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THE INTERPLAY BETWEEN ENGLISH PROFICIENCY AND READING STRATEGY USE IN ENGLISH READING: VALIDATING THE LINGUISTIC THRESHOLD HYPOTHESIS AND THE INTERACTIVE-COMPENSATORY MODEL

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ABSTRACT

The present study attempted to validate the linguistic threshold hypothesis (LTH) and the interactive-compensatory model (ICM) in an English as a foreign language (EFL) setting by assessing the relative contributions of English proficiency and reading strategy use to English reading and examining the mutual compensation between these two factors in English reading, respectively. To this end, 166 (55 males, 111 females) EFL freshmen enrolled in General English I at a university in southern Taiwan satisfactorily completed three measurements to respectively assess their English proficiency (vocabulary and grammar knowledge), English reading comprehension, and reading strategy use (bottom-up and top-down strategies). The findings support the LTH by showing that English proficiency was a stronger predictor of English reading comprehension than reading strategy use and that the high proficient learners employed more reading strategies and used them more effectively in English reading than the low proficient learners. Furthermore, the findings verify the ICM by specifying the actual levels at which intermediate English proficiency compensated for low reading strategy use, and high reading strategy use compensated for low English proficiency for successful English reading. The present study concludes with the suggestion that linguistic knowledge should be taught to EFL learners simultaneously along with reading strategy use for the best performance in English reading comprehension.

Key Words: English proficiency, reading strategy use, English reading comprehension

INTRODUCTION

It is widely accepted that being able to read and comprehend texts written in English has become an important skill that English as a foreign

language (EFL) university students need to have (Kim, 1995) because the ability to read effectively influences both academic success and later career development (Xin, Ismail, & Aziz, 2018). Therefore, most universities in Taiwan are increasingly requiring their students to acquire a good English reading ability. Unfortunately, the students' achievements do not seem to meet the universities' expectations because the mastery of English reading skills is not a simple task (Usó-Juan, 2006). Generally, most Taiwanese EFL university learners have difficulty understanding texts in English and are unable to employ reading strategies to remedy their comprehension breakdown (Yeh & Lai, 2012) although they have received reading instruction from their EFL teachers for more than seven years. Their reading problems might be related to two key factors: a more language-specific knowledge factor, namely, second language (L2) knowledge (L2 proficiency, generally indicated by L2 vocabulary and L2 grammar tests) and a more general and transferable reading knowledge factor, usually called general reading skills or reading strategies (generally measured by an L1 reading test) (Guo & Roehrig, 2011; Schoonen, Hulstijn, & Bosser, 1998). To illustrate, Chen's studies (2018, 2019) with Taiwanese university freshmen revealed that English proficiency alone explained 36% to 41% of the variation in English reading, while reading strategy use alone explained 13% of the variation in English reading. Alderson (1984) attempted to find out if difficulty in L2 reading is a reading problem (weakness in reading strategies) or a language problem (weakness in L2 language knowledge); that is, L2 reading mainly relates to a person's reading ability, or it is about L2 language proficiency. To address this issue, two opposing linguistic hypotheses have been proposed, namely, the linguistic interdependence hypothesis (LIH) and the linguistic threshold hypothesis (LTH) (Bernhardt & Kamil, 1995; Goodman, 1971; Jiang, 2011; Yamashita, 2002a). The former upholds that first language (L1) reading strategies can be automatically transferred to L2 reading, while the latter asserts that reading strategies cannot be transferred from L1 to L2 reading until learners cross a critical level of L2 proficiency (Cui, 2008). The present study focused on validating the LTH, not the LIH, because research has offered enough evidence favoring the LTH (Cui, 2008). Another notion facilitating our understanding of the nature of L2 reading is the interactive-compensatory model (ICM) proposed by Stanovich (1980). The ICM recognizes the mutual compensation between different reading components and posits that "if one component is weak, other reading processes work harder in order to compensate for the weak

one" (Yamashita, 2002a, p. 84). Although most of the studies (e.g., Barnett, 1989; Carrell, 1991; Chen, 2018, 2019; Oxford, Park-Oh, Ito, & Sutural, 1993) have demonstrated the importance of L2 proficiency or reading strategy use in successful reading performance separately, they fail to provide enough information about how these two variables interplay during the L2 reading process. Hence, EFL teachers have few clues to know if the contributions of L2 proficiency and reading strategy use to L2 reading differ by L2 proficiency levels (Guo & Roehrig, 2011) and if these two variables can compensate for each other for successful L2 reading (Yamashita, 2002a). In response, the present study intended to uncover the mechanism behind the interplay between English proficiency and reading strategy use in English reading through validating the notions of the LTH and the ICM in a Taiwanese EFL context. These two notions were respectively validated by exploring the relative contributions of English proficiency and reading strategy use to English reading and investigating the mutual compensation between these two variables in English reading.

LITERATURE REVIEW

Definitions of Reading Comprehension, L2 Proficiency, and Reading Strategies

Reading comprehension.

Reading can be defined as a dynamic interaction between language and thought, where "the writer encodes thought as language, and the reader decodes language to thought" (Goodman, 1988, p. 12); also, reading usually refers to an interactive process among readers, texts, and tasks with the purpose of making meaning from written texts (Koda, 2005). On the other hand, comprehension is seen as readers' construction of meaning from an author's message (Goodman, 1967), which requires the readers to connect information from the written text with their previous knowledge (Gamboa-González, 2017). Thus, we can define reading comprehension as "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (Snow, 2002, p.11). Since prior studies have noted that L2 proficiency and reading strategies are the two major components contributing to L2 reading (Clarke, 1979; Cziko, 1980; Grabe, 2009; Guo & Roehrig, 2011; McNeil, 2012) and that L2 proficiency and reading strategies operate interactively when engaging in L2 reading (Bernhardt,

2005), these two components are defined in the following sections.

L2 proficiency.

The present study used L2 proficiency to represent the L2-specific knowledge factor in L2 reading. Although various models regarding the construct of L2 proficiency have been proposed (Wu, 2016), vocabulary and grammar are "the clearest examples to represent language proficiency in L2 reading" (Yamashita, 2002a, p. 83), and they are the critical language knowledge contributing to effective L2 reading (Nassaji, 2003; Yamashita, 2002a). Following Yamashita's construct, the present study defined L2 proficiency as "knowledge of vocabulary and grammatical structure" (Yamashita, 2002a, p. 83).

Reading strategies.

The present study employed reading strategies to represent the more general and transferable reading knowledge factor in L2 reading. Generally, reading strategies are considered as "conscious actions readers take to solve difficulties in reading and therefore improve reading comprehension" (Abbott, 2010; Carrell, 1998, as cited in Uribe-Enciso, 2015, p. 41). Reading strategies have been classified diversely (Block, 1986; Mokhtari & Reichard, 2002; Ozek & Civelek, 2006). The reading strategies used in the present study are categorized into bottom-up and top-down strategies, which are related to the two reading processing models that are most frequently referred to in L2 literature: bottom-up and top-down processing (Barnett, 1989; Birch, 2007). To elaborate, in bottom-up processing, the reader is seen as a passive decoder (Gough, 1972), and reading is a passive process, where the reader constructs meaning "by moving from the lowest level, such as letters and words, towards the higher level of clauses, sentences, and paragraphs" (Carrell, 1998, as cited in Gamboa-González, 2017, p. 162). Since this model deals with linguistic elements in the reading (Uribe-Enciso, 2015), good readers should have a large vocabulary size and have sufficient knowledge in grammar to analyze the sentences (Nagao, 2002). Typical strategies associated with bottom-up processing include "breaking words into smaller parts, using knowledge of syntactic structures or punctuation, scanning for specific details, paraphrasing or rewording the original text, and looking for key vocabulary or phrases" (Abbott, 2006, pp. 637-638).

In contrast, top-down processing emphasizing the active role of the reader contends that "comprehension begins with more global aspects,

(the title, the basic idea of each paragraph, etc.) and subsequently, goes into smaller linguistic units" (Angosto, Sánchez, Álvarez, Cuevas, & León, 2013, p. 84) and that good readers rely on background knowledge, discourse organization, text gist, and context cues (Abbott, 2006; Cruz & Escudero, 2012). Typical strategies associated with top-down processing contain "recognizing the main idea, integrating scattered information, drawing an inference, predicting what might happen in a related scenario, and recognizing text structure" (Abbott, 2006, p. 638).

Many L2 researchers have contended that L2 readers need both bottom-up and top-down processing and should master both types of strategies so as to be successful readers (Bernhardt, 1991; Eskey, 1988). To elaborate, the interaction of these two types of processing enables the readers to simultaneously utilize multiple sources of information in making meanings of the written text; the simultaneous interaction of multiple sources of information allows a strength in one area to compensate for a weakness in another area (Garner, 1987; Stanovich, 1980).

Some researchers have pointed out that both L1 and L2 reading are underpinned by two major factors: a language-specific knowledge factor and a more general reading knowledge factor (reading strategies) (Guo & Roehrig, 2011; Schoonen et al.,1998) and that reading strategies are potential candidates for transfer from L1 to L2, while the L1 language-specific knowledge is not or only to a limited extent (Schoonen et al.,1998).

Theoretical and Empirical Support for the Linguistic Interdependence Hypothesis

In dealing with the comparative roles served by L1 reading ability and L2 proficiency in L2 reading, two conflicting hypotheses have been introduced: the linguistic interdependence hypothesis and the linguistic threshold hypothesis. The LIH, in its simple form, suggests that reading strategies can be automatically transferred across languages (Chuang, 2007). This hypothesis originated in Goodman's (1971) statement that "… the reading process will be much the same for all languages with minor variations to accommodate the specific characteristics of the orthography used and the grammatical structure of the language" (p. 140). In other words, "there is a common underlying cognitive ability between L1 and L2, and we do not need to learn reading in L2 if we have a certain level of L1 reading ability" (Yamashita, 2001, p. 189) because cognitive skills can be easily and automatically transferred from L1 to L2 (Kamita, 2015).

Hence, the transfer of cognitive skills might lead to a significant correlation between L1 and L2 reading (Morvay, 2015). Most importantly, this hypothesis believes that we learn to read only once (Gerbault, 1997; Yamashita, 2001), that effective L1 readers are supposed to be effective L2 readers (Schoonen et al., 1998), and that L2 reading can be seen as a reading problem (Schoonen et al.,1998), where L1 reading ability contributes more to L2 reading than does L2 knowledge (August, 2006).

Some positive evidence supporting the LIH is provided by studies demonstrating that the contribution of L1 reading ability to L2 reading is bigger than that of L2 knowledge among native Spanish-speaking ESL college students (August, 2006) and among English learners of Spanish who were in levels 3, 4, and 6 (Carrell, 1991), suggesting that L1 reading ability is more strongly associated with L2 reading than L2 knowledge (Schoonen et al., 1998). Additional evidence in support of the LIH is offered by studies showing the similarity between L1 reading and L2 reading (Feng & Mokhtari, 1998; Qu, 2013; Swicegood, 1994; Xin et al., 2018), with correlations ranging from .54 to .91 (Sarig, 1987; Yamashita, 1999). This suggests that "the entire process of reading can be much more similar in L1 and L2 reading" (Yamashita, 2002b, p. 277). In other words, L1 and L2 reading are related and interdependent (Chuang, 2007).

Theoretical and Empirical Support for the Linguistic Threshold Hypothesis

Since reading ability transfer does not occur in all cases (Brisbois, 1995), the linguistic threshold hypothesis, as opposed to the LIH, emerged to further assess the associations between LI and L2 reading. The main assumption of the LTH is that L2 learners must first reach a certain level of L2 proficiency before transferring their L1 reading skills or strategies to improve L2 reading comprehension (Bernhardt & Kamil, 1995; Jiang, 2011; Yamashita, 2002a). Below this level, it is difficult to transfer reading strategies from L1 to L2 reading (Cui, 2008). Alderson (1984) further hypothesized that "poor foreign language reading is due to reading strategies in the first language not being employed in the foreign language, due to inadequate knowledge of the foreign language" (p. 4), suggesting that a certain threshold of L2 proficiency seems to be essential for skilled LI readers to become fluent L2 readers (Brisbois, 1995) and that success or failure in L2 reading might be dependent on if a reader has crossed a critical level of L2 proficiency or not (Lee & Schallert, 1997). In this view, L2 reading can be considered as a language problem (Kamita, 2015),

where "…knowledge of the second language is a more important factor than first-language reading abilities" (Alderson, 2000, p. 23).

An abundance of research favoring the LTH has verified that L2 language proficiency accounts for more of the variance in L2 reading compared with L1 reading ability (Bernhardt, 2005; Bernhardt & Kamil, 1995; Jiang, 2011) and that the L2 reading problem can be attributed more to weakness in L2 proficiency than to weakness in L1 reading ability (Morvay, 2015). These findings are consistent with the claim that when L2 knowledge influences L2 reading more than L1 reading ability, the LTH is supported (August, 2006; Bernhardt & Kamil, 1995). Most importantly, other studies have shown that the relation of L1 reading ability to L2 reading is stronger among high L2 proficient learners than low proficient L2 learners (Bossers, 1991; Lee & Schallert, 1997; Pichette, Segalowitz, & Connors, 2003); compared with high proficient L2 learners, low proficient L2 learners transfer no or few reading strategies from L1 to L2 reading (Brisbois, 1995; Lee & Shalleart, 1997). This suggests that "when L2 proficiency passes the threshold, one would expect increased transfer from the L1 to the L2 and, thus, for the contribution of L1 reading to L2 reading to increase as well" (Brisbois, 1995, p. 567). Worthy of note is that the above findings seem to suggest that the existence of the LTH can be claimed if two conditions are met. First, L2 proficiency contributes more to L2 reading than L1 reading ability (August, 2006; Bernhardt & Kamil, 1995; Jiang, 2011). Second, an L2 proficiency threshold influences the transfer of L1 reading strategies to L2 reading (Lee & Schallert, 1997).

It is noteworthy that the aforementioned studies have provided no evidence to demonstrate which aspects (linguistic-specific knowledge or reading strategies) of L1 reading are involved when L1 reading ability influences L2 reading (Mushait, 2003). Although in some research it appears as if L1 reading ability is equal to reading strategies alone, it is unclear how far previous researchers control the effect of L1 linguistic-specific knowledge so that an effect of L1 reading ability is equal to an effect of reading strategies (Mushait, 2003). Hence, to completely understand the roles of L2 proficiency and reading strategy use in L2 reading, we have to review the literature directly addressing the relations of these two variables to L2 reading.

Probing the Contributions of L2 Proficiency and Reading Strategy Use to L2 Reading in Terms of the LTH

Previous research has identified the overlap between strategic knowledge and L1 reading ability (McNeil, 2012). Therefore, when the LTH is applied directly to L2 reading strategy use, the words "L1 reading ability" in the first condition supporting the LTH can be replaced by the words "reading strategy use". The modified first condition reads like this: "L2 proficiency is more contributive to L2 reading than reading strategy use." To test this condition, several studies have indicated that compared with reading strategy use, L2 proficiency is a more powerful factor influencing L2 reading performance among Chinese-speaking university students (Guo & Roehrig, 2011), among Spanish ninth and tenth graders (Halpern, 2009), and among Iranian university freshmen (Talebi, 2015). This implies that L2 reading is primarily a language problem (Guo & Roehrig, 2011). The results of these three studies provide only the potential existence of the LTH, "with no indication of a hypothetical threshold level in L2 reading" (Park, 2013, p. 39).

To gain more convincing evidence in support of the LTH, the second condition addressing how an L2 proficiency threshold influences the transfer of reading strategies across languages should be tested. To this end, some studies have concentrated on exploring the effects of L2 proficiency on reading strategy transfer. The results have pointed out that proficient L2 readers transfer more reading strategies from L1 to L2 and use them in L2 reading more effectively compared with less proficient L2 readers (Davis & Bistodeau, 1993; Taillefer & Pugh, 1998; Tsai, Ernst, & Talley, 2010; Yau, 2009). These results imply that L2 proficiency is essential for the transfer of reading strategies across languages (Taillefer & Pugh, 1998).

Further support for the second condition comes from studies focusing on investigating whether the effects of L2 proficiency and reading strategy use on L2 reading differ at various grades. This is exemplified in Schoonen et al.'s (1998) study with Dutch EFL sixth, eighth, and tenth graders and van Gelderen, Schoonen, Stoel, Glopper, and Hulstijn's (2007) longitudinal study among Dutch EFL students (grades 8-10). The results pointed out that L2 language was a stronger predictor of L2 reading at grade 8 than metacognition, but the strength of L2 language declined over time and the influence of metacognition on L2 reading became stronger. These two studies highlight that in L2 reading, L2 language plays a more important role for the lower-level L2 readers, while reading strategies play a more important role for the higher-level L2 readers, reflecting the existence of a language threshold.

It is evident that the LTH not only can explain the relations of L1 reading ability and L2 proficiency to L2 reading but also can account for the interplay between L2 proficiency and reading strategy use in L2 reading. However, the joint effects of English proficiency and reading strategy use on English reading in terms of the LTH are not well understood in a Taiwanese EFL context. To shed further light on this issue, the present study tried to verify the two conditions which are necessary for supporting the existence of the LTH.

Theoretical and Empirical Support for the Interactive-Compensatory Model

Aside from the two linguistic hypotheses, the interactive-compensatory model developed in L1 reading (Stanovich, 1980) offers additional insights for the interplay between L1 reading ability and L2 proficiency in L2 reading. The ICM acknowledges the mutual compensation of different components of reading and proposes that a shortage in one knowledge source can be conquered by depending on another, whereas a strength in one processing stage can compensate for a weakness in another. In L1 reading, the ICM has been applied to identifying the compensation between orthographic structure and contextual information on word recognition (Stanovich, 1980), between vocabulary and background knowledge toward reading (Stahl, Hare, Sinatra, & Gregory, 1991; Stahl, Jocobson, Davis, & Davis, 1989), and between reading ability and background knowledge during the reading process (Adams, Bell, & Perfetti, 1995).

Turning to L2 reading contexts, the ICM has also been applied to examine the compensation between L1 reading ability and L2 proficiency (Yamashita, 2002a; Zwaan & Brown, 1996) and between discipline-related knowledge and English-language proficiency (Usó-Juan, 2006). The results suggest that there seems to be a compensatory mechanism within L2 reading processes, "with stronger components trying to make up for the weaker ones" (Yamashita, 2002a, p. 84). Regrettably, there has been little discussion on the compensation between English proficiency and reading strategy use for successful English reading in a Taiwanese EFL context. Obviously, this is an issue deserving further investigation.

Viewed collectively, extant literature seems to support the existence of the LIH, the LTH, and the ICM. However, what remains unclear is whether the notions of LTH and the ICM can be validated through examining the interplay between English proficiency and reading strategy

use in English reading. To bridge this gap, the present study aimed to answer the following research questions:

1. What are the relative contributions of English proficiency and reading strategy use to English reading comprehension?
2. Do the correlations of English proficiency and reading strategy use to English reading comprehension differ depending on English proficiency levels?
3. Can a weakness in one of these two variables--English proficiency or reading strategy use-- be compensated for by a strength in the other variable for successful English reading?

The contributions of the present study are unique in the sense that the notions of the LTH and the ICM have never been validated simultaneously, and the joint effects and the mutual compensation specified here have not been available previously in Taiwan. The present study may bring insights into the mechanism behind the interplay between English proficiency and reading strategy use in English reading if the evidence supporting the LTH and the ICM can be established. Also, using these insights, EFL teachers can help their students improve English reading.

METHOD

Participants

A convenience sample of 166 non-English-major freshmen (55 males, 111 females; age 19-20) enrolled in General English I offered by a university in southern Taiwan participated in the present study. The participants were from six different departments. Most of them had seven to nine years of English learning experience and all of them needed to take English to fulfill their program requirements. They satisfactorily completed a survey measuring reading strategies and two tests assessing English proficiency and English reading comprehension, respectively.

Instruments

The present study employed three instruments: the English Proficiency Test, the English Reading Comprehension Test, and the Reading Strategy Survey.

English Proficiency Test (EPT).

The EPT consisted of the Grammar Test (GT, see Appendix A) and the Vocabulary Test (VT, see Appendix B). Both the GT and the VT were adopted from the Michigan English Placement Test (MEPT). The MEPT has 100 multiple-choice questions covering four English skills: listening comprehension (20 items), grammar (30 items), vocabulary (30 items), and reading comprehension (20 items). The internal consistency reliability coefficients for the MEPT have been found to be from .89 to .94 (Testing and Certification Division of the English Language Institute, 1993). For the purpose of the present study, the GT and the VT were employed to tap English-specific knowledge (English proficiency). Scoring for the GT and the VT is simple: 1 point for answering the items correctly and 0 for answering the items incorrectly. The scores of these two tests were then added to produce an overall English proficiency score of 0-60.

According to Wistner, Hideki, and Mariko (2008), the questions of GT cover identifying the appropriate use of prepositional phrases and choosing an appropriate pronoun, verb form, and word order. As for the VT, the questions are designed to measure test-takers' knowledge of the meanings and uses of English words. Item analysis done in Chen's (2018) study indicated that the items on the GT and the VT had good levels of difficulty (M = .43 for the GT and M = .36 for the VT) and acceptable levels of discrimination (M = .34 for the GT and M = .35 for the VT). The reliability coefficients measured by KR-20 (Kuder & Richardson, 1937, as cited in Tan, 2009) were .74 for the GT and .80 for the VT (Chen, 2018). Clearly, the EPT is an effective and reliable tool for measuring the participants' English proficiency.

English Reading Comprehension Test (ERCT).

The adapted version of the ERCT (see Appendix C) had 22 multiple-choice questions measuring the participants' English reading comprehension on seven different texts. Four texts were cited from the Basic Competence Test (BCT) in English of 2001 and 2002 (Kuo, 2002) and three from the simulated intermediate level GEPT reading test (Lai, 2003). Both the BCT and the GEPT are standardized tests developed in Taiwan. The former is an exam used to apply for admissions to senior high schools, and the latter is used to measure learners' general English proficiency. The reading texts used in the present study consisted of four types: short reading, long reading, dialogue, and letter. As for the short

reading, it had six to nine lines in the reading selection and it was not hard for students to understand. With respect to the long reading, it was harder and more complex in the structure of sentences and text. It might involve reading strategy use, grammar analysis, and vocabulary solution (Kuo, 2002). It had ten to thirteen lines. Regarding the dialogue, it was an easy text type owing to its loose structure and easy grammar. It was designed to test if students could use the contextual clues to infer the meaning. Concerning the letter, it was about telling something to somebody. The reading questions were intended to ask about the details or inferences from the letter (Kuo, 2002). Scoring for the ERCT was similar to that of the GT and the VT, with total scores ranging from 0 to 22 points. Item analysis done in Chen's (2018) study revealed that the ERCT items had an ideal level of difficulty (M = .64) and a very good level of discrimination (M = .42). The reliability coefficient measured by KR-20 (Kuder & Richardson, 1937, as cited in Tan, 2009) was .82 (Chen, 2018). Clearly, the ERCT is an effective and reliable tool for assessing the participants' reading comprehension.

Reading Strategy Survey (RSS).

Unlike previous studies using L1 reading tests to measure more general and transferable reading knowledge (strategies), the present study employed the RSS to assess reading strategies in English reading as a form of general and transferable reading knowledge. The modified Chinese version of the RSS (see Appendix D), adapted from Carrell's (1989) Reading Metacognitive Awareness Questionnaire and Rusciolelli's (1995) Reading Strategy Survey, included six items for detecting bottom-up (local) strategies and six items for top-down (global) strategies. All the items were modified to suit the EFL learning context. For example, each item was preceded by the common stem "When reading silently in English, the things I do to read effectively are to focus on…" (Hirose, 2014, p. 260). Items of bottom-up or top-down strategies occurred randomly in the survey. The RSS used a 6-point Likert-type scale ranging from "strongly disagree" (1 point) to "strongly agree" (6 points). For the purpose of the present study, the bottom-up and top-down scores were combined to yield an overall reading strategy use score of 12-72, with higher scores representing higher levels of overall reading strategy use. The RSS was validated in Chen's (2019) study, where the Cronbach's alpha reliability coefficient for the entire RSS was .85, and a principal component analysis (PCA) resulted in a two-factor (top-down and bottom-up strategies)

solution that accounted for 51.77 % of the variance. Clearly, the modified RSS is valid and reliable for evaluating the participants' reading strategy use.

Procedures

Data collection took place during the regular class periods. The tests were administered in four different classes by the researcher. Before administrating each test, the researcher gave the participants a brief overview of the test and encouraged them to answer all the questions sincerely. Tests were given to the participants in the order of the EPT, the ERCT, and the RSS. It took about 35 minutes to complete the EPT, 40 minutes to complete the ERCT, and 10 minutes to complete the RSS. In particular, in order to gather the information on whether the participants employed effective strategies or not while they were reading, the participants were asked to answer the items on the RSS immediately after they completed the ERCT. Students' participation was voluntary and the confidentiality of their responses was assured.

Data Analysis

The data were analyzed by performing a multiple regression analysis, an independent samples t-test, a Pearson correlation analysis, and a one-way ANOVA using SPSS 18.

RESULTS AND DISCUSSION

Results and Discussion of Research Question 1

Research Question 1 attempted to validate the first condition supporting the LTH by examining the relative contributions of English proficiency and reading strategy use (bottom-up and top-down together) to English reading comprehension. To answer this question, a multiple regression analysis was run, with English reading comprehension as a criterion variable and English proficiency and reading strategy use as predictor variables. To verify that the data in the present study had met the regression assumptions, a P-P plot was first generated to assess the assumption of normality. "Since the plotted values fell closely along the diagonal line, the residuals are considered to represent a normal

distribution" (Chen, 2002, p. 18). Second, the Durbin-Watson statistic was used to assess serial correlation. The Durbin-Watson value of 1.66 indicates that the data are not autocorrelated (Field, 2013). Finally, the VIF statistic was employed to detect the collinearity among predictor variables. The VIF value of 1.11 suggests that the possibility of the collinearity problem between predictor variables is low (Field, 2013).

Table 1

Regression Analysis Summary for English Proficiency and Reading Strategy Use Predicting Reading Comprehension (N = 166)

Variable	*b*	ß	*t*	*p*
(Constant)	3.34		2.11	.036
English proficiency	0.32	.67	11.78	.000
Reading strategy use	0.07	.13	2.18	.031

Note. R2 = .521; F (2, 163) = 88.80, p < .001;VIF = 1.11; Durbin-Watson= 1.66.

As noted from Table 1, the multiple regression model with two predictors produced R2 = .521, F(2, 163) = 88.80, p < .001, signifying that approximately 52.1% of the variance in English reading comprehension can be accounted for by the linear combination of English proficiency and reading strategy use. Looking at the regression weights, we can find that both predictors had significant positive b-values (b = 0.32, t = 11.78, p < .001 for proficiency; b = 0.07, t = 2.18, p = .031 for strategy), suggesting that EFL learners with higher scores on English proficiency or reading strategy use are expected to have higher reading comprehension scores. In addition, the standardized ß values imply that English proficiency (ß = .67) is a stronger predictor of English reading comprehension than reading strategy use (ß = .13) (Field, 2013), demonstrating the fact that English reading comprehension owes more to English proficiency than to reading strategy use. These findings also suggest that for EFL learners in the present study, although English reading seems to be both a language and a reading problem (Alderson, 1984), the importance of language problem far outweighs that of reading problem in English reading comprehension.

The b values from Table 1 provide the values necessary to write the regression equation in the form of: Reading = 3.34 + 0.32 proficiency +

0.07 strategy. This equation then was used to investigate Research Question 3, which concerned the mutual compensation between English proficiency and reading strategy use for successful English reading.

The present findings appear to be consistent with previous studies reporting that L2 proficiency influences L2 reading more than strategy use (Guo & Roehrig, 2011; Halpern, 2009; Talebi, 2015). This can be explained by considering the fact that the participants' performance on the EPT was only 39.5% (23.72 out of 60), indicating a low level of English proficiency. As noted in earlier research, "when learners are at a lower level of proficiency, they often rely more on their L2 language knowledge to facilitate their L2 reading comprehension" (Jiang, 2011, p. 187); therefore, English proficiency tends to be more contributive to English reading comprehension than reading strategy use. Another possible explanation is that increasing L2 knowledge would significantly enhance L2 reading ability if there are big differences between L1 and L2, such as Chinese and English (Cowan, 1976; Yang, 2007). Thus, the great differences between Chinese and English may make English proficiency a stronger predictor of English reading than reading strategy use.

The present findings verify the first condition supporting the LTH by showing that English proficiency made a greater contribution to English reading than reading strategy use. However, this condition might be necessary but not sufficient to validate the LTH (Park, 2013). Because the data in Research Question 1 were analyzed among the whole group without differentiating the participants by their English proficiency levels, the results provided no evidence about a critical level of English proficiency threshold, which is considered a crucial point in support of the LTH (Park, 2013).

Results and Discussion of Research Question 2

Research Question 2 aimed to validate the second condition supporting the LTH by investigating whether the correlations of English proficiency and reading strategy use to English reading comprehension differ by English proficiency levels. Before performing Pearson correlation analyses, two groups were formulated based on the median split of the EPT. Individuals who scored above the median (22 out of 60) on the EPT were classified as being the high proficient learners (n = 80); those scoring below the median were classified as being the low proficient learners (n = 86). To make sure that the two groups were different in terms of English proficiency, an independent samples t-test assuming unequal

variance, Levene $F(1,164) = 30.07$, $p < .001$, was conducted. Table 2 reveals that the two groups were statistically different, $t(122.52) = 16.89$, $p < .001$, $d = 2.65$, suggesting that the two groups have different proficiency levels.

Table 2

t-test Results Comparing High (n = 80) and Low (n = 86) Proficient Learners on English Proficiency

Group	HP		LP				
Variable	*Mean*	*SD*	*Mean*	*SD*	*t*	*p*	*d*
English proficiency	31.81	7.26	16.19	4.08	16.89	.000	2.65

Note. HP = High proficient; LP = Low proficient.

Table 3 presents the correlations of English proficiency and reading strategy use to English reading comprehension across learners with high and low proficiency.

Table 3

Correlations among English Proficiency, Reading Strategy Use, and Reading Comprehension by Proficiency Groups

Variable	Reading	
Group	HP	LP
English proficiency	.67***	.39**
Overall reading strategy use (bottom-up + top-down)	.38**	.16
Bottom-Up strategies		
Understanding the meaning of each word	.33**	-.04
Looking up words in the dictionary	.27*	.07
Trying to guess at the unknown word by relating it to the part of speech	.24*	.11
Analyzing the grammatical structures	.12	-.14
Rereading the problematic part	.25*	.25*
Reading the article word by word	.33**	.03
Top-Down strategies		
Underlining the keyword of each paragraph	.33**	.15
Reading the reading questions first and just looking for those answers	.19	.13
Trying to guess at unknown word by relating it to the context	.13	.18
Skimming the whole article to see what the general idea is	.31**	.08
Reading the first line of every paragraph to understand what the text is about	.11	.16
Using my prior knowledge and experience to understand the content of the text I am reading	.35**	.27*

Note. HP = High English proficiency learners (n = 80); LP = Low English proficiency learners (n = 86); * p < .05, ** p < .01, *** p < .001.

It is worth noting that both English proficiency and overall reading strategy use had a higher correlation with English proficiency at the higher level of English proficiency than at the lower level of English proficiency. Regarding English proficiency, the correlations increased from .39 ($p < .01$) for the low proficient learners to .67 ($p < .001$) for the high proficient learners. This suggests that English proficiency plays an important role in English reading comprehension regardless of learners' English proficiency levels, but its role is becoming more and more important as the learners achieve higher proficiency levels. Concerning overall reading strategy use, the correlations increased from .16 ($p > .05$) for the low proficient learners to .38 ($p < .01$) for the high proficient learners. This suggests that a threshold level of English proficiency exists so that low proficient learners show an insignificant relationship between their reading strategy use and English reading performance, whereas high proficient learners show a stronger and significant relationship between these two variables. In other words, learners need to reach a certain level of English proficiency before they can successfully employ their reading strategies to help with English reading. Apparently, the high proficient learners' superior English knowledge may lead to the ability to use both English knowledge and reading strategies more effectively in the English reading process (Brisbois, 1995).

The finding that the effect of English proficiency on English reading comprehension increased at the higher proficiency levels seems to be in line with previous studies (Brisbois ,1995; Taillefer, 1996; Yamashita, 1999), where the effect of L2 proficiency on L2 reading tends to increase when readers reach the higher levels of L2 proficiency. However, this finding appears to provide counter-evidence to the proposition that "when the readers' L2 proficiency develops towards the maximum level, the contribution of L1 reading ability increases and L2 language ability loses its power in explaining the variation of L2 reading ability" (Yamashita, 2001, p. 197). This could be due to the fact that the high proficient learners' performance on the EPT was only 53% (31.81 out of 60), which is not high enough for the expected decrease in the effect of English proficiency on English reading comprehension to happen (Yamashita, 2001).

Another finding that there was no correlation between reading strategy use and English reading until learners reached a higher level of English proficiency offers crucial evidence to the second condition supporting the LTH (Lee & Schallert, 1997). Also, this finding seems to partially align with the results of Schoonen et al. (1998), who found that metacognition

explained 5% of L2 reading comprehension for the lower-proficiency readers, while 25% of L2 reading scores were attributed to metacognition for the higher-proficiency readers.

Further examination of the correlations of individual strategy items to English reading comprehension indicated that the correlations differed by English proficiency levels. For example, with respect to the number of the significant correlations, eight out of the 12 correlations were significant for the high proficient learners, while only two out of the 12 correlations achieved significance for the low proficient learners. This implies that although learners, despite their weak English knowledge, are able to use certain reading strategies effectively to cope with reading difficulties, weak English knowledge can sometimes get in the way of successful reading strategy deployment (Razi & Grenfell, 2012), reflecting the contention that limited English proficiency seems to be a primary factor that short-circuits the transfer process (Chuang, 2007).

Turing to the values of the correlation coefficients, the results indicated that the high proficient learners had higher coefficients than the low proficient learners in eight out of the 12 reading strategies. This implies that in general, the correlations between individual reading strategies and English reading increase as learners reach higher levels of English proficiency. In other words, there seems to be a threshold level of English proficiency above which the use of reading strategies becomes more effective. Evidently, this threshold level not only affects the degree of strategy transfer but also the effectiveness of strategy use, giving further credibility to the second condition supporting the LTH. Obviously, the present findings corroborate those of previous studies, which have revealed that the proficient EFL readers employ more strategies and better understand when to use them compared with the less proficient readers (Ikeda & Takeuchi, 2006) and that the proficient L2 readers employ reading strategies more effectively than the less proficient L2 readers (Sheorey & Mokhtari, 2001).

Results and Discussion of Research Question 3

Research Question 3 endeavored to validate the ICM by exploring whether a weakness in one of these two variables--English proficiency or reading strategy use--can be compensated for by a strength in the other variable for successful English reading. To answer this question, a one-way ANOVA was conducted and the equation formulated in Research Question 1, Reading = 3.34 + 0.32 proficiency + 0.07 strategy, was used.

As for the ANOVA, four groups were formulated based on the median splits for the EPT and the RSS scores. Individuals who scored above the median on the EPT (22 out of 60) and the RSS (53 out of 72) were classified as being high in English proficiency and reading strategy use, respectively; those scoring below the median were classified as being low. Group 1 (n = 44) consisted of the high proficiency/high strategy use (HP-HS) learners. The members in Group 2 (n = 36) were the high proficiency/low strategy use (HP-LS) learners, whereas the members of Group 3 (n = 34) comprised the low proficiency/high strategy use (LP-HS) learners. Finally, Group 4 (n = 52) was made up of the low proficiency/low strategy use (LP-LS) learners. Table 4 indicates the means and standard deviations of reading comprehension for these four groups.

Table 4

Descriptive Statistics for Reading Comprehension in Four Groups

Group	*n*	*Mean*	*SD*
High proficiency/high strategy use (HP-HS)	44	18.20	2.77
High proficiency/low strategy use (HP-LS)	36	15.77	3.74
Low proficiency/high strategy use (LP-HS)	34	12.82	3.99
Low proficiency/low strategy use (LP-LS)	52	11.28	3.97

Prior to performing the ANOVA, the homogeneity of variance assumption was tested for reading comprehension across the four groups. Since the test for homogeneity of variance was significant, Levene $F(3, 162) = 4.07$, $p = .008$, an adjusted F statistic, the Welch statistic, was used (Field, 2013). Using the Welch statistic, the researcher found that the adjusted F ratio was significant, $F(3, 83.74) = 37.68$, $p < .001$. This suggests that there is a significant difference in reading scores for the four groups of combined English proficiency and reading strategy use. Because the assumption of equal variances had been violated, the Games-Howell post hoc test was used to isolate more specifically where those differences occurred (Field, 2013). As shown in Table 5, the HP-HS group significantly outperformed the other three groups, and the HP-LS group significantly outperformed the LP-HS and the LP-LS groups. However,

no significant difference was detected between the LP-HS group and the LP-LS group. The d values for the significant differences in English reading comprehension among four groups ranged from 0.74 to 2.02, indicating medium to large effect sizes (Cohen, 1988). Taken together, the results highlight that the HP-HS learners received the highest reading scores, followed by the HP-LS and the LP-HS learners, with the LP-LS learners receiving the lowest reading scores.

Table 5

Games-Howell Post Hoc Results for Reading Comprehension by Proficiency-Strategy Groups

Variable	HP-HS vs. HP-LS	HP-HS vs. LP-HS	HP-HS vs. LP-LS	HP-LS vs. LP-HS	HP-LS vs. LP-LS	LP-HS vs. LP-LS
Difference	2.43	5.38.	6.92	2.95	4.49	1.54
p	.010	.000	.000	.011	.000	.308
d	0.74	1.57	2.02	0.76	1.16	0.38

Note. HP-HS = High proficiency/high strategy use; HP-LS = High proficiency/low strategy use; LP-HS = Low proficiency/high strategy use; LP-LS = Low proficiency/low strategy use.

The ANOVA results seem to support the mutual compensation in terms of group differences. For example, to identify the existence that high English proficiency compensates for low reading strategy use, a comparison was made to distinguish the difference in reading mean scores between the HP-LS group and the LP-LS group. As Table 5 reveals, for the low level of reading strategy use, the difference in reading mean scores between the learners reporting high/low English proficiency (i.e. HP-LS group vs. LP-LS group) was 4.49 (15.77 - 11.28, $p < .001$), suggesting that the high English proficiency of this group compensates for the reading ineffectiveness caused by their low reading strategy use and helps raise the reading mean score by 4.49 points. Similarly, to identify the existence that high reading strategy use compensates for low English proficiency, a comparison was made to distinguish the difference in reading mean scores between the LP-HS group and the LP-LS group. As revealed in Table 5,

for the low level of English proficiency, the difference in reading mean scores between the learners reporting high/low reading strategy use (i.e. LP-HS group vs. LP-LS group) was 1.54 (12.82 - 11.28, p = .308), implying that the high reading strategy use of this group tends to compensate for the reading ineffectiveness caused by their low English proficiency and helps raise the reading mean score by 1.54 points, although this compensatory effect is not significant. Taken together, these results suggest that the compensatory facilitation by reading strategy use (1.54) is much smaller than English proficiency (4.49), confirming that English proficiency is the primary factor contributing to successful English reading (Yamashita, 2002a). The present findings appear to partially support Stanovich's (1980) ICM of reading.

Deserving of note is that the ANOVA results provide only the potential existence of mutual compensation between English proficiency and reading strategy use, with no indication of actual levels of these two variables at which the compensatory effect between them takes place. To specify these actual levels, the researcher employed the regression equation method suggested by Usó-Juan (2006). To this end, the regression equation, Reading = 3.34 + 0.32 proficiency + 0.07 strategy, was used in the following analyses. The b-values in the equation indicate that as English proficiency increases by one unit, English reading comprehension increases by 0.32 units and that as reading strategy use increases by one unit, English reading comprehension increases by 0.07 units. This seems to indicate that a large decline in reading strategy use can be compensated for by a small increase in English proficiency so as to yield the same reading score (Yamashita, 2002a).

Before conducting the main analyses based on the equation, participants were first classified into three English proficiency and three reading strategy use groups based on their scores on the EPT and the RSS, respectively. Participants whose scores were smaller than the scores of the 27th percentile were judged to be the low proficiency group (4-17) and the low strategy use group (28-47), respectively; those whose scores were between the 27th and the 73rd percentiles were judged to be the intermediate proficiency group (18-27) and the intermediate strategy use group (48-57), respectively; and those whose scores were larger than the scores of 73rd percentile were judged to be the high proficiency group (28-52) and the high strategy use group (58-71), respectively. The researcher also classified the English reading comprehension into two levels: unsuccessful, for scores under 13 points (Total Score × 0.6; i.e., 22 × 0.6),

and successful, for scores of 13 or above. This classification aligns with the passing mark used in Taiwan, 60 out of 100 or above for most tests.

Because the scores within a low English proficiency level and a low reading strategy use level ranged from four to 17 and from 28 to 47, respectively, the researcher first substituted these four values in the equation, respectively; then he calculated the scores needed on the RSS and the EPT respectively so as to yield a reading score of 13 in the equation (Usó-Juan, 2006).

With reference to the compensatory effect of high reading strategy use, the minimum English proficiency score was four, and this value was substituted in the equation. The result indicated that the needed reading strategy use score was 119.71 for successful reading or to yield a reading score of 13. This result suggests that one would need a reading strategy use score that exceeds the maximum reading strategy use score established in the present study (a score of 71) in order to receive a reading score of 13. Hence, in spite of having a maximum reading strategy use score, one needs a linguistic threshold for successful reading (Usó-Juan, 2006). The other score within the low English proficiency level was 17, and this value was substituted in the equation. The result revealed that for successful reading performance, the needed reading strategy use score was 60.28, which is equivalent to a high strategy use level. This suggests that a low English proficiency level can be compensated for by a high reading strategy use score. Clearly, as the learners' proficiency levels reached a score of 17, their low English proficiency levels could be compensated for by a high reading strategy use score. These results are indicative of the existence of the threshold level (Clarke, 1980; Cziko, 1980). However, this linguistic threshold is not fixed but will vary with the existing strategy use levels; the higher the strategy use level is, the lower the threshold level the learner requires (Usó-Juan, 2006).

Pertaining to the compensatory effect of high English proficiency level, the minimum score on the reading strategy use scale was 28, and this value was substituted in the equation. The result indicated that for successful reading, the necessary English proficiency score was 24.06, which is equivalent to an intermediate proficiency level. The other score within the low reading strategy use was 47, and this value was substituted in the equation. The result demonstrated that for successful reading, the necessary English proficiency score was 19.90, which is equivalent to an intermediate proficiency level. These findings imply that a low reading strategy use level can be compensated for by an intermediate English

proficiency level for successful reading.

Indeed, the EFL learners can compensate for a low level of reading strategy use for successful reading if their English proficiency reaches an intermediate level; on the other hand, if they have a low English proficiency level, they not only need to have a high level of reading strategy use but also need to reach a linguistic threshold (17 out of 60) in order to read English texts successfully. Overall, the present findings seem to reinforce Stanovich's (1980) ICM of reading.

The present study appears to be one of the first studies devoted to identifying the actual levels of English proficiency and reading strategy use at which the compensatory effect between them occurs. Thus, it is impossible to directly compare the present findings with those of other studies. Given the present findings, it is safe to conclude that there seems to be a compensatory mechanism between English proficiency and reading strategy use within English reading processes, "with stronger components trying to make up for the weaker ones" (Yamashita, 2002a, p. 84) and that a linguistic threshold is essential for a low level of English proficiency to be compensated for by a high level of reading strategy use.

CONCLUSIONS

The present study set out to validate the LTH and the ICM in a Taiwanese EFL context by assessing the relative contributions of English proficiency and reading strategy use to English reading and examining the mutual compensation between these two variables, respectively. The findings support the LTH by showing that English proficiency was a stronger predictor of English reading comprehension than reading strategy use and that the high proficient learners employed more reading strategies and used them more effectively in English reading than the low proficient learners. Furthermore, the findings verify the ICM by specifying the actual levels at which intermediate English proficiency compensated for low reading strategy use, and high reading strategy use compensated for low English proficiency for successful English reading.

From a pedagogical point of view, the present findings pointing to the significant impact of English threshold level on strategy deployment suggest that a level of English proficiency must be ensured in order for EFL learners to be able to use strategies properly to facilitate English reading (Razi & Grenfell, 2012). This is particularly the case of EFL learners in the present study, who, on average, had a low level of English

proficiency. Since "for L2 learners, vocabulary and syntactic knowledge are typical aspects of their L2 language proficiency" (Jiang, 2011, p. 179), a reading instruction allowing low proficient EFL learners to master basic vocabulary and grammar knowledge might help them cross a critical level of English proficiency (Lee & Schallert, 1997). Once they arrive at the threshold level, the learners may need to pay attention to both linguistic factors and reading strategies because it was observed that these two variables compensated for each other to achieve a better level of English reading comprehension and that the best performance in English reading comprehension was when the two variables were at high levels. Therefore, linguistic knowledge should not be taught to EFL learners in isolation but simultaneously along with reading strategy use; also, strategy instruction should be delivered with a concern of increasing learners' linguistic knowledge without overemphasizing one variable over another (Razi & Grenfell, 2012; Talebi, 2015).

Referring to research implications, it is important to recognize that although the present study has validated the LTH by showing that high proficient learners employed more reading strategies in English reading, the present study did not employ any instruments to measure learners' L1 (Chinese) reading strategies, failing to provide direct evidence for the transfer of L1 strategies in L2 (English) reading. Accordingly, future studies should simultaneously explore L1 and L2 reading strategies and examine what reading strategies can be transferred across languages. Moreover, although the present study has specified the actual English threshold (17 out of 60) at which a high reading strategy use can compensate for a low English proficiency, this threshold "does not seem to be a single specific constant" (Jiang, 2011, p. 181); it is prone to fluctuate corresponding to the continually changing relationships among English proficiency, reading strategy use, and English reading (Jiang, 2011). In this sense, the actual English threshold level identified here remains tentative and warrants further confirmation from future similar research involving the participation of larger groups of college students with varying levels of English proficiency and reading strategy use in different EFL learning contexts.

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APPENDIX

Appendix A. Sample grammar test items

1. “It’s very hot here.” “Yes, but ____ the winter it gets very cold.”

   a. already b. as long as c. while d. during

2. “What book did you take?” “The one _____.”

   a. that was on the table b. that on the table c. on the table was d. was on the table

Appendix B. Sample vocabulary test items

1. All the students like Miss Kincaid; she must be the most ___teacher at school.
   a. popular b. central c. ordinary d. sufficient
2. Our house needs a few ___ before we can try to sell it.
   a. developments b. movements c. improvements
   d. conditions

Appendix C. Sample English reading comprehension test

Many people are unhappy at work because their jobs don't suit their personalities. Although people are complex, author Peter Urs Bender classifies people into four personality types. To make it simple, he compares people to birds. The four bird types are the owl, eagle, dove, and peacock.

(5) Owls are analytical people who like to know how things work. These people work best in jobs with numbers and facts. Eagles like to be in the driver's seat. They are born leaders and like to be the boss. The dove is a bird that represents peace. So, dove personalities excel in jobs where they are helping others. Lastly, the peacock is the show-off. These people like attention and like to be popular. They are most productive in

(10) jobs where they can be very social. Bender recommends taking a look at your personality before you choose your career. People are happier in jobs where they use their strengths.

17. What is the best title for this article?
    (A) Careers in the Workplace
    (B) Animals in the Wild
    (C) Choosing a Career That Suits Your Personality
    (D) Animals at Work
18. Based on the four animal personalities, what type of job would an owl most enjoy?
    (A) Nurse
    (B) Accountant
    (C) Actor
    (D) Professional athlete
19. Where is the conclusion of the passage?
    (A) Lines 1-2.
    (B) Lines 4-5.
    (C) Lines 8-9.
    (D) Lines 10-11.

Appendix D. Reading strategy survey

When reading silently in English, the things I do to read effectively are to focus on

1. understanding the meaning of each word.
2. underlining the keyword of each paragraph.
3. reading the reading questions first and just looking for those answers.
4. trying to guess at unknown word by relating it to the context.
5. looking up words in the dictionary.
6. skimming the whole article to see what the general idea is.
7. trying to guess at the unknown word by relating it to the part of speech.
8. reading the first line of every paragraph to understand what the text is about.
9. analyzing the grammatical structures.
10. using my prior knowledge and experience to understand the content of the text I am reading.
11. rereading the problematic part.
12. reading the article word by word.

Appendix E. Reading strategy survey (Chinese version)

當我默讀英文讀物時，為了能有效地理解內容，我將注意力集中在：

1. 了解每一字的意思。
2. 劃出每段文章的重點關鍵字。
3. 先看文章後的問題，然後閱讀時就找答案。
4. 利用上下文的意思來猜測不認識的字。
5. 用字典查單字。
6. 大概略讀整篇文章，找出大意。
7. 利用分析字的詞性（名詞、動詞等）來猜測不認識的字。
8. 先讀每一段第一行，以了解每段大意。
9. 分析文法的結構。
10. 以我既有的知識和經驗來了解文章的內容。
11. 重讀所不了解的地方。
12. 逐字閱讀文章中的每一個字。