The Use of English Reading Strategies of Thai Engineering Undergraduate Students for Reading Comprehension

การใช้กลยุทธ์การอ่านภาษาอังกฤษของนักศึกษา

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สำหรับการอ่านเพื่อความเข้าใจ

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Abstract

The objective of the study was to investigate how the student participants used their English reading strategies. The Survey of Reading Strategies (SORS) originally developed by Mokhtari and Sheorey (2002) was adapted and then distributed to 41 fourth-year Industrial and Civil Engineering undergraduate students who took English for Communication in the second semester of academic year 2021 at the public university in Thailand. Also, the analyses of the textbook and the lesson plan were used to provide the complementary information. The findings showed that the student participants rated their reading strategies under the three main categories: problem-solving (PROB), global (GLOB), and support (SUP) at the low level. It indicates the limitations on the use of the English reading strategies. Lastly, the set of the English reading instruction was suggested based on the theory of the compensatory reading model. Recommendations for future research were discussed.

Keywords

English reading strategies, Thai engineering undergraduate students, reading comprehension

บทคัดย่อ

การศึกษาวิจัยครั้งนี้ มีวัตถุประสงค์เพื่อ สำรวจการใช้กลยุทธ์การอ่านภาษาภาษาอังกฤษของนักศึกษากลุ่มตัวอย่าง แบบสำรวจการใช้กลยุทธ์การอ่านซึ่งพัฒนาโดย Mokhtari และ Sheorey (2002) ได้มีการประยุกต์ใช้และเก็บข้อมูลจากนักศึกษาระดับอุดมศึกษาสาขาวิศวกรรมอุตสาหการและวิศวกรรมโยธา ชั้นปีที่ 4 จำนวน 41 คน ในวิชาภาษาอังกฤษเพื่อการสื่อสารภาคการศึกษาที่ 2 ประจำปีการศึกษาที่ 2564 ณ มหาวิทยาลัยรัฐแห่งหนึ่งในประเทศไทย รวมทั้ง มีการวิเคราะห์หนังสือแบบเรียนและแผนการสอนเพื่ออธิบายข้อมูลประกอบ ผลการวิจัยพบว่า นักศึกษาประเมินการใช้กลยุทธ์การอ่านในด้านต่าง ๆ จากใน 3 หัวข้อหลัก ได้แก่ การแก้ปัญหา การใช้แบบองค์รวม และการใช้เพื่อสนับสนุนอยู่ในระดับน้อย ซึ่งแสดงให้เห็นถึงข้อจำกัดในการใช้ กลยุทธ์การอ่าน สุดท้ายนี้ ผู้วิจัยได้เสนอการสอนอ่านโดยอิงจากกระบวนการอ่านแบบชดเชยและยังได้แนะนำประเด็นสำหรับการศึกษาวิจัยในครั้งต่อไป

คำสำคัญ

กลยุทธ์การอ่านภาษาอังกฤษ, นักศึกษาระดับอุดมศึกษาคณะวิศวกรรมศาสตร์, การอ่านเพื่อความเข้าใจ

Introduction

With regard to the preliminary English reading difficulties of Thai engineering undergraduate students at the research setting, it was found that some of them tended to read without patterns in relation to reading processes. For example, they read without having purpose in mind, read every sentence in a paragraph, and read word-by-word. It led to a slow reading rate. Also, they could understand the meaning of word, but they could not interpret the meaning of sentence or the idea of entire paragraph.

According to the theory, second-language (L2) reading comprehension is built on the interplay of complex variables[1]. The threshold hypothesis has captured the different characteristics of L2 individual readers. First, to go through L2 reading developmental processes, L2 readers should attain a basic level of L2 reading literacy. That is, they have an awareness of L2 language variables pertinent to reading. For example, word recognition ability, vocabulary and structure knowledge, discourse, content background knowledge, strategy, and metacognitive[2] knowledge (Grabe, 1991). Second, first-language (L1) reading literacy alone cannot fully support successful L2 reading. Rather, L1 is believed to facilitate the acquisition of L2 reading in terms of word-recognition and grammatical knowledge. Third, there is a relationship between L1 and L2 reading literacy in guiding L2 readers to make use of appropriate reading strategies, such as regulating language learning and transferring cognitive ability (Bunch, Walqui, & Pearson, 2014; Grabe, 2002).

[1] The word "variables" are used in Bernhardt (2005), (2011) and McNeil (2012). They refer to L1-L2 language components and language skills which are involved in L2 reading. Still, some of them need a further research.
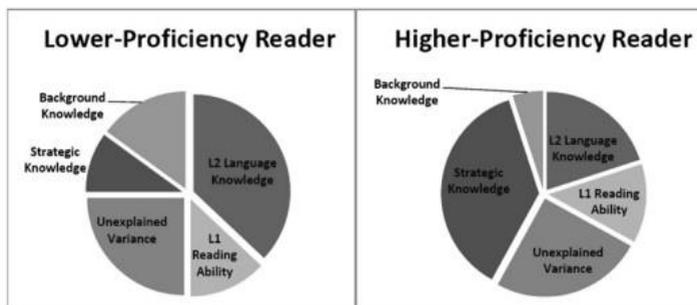[2] Attempt to regulate own reading in order to process information

Figure 1: Predicting the relative contributions of L2 language knowledge, L1 reading ability, strategic knowledge, and background knowledge to L2 reading.

As shown in Figure 1, McNeil's (2012) L2 reading model, a refinement of Bernhardt (2005), focuses directly on high and low-reading proficiency of L2 readers. L2 readers with different levels of reading proficiency perform L2 reading differently. This is because they have different amounts of background knowledge, strategic knowledge, L2 language knowledge, L1 reading ability, and unexplained variance.

Background knowledge is thought to help build better L2 reading comprehension. Bunch, Walqui, and Pearson (2014) stated that texts "do not exhibit difficulty by themselves: it is a matter of who readers are and what they bring to reading tasks; what the broader environment factors and sociocultural content entail" (p. 552). To be more specific, L2 reading is tied to a recall ability (transferring between L1 and L2 reading processes) (Lems, Miller, & Sora, 2009) because they can integrate and relate both background knowledge and relevant variables to comprehend different types of reading texts (Aukerman et al., 2015).
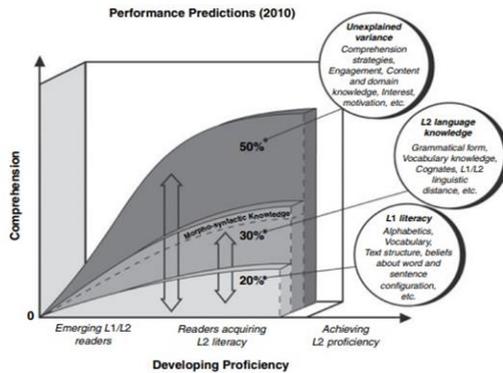
Figure 2: A compensatory model of second-language reading (revised).

As seen in Figure 2, Fuengbangluang and Panjanon (2021) and Fuengbangluang (2021) found that Bernhardt's (2005) and (2011) compensatory reading model is the promising model to be used in an English as a foreign language (EFL) context. This is because it is developed to describe that the patterns of L2 reading are unpredictable. That is, L2 readers do not always follow top-down and bottom-up processes. Thus, this model resides on the nature of L2 reading which relies heavily on availability of multiple information sources to buttress language deficiencies to comprehend reading texts meaningfully.

However, little attention is paid to the combination of relevant theories to design a L2 reading model for a local use. To design a suitable L2 reading model, the suggesting second-language reading model based on the theories of the compensatory reading and previous studies is discussed in Figure 3.
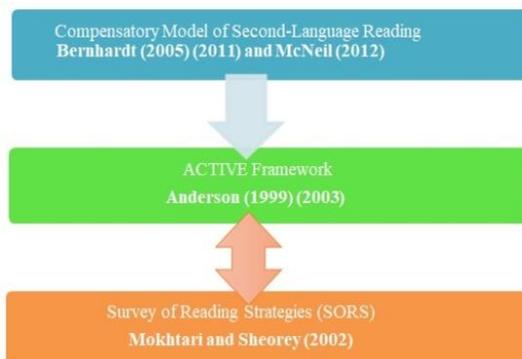
Figure 3: Suggesting second-language reading model for classroom adaptation.

As shown in Figure 3, the discrete concepts relevant to L2 reading are analysed and applied together to design the concrete L2 reading model as the guideline for L2 reading instruction. First, when designing L2 reading instruction, EFL teachers can prepare in-class exercise, activity, or task which allow for picking up a larger domain of language sources. Second, language acquisition can be reinforced by designing reading strategies through the instructional practices based on ACTIVE framework (Anderson, 1999, 2003) and metacognitive reading pertinent to the Survey of Reading Strategies (SORS) (Mokhtari & Sheorey, 2002). The framework includes activating prior knowledge, cultivating vocabulary, teaching for comprehension, increasing reading rate, verifying reading strategies, and evaluating process. Third, EFL teachers can ask their students as L2 readers to report the reading strategies by completing the SORS. All of the processes from steps 1 to 3 can be repeated (Fuengbangluang, 2021).

This present study aimed to investigate how the fourth-year undergraduate engineering students who were non-language major students used their English reading strategies. Information obtained could provide for the English reading instruction.

Research Question

How do Thai engineering undergraduate student participants use their English reading strategies?

Literature Review

This section will discuss L2 reading instruction and previous studies.

1. L2 Reading Instruction

Meaningful reading comprehension requires the developmental processes of L1-L2 and relevant language sources, so L2 readers need the reading strategies which involve the reading processes and language sources to guide them through the systematic patterns of reading (e.g., Bunch, Walqui, & Pearson, 2014; Grabe, 1991; Lems, Miller, & Sora, 2009). Based on the intensive review of L1-L2 reading research, L2 reading instruction was developed by Grabe (2009). See Table 1.

Table 1 L2 Reading Instruction based on L1 and L2 Reading Research

The ability to:
decode graphic forms for efficient word recognition
access the meanings of a large number of word
draw the meaning from phrase-and clause-level grammatical
combine clause-level meanings to build a larger network of meaning relations (how readers comprehend the text)
recognize discourse-level relationships and use this information to build and support comprehension
use reading strategies with more difficult texts and for a range of academic reading tasks

Table 1 L2 Reading Instruction based on L1 and L2 Reading Research (cont.)

The ability to:
set goals for reading and adjust them as needed
use inferences of various types and to monitor comprehension in line with reading goals
draw on prior knowledge as appropriate
evaluate, integrate, and synthesize information from a text to form a situation model of comprehension (how readers interpret the text)
maintain these processes fluently for an extended period of time
The motivation to:
persist in reading and to use the text information appropriate in line with reader goals

Relating to this, the Survey of Reading Strategies (SORS) was developed Mokhtari & Sheorey, 2002). It is the self-report survey which is used to provide for the descriptive information. It paid much attention to the close nature of L2 reading as tabulated in Table 1 under the three main categories: global reading (GLOB), problem solving (PROB), and support strategies (SUP).

GLOB guides L2 readers to monitoring and managing reading at a time; for example, setting reading purposes.

PROB guides L2 readers to using L1-L2 language knowledge to overcome language deficiencies, like unknown word and insufficient background knowledge. It also guides L2 readers to going through text organization.

SUP supports L2 readers by using reading literacy; for example, taking notes, underlining text.

Moreover, a set of L2 reading instruction was suggested based on the theory of the compensatory model as suggested by Bernhardt (2011). There are four suggestions.

First, a retrospective, its conceptualization resides on the Recall Protocol Procedure. After reading, L2 readers are asked to recall and reconstruct texts by writing a paragraph in L2 or L1. In the light of language acquisition and language use, EFL teachers can

check the extent to which those language processing facilitates L2 readers to comprehend reading texts and also check the extent to which language processing that they need for particular to make them more learnable and understandable.

Second, a focus on recent writings, it focuses on instructional design which pays great importance on preparing for higher-level processes by promoting on automaticity. That is, L2 readers revisit their writings so as to formulate ideas by integrating all language knowledge and skills in L2-L1.

Third, illustrating compensation, it involves organizing of reading texts, especially vocabulary section. It should be designed to guide L2 readers to drawing inferences or guessing unknown words and to guide them to processing reading texts as a paragraph level, not rely on a single word.

Fourth, toward reader independence, it relates to enabling L2 readers to be independent readers. For instance, it places emphasis on instructional practices by letting L2 readers to make the most use of L2 grammatical strengths, L2 vocabulary knowledge, L1 literacy knowledge transfer, and background knowledge of local content to assist own independent reading.

In the present study, Bernhardt's (2011) four suggestions were used to provide the set of English reading instruction based on the research results. It was used for two reasons. First, it resides on the idea that the patterns of L2 reading are unpredictable. So, it relies heavily on the nature of L2 reading by focusing on the L1 reading literacy, L2 language knowledge, and background knowledge. L2 readers can pick up multiple language sources from those sources to compensate for language deficiencies while reading. Second, it offers the comprehensive suggestion for designing L2 reading instruction.

2. Previous Studies

Some previous studies conducted in Thai universities were randomly selected from databases and analyzed based on their main finding, conclusion, or suggestion according to Fraenkel, Wallen, and Hyun's (2011) suggestion so as to report the use of reading strategies.

Chemistry-major students used the global reading (GLOB) technique the most. For example, they used context clues, like discourse and syntax (Phonhan, 2017). Also, the support reading (SUP) technique was used the most among the undergraduate students who took English as a Specific Purposes (Suwannaprut & Siriwan 2020). Similarly, the undergraduate students who majored in science discipline had a limitation on English vocabulary knowledge. They tended to rely on this technique because it helped them overcome this reading difficulty (Seangpakdeejit, Muangkote, Chaisiri, & Maneekanon, 2020; Torudom & Tarlor, 2017).

English-major undergraduate students used the problem-solving (PROB) technique the most (Rupsong & Saitakham, 2020), such as planning for reading, monitoring, and checking reading comprehension (Vongkrahchang & Chinwonno, 2016; Khamkhong 2017; Chanprasert, 2018).

With an attempt to improve the undergraduate students' L2 reading ability, previous studies suggested that a set of reading instruction for local use should be made available (Khamkhang, 2017; Seangpakdeejit, Muangkote, Chaisiri, & Maneekanon, 2020; Suwannaprut & Siriwan, 2020; Torudom & Taylor, 2017).

Therefore, the present study was conducted to reveal how the student participants used their English reading strategies.

Methodology

1. Research Design

To triangulate the data, the quantitative and qualitative research were employed in the present study.

The quantitative research is a process of collecting and analyzing individuals' behaviors. It yields the numerical data. In this study, the Survey of Reading Strategies (SORS) was used to investigate the student participants' use of English reading strategies.

The qualitative research is an approach which gains deep understanding of the phenomena. It provides the descriptive data. Then the textbook and the lesson plan were analyzed to provide the complementary information (Creswell, 2003).

2. Participants

To report the use of the English reading strategies, entire undergraduate engineering students (N = 60) who took English for Communication from three classes in the second semester of academic 2021 were selected based on the purposive sampling technique. They were selected for two reasons. First, as discussed in the Introduction Section, they failed to use appropriate English reading strategies. Second, they were non-language major students who are prepared for reading English for academic purposes. As a result, the findings could be generalizable in the local context and other comparable contexts. Then they were recruited again based on the sampling random method (Cohen, Manion, Morrison, & 2018). That is, their fields of study (Mechatronics Engineering, Industrial Engineering, and Civil Engineering) were listed and drawn. Therefore, 41 fourth-year students from Industrial Engineering and Civil Engineering at a public university in Thailand were selected.

They were asked to complete the survey online because they studied online during the coronavirus disease (COVID-19).

3. Characteristics of the Public University

It is a government university where the main campus is located in an outskirt of Bangkok, Thailand. The educational main aim is to offer higher vocational educational based on science and technology to all students. It provides both undergraduate and graduate programs. In particular, there are a variety of undergraduate programs, such as engineering, industry and technology, and business administration.

4. Research Instruments

Two research instruments were employed in the study.

First, the 3 Point Likert scale Survey of Reading Strategies (SORS) originally developed by Mokhtari and Sheorey (2002) was used to ask the student participants to report their use of reading strategies. It is a self-report survey. The Thai version of the self-report survey with 30 statements under three main categories: global

reading (GLOB), problem-solving (PROB), and support strategies (SUP) was used (Nuwee, 2010).

GLOB refers to strategies which help monitor and manage reading texts.

PROB refers to strategies which guide how to overcoming reading difficulties while reading.

SUP refers to strategies which help re-check understanding while reading.

Table 2 presents the three main reading strategies with their relevant items.

Table 2 Items of Reading Strategies in the Self-Report Survey

Reading Strategies	Statement Items
GLOB	1, 3, 4, 6, 8, 12, 15, 17, 20, 21, 23, 24, 27
PROB	7, 9, 11, 14, 16, 19, 25, 28
SUP	2, 5, 10, 13, 18, 22, 26, 29, 30

Moreover, the self-report survey is assured that it is still practical to be used (Mokhtari, Dimitrov, & Reichard, 2018).

The self-report survey consisted of two parts. Part I elucidated the demographic information of the participants: gender, field of study, and grade point average (GPA). Part II comprised 30 statements asking about the English reading strategies as shown in Table 2.

The Thai version of the self-report survey was used as the research instrument. To calculate the reliability of the self-report survey's items, the pilot study was conducted with 30 undergraduate students. It revealed 0.86 for the acceptable reliability coefficient for the overall reliability of items (Suwannaprut & Siriwan, 2020). Altogether, the self-report survey's items were piloted with 15 engineering undergraduate students. It revealed 0.81, 0.85, and 0.83 for the reliability of the items under the three main categories GLOB, PROB, and SUP respectively (Phonhan, 2017). Hence, it was reliable to use as the research instrument in the present study.

In this present study, it revealed 0.89 for the overall reliability of the items.

Second, to clarify the main points the student participants made about their use of reading strategies, analyses of the textbook and the lesson plan were used in this study (Singh, 2006).

The overview of the textbook and the lesson plan is given below.

The textbook in use is a commercial material. It is designed for B1 level according to Common European Framework of Reference for Languages (CEFRL). Students can listen, speak, negotiate, read, and write related to routine life, such as, education, personal stories, and world. It was placed as a core material for English for Communication subject.

In the lesson plan, there were nine units selected from the textbook. The instructional time was allocated for three hours per week/unit. Each unit was designed for grammar, vocabulary, functional language, listening, reading and writing, and speaking.

5. Data Collection

The data collection procedures entailed the following steps.

First, the researchers sought a formal permission from the head of the English Program at a public university to conduct the study.

Second, before administering the survey through two online classes, the student participants were informed about the study objective. Then they were asked for the voluntary participants. Altogether, all of them were informed that (a) their personal information (name, field of study, grade point average (GPA)) was kept confidential, (b) their participation would not affect their scores in any subjects, and (c) they could withdraw their participation anytime, if they felt unpleasant. On February 2022 (one month before the end of the second semester), they were asked to complete the survey online. They used appropriately 15 minutes to complete it.

Third, quantitative data from the self-report survey were analysed. Then qualitative data from analyses of the textbook and the lesson plan were done. Further clarification regarding the main points was re-checked by the student participants.

6. Data Analysis

Descriptive statistics were used to analyze the quantitative data. The background information of the participants was analyzed by frequency and percentage. The survey items were analyzed by using Commercial Statistical Package for the Social Science (SPSS) based on the levels of interpretation in Table 3. The standard for interpretation is based on Mokhtari and Sheorey (2002) as tabulated below.

Table 3 Levels of Interpretation of the Survey Items' Interpretation

Range of Scores	Levels
3.5 - 5.00	High
2.5 - 3.49	Moderate
2.49 - 1.00	Low

Qualitative data from analyses of the textbook and the lesson plan were done by a content analysis. The researchers assessed the sequences and details of the instructional contents in the lesson plan. Then the researchers assessed the textbook and took some of the instructional contents to illustrate as examples in the result section to show how the student participants were asked to use the English reading strategies.

Results and Discussion

This section reports and discusses the obtained results according to the research question.

Table 4 Percentages of Demographic Information of the Participants

Participants	n	Percentage
Gender		
Male	20	48.8
Female	21	51.2
Total	**41**	**100**
Field of Study		
Industrial Engineering	22	53.7
Civil Engineering	19	46.3
Total	**41**	**100**
Grade Point Average (GPA)		
3.00-4.00	6	14.6
2.00-2.99	34	83
1.00-1.99	1	2.4
Total	**41**	**100**

Table 4 shows the percentages of demographic information of the respondents. Of 41, 21 (51.2%) were female and 20 (48.8%) were male. The majority of the respondents (53.7%) majored in Industrial Engineering. Overall, 41 respondents showed an average level of GPA.

The overall sum of means and standard deviations are discussed in the chronological order below.

Table 5 Sum of Means and Standard Deviations on
Reading Strategies

Strategy Categories	Mean	SD	Level
Problem-solving (PROB)	2.38	.33	Low
Global (GLOB)	2.38	.30	Low
Support (SUP)	2.37	.35	Low

Table 5 summarizes the respondents' ratings on the statements related to the English reading strategies. Overall, all of the three main categories received a low level, indicating a limited use of reading strategies for reading comprehension.

The levels of the student participants' ratings are tabulated below.

Table 6 Problem-solving Strategy (PROB)

Strategy Categories	Mean	SD	Level
7. I read slowly and carefully to make sure I understand what I am reading.	2.66	.53	Moderate
28. When I read, I guess the meaning of unknown words or phrases.	2.44	.67	Low
25. When the text becomes difficult, I reread it to increase my understanding.	2.44	.59	Low
16. I stop from time to time and think about what I am reading.	2.44	.55	Low
14. When the text becomes difficulty, I pay closer attention to what I am reading.	2.37	.58	Low
9. I try to get back on track when I lose my concentration.	2.34	.65	Low
19. I try to picture or visualize information to help remember what I read.	2.27	.63	Low
11. I adjust my reading speed according to what I am reading.	2.15	.65	Low
Total	**2.38**	**.33**	**Low**

Table 6 displays the respondents' ratings their English reading strategy under the PROB. The statements related to *changing reading rate to make sure understanding*, *guessing the unknown*

words or phrases, rereading when facing difficulty, *and stopping and thinking about what have been read* received a relatively low level, whereas the statements relating to *picturing or visualizing information to help remember* and *adjusting the speed according to reading text* received the lowest level.

Table 7 Global Reading Strategy (GLOB)

Strategy Categories	Mean	SD	Level
3. I think about what I know to help me understand what I read.	2.66	.48	Moderate
24. I try to guess what the content of the text is about when I read.	2.56	.59	Moderate
15. I use tables, figures, and pictures accompanying the text to increase my understanding.	2.49	.63	Low
4. I take an overall view of the text to see what it is about before reading it.	2.49	.55	Low
23. I check my understanding when I come across new information.	2.46	.50	Low
27. I check to see if my guesses about the text are right or wrong.	2.44	.67	Low
1. I have a purpose in mind when I read.	2.37	.53	Low
6. I think about whether the content of the text fits my reading purpose.	2.32	.65	Low
17. I use context clues to help me better understand what I am reading.	2.32	.65	Low
12. When reading, I decide what to read closely and what to ignore.	2.32	.52	Low
20. I use typographical features like bold face and italics to identify key information.	2.29	.60	Low
21. I critically analyse and evaluate the information presented in the text.	2.20	.55	Low
8. I review the text first by noting its characteristics, like length and organization.	2.15	.57	Low
Total	**2.38**	**.30**	**Low**

Table 7 displays the respondents' ratings their English reading strategy under the GLOB. The statements related to *thinking about what they know when reading*, *guessing information relevant to the text*, *using tables, figures, pictures to increase understanding*, *taking an overall view of the text before reading*, and *checking understanding when coming across new information* received a relatively low level, while the statement related to *reviewing text organization* received the lowest level.

Table 8 Support Strategy (SUP)

Strategy Categories	Mean	*SD*	Level
29. When reading, I translate from English into Thai.	2.59	.54	Moderate
13. I use reference materials (e.g. a dictionary) to help me understand what I read.	2.51	.77	Moderate
10. I underline or circle information in the text to help me remember it.	2.46	.67	Low
30. When reading, I think about information in both in English and in Thai.	2.46	.55	Low
18. I paraphrase (restate ideas in my own word) to better understand what I read.	2.39	.58	Low
26. I ask myself questions that I'd like to have answered in the text.	2.32	.61	Low
22. I go back and forth in the text to find relationships among the ideas in it.	2.29	.55	Low
2. I take notes while reading to help myself understand what I read.	2.27	.62	Low
5. When the text becomes difficult, I read aloud to help myself understand what I read.	2.07	.81	Low
Total	**2.37**	**.35**	**Low**

Table 8 displays the respondents' ratings their English reading strategy under the SUP, the statements related to *translating from English into Thai*, *using reference materials*, *underlining or circling information*, *thinking about information in Thai and English, and paraphrasing for better understanding* received a

relatively low level; however, the statement related to *reading aloud when facing difficulty* received the lowest level.

To complement the quantitative data, the qualitative data were then discussed to provide examples of how the student participants were asked to use their English reading strategies in the classes.

As for the PROB and the SUP, they require the student participants to use L1-L2 language knowledge to understand reading texts. In using language knowledge, the reading section in Unit 5 asked the student participants to read short paragraphs about seven wonders of the natural world. Each paragraph included pictures of each place. There were additional sentences which the student participants needed to table and match the correct name with the correct place. Also, the reading section in Unit 1 let the student participants to read a long passage with six paragraphs about benefits of game. Then they had to answer the questions from the passage about the benefits of game in terms of cognitive skills, social skills, and physical skills.

As for the GLOB, it requires the student participants to use inherent L1-L2 reading literacy. In using reading literacy, the reading comprehension sections feature both controlled responses, such as multiple-choice, matching, and gap-filling and constructed responses, such as information transfer (comprehension headings and infer messages) and short-answer comprehension (graphic). These kinds of reading exercises allow the student participants to internalize or absorb the language inputs to learn language. For example, Unit 2 (Reading section), after reading five paragraphs about emphasising experiences, the student participants were asked to number the five restated sentences in the correct time order. In addition, Unit 4 (Reading section), after reading an interview about the life of an astronaut, the student participants were asked to read the restated phrases and select only 4 from 6 things which were done by the astronaut.

In sum, all three categories PROB, GLOB, and SUP were rated at the low level. The student participants had the limitation on using English reading strategies. On closer scrutiny of the research results, the limitations were due to the level of their English linguistic knowledge and the reading literacy as discussed below.

First, the findings revealed that the student participants minimally used reading strategies under the problem-solving and support strategy. These strategies require English knowledge, such as word-recognition, sentence structure, and grammar so as to direct and re-check their reading. In this study, the student participants were non-language major students, so they might have the limited language knowledge. This led to neglecting to use these strategies as much as possible. The result was in line with Seangpakdeejit, Muangkote, Chaisiri, and Maneekanon (2020) and Torudom and Taylor (2017) in that the undergraduate students who majored in science had limited vocabulary knowledge which directly affected making use reading strategies, like picking up the L2 language sources to compensate for any deficiencies. Theoretically, the reading patterns of L2 readers are unpredictable. They pick up multiple-language sources to relate and connect them with reading texts. L2 reading is dependent on transferring and recalling both L1 and L2 linguistic elements and world knowledge. For instance, while reading, L2 readers can transfer the structure-build ability, word-recognition, world issue to facilitate a sentence or a paragraph reading (Bernhardt, 2005, 2011; Bunch, Walqui, & Pearson, 2014; Lems, Miller, & Sora, 2009).

Second, the findings also revealed that the student participants minimally used the reading strategies under the global strategy. This strategy relies on the reading literacy both L1 and L2 to help them monitor and manage reading. Low level of reading literacy can account for the imitation on using this reading strategy. The result corresponded with Phonhan (2017) in that chemistry-major undergraduate students tended to use the context clues (e.g., syntax and discourse). Knowledge of syntax and discourse are shared between languages. Theoretically, L1 reading literacy is a developmental stage in acquiring and facilitating L2 reading (McNeil, 2012).

Set of the English Reading Instruction

Based on the research results, the set of the English reading instruction according to the theory of the compensatory reading is suggested below.

- designing in-class exercise, activity, or task which could reflect the extent to which the availability stored in the undergraduate students' brain,

- designing instructional practices which allow the undergraduate students to make the most use of L1-L2 linguistics elements and background knowledge,

- designing instructional practices which reinforce working memory (e.g., information transfer),

- guiding the undergraduate students to acquiring more about content background knowledge before reading, and

- guiding the undergraduate students to applying the appropriate reading strategies to their own reading contexts.

Recommendations for Future Research

A subsequent research should include EFL teachers. They can voice their teaching of English reading.

Moreover, a future research can adapt the set of English reading instruction so as to assess the extent to which it is helpful for improving undergraduate students' reading proficiency.

Conclusion

L2 reading has shifted its focus in studying and understanding the mental abilities and the availability stored in individuals rather than language sources. In particular, L2 reading comprehension not only requires L2 linguistic knowledge, but also involves L1 reading literacy and L1 background knowledge.

The quantitative and qualitative research were undertaken with an aim at reporting how the 41 fourth-year student participants, who were Industrial and Civil Engineering undergraduate students from English for Communication in the second semester of academic year 2021 at the public university in Thailand, used their English reading strategies. The findings revealed that the student participants

showed the low level of the use of the English reading strategies in all aspects under the three main categories: problem-solving (PROB), global (GLOB), and support (SUP). These limitations might be due to their level of English linguistic knowledge and reading literacy. Based on the findings, the set of English reading instruction should focus on developing the instructional contents in relation to the local undergraduate students' characteristics.

A future research should include EFL teachers in order to study their voices of English reading teaching. An adaptation of the set of the English reading instruction is recommended.

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