A Study of Reading Strategies Used by Thai Civil Engineers in Reading English Safety Materials

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Abstract

The purpose of this research study is to investigate the use of reading strategies in the reading of English safety materials by Thai civil engineers as well as to find out the relationship between the work experience of Thai civil engineers and their use of different types of reading strategies. The participants were 53 Thai civil engineers who had work experience of durations from 1 to 18 years. This study focused on the use of the Metacognitive Reading Strategies collected by using the Survey of Reading Strategies (SORS) of Mokhtari and Sheorey (2002). The result of the study reported that Thai civil engineers used a wide range of strategies but there was a preference for global reading strategies, followed by problem-solving strategies and support strategies, and also revealed the use of cognitive strategies, compensation strategies and social strategies in reading English safety materials. The results of this study also showed that there was no correlation between their use of strategies and their work experience.

Keywords: Reading strategies, global reading strategies, problem-solving strategies, support strategies, cognitive strategies, compensation strategies, social strategies, reading english safety materials, thai civil engineers

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Introduction

Background and Rationale of the Study

Nowadays, English is increasingly used for communication in construction projects. Construction documents of multinational companies as well as of Thai companies are frequently written in English in order that both Thai and foreign staffs can understand them. Safety materials are documents written in English which Thai civil engineers must use under construction. Civil engineers who can clearly understand contents of safety materials will be able to prevent themselves and workers they supervise from meeting with accident during construction. Safety materials are effective media used for safety communication. They inform correct and safe procedure for construction; and warn about danger from works. In Thailand, safety materials are written increasingly in English because construction professionals ought to have international communication. Reading English is necessity for Thai civil engineers to get work done. However, Thai engineers work domestically. That's why they have limited opportunity to use English. Thai engineers are not good at using English because they are not in an English atmosphere. English skills of Thai engineers were inferior because they could use only Thai while working as well as they could us textbooks written in Thai instead of English while studying in universities (Sophabutr, 2012).

As the reasons previously mentioned, the researcher conducts a study on strategies in reading English safety materials used by Thai civil engineers in order to understand what kind of strategies to help them read. This research can be used as a guideline to develop the English reading skills of Thai civil engineers.

Research Objectives and Questions

From the background and rational, the objectives of this study are as follows:

1) To investigate the strategies Thai civil engineers use in reading English safety materials.

2) To find out the relationship between their work experience and the strategies they use in reading safety materials.

The research questions are based on the objectives as follows:

1) What strategies do Thai civil engineers use in reading English safety materials?

2) Is there a relationship between their work experience and the strategies they use in reading English safety materials?

Literature Review

Safety Materials and Technical English

Safety materials can be explained as documents providing information how to work safely (Roongrojdee, 2001) as well as what should be done when accidents happen (Shigekazu, 1995). Safety materials have to be clear, concise and provide useful information. They are not only texts but graphics as well. Safety materials consist of various materials that are manuals; check lists; lock-out tags;

brochures; posters; warning signs or warning notices; instruction sheets and specifications of equipment (Vecchio-Sadus, 2007). The difference between safety materials and general texts is that safety materials are written in Technical English. Technical English is used to write safety materials because construction safety materials aim to provide scientific and technical information which is generally related to materials, machines, and work procedure. Accordingly, vocabulary of safety materials mainly consists of names of construction equipment and tools; dimension description; vocabulary of quality such as failure, pass, fit, suitable; scientific units; vocabulary of operation such as check, fasten, perform, avoid, supply, fit, insert; allowing and preventing verbs such as allow, permit, enable, prevent, stop. According to the characteristic of technical English, main strategies which readers use to read safety materials can be hypothesized that the strategies relate to graphics, vocabulary, and short texts.

Metacognitive Reading Strategies

Metacognitive reading strategies are the strategies readers used for planning, monitoring and evaluating their own thinking while reading. It enhances reading comprehension of readers (Anderson, 2002). These strategies concern planning for reading; checking reading comprehension; correcting readers' own previous understanding; setting goals and objectives of reading; and self-monitoring. Mokhtari and Sheorey (2002, as cited by Ramli et al., 2011, p. 197) divide metacognitive reading strategies into three sub-categories as follows:

1) Global reading strategies are intentional, carefully planned techniques by which learners monitor or manage their reading (Mokhtari and Sheorey, 2002, p.4). The use of Global reading strategies aims at a global analysis of the reading text (Rastegar et al., 2017). The use of these strategies helps readers make themselves ready to comprehend the main text.

2) Problem-solving strategies are strategies that readers work directly with text to solve problems while reading. These strategies help readers deal with problem in the real act of reading a text while the text becomes difficult to understand. Problem-solving strategies are localized and focused techniques used when problems develop in understanding textual information (Mokhtari and Sheorey, 2002).

3) Support strategies are strategies that readers use basic support mechanisms to help them read (Mokhtari and Reichard, 2002).

This study focused on metacognitive reading strategies because the use of these strategies is a significant factor for readers who learn English as a foreign language such as Thai civil engineers to achieve success in reading. According to other studies, the significant positive relationship between the use of metacognitive reading strategies and reading comprehension while reading foreign languages were found. The high use of metacognitive reading strategies is correlated with high achievements in reading of good readers (Mokhtari and Reichard, 2002) whereas

poor readers are less proficient in using these strategies to solve their problems in reading (Pressley, 2002, as cited in Chanprasert, 2013). Studies concerning second language reading on English, French, Japanese, Chinese language students demonstrated that the relationship between the use of metacognitive reading strategies of readers and their reading comprehension was positive. High proficiency students used more metacognitive reading strategies (Mokhtari and Reichard, 2002; Barnett, 1988 ; Upton, 1997 ; Zhang and Seepho, 2013, as cited in Rastegar et al., 2017). Alos, previous studies on the use of metacognitive reading strategies had the result that the more successful readers use metacognitive reading strategies in reading more than the less successful readers (Ahmadi et al., 2013, as cited in Rastegar et al., 2017).

The Survey of Reading Strategies (SORS)

The Survey of Reading Strategies (SORS) is an instrument used for collecting information about the perceived use of strategies of respondents. Mokhtari and Sheorey (2002) developed the SORS to measure the use of the metacognitive strategies of English as a Second Language (ESL) students. The SORS is developed from the Metacognitive Awareness of Reading Strategies Inventory (MARSI) which is the survey used to measure the use of metacognitive strategies for reading academic or school-related materials (Mokhtari and Reichard, 2002). In this survey the metacognitive reading strategies are subdivided into three categories: global reading strategies, problem-solving strategies, and support reading strategies. Global reading strategies consist of 13 strategies. Problem-solving strategies consist of 8 strategies. Support reading strategies consist of 9 strategies. These 30 strategies are designed by using frequency survey questions. The frequency survey questions are designed by using check lists, 5-point Likert scale (Likert, 1932). Respondents answer the survey question by rating the frequency they think they use strategies while reading on a 5-point Likert scale. The frequency rated by the respondents can be interpreted as high use, moderate use, and low use. The internal consistency reliability coefficients of the SORS determined by Cronbach's alpha (1951) for its overall scale was 0.93. Therefore, the SORS has the excellent reliability because its internal consistency reliability coefficient is higher than 0.90. The SORS is adapted to the Online Survey of Reading Strategies by Anderson (2003) in order to measure the use of the metacognitive strategies of English as a Second Language (ESL) readers and English as a foreign language (EFL) readers.

Methodology

Participants

This study conducted with 53 Thai civil engineers holding professional licenses chosen from simple random sampling. The researcher checked construction companies in Thailand which used English safety materials and distributed 400 copies of Thai version of questionnaires to Thai civil engineers working for companies selected and collected

the answered questionnaires after the respondents finish completing. 53 copies out of 400 were responded.

Instrument

The data for this study were collected through the Survey of Reading Strategies (SORS) developed by Mokhtari and Sheorey (2002). The researcher selected this questionnaire because the purposes of the study of Mokhtari and Sheorey were similar to the researcher's purpose and the SORS were referred by the number of studies on strategies in reading. Its internal consistency reliability coefficients determined by Cronbach's alpha for its overall scale was 0.93. The questionnaire was designed by using check lists, 5-point Likert scale (Likert, 1932). The researcher distributed the Thai version of the questionnaire translated by Boonkongsaen et al. (2016) to the participants because Thai is the native language of the participants. The questionnaire written in Thai is easy to understand. The open-end question was also used for collecting strategies which participants would use apart from the strategies mentioned in the questionnaire. The questionnaire consisted of 30 frequency survey questions and 1 open-ended question. According to Best and Kahn (1993), the questions were scored as follows:

5 points = Always or Almost Always

4 points = Usually

3 points = Sometimes

2 points = Occasionally

1 point = Never or Almost Never

According to Mokhtari and Sheorey (2002), the interpretation for the frequency the participants rated their use of strategies was given as follows:

3.50 - 5.00 = High use

2.50 - 3.40 = Moderate use

1.00 - 2.40 = Low use

Data analysis

The data obtained from the completed questionnaires were analyzed by the Statistic Package for Social Science (SPSS) software and presented as descriptive statistics. The percentage, mean and standard deviation of the data were presented in tables. Also, Pearson product-moment correlation (Pearson's r) was used to perform bivariate correlation analysis of this study at the level of significance (α) of 0.05 in order to consider correlation between work experience of Thai civil engineers and strategies they used. According to Hinkle et al (1998), the size of the correlation coefficient was interpreted as in Table 1.

Table 1 Rule of thumb for interpreting the size of a correlation coefficient (Hinkle et al, 1998, p.120)

Size of Correlation	Interpretation
0.90 to 1.00 (-0.90 to -1.00)	Very high correlation
0.70 to 0.90 (-0.70 to -0.90)	High correlation
0.50 to 0.70 (-0.50 to -0.70)	Moderate correlation
0.30 to 0.50 (-0.30 to -0.50)	Low correlation
0.00 to 0.30 (0.00 to -0.30)	Little if any correlation

Results

1. The use of strategies of Thai civil engineers in reading English safety materials

Table 2 shows the level of Thai civil engineers' overall strategy use and the level of the use of overall strategies by the 3 main categories. Table 3 shows the individual strategy items used most and least

Table 2 Reported Use of Overall, Global, Problem-Solving and Support Reading Strategies

Strategy Use	Mean	S.D.	Level of Use
Overall Use	3.70	0.463	High
Global Reading Strategies	3.80	0.481	High
Support Strategies	3.48	0.600	Moderate
Problem-Solving Strategies	3.79	0.572	High

Table 3 The individual strategy items used most and least

Statement	Mean	S.D.	Level of Use
4. I take an overall view of the text to see what it is about before reading it.	4.21	0.793	High
3. I think about what I know to help me understand what I read.	3.98	0.665	High
14. When text becomes difficult, I pay closer attention to what I am reading.	3.98	0.772	High
25. When text becomes difficult, I re-read it to increase my understanding.	3.98	0.843	High
20. I use typographical features like bold face and italics to identify key information.	3.96	0.854	High

Statement	Mean	S.D.	Level of Use
29. When reading, I translate from English into my native language.	3.32	0.996	Moderate
5. When text becomes difficult, I read aloud to help me understand what I read.	3.30	1.119	Moderate
2. I take notes while reading to help me understand what I read.	3.19	1.241	Moderate
30. When reading, I think about information in both English and my mother tongue.	3.15	0.969	Moderate
8. I review the text first by noting its characteristics like length and organization.	3.09	0.946	Moderate

53 surveyed Thai civil engineers reported using each reading strategy item on the SORS with not varying levels of use. 22 out of 30 strategies reported being used at the high level, 8 out of 30 strategies being used at the moderate level and none of 30 strategies being used at the low level respectively. The means of individual strategy items ranged from a high of 4.21 with a standard deviation of 0.793 to a low of 3.09 with a standard deviation of 0.946. The most frequently reported strategy was the statement 4 (Mean = 4.21, S.D. = 0.793). This strategy was followed by the statement 3 (Mean = 3.98, S.D. = 0.665), the statement 14 (Mean = 3.98, S.D. = 0.772), the statement 25 (Mean = 3.98, S.D. = 0.843), and the statement 20 (Mean = 3.96, S.D. = 0.854). The strategy with the lowest mean was the statement 8 (Mean = 3.09, S.D. = 0.946). This strategy was followed by the statement 30 (Mean = 3.15, S.D. = 0.969), the statement 2 (Mean = 3.19, S.D. = 1.241), the statement 5 (Mean = 3.30, S.D. = 1.119), and the statement 29 (Mean = 3.32, S.D. = 0.996).

The participants reported high use with the mean score of 3.70 and the standard deviation of 0.463. Regarding the category level, global reading strategies were reported high use with the mean score of 3.80 and the standard deviation of 0.481; support strategies were reported moderate use with the mean score of 3.48 and the standard deviation of 0.600; and problem-solving strategies were reported high use with the mean score of 3.79 and the standard deviation of 0.572. The participants reported that they used global reading strategies the most, problem-solving strategies the second most and support strategies the least.

In addition, some of the participants reported the strategies they used in reading apart from the strategies mentioned in the SORS. They were collected by using the open-ended question in the questionnaire. These strategies were I re-read several times, I have a conversation in the contents I read with friends, I ask a guru, I make a note of vocabularies in what I read and try to think of them, and I read other texts related to the text I focus to help me understand what I focus to read.

2. The relationship between Thai civil engineers' work experience and their use of strategies

Individual correlation coefficients of each reading strategy to work experience explored by using Pearson's r. This table showed the individual correlation coefficients of each reading strategy to work experience. Only the use of the statement 11 has the significant negative correlation at a very low level with work experience at the 95% confidence level because the level of signification of correlation between the use of this strategy and work experience ($r = -0.284$, p-value = 0.040) was less than the margin of error ($a = 0.05$). The use of the other strategies did not have significant correlation with work experience because the level of signification of correlation between the use of the other strategies and work experience were more than the margin of error (p-value > .05). The finding could be interpreted that different work experience did not have significant correlation with the use of the strategies except the statement 11. That is, the Thai civil engineers who have longer work experience are likely to use slightly fewer strategies than other Thai civil engineers having less work experience do.

Discussion

1. The Use of Strategies of Thai Civil Engineers in Reading English Safety Materials

Firstly, the participants of this study reported the use of strategies in reading in overall at a high level. The explanation could be the frequency of their out-of-classroom reading. According to Chen and Intaraprasert (2014, p. 31), learners who reported a higher frequency of the use of strategies also reported a higher frequency of out-of-classroom reading. It could be inferred that the more they read, the more they could employ strategies. Engineering students frequently need to read text written in English after class as well as engineering professionals frequently do so while working because most of engineering reference materials are written in English. By reading English safety materials more, Thai civil engineers would be more experienced in reading technical English and more skillful in employing strategies to enhance their reading comprehension (Chen and Intaraprasert, 2014). Moreover, although the previous studies mentioned in chapter 1 demonstrate that Thai engineers probably are weak in English, it can be assumed that some Thai engineers are good in English, especially in reading English because significant positive relationship exists between the use of strategies and English as a foreign language (EFL) proficiency. Significant positive relationship also exists between the use of strategies and reading comprehension achievement. EFL Learners at a higher reading proficiency report a significantly higher frequency of the use of strategies (Chen and Intaraprasert, 2014; Nisbet and Huang, 2015; Dawadi, 2017; Rastegar et al., 2017; Tanthanis, 2016).

Secondly, the strategies in the category of global reading strategies were the strategies participants used most frequently. The strategies in problem-Solving strategies

were used less frequently than the strategies in global reading strategies while the strategies in the category of support reading strategies were the least used strategies. The explanation could be the nature of works of Thai civil engineers. Thai civil engineers mainly responsible for planning and managing works which have to be done, and monitoring workers in construction. This would be similar to Thai civil engineers' use of global reading strategies to help them work with text directly or to manage and monitor their reading.

Thirdly, the most frequently reported strategy was the statement 4. This strategy was followed by the statement 3, 14, 25 and 20. None of these strategies was in the category of support reading strategies. The explanation might be engineers' opportunity for reading. Professional engineers frequently read materials alone. Therefore, they would employ global reading strategies and problem-solving strategies which can help them encounter reading problems by themselves. The finding also revealed that the participant did not especially use strategies relating to graphics, vocabulary, and short text which were the main components of safety materials. It can be assumed that strategies used for reading technical English that is used to write safety materials are not different from strategies used for reading general English.

Lastly, some of the participants reported the strategies beside the strategies in the SORS. According to the classification of strategies of Oxford (2003), the strategy I re-read several times and I read other texts related to the text I focus to help me understand what I focus to read still involved metacognitive reading strategies. But other strategies involved other categories of strategies. The strategies I make a note of vocabularies in what I read and try to think of them involved the cognitive strategies. The strategy I ask a guru involved the compensation strategies. The strategy I have a conversation in the contents I read with friends involved the social strategies. Therefore, the finding emphasized that Thai civil engineers used not only the metacognitive reading strategies but other strategies to solve problems of reading.

According to the findings on the use of strategies of Thai civil engineers in reading English safety materials mentioned, the significance of the study for designing a training course for reading English can be appreciated as follows:

Firstly, because Thai civil engineers reported their use of metacognitive reading strategies at a high level, it could be inferred that they would be high reading proficiency learners in learning English. Therefore, training courses in reading English for them should focus on advanced techniques for reading. In addition, metacognitive reading strategies enhance reading proficiency of language learners and Thai civil engineers use them at a high level, they may have high abilities to learn reading other foreign languages apart from English.

Secondly, because Thai civil engineers used global reading strategies most frequently, training courses in reading English for Thai civil engineers should encourage them to increase the use of problem-solving strategies and support strategies.

Thirdly, because It can be assumed that strategies used for reading technical English are not different from strategies used for reading general English, training courses in the use of metacognitive reading strategies for reading technical English can be the same as training courses for reading general English.

Lastly, because Thai civil engineers reported the use of other strategies apart from metacognitive reading strategies. Training courses in reading English for them should consist of the use of all six categories of strategies according to Oxford (2003).

2. The Relationship Between Thai Civil Engineers' Work Experience and Their Use of Strategies

The result of the study showed that the use of most of strategies did not have significant correlation with work experience. The result of the study also showed that the Thai civil engineers used strategies in overall at a high level. This could be explained that Thai civil engineers use strategies at a high level since they have short work experience. Although having high prior knowledge is crucial for achieving high performance in reading, readers who do not have high prior knowledge are possible to achieve high performance in reading as well if they are skillful in the language (Abdelaal and Sase, 2014).

According to a study of the use of strategies of Thai university engineering students conducted by Thampradit (2008), Thai university engineering students used strategies at moderate level in overall. According to the case study conducted by Sillapee (2016), Thai civil engineers who have work experience less than 10 years possess English skills. Based on this rationale, the use of strategies of Thai civil engineers who have longer work experience are likely to not differ from the use of reading strategies of Thai civil engineers having less work experience because Thai civil engineers would use strategies at a high level since they start working and still use strategies at a high level after they work for years. This finding can appreciate the significance of the study for designing a training course for reading English that Thai civil engineers who have longer work experience and those having less work experience can take the same course in using metacognitive reading strategies in reading English materials.

Recommendations for Further Research

Based on the findings and conclusions of this study, the following recommendations are made for future research on the field of engineering in English as a foreign language.

First, this study has limitations in the sense that participants are only the Thai civil engineers. Nevertheless, other types of engineers – i.e. mechanical engineers – also have to read English safety materials while working. Further research is needed to see whether the same results would be gained from different samples. Further studies dealing with investigation and comparison of the use of strategies used by various types of engineers would help demonstrate the use

of strategies of Thai engineers in overall and verify the findings of this study.

Second, results based on self-report questionnaire like the SORS would have limitations. The researcher cannot ascertain with firm conviction from the instrument alone if the Thai civil engineers truly use the strategies they have reported as being used by them. A qualitative research method such as in-depth interviews should be considered in order that the researcher can explore the Thai civil engineer's strategies more accurately.

Finally, this study focuses on the use of strategies in reading English safety materials. However, the main function of safety materials is limited to giving instruction. Further research is needed to see whether the same results would be gained from different text genre in workplace engaged in reading lengthy texts.

Limitation of the Research

Because the population sampling of the research is a simple random sampling as well as the number of respondents is limited, the amount of the sample might be too small to effectively measure the significant interaction between Thai civil engineers who have short work experience and others who have long work experience. In addition, this study might not be able to demonstrate the actual use in average of all Thai civil engineers. The participants of this study reported the use of strategies at a high level while most of Thai civil engineers are likely to report the use of strategies at a low or medium level as reported in the previous studies.

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