

Prediction Abilities vs. Content Schema in Explaining Korean EFL Learners' Reading Comprehension*

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As research evidence for the facilitative effects of reading strategies on reading comprehension has been accumulating, research and pedagogical interests in pre-reading strategies such as prediction and schema^{activation} are increasing. Yet, little research evidence of how actual performance on such tasks may be related to reading comprehension is sparse. This study explores whether prediction abilities and content schema are related to Korean middle school EFL learners' reading comprehension abilities in English, and whether such potential relations may differ for factual and inferential comprehension. The study participants were one hundred thirty-seven Korean seventh grade students, and their performance on schema activation, prediction, and reading comprehension abilities was investigated, while controlling for their overall language proficiency and literacy skills. The findings indicated that although both prediction abilities and content schema facilitated reading comprehension, prediction abilities were a relatively stronger predictor of both factual and inferential comprehension. The results further suggest the need to provide effective trainings on pre-reading strategies.

Key words: prediction abilities, content schema, pre-reading strategies, reading comprehension, Korean EFL learners, factual comprehension, inferential comprehension

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1. INTRODUCTION

Over the past decades, many studies have demonstrated the positive effects of using appropriate reading strategies on reading comprehension in both the first language (L1) and second language (L2) (Acosta & Ferri, 2010; Aebersold & Field, 1997; Aghaie & Zhang, 2012; Barnett, 1988; Bimmel & van Schooten, 2004; Carrell, Pharis & Liberto, 1989; Cotterall, 1990, 1993; Kozminsky & Kozminsky, 2001; Nahatame, 2014; Nolan, 1991; Palincsar & Brown, 1984; Pesa & Somers, 2007; Pressley & Harris, 2006; Salataci & Akyel, 2002; Song, 1998; Wilson, 1979). Based on such research evidence, a variety of reading activities incorporating reading strategies have been implemented in the classrooms. Among those reading strategies, pre-reading strategies, in particular, have received much research and pedagogical attention as they prepare the readers prior to reading with appropriate contextualization (Acosta & Ferri, 2010; Carrell, 1989; Carrell, et al., 1989; Duke & Pearson, 2002; Hammadou, 2000; Kendeou & van den Broek, 2007; Li & Lai, 2012; Salataci & Akyel, 2002; Sheorey & Mokhtari, 2001; Song, 1998; Taboada & Guthrie, 2006; Tudor, 1990). According to Duke and Pearson (2005), pre-reading strategies work in “encouraging students to use their existing knowledge to facilitate their understanding of new ideas encountered in text” (p. 213). However, past research on pre-reading strategies has mainly focused on the effects of schema activation (Abdelalal & Sase, 2014; Carrell, 1983, 1987; Carrell & Floyd, 1987; Hammadou, 2000; Hudson, 1982; Keshavarz, Atai, & Ahmadi, 2007; Kendeou & van den Broek, 2007; Li & Lai, 2012; Taboada & Guthrie, 2006), and relatively little attention has been paid to other pre-reading strategies such as prediction (Abdelhalim, 2017; Elbro & Buch-Iversen, 2013; Fincher-Kiefer, 1992; Forood & Farahanni, 2013; Haenggi & Perfetti, 1994; Hansen, 1981; Kim & Kang, 2017; Levine & Haus, 1985; Park, 2004; Roberts, 1988; Wilson, 1979). In addition, despite differences in the linguistic and cognitive demands different levels of reading comprehension, such as factual and inferential comprehension, impose (Abdelhalim, 2017; Elbro & Buch-Iversen, 2013; Fincher-Kiefer, 1992; Forood & Farahanni, 2013), most past studies have largely overlooked the potential differences in the strategies that are needed for different comprehension tasks. Thus, this study aims to expand on previous research on pre-reading strategies and examine the potential effects of prediction strategies in comparison to schema activation on Korean middle school EFL learners’ reading comprehension in English. In doing so, the relative contribution of the two pre-reading strategies will also be examined separately for two sub-types of reading comprehension—factual and inferential comprehension.

2. REVIEW OF THE LITERATURE

Content schema, in general, refers to the readers' background knowledge in the content area of a text (Carrell, 1987). Previous studies have shown its significant contribution to reading comprehension in both first language (L1) and second language (L2) (Abdelaal & Sase, 2014; Carrell, 1983, 1987; Carrell & Floyd, 1987; Hammadou, 2000; Hudson, 1982; Kendeou & van den Broek, 2007; Keshavarz et al., 2007; Li & Lai, 2012; Taboada & Guthrie, 2006). Numerous studies in L1 context have shown that readers' background or cultural knowledge has a positive impact on their reading comprehension (Hammadou, 2000; Kendeou & van den Broek, 2007; Li & Lai, 2012; Taboada & Guthrie, 2006). In addition, many studies have reached an agreement that schema has bigger influence on reading comprehension than other relevant language and textual factors, such as linguistic complexity and reading proficiency (Carrell & Floyd, 1987; Hammadou, 2000).

Similarly, many studies concerning cross-language and L2 reading comprehension have identified the positive facilitative role content schema plays in the reading comprehension of L2 readers who are familiar with the content of the reading passages (Abdelaal & Sase, 2014; Carrell, 1987; Carrell & Floyd, 1987; Hudson, 1982; Keshavarz et al., 2007). In her classical study on content schema, Carrell (1987) had ESL students with different language backgrounds read both culturally familiar and unfamiliar content, and the results indicated that readers performed better when reading the culturally familiar one. Likewise, Carrell and Floyd (1987) demonstrated that teaching prior knowledge related to reading passages in the ESL classroom resulted in improvement in reading comprehension. Furthermore, differential effects of content schema on ESL reading comprehension depending on the readers' language proficiency have also been identified, showing, in general, relatively stronger facilitative effects of content schema for beginning and intermediate ESL readers, compared to the advanced ones (Hudson, 1982; Keshavarz et al., 2007).

Although the importance of content schema in reading comprehension confirmed through numerous studies over the past decades have highlighted schema activation as a critical, or even obligatory, pre-reading activity in the classrooms, such a phenomenon might have undermined research attention to other potentially important pre-reading strategies, such as prediction. Research findings from studies on such relatively less-studied pre-reading strategies might yield important pedagogical implications regarding adaptations and selections of appropriate strategies, instead of heavily relying on a single one.

In fact, there is a growing interest in another potential significant pre-reading strategy that predicts reading comprehension—namely, prediction abilities. As stated by McKown and Barnett (2007), prediction defined as “a strategy for improving comprehension ...helps the reader set a purpose for their reading” (p. 17). Expanding on the definition, Pesa and

Somers (2007) added that prediction can "...activate prior knowledge, set a purpose for reading, and engage the reader from the outset" (p. 31), which further pointed out the potential close relations between the two reading strategies—schema activation and prediction. Several studies on prediction ability has identified its critical role in reading comprehension of first language (L1) readers (Allbritton, 2004; Barnett, 1988; Castillo & Bonilla, 2014; Bimmel & van Schooten, 2004; Cotterall, 1990, 1993; Kozminsky & Kozminsky, 2001; Palincsar & Brown, 1984; Salataci & Akyel, 2002; Valencia & Stallman, 1989). However, a majority of such studies have considered prediction abilities as one of many different reading strategies rather than focusing on the use of prediction strategy in and of itself. One group of such studies regarded prediction as one of many cognitive strategies, such as identification of the meaning, sentence syntax, and text details, activating schema, and so on, which aid the reader in building meaning from the text (Aebersold & Field, 1997; Barnett, 1988; Bimmel & van Schooten, 2004; Carrell, 1989; Castillo & Bonilla, 2014; Cotterall, 1990, 1993; Kozminsky & Kozminsky, 2001; Palincsar & Brown, 1984; Pressley & Harris, 2006). These studies, for example, have argued that using reading strategies such as interpretation and prediction are one of the main strategies that fostered reading comprehension of English-speaking students in the United States (Palincsar & Brown, 1984) and that mastery of reading strategies, including prediction, enhanced reading comprehension of adolescent Dutch readers regardless of their language proficiency (Bimmel & van Schooten, 2004). Similarly, Kozminsky and Kozminsky (2001) investigated whether reading strategies including prediction strategies had a cumulative effect on reading comprehension of ninth-grade students in Israel and demonstrated its positive contribution to their reading comprehension. In addition to being studied as part of many different cognitive strategies, prediction strategies have been studied in combination with the use of metacognitive strategies as well (Carrell, 1989; Carrell, et al., 1989; Lee & Tsai, 2017; Nolan, 1991; Salataci & Akyel, 2002). These studies have also confirmed the positive role of prediction strategies, as shown in Nolan's study (1991) which highlighted the effectiveness of combining prediction strategies with other metacognitive reading strategies such as self-questioning, regardless of the readers' language proficiency.

On the whole, most previous studies in L1 contexts have confirmed the positive relationship between prediction abilities, as part of or in combination with different reading strategies, and reading comprehension. Yet, many of these studies may be limited in identifying the exact relationship, as they commonly have not accurately or directly measured prediction abilities, relying on multiple-choice questionnaires (Barnett, 1988) or self-reports on readers' own use of such strategies (Kozminsky & Kozminsky, 2001). Despite such limitations, most studies have demonstrated the positive role of cognitive strategies, including prediction, in enhancing reading abilities. Thus, further studies which

reflect the actual use of prediction strategy and how it relates to reading comprehension outcomes, instead of self-reports, are in great need.

Compared to the growing research interests in the influence of prediction abilities on reading comprehension in L1 contexts, relatively less research has been conducted in L2 and foreign language (FL) contexts (Acosta & Ferri, 2010; Aghaie & Zhang, 2012; Nahatame, 2014; Salataci & Akyel, 2002; Sheorey & Mokhtari, 2001; Song, 1998; Tudor, 1990). It may be related to the rarely observed use of such strategies in L2 reading in general, for which L2 readers are often too preoccupied with the L2 tasks at hand that they feel that using strategies are burdensome (Cotterall, 1993). Among the limited number of such research in L2 and FL settings, researchers have either regarded prediction as a pre-reading strategy through which readers predicted the text content based on titles or subheadings (Acosta & Ferri, 2010; Sheorey & Mokhtari, 2001; Song, 1998; Tudor, 1990) or as a during-reading strategy where "the reader predicts the likely content of the succeeding portions of the text" (Salataci & Akyel, 2002, p.15). In both cases, readers' utilization of prediction abilities has yielded positive results. Specifically, several studies have demonstrated how teaching reading strategies, including prediction strategies, promoted reading comprehension of Korean EFL college students (Song, 1998), Turkish EFL college students (Salataci & Akyel, 2002), and Iranian high school EFL students (Aghaie & Zhang, 2012). However, these studies in L2 contexts have been limited to older, or more advanced, L2 learners, and thus little is known about younger or less advanced L2 learners' use of prediction strategies in reading. In addition, these studies not only have failed to accurately measure prediction abilities, relying on survey forms (Sheorey & Mokhtari, 2001), similar to those in L1 contexts, but also merely investigated the training effects on the use of reading strategies rather than measuring the prediction abilities themselves (Aghaie & Zhang, 2012; Song, 1998) or gave cues during think-aloud protocols, thus constraining the kinds of strategies readers could use during reading (Salataci & Akyel, 2002). Moreover, none of these studies have taken L2 proficiency and L2 background such as oversea experience into account, despite their potential effects in explaining the relationship between the use of prediction strategies and reading comprehension. Considering that reading comprehension is a big part of foreign language instruction in secondary schools, especially in Korean EFL contexts, more thorough research with accurate measures and design is needed for valuable pedagogical implications for reading instructions.

One distinction that needs to be considered, but has been generally overlooked, in investigating the relationship between strategy-use and reading abilities are the potential different roles it might play for different levels of reading comprehension; such as factual and inferential comprehension. Factual comprehension usually refers to literal understanding of the explicitly stated information in the text, thus involving relatively

lower-order comprehension abilities, while inferential comprehension involves one's higher-order processing skills of making inferences in understanding implicitly stated information from the text (Farhady, 1998). Although past studies distinguishing different sub-types of reading comprehension have indeed identified the differences in the nature between them (Abdelhalim, 2017; Elbro & Buch-Iversen, 2013; Fincher-Kiefer, 1992; Forood & Farahani, 2013; Haenggi & Perfetti, 1994; Hansen, 1981; Kim & Kang, 2017; Levine & Haus, 1985; Park, 2004; Roberts, 1988; Wilson, 1979), showing how readers' performance on these two sub-types of comprehension was related to their reading abilities in general (Wilson, 1979) and cognitive and linguistic abilities in particular (Forood & Farahani, 2013), there has been only dearth of research studies that have related such differences to strategy-use, especially in L2 contexts. In fact, while previous studies that differentiated these sub-types of reading comprehension have demonstrated that schema activation as part of pre-reading strategies was related to both factual and inferential comprehension of L1 readers (Elbro & Buch-Iversen, 2013; Fincher-Kiefer, 1992; Haenggi & Perfetti, 1994; Roberts, 1988), relatively fewer such studies have been conducted with L2 readers (Kim & Kang, 2017; Levine & Haus, 1985; Park, 2004). Of the few available studies, Kim and Kang (2017) revealed that schema not only had critical positive correlations with factual and inferential comprehension abilities, but also predicted both sub-types of comprehension. Yet, little research attention has been paid to the potential different contribution prediction strategy might have on different levels of reading comprehension (Abdelhalim, 2017; Hansen, 1981), although Abdelhalim (2017) did demonstrate contribution of prediction strategy training on both factual and inferential comprehension of Saudi Arabian adult EFL learners. Nonetheless, none of the past studies investigated the potential relative different contribution prediction strategies and schema activation might have on different levels of reading comprehension for L2 readers, when their L2 proficiency as well as L2 backgrounds are taken into consideration, and with adequate assessment of their strategy use.

On the whole, although the widely acknowledged positive effects of strategy-use in reading comprehension have been recognized, little is known about the potential facilitative role of a particular pre-reading strategy, namely prediction strategy. Since most past research on pre-reading strategies have focused on the role of schema, investigation of the relative importance between schema and prediction strategy, especially in relation to different sub-types of reading comprehension abilities, will expand on the previous emphasis on schema activation as the key pre-reading activity. Such a study will further shed light on the need to employ appropriate pre-reading strategies for different reading tasks at hand instead of relying on a sole pre-reading strategy. To complement the limitations of previous research, further studies assessing the quality and accuracy of the readers' actual use of and performance on the specific strategies themselves, instead of

relying on their self-reports or survey forms, are especially in need. This study was designed to answer the following research questions:

1. Are Korean EFL middle school students' prediction abilities and content schema related to their reading comprehension abilities in English? If so, between prediction abilities and content schema, which plays a bigger role in explaining their reading comprehension?
2. Is the relative predictive power of prediction abilities and content schema different for Korean EFL middle school students in explaining their comprehension of factual vs. inferential information in English?

3. METHOD

3.1. Participants

137 Korean middle school seventh graders from a local public school in a middle- and upper middle-class region in Seoul, Korea, served as participants for this study. 79 of them were male and 58 of them were female students, who were students from five randomly selected all-inclusive classrooms, and all the students in each classroom participated in order to ensure representation of diverse reading-related abilities in the sample. Thus, a wide range of English proficiency and reading abilities were represented in the sample. Approximately 10.2% of the participants reported that they had oversea-living experiences in English-speaking countries, for an average of 26.26 months; the average duration of overseas stay in English-speaking countries for the whole participants, on the other hand, were 2.7 months.

3.2. Measures

3.2.1. English reading comprehension

In assessing students' overall reading comprehension abilities, the Passage Comprehension subtest of the Qualitative Reading Inventory-5 (Leslie & Caldwell, 2010) was administered. For this particular subset of the test, students were asked to read an expository text comprised of 198 words, after which their reading comprehension abilities were measured both quantitatively and qualitatively. The participants' responses to the eight reading comprehension questions that measure both inferential and factual understanding of the reading and their retellings of the text were scored both quantitatively

and qualitatively, taking the degree of accuracy and details provided into account. Response to each reading comprehension question received scores between 0 and 3, depending on the degree of detailedness, thus totaling to the maximum score of 24. For instance, for a factual comprehension question that asked which part of the whale functions like human nose, a fragmented response such as “hole” received score 1, while more detailed and accurate answer such as “the hole on top of their head” was scored 3. In evaluating the retellings, each accurately recalled idea units were counted, according to the scoring rubric provided by the test developers, and the maximum possible retelling score was 50. The combination of scores for these two sub-measures of reading comprehension served as the measure of reading comprehension in this study. The reported reliability estimate of the test by the test developer was above .80 (Leslie & Caldwell, 2010; Nilsson, 2013).

3.2.2. Prediction abilities

The pre-test item that is part of The Passage Comprehension subtest of the Qualitative Reading Inventory-5 (Leslie & Caldwell, 2010) was administered to measure the participants' prediction abilities, before the reading comprehension test. Before having them read the actual reading passage, the participants were presented with the title of the passage and were asked to write down what they thought the passage would be about. Their responses were evaluated for the number of idea units in their responses that qualitatively matched the idea units in the passage. The idea units that did not qualitatively correspond to those in the actual passage were also counted to be reflected in their prediction score. Each correct idea unit received 1 point, while 1 point was subtracted for each of the incorrect predictions. The computed score for correct and incorrect predictions served as the prediction test score in this study. For example, if a student provided six idea units as part of the prediction test, of which only four were correct, he received score 2.

3.2.3. Content schema

The content schema test items from The Passage Comprehension subtest of the Qualitative Reading Inventory-5 (Leslie & Caldwell, 2010) were utilized to assess the participants' background knowledge on the given passage. Three open-ended questions that asked participants' prior knowledge about the topic of the passage, whale, were presented to them before the reading comprehension test. Each response was evaluated qualitatively, by considering both its degree of accuracy and detailedness, according to the scoring rubric (Leslie & Caldwell, 2010). Each response was given the score between 0 and 2, and thus the maximum possible score for this test was 6. For example, in response to

the question that asked how whales breathe, an accurate and detailed answer, "they come to the top of the water to breathe in air through a hole in the top of their heads" was given score 2, while a fragmented response such as "they breathe and go back into the water" was scored 1. Incorrect answers, such as "they use their gills" were given the score 0.

3.2.4. English vocabulary knowledge

As a control variable that taps into the participants' English proficiency, a standardized test of receptive vocabulary knowledge, the Peabody Picture Vocabulary Test-III (PPVT-III) (Dunn & Dunn, 1997), was used. The participants heard discrete words one at a time and were asked to choose one of the four picture choices that corresponded to the given word. Each correct answer scored 1 point, and the maximum possible score on this test was 132. The test-retest reliability is .90 (Dunn & Dunn, 1997).

3.2.5. Decoding abilities

As an additional control variable that takes into account the participants' English print-related skills, the Word Decoding subtest of the standardized Gates-MacGinitie Reading Test (MacGinitie, MacGinitie, Maria, & Dreyer, 2000) was used. The participants were asked to select one correctly spelled word that matches the given picture among four different answer choices. For example, for a picture of a hammer, they were supposed to choose one correct answer among four differently spelled words and nonwords, "hamper", "hammer", "hummer", and "homer". Each correct answer received one point, for total 43 questions, and thus the maximum possible score being 43 for this test. The reported Kuder-Richardson reliability coefficient is .94 (MacGinitie et al., 2000).

3.3. Analyses

Upon first exploring the participants' performance on each of the test measures, the relations among the measures are examined, followed by a series of hierarchical regression analyses that assess the relative contribution of prediction abilities and schema activation in explaining their reading comprehension, while their basic English proficiency measured by vocabulary knowledge and English print-related skills measured by decoding abilities served as control variables.

4. RESULTS

Presented in Table 1 are the means and standard deviations of scores on each measure (Number of months abroad, reading comprehension, vocabulary knowledge, decoding abilities, content schema, prediction abilities, and separate reading comprehension scores for inferential and factual understanding). The participants had spent about 2.7 months on average in English-speaking countries and received, on average, the score of 76.01 on the vocabulary test, 37.21 on decoding test, 5.04 on schema test, and 1.50 on the prediction test, with large variations ($SD = 13.73, 4.75, 1.95, \text{ and } .98$ respectively). In addition, the participants, on average, scored 21.59 out of maximum possible score 50, on the reading comprehension test and 4.37 and 4.70 on the measures of factual and inferential understanding, respectively, out of the maximum possible score of 8. To be noted is that there were a few participants who received negative scores on the prediction test, which indicate that the number of their incorrect predictions exceeded the number of correct predictions.

TABLE 1
Descriptive Statistics for the Variables Examined (N =137)

	Minimum	Maximum	Mean	Std. Deviation
Number of Months Abroad	0	84	2.73	12.55
Vocabulary Knowledge	21	97	76.01	13.73
Decoding Ability	17	42	37.21	4.75
Content Schema	0	10	5.04	1.95
Prediction Ability	-1	3	1.50	.98
Reading Comprehension	1	40	21.59	9.84
Factual Comprehension	0	7	4.37	1.46
Inferential Comprehension	0	7	4.70	1.65

In identifying the potential relationships among the variables, correlation analyses were conducted next (Table 2). Both content schema and prediction abilities were significantly and positively correlated to reading comprehension ($r = .30, p < .001, r = .39, p < .001$, respectively). Duration of overseas stay did not show any significant correlations with any of the measures, while two control variables, vocabulary knowledge and decoding abilities, showed significant positive correlations with reading comprehension abilities in general ($r = .52, p < .001; r = .42, p < .001$, respectively) and with factual understanding ($r = .46, p < .001; r = .35, p < .001$, respectively) and inferential understanding ($r = .43, p < .001; r = .46, p < .001$, respectively) in particular.

Furthermore, both content schema and prediction abilities showed significant correlations with comprehension of both factual ($r = .23, p < .01; r = .40, p < .001$, respectively) and inferential information ($r = .37, p < .001; r = .43, p < .001$, respectively).

In sum, both content schema and prediction abilities not only had significant relationship with Korean middle school EFL learners' general reading comprehension abilities but also with specific sub-types of comprehension abilities, namely factual and inferential understanding of the text.

TABLE 2
Correlation Analyses of the Examined Variables

	2	3	4	5	6	7	8
1. # of Months Abroad	.01	.06	.06	.02	.11	.06	.08
2. Vocabulary Knowledge		.57***	.24**	.35**	.52***	.46***	.54***
3. Decoding Ability			.35***	.39***	.42***	.35***	.46***
4. Content Schema				.37***	.30***	.23**	.37***
5. Prediction Ability					.39***	.40***	.43***
6. Reading Comprehension						.53***	.71***
7. Factual Comprehension							.53***
8. Inferential Comprehension							1.00

** $p < .01$ *** $p < .001$

In order to discern the relative predictive power of schema and prediction abilities on reading comprehension, two sets of hierarchical regression analyses were conducted by controlling for the duration of the participants' overseas stay, vocabulary knowledge, and decoding abilities. As presented in Table 3, number of months spent abroad was entered in the first step to control for the effects of overseas experiences ($\Delta F = 1.79, p = .18$). Then, vocabulary knowledge and decoding abilities were entered in Step 2 to control for the participants' general English proficiency and print-related skills, which accounted for an additional 29% ($\Delta F = 27.61, p < 0.01$) of the variance in reading comprehension. Content schema, entered in the third step of the analysis, did not turn out to be a significant predictor of the students' reading comprehension abilities at .05 significance level, although it did at .10 level of significance ($\Delta F = 3.46, p = .07$), when their vocabulary knowledge, decoding abilities, and overseas experiences were controlled for. Finally, their prediction abilities entered at Step 4 made unique significant contribution in explaining variance in reading comprehension ($\Delta F = 5.40, p < .05$), accounting for an additional 3% of the variance. Thus, the analysis revealed that the Korean middle school EFL learners' prediction ability was a significant predictor of their reading comprehension, above and beyond the effects of content schema, decoding abilities, vocabulary knowledge and overseas experience.

Another hierarchical regression analysis conducted with the order of entry at Step 3 and 4 reversed (see the bottom panel of Table 3), in assessing the potential contribution of content schema beyond prediction abilities, indicated that content schema did not account for any additional variance in reading comprehension beyond the effects of prediction

abilities ($\Delta F = 1.42, p = .24$). That is, between content schema activation and prediction abilities, prediction abilities turned out to be a more significant predictor of Korean middle school EFL learners' reading comprehension abilities when their vocabulary knowledge, decoding abilities, and overseas experiences were taken into consideration.

TABLE 3
Hierarchical Regression Analyses Predicting Reading Comprehension

Steps	Variables	R^2	ΔR^2	ΔF	Sig.
1	Number of Months Abroad	.01	.01	1.79	.18
2	Vocabulary Knowledge, Decoding Ability	.30	.29	27.61	.00
3	Content Schema	.32	.02	3.46	.07
4	Prediction Ability	.35	.03	5.40	.02
3	Prediction Ability	.34	.04	7.53	.01
4	Content Schema	.35	.01	1.42	.24

In order to further examine the relative role schema and prediction abilities play in two specific kinds of reading comprehension, namely factual and inferential comprehension, additional sets of hierarchical regression analyses were conducted, with the same control variables and same order of variables entry. As seen in Table 4, vocabulary knowledge and decoding abilities entered in the second step as control variables, accounted for an additional 22% ($\Delta F = 19.02, p < 0.001$) and 33% ($\Delta F = 32.23, p < 0.001$) of the variance in factual comprehension and inferential comprehension, respectively, when controlling for the effects of the number of months spent abroad. Content schema, entered in Step 3, displayed significant predictive power in explaining inferential comprehension, contributing additional unique variance ($\Delta F = 27.61, p < 0.01$) and explaining an additional 4% of the variance beyond the effects of vocabulary knowledge and overseas experiences, while it did not make any significant additional contribution for factual comprehension ($\Delta F = 1.70, p = 0.20$). Prediction abilities entered at Step 4, on the other hand, made significant unique contribution above and beyond the effects of content schema, decoding abilities, vocabulary knowledge, and overseas experience, for both factual and inferential comprehension ($\Delta F = 8.57, p < 0.01$; $\Delta F = 6.16, p < 0.05$, respectively), explaining additional 5% and 3% of the variance in reading comprehension abilities, respectively. Thus, prediction abilities turned out to be a significant predictor of both factual and inferential comprehension beyond the effects of content schema.

Additional sets of hierarchical regression analyses, with Step 3 and 4 reversed (See bottom panel of Table 4), were conducted to assess the relative predictive power of content schema and prediction abilities. Prediction abilities, when entered at Step 3, were identified as significant predictor of Korean middle school EFL learners' reading comprehension abilities when controlling for their overseas experience, decoding abilities, and vocabulary

knowledge ($\Delta F = 10.17, p < 0.01$; $\Delta F = 9.88, p < 0.01$, respectively). However, content schema, entered at Step 4 in controlling for the additional effects of prediction abilities, made unique additional contribution only for their inferential understanding ($\Delta F = 4.70, p < .05$) and not for their factual understanding ($\Delta F = 0.25, p = 0.62$). Prediction abilities explained additional 2% of the variance in their inferential comprehension, above and beyond the effects of schema, decoding abilities, vocabulary knowledge, and overseas experiences.

TABLE 4
Hierarchical Regression Analyses Predicting Factual and Inferential Comprehension

Variables	Factual Comprehension			Inferential Comprehension		
	R^2	ΔR^2	ΔF	R^2	ΔR^2	ΔF
1 # of Months Abroad	.00	.00	.41	.01	.01	.77
2 Vocabulary, Decoding	.23	.22	19.02***	.33	.33	32.23***
3 Content Schema	.24	.01	1.70	.37	.04	8.38**
4 Prediction	.28	.05	8.57**	.40	.03	6.16*
3 Prediction	.28	.06	10.17**	.38	.05	9.88**
4 Content Schema	.28	.00	.25	.40	.02	4.70*

** $p < .01$ *** $p < .001$

In other words, prediction abilities turned out to be a significant predictor for both factual and inferential comprehension beyond the effects of content schema, while content schema was identified as a significant predictor beyond the effects of prediction abilities for only inferential comprehension. However, relatively speaking, prediction ability was a relatively stronger predictor even for inferential comprehension compared to content schema. Thus, compared to content schema, prediction ability seems to play a more important role in making inferences and understanding literal meanings from the text for Korean middle school EFL learners.

5. DISCUSSION AND CONCLUSION

The present study aimed to identify the relative predictive power of content schema and prediction abilities for reading comprehension abilities and investigated their predictive roles in explaining two different sub-types of reading comprehension – factual and inferential comprehension. First, the results revealed that both prediction abilities and content schema had significant positive relationship with Korean middle school EFL learners' reading comprehension, which coincide with findings from other existing studies (Acosta & Ferri, 2010; Aghaie & Zhang, 2012; Carrell, 1983; Carrell & Floyd, 1987; Hudson, 1982; Keshavarz et al., 2007; Salataci & Akyel, 2002; Sheorey & Mokhtari, 2001;

Song, 1998; Taboada & Guthrie, 2006; Tudor, 1990). This finding is meaningful in that unlike previous studies, this study aimed to incorporate readers' actual performance on the prediction and content schema tasks, rather than relying on observations or self-reports. In addition, the findings from this study further pointed out that between content schema and prediction ability, it was prediction ability that was a more significant predictor of Korean middle school EFL learners' general reading comprehension, even when their overseas experiences, vocabulary knowledge, and decoding abilities were taken into consideration. Secondly, this study identified differential role of content schema and prediction strategies for different sub-types of reading comprehension. While prediction abilities displayed significant predictive role, beyond the effects of content schema, in explaining Korean middle school EFL learners' factual comprehension, content schema did not, when their prediction abilities and other language and literacy skills were controlled for. That is, prediction abilities seemed to have much stronger predictive role compared to content schema in predicting factual comprehension. On the other hand, in predicting inferential comprehension, both prediction abilities and content schema turned out to be significant predictors, beyond the effects of each other and other language and literacy backgrounds. However, the contribution of prediction abilities was relatively bigger than content schema. Thus, overall, prediction abilities were identified as the relatively stronger predictor of Korean middle school EFL learners' reading comprehension on both factual and inferential tasks, even when their L2 proficiency measured with vocabulary knowledge, decoding abilities and language background measured with overseas experiences were taken into consideration. The findings in this study expanded on Kim and Kang's study (2017) which showed significant positive role of content schema in both factual and inferential comprehension abilities of Korean middle school students, and further cautions against regarding schema activation as the key or sole pre-reading activity in reading instructions.

Overall, this research not only demonstrated the relatively stronger predictive role of prediction abilities, compared to content schema, for both factual and inferential reading comprehension, but also has provided important pedagogical implications for effective reading instructions, pointing to the need to incorporate diverse pre-reading strategies in promoting successful reading comprehension. This study, however, only considered partial role of prediction abilities, as it did not investigate their role as a during-reading strategies through which readers predicted the content of succeeding portion of the text (Salataci & Akyel, 2002). Thus, future studies, which explore the role of prediction strategies as both pre- and during-reading strategies, as well as the potential contribution of other relevant strategies are called for. Nevertheless, this study has demonstrated the need to diversify strategies used and taught in reading comprehension instructions and to expand research attention to diverse reading strategies in relation to different sub-types of reading comprehension.

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