or other references				
24.	Paraphrase or restate ideas in your own words for better understanding				
25.	Ask oneself questions about the text				
26.	Read aloud				
27.	Summarize the information in the text				
28.	Try to search and clarify technical terms in the text				
29.	Consult online resources for more information to better understand difficult terminologies in the text				
30.	Read other textbooks/materials written in Thai on the same content to increase comprehension				
31.	Ask academic content teachers for clarification of the text				
32.	Ask classmates for clarification of the text				

### Semi-structured Interview Questions

No.	Questions	Rating			Comments
		1	0	-1	
1.	How is reading important for your study in the program?				
2.	What are the difficulties that you have encountered when reading academic texts or course materials in English?				
3.	From the provided lists, what strategies do you often use to solve problems when reading academic texts or course materials in English?				
4.	What strategies do you think are important for academic reading?				
5.	Apart from the provided lists, are there any other strategies that you also apply when reading academic texts or course materials?				

**Other comments**

---



---



---



---

**Thank you very much for your time and assistance**

**Appendix D: List of Experts Validating the Instruments**

1. Assoc. Prof. Sumalee Chinokul, Ph.D.  
Faculty of Education, Chulalongkorn University
2. Assoc. Prof. Chaleosri Pibulchol, Ph.D.  
Faculty of Humanities, Srinakarinwirot University
3. Banchakarn Sameephet, Ph.D.  
Faculty of Humanities and Social Sciences, Khon Kaen University



## VITA

<b>NAME</b>	Namfar Boonkor
<b>DATE OF BIRTH</b>	26 July 1993
<b>PLACE OF BIRTH</b>	Chonburi
<b>INSTITUTIONS ATTENDED</b>	B.A. (English, First Class Honours), Kasetsart University
<b>HOME ADDRESS</b>	2/2 Moo 2, Nonplalai, Banglamung, Chonburi 20150



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY