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The Interactive Effects of Instructions and Learning Styles on the Inference Skills on College Low Achieving Readers

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The purpose of this study is to investigate the effects of instructional strategies and cognitive styles on Korean college students' reading comprehension, particularly to discover whether using matched instructions with cognitive styles improves their inference skills on reading. It was conducted with 95 college students in one university in Korea, and data were gathered from three reading classes during a fifteen-week period. In the first week, students took the reading test as a pre-test, and the survey was done to identify and categorize cognitive learning style type. Fifteen weeks later, the subjects were given the reading test as a post-test to check the achievement of inference skills on reading through treatments. The findings indicate that the group of students who received instruction matched with their cognitive styles outperformed the group of students who were the opposite. This research will provide useful information to the EFL reading teachers who consequently could modify their reading instruction to incorporate learning styles in class, especially for low achieving students to achieve higher level of inference skills on reading comprehension.

**[English reading/low achievers/cognitive style/inference skill/
영어읽기/학습 부진아/인지양식/추론능력]**

I. INTRODUCTION

A lot of college EFL students are struggling to comprehend reading texts in English. Although they have a certain level of English reading ability, they may have difficulties in understanding reading texts. In this sense, the quest for effective reading instruction in English reading classrooms has been one of the major concerns among both the teachers and learners; nevertheless, not many empirical studies have been conducted in Korea. That is, there is a limited number of reading studies identifying Korean college students' use of

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reading strategies (M. Song, 1998). In this regard, this research was motivated by the practical needs to implement a more effective reading instruction in reading classrooms.

Several researchers examined the disparity in overall achievement, foreign language achievement, and student attitude, and they found individual student's learning differences to be important factors in improving outcomes. Especially in foreign language learning, increasing efficacy requires examining individual differences in the classroom. Thus, examining students' learning styles could yield important information about why and how students learn foreign languages.That is, it is stated that among the variables affecting successful reading achievement, it is critical to investigate individual differences in the classroom where they interact with the learning environment and the instructional methodology (Jonassen & Grabowski, 1993). Particularly, regarding the important relationship of Field Independence (FI) and Field Dependence (FD) and reading comprehension in EFL, FI/FD research could help enlighten individual differences in the reading process.

Under this issue, the primary purpose of this study is to investigate the effects of matching instructional strategies and cognitive styles (FI/FD) on college low achieving readers' reading achievements, particularly to discover whether using instructional strategies that match or mismatch cognitive learning styles of college low achieving readers improves their inference skills on reading comprehension. This study is designed to address the following research questions:

1. Does strategy instruction improve reading comprehension ability of college EFL low achieving students, and is there any superior strategy instruction for them?
2. Is there any interactive effect of cognitive learning styles and strategy instruction on inference skills of reading comprehension?

II. LITERATURE REVIEW

1. Cognitive Learning Styles in the EFL Classroom

Individuals have different preferences as to how they receive, process, and recall information during instruction. Among the various learning styles that were identified, FI/FD received the great research attention over the years (Jonassen & Grabowski, 1993). It is unlikely that reading strategy instruction would be effective unless it is aligned with learner differences in terms of learning styles. Thus, in response to this nature of second language learning, it was suggested that the students' cognitive learning style differences and preferences should be considered in implementing instructional strategy (Reid, 1987).

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In general, in the EFL classroom, FD individuals are perceived as warm, tactful, considerate, socially outgoing, and affectionate by others. FI individuals, on the other hand, are often described as cold and distant with others, unaware of their social stimulus value, and individualistic (Witkin, Moore, Goodenough & Cox, 1977). The FI learner tends to perceive elements independently of a context or field, but the FD learner is more apt to perceive the whole visual field or situation rather than its discrete parts. Researchers found that learners described as FI in the classroom prefer fairly predictable classroom routines and instructional strategies that are focused and systematic. These students are most comfortable working independently, and they tend to be more task-oriented and competitive. On the other hand, students described as FD are especially effective in situations where collaboration and social relationships contribute to achievement. They like to work with classmates to achieve a common goal, and they enjoy assisting others. These students are generally quite sensitive to the opinions and feelings of others and look to their instructor for recognition, guidance, and modeling (Witkin et al., 1977).

For this research, it took FI /FD cognitive style dimension and analyzed it in terms of one specific area of the curriculum, reading. The main reason for this is that regarding the important relationship of FI/FD and reading comprehension in EFL, first of all, FI/FD research could help enlighten individual differences in the reading process; it was asserted that FI/FD dimension among the various cognitive style dimensions can explain certain aspects of the reading process in a more detailed way (Jae-Suk Suh, 2009). Furthermore, FI/FD dimension was preferred among other alternative learning style dimensions because of its stability as a measure used over time. This stability makes the variables of FI and FD more useful in designing research because it can produce more valid statistical results. This reduced the validity of the argument that participating college students' learning styles may naturally change during the research period and also decrease the likelihood that statistical results are affected.

2. Instructional Strategies of Matching Learning Styles and Instructions

In order to identify the effective instructional strategies for individuals who have particular characteristics, researchers have developed several approaches. Among them, matching individuals' learning styles and the types of instruction is the most common approach (Jonassen & Grabowski, 1993). Various types of instructions and learning styles have been utilized to investigate the possible effects of providing instruction that matches the learning preferences of individual learners; the two types of instructional strategies for FI and FD individuals are the explicit and discovery types of instructional strategies (Hopkins, 2002). Specifically, explicit instructional strategies usually focus on explicit and clear explanations about the concept, activities, and lesson from the teachers. Also, in order

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to guide the learners, the structure of the material is presented at the beginning. Then learners are given a clear and detailed orientation to the material, a conceptual framework, and some key ideas with which to work (Andrews, 1984). Explicit instructional strategies are teacher-centered approaches and particularly effective for FDs who prefer to have an explicit instruction provided during the instruction (Jonassen & Grabowski, 1993).

On the other hand, the basic assumption of discovery instructional strategies is that learners can learn better when they are given opportunities to generate ideas inductively (Andrews, 1984). One of the benefits of discovery activities is that students do more than just learn the content (Hopkins, 2002). Incorporating scenarios that are realistic to individuals in the instruction activities provokes individual's curiosity and increases their motivation. Discovery types of activities are recommended for students who are primarily FIs and prefer to receive abundant reference materials in the instruction (Jonassen & Grabowski, 1993).

III. RESEARCH METHOD

1. Participants and Instruments

This research was conducted with college students in one university in Korea. Data were gathered from three English reading courses during a fifteen-week period in the fall semester of the 2010 academic year. A total of 95 college students who enrolled in an English reading course participated in this study. Originally, 127 students from three classes participated in taking the pre-test, and 32 of the participating students were eliminated from the study because of errors in completing the research instruments; a reading comprehension pre-and post-tests were given to the subjects, but several subjects did not take post- test, so those who did not complete both tests were excluded. Also, students who could not be classified distinctly to either FI or FD dimension were excluded. Each class met once every week for two hours and consisted of 30 to 33 students.

Before entering into the university, all students were required to take English placement tests based on TOEFL Reading comprehension test in order to be divided into classes according to students' English levels. According to the students' placement test score, students were assigned to four different levels in reading course. With the test results of placement test, those who are below 20 % on the placement test were deployed into Level 1, and all subjects in this study were all in Level 1, assuming that they were similar in their English reading proficiency, as low achievers.

To identify cognitive styles, the Grasha-Reichmann Student Learning Style Scales (GRSLSS) was used to identify and categorize learning preferences because it is designed

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specifically to be used with college/university students, and it is a relevant scale to use in the language classroom, focusing on how students interact with the instructor, other students, and with learning in general. Originally, it consists of a 60-item questionnaire that is constructed to identify 6 major learning styles, and responses are recorded using a 5-point Likert scale. For the purpose of this study, only 20 items that were intended to assess FI/FD were analyzed. The placement of the students into two experimental groups and one control group was done by randomly assigning the class as a group to treatment conditions rather than by randomly assigning each individual. After completing the GRSLSS to identify FI or FD, students were assigned to FD or FI individual. In this study, FI students are those who have above 3.6 scale of FI and below 2.9 scale of FD at the same time, while FD students are those who are above the 3.6 scale of FD and below the 2.9 scale of FI at the same time. Table 1 below shows the number of students in each group.

TABLE 1

Students Profile

		Male	Female	Total
Explicit (Experimental Group 1)	FI	7	11	18
	FD	7	8	15
Discovery (Experimental Group 2)	FI	6	11	17
	FD	8	7	15
Common (Control Group)	FI	8	8	16
	FD	8	6	14
Total	FI	21	30	51
	FD	23	21	44

As for the pre-and post-tests, the TOEFL (Test of English as a Foreign Language) reading comprehension tests were used at the first (1st week) and final week (15th week). It is a standardized test of admission test administered by the ETS. It includes 40 multiple-choice questions (1 point each, total score= 40 points) and consists of 6 passages. It was scored by counting the number of points gained by the responses given by students. The time allotted is 40 minutes; the types of reading passages are the following: narratives, humanities, social studies, science, and argumentative. The reading comprehension test was measured through multiple choice comprehension questions due to the simplicity in administrating and scoring. Following each passage, there were 5-7 multiple choice questions: (a) 1-2 main idea questions, (b) 2-3 factual information, or detail questions, and (c) 1-3 inference questions. To recognize these question types quickly and understand the aim of the question in the study, the 40 questions can be classified into 3 distinct categories: Main idea, Details, and Inference type questions. Among the 40 questions, there were 6 questions for Main idea, 16 questions for Inference and 18 questions for Details.

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2. Data Collection Procedure

In the first week, students took a TOEFL reading comprehension test (pre-test) and the GRSLSS. The test and survey lasted for ninety minutes to allow students time to read. Upon completion of the 15-week treatment program, a post-test was administered to all the students. As with the pre-test, the same test format and same level of difficulty were used in the post-test. Also, inference question scores were calculated from the numbers of questions in the tests (each correct answer received one point). The two types of instructional strategies used in this study are the explicit and discovery types of instructional strategies (Hopkins, 2002). All the instructional strategies used in the Explicit group (EX 1) were consistent with the instructional preference of FDs to create a match condition. However, these same instructional strategies created a mismatch condition for FIs in the same group. Likewise, the instructional Strategies used in the Discovery Group (EX 2) were consistent with instructional preferences of FIs to create a match condition, but these same instructional strategies created a mismatch condition for FDs in the same group. Fifteen weeks later, all subjects were given the reading comprehension test as a post-test to check the reading achievement through the reading strategy intervention. The rationale for using the same format and level of test for both pre- and post-tests was to assure a comparable test, thus avoiding the problem of equating different forms of pre- and post-tests. Table 2 shows the experimental research design for this study.

TABLE 2
Experimental Research Design

	Cognitive	Styles
	Field Dependent (FD)	Field Independent (FI)
Explicit group (Ex 1)	Matched	Mismatched
Discovery group (Ex 2)	Mismatched	Matched

3. Treatment Conditions

1) Experimental Group 1 (Explicit Group)

Based on the literature review, explicit instructional strategies are teacher-centered approaches and particularly effective for FDs who prefer to have an explicit instruction provided during the instruction (Jonassen & Grabowski, 1993). The key instructional condition for the Explicit group capitalizes on the preferences of the FDs and challenges the FIs. Explicit instructional method means basically direct instruction. In direct

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instruction, the teacher tells, shows, models, demonstrates, and teaches the skill and strategy to be learned. The key word is a "teacher," for it is the teacher who is in command of the learning situation and leads the lesson, and students are being told what they need to know (Baumann, 1983). It was intended to match with the preference of FDs who prefer to be provided with clear and explicit directions and teacher's extensive guide, but FIs prefer to have teacher's minimum teacher's support.

For the pre-reading activities, to activate the students' prior knowledge, the teacher got students interested in a topic by displaying objects related to the story and leading discussions. Graphic organizers, such as charts, graphs, or labeled drawings were provided to improve students' organizational skills and to enhance retention of details and events. Also, prepared scripts were read to activate prior knowledge and were conducted for the Explicit group. It was also a matched strategy with the instructional preference of FDs but not with FIs in that FDs prefer to teacher's deliberate support and maximum amount of guidance (Abraham, 1985).

During-reading activities, the teacher asked the students to read silently the assigned section of the passage. The strategies were modeled explicitly, which were important in the active comprehension process and comprehending reading text when they were relevant to the passage. The researcher adapted the self-questions of active thinking together with a format designed for instruction. After finishing the reading, students were required to extend their understanding of the text by filling in the chart or table. Graphic organizers, such as semantic maps, venn diagrams, and two or three column charts were used to assist students in visualizing and understanding the conceptual relationships in the text. Students were provided with part of the structure of the text and were asked to fill in the rest. Students were also taught to use graphic organizers to analyze text structure. This was designed to be consistent with the preferred teaching approaches of FDs in that FD individuals respond with greater enthusiasm to course content and activities that are clearly structured and prefer to have organization and structure (instructional preferences), but FI individuals prefer to organize their own structure or environment (Witkin & Goodenough, 1981). It was also intended to match with the preference of FDs and mismatch with that of FIs in the sense that FD individuals achieve more with the use of advance organizers to enhance reading comprehension, but FI individuals reject direction and suggestions from others.

For the post-reading activities, reading activities provided students with opportunities to understand texts through the reflection provided by discussing post-reading questions in small groups and writing summary of the text in groups. According to J. Y. Lee and C. K. Min (2010), the summary instruction and actual summary writing are effective in the improvement of students' overall reading and writing skills. Instruction was delivered to small groups of students who sat in a semicircle and was delivered in which there was

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constant interaction between the instructor and students since FDs tend to interact with other students and work cooperatively with others, but FIs prefer to work independently (Witkin et al., 1977). Witkin et al. (1977) mentioned that FDs are perceived as warm, tactful, considerate, socially outgoing, and affectionate by others, but FIs are often described as cold and distant with others, unaware of their social stimulus value, and individualistic.

2) Experimental Group 2 (Discovery Group)

According to Jonassen and Grabowski (1993), some of the instructional conditions that capitalize on the preferences of the FIs and challenge the FDs include providing an independent learning environment, utilizing discovery teaching method, and providing minimum guidance and direction (Jonassen & Grabowski, 1993). Discovery type of instructional strategies moves students' roles from being passive receivers of information to active information seekers.

For the pre-reading strategies, a student-centered strategy which would help with texts they read on their own was conducted; it was intended to let students resolve problems on their own rather than requiring the assistance of others in the sense that FI people are described as having the ability to rely on their own internal sources of information. Students were taught to think consciously about why they were about to read a particular text. At the beginning of each unit, students involved in reading and thinking about the title of the text and major headings, reading the introduction and conclusion, and examining text support features, such as tables and graphs. Within each activity, students personalized their learning by composing their own questions as the basis for reading. Activating one's prior knowledge of a topic before reading provided a mental hook linking knowledge the reader already possesses with ideas in the text. It was also designed to have students make predictions about the story on the basis of the title.

After finishing reading the first paragraph, students were asked to picture what they think. Then they were asked to compare what they thought would happen. After making predictions, the students read the next few paragraphs of the text and then stopped to discuss whether their predictions were correct and what might happen next. Also, after reading the first paragraph, students made text-to text connections and inferences, based on background knowledge or another story read earlier as a pre-reading activity, using picture clues and predicted while reading. In the process, the students learned not only from their teacher but also from their deep-thinking. These activities were designed to match with the preferred instructional practice of FIs in that FIs gain knowledge and understanding better through their personal process, and they do more than just learn the content.

During-reading activities, although the teacher initially contributed to explaining and

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demonstrating reading strategies, the responsibility for strategy use was transferred as quickly as possible to students. At this point, the teacher shifted responsibility for modeling and enacting strategies to students. In this respect, it was matched with the instructional preference of FIs and not with FDs since FIs tend to assume responsibility for their own second language learning (Chapelle, 1995). Asking questions during reading helped readers to monitor their comprehension. In the process, they thought about other strategies they could use to answer their questions. Students summarized important information, often using their knowledge of various text structures to construct summaries.

After reading, students had opportunities to extend their comprehension by using the information they have read to create something new: a timeline, a map, a television newscast, a newspaper report, a letter or a diary. After the reading assignment, students were asked to research a topic in the area using extensive information sources including articles, books, and internet sources. After selecting their topic to research, students were required to gather information and organize the information that they obtain in a presentable way to share with their classmates and develop a new insight about the topic. Finally, students were expected to review other's presented works and share their thoughts on each student's selected topic. These activities were consistent with the instructional preferences of the FIs, but they were not consistent with preferences of the FDs in the sense that using project-based approaches during discovery learning would be favored.

4. Data Analysis

In an analysis of the results of the study, three statistical models were used. First of all, one-way ANOVA was conducted to examine whether there was initial difference in mean scores among the three groups in the pre-test and to see if there was a statistically significant difference among the three groups in the post-test. A two-way ANCOVA was also used to any differences in the instructional strategies of the experimental and control groups by controlling the pre-test score. As the main focus of this study is on the interactions between matching cognitive learning styles with instructional strategies on reading comprehension and inference skills, the effects of matching and mismatching in accordance to students' cognitive learning style will be discussed in detail. A mixed-model repeated measures ANOVA (Analysis of Variance) was utilized to analyze the interaction effects between cognitive learning styles (FI and FD) and instructional strategies (Explicit or Discovery) on inference type questions in each group.

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IV. DATA RESULTS

1. Results of One-Way ANOVA on Reading Comprehension Tests

For the analysis of the research questions, the one-way ANOVA was conducted to examine whether there was statistically significant mean difference among the three groups in pre-test. Table 3 below shows the results of the one-way ANOVA for the three groups in the pre-test.

TABLE 3

ANOVA Analysis on the Pre-Test

	N	Mean	SD	ANOVA F (df1, df2)	Result Sig.
Common (Control)	30	21.03	1.77		
Explicit (EX1)	33	21.27	2.30	F (2,92)=0.107	0.899
Discovery (EX2)	32	21.12	2.15		

From the pre-test administered at the beginning of the semester, the result showed that significant group difference was not found in reading comprehension ability. The one-way ANOVA shows that the mean difference among the three groups in pre-test is not statistically significant (F =0. 107, *df*= (2, 92), $p<0.001$). This finding is interpreted to mean that the three groups had a similar reading ability at the time of the pre-test. On the pre-test, mean score for the three groups were 21.03 (SD=1.77) for the Common group, 21.27 (SD=2.30) for the Explicit group, and 21.12 (SD=2.15) for the Discovery group. However, this result was different in post-test as in Table 4 below.

TABLE 4

ANOVA Analysis on the Post-test

	N	Mean	SD	ANOVA F (df1, df2)	Result Sig.
Common (Control)	30	22.06	1.87		
Explicit (EX1)	33	24.63	2.99	F (2,92)=10.893	0.000
Discovery (EX2)	32	24.84	2.73		

As is shown in Table 4, the one-way ANOVA shows that there was statistically significant mean difference between the two experimental groups and one control group, but there was not statistically significant difference between the Explicit group (EX1) and

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the Discovery group (EX2). However, the difference between the Explicit group and the Common group (mean difference= 2.57) is statistically significant, and so is the difference between the Discovery group and the Common group (mean difference= 2. 78).

2. Results of a Two-way ANCOVA: Covariate on the Pre-test

In order to accommodate for individual differences, pre-test scores of the reading comprehension was used as a covariate in this statistical analysis. The two-way ANCOVA results demonstrated that the effects of cognitive styles (FI or FD) were meaningful when FI/FD was matched with the instructional strategies. As expected, matching students' cognitive learning styles with reading instructions helped to improve on reading achievement. The results of the two-way ANCOVA are shown in Table 5.

TABLE 5

Two-way ANCOVA with Pre-test as Covariate

	Mean Square	F (df1, df2)	**η² (**Eta Squared)
covariate(pre-test)	287.267	F(1,88) = 313.612**	0.781
Main effect for FI or FD	0.890	F(1,88) = .972	0.011
Main effect for Instruction	66.229	F(2,88) = 72.303**	0.622
Interaction between learning style and instruction	117.518	F(2,88) = 128.296**	0.745

Dependent Variable : Post-test , Note. *p<.05 **p<.01

As shown in Table 5, there was a significant effect of reading instructions on total reading performance, F (2, 88) = 72. 303, p = 66.229, η^2= .622**.** That is, the Eta Squared (η^2) was .622 to indicate that instructional strategies provided a relatively high effect on reading achievement. The two-way ANCOVA results also illustrated that there were significant interaction effects between student's cognitive learning styles and instructional strategies on the reading achievement. The graphical results of the two-way ANCOVA are illustrated in Figure 1 below.

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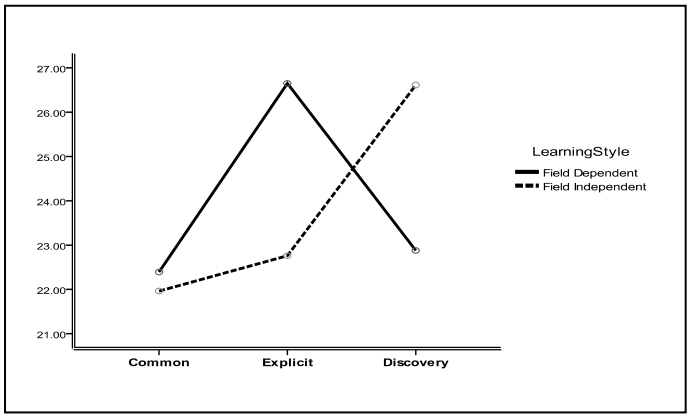

FIGURE 1 Interaction Effects between Cognitive Learning Styles and Instructional Strategies with Pre-test as Covariate

The two-way ANCOVA findings revealed that the interaction effects of cognitive learning styles and strategy instructions on reading achievement, F (2, 88) =128.296, p = 117.518, η^2= .745. The significance in overall reading performance indicated that the teaching effect was more meaningful when the cognitive learning style (FI/FD) was matched with the instructional strategies.

3. Results of the Mixed-Model Repeated Measures ANOVA on Inference Items

Considering the achievement of inference items on reading comprehension, the second research question was to investigate whether strategy instructions enhance inference ability in reading comprehension, and there is any interactive relationship among FI/FD, strategy instruction, and inference skill. Table 6 displays the means and standard deviations of the inference items of the two experimental groups and one control group in pre-and post-tests.

TABLE 6

Descriptive Statistics on Inference Items in Pre- and Post- tests

		Explicit	Discovery	Common	Total
Pre-test	N	33	32	30	95
	Mean	7.39	6.59	7.30	7.09
	SD	0.66	0.91	0.59	0.81
Post-test	N	33	32	30	95
	Mean	9.91	9.41	9.36	9.06
	SD	2.12	1.60	0.86	1.85

Inference Items: 16 points

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With regard to the achievement of inference items specifically, the results showed that experimental groups achieved improvement in inference items from the pre-test to post-test. However, students in the Explicit and Discovery groups showed similar achievement in gain scores in the inference category, yet these two groups outperformed the Common group in the achievement (gain score), the pre-test total: Explicit group's M = 7.39, SD= .66; Discovery group's M = 6.59, SD = .91; Common group's M = 7.30, SD = .59 and the post-test total: Explicit group's M = 9.91, SD = 2.12 ; Discovery group's M = 9.41 , SD = 1.60 ; Common group's M = 7.77, SD = . 860. The Mixed-Model The results of the mixed-model repeated measure ANOVA on the inference items are shown in Table 7 below.

TABLE 7

Results of the Repeated Measure ANOVA in Inference Items on Reading Comprehension Test

	Main effect for the level of learning style		Within-Subjects Effects			
			Instruction effect		Interaction between learning style and teaching	
	F(df1, df2)	η^2	F(df1, df2)	η^2	F(df1, df2)	η^2
Common	F(1,28)=2.820	0.092	F(1,28)=19.470**	0.410	F(1,28)=.087	0.003
Explicit	F(1,31)=68.088**	0.687	F(1,31)=181.566**	0.854	F(1,31)=86.304**	0.736
Discovery	F(1,30)=17.591**	0.370	F(1,30)= 181.679**	0.858	F(1,30)=47.402 **	0.612

Note. *p<.05 **p<.01

As shown in Table 7, the mixed-model repeated measures ANOVA indicated significant main effect for teaching instructions, F (1, 31) =181.566, p = .000, η^2 = .854 for the Explicit group and F (1, 30) = 181.679, p = .000, η^2 = .858 for the Discovery group. The graphical results of the mixed-model repeated measures ANOVA for the inference items in the Common group are illustrated in Figure 2.

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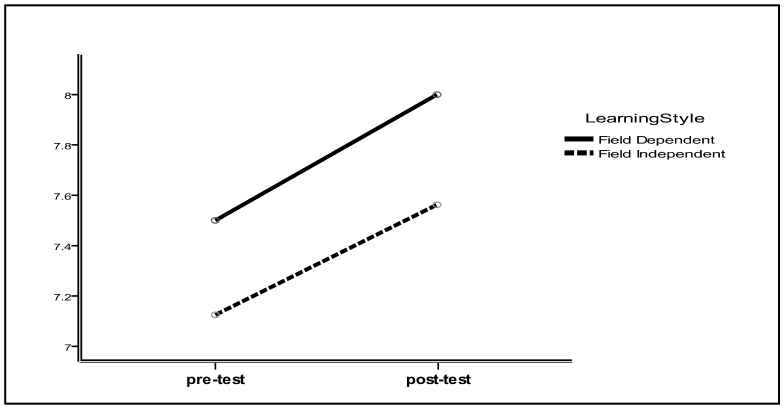

FIGURE 2 Graphical results of the Mixed-Model Repeated Measures ANOVA on Inference Items for Common Group

For the Common group, there was no interactive effect between learning styles and instruction on inference items, F (1, 28) = .087, p = .450, η^2 = .003. The graphical results of the mixed-model repeated measures ANOVA on the inference items for the Explicit and Discovery groups are illustrated in Figures 3 and 4 below.

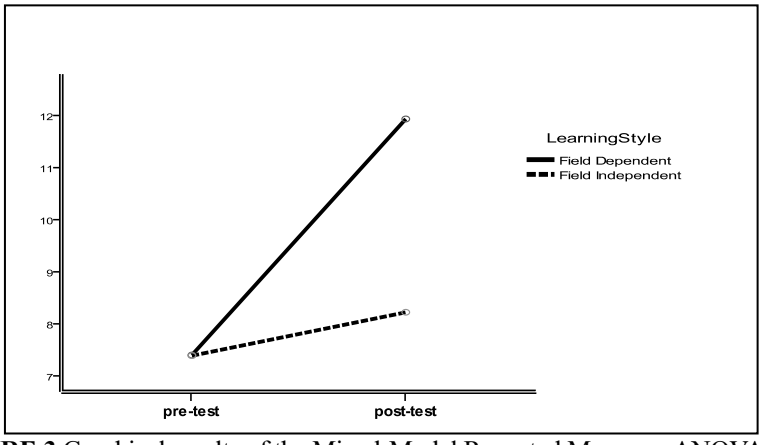

FIGURE 3 Graphical results of the Mixed-Model Repeated Measures ANOVA on Inference Items for Explicit Group

Unlike Common group, the interaction effects of cognitive learning style (FI/FD) and instructional strategies were significant, F (1, 31) = 86. 304, p = .000, η^2 = .736 for the Explicit group. Based on this finding, the possible explanation for the highly significant interaction effects of the Explicit group on the inference items would be assigned to the matching effect of FI/FD and strategy instruction.

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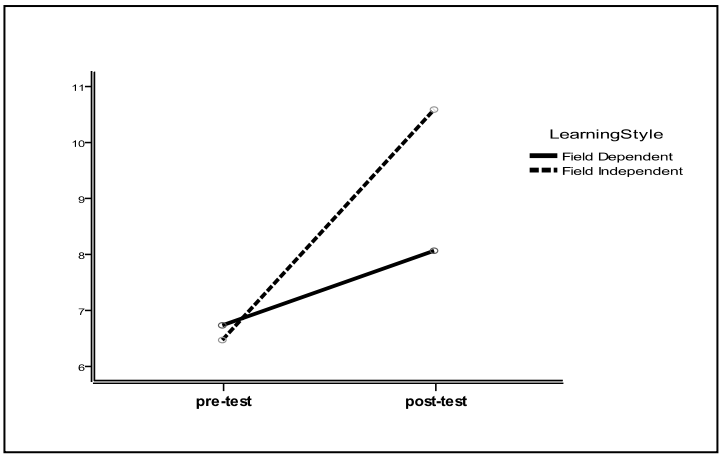

FIGURE 4 Graphical results of the Mixed-Model Repeated Measures ANOVA on Inference Items for Discovery Group

From the result of the interactive effects for the Discovery group, there were significant interaction effects, F (1, 30) = 47.402, p = .000, η^2 = .612. Moreover, the effective size of the interaction effects of the two experimental groups, η^2 = .736 for the Explicit group and η^2 = .612 for the Discovery group indicates that the matching/mismatching effect on Inference items from the Explicit group was slightly higher than that from the Discovery group, which means the stronger interaction effects.

V. DISCUSSION AND IMPLICATIONS

1. The Effects of Reading Strategy Instructions on Low Achieving Readers

To investigate the effect of strategy instruction on the development of low achieving students' reading comprehension, the first research question investigated whether strategy instruction enhances reading ability of college EFL low achievers. This finding indicates that the reading strategy instruction contributes to the reading improvement of college EFL low achievers more than the conventional reading environment (research question one). From this finding in this study, it can be reasoned that low level students might not be aware of the types and the value of reading strategies prior to the strategy instruction or might not utilize those strategies actively even though they may be aware of them. This may explain the reason why the amount of the gain made by the two experimental groups was relatively greater than that made by the control group.

The other possible reason of this finding is that low achieving readers are not proficient

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at using varied strategies so that strategies might not unconsciously be applied in their reading process (Chamot, 2005). According to Carrell (1989), EFL readers' proficiency level can intercept their perceived use of strategies. That is, good EFL readers know well how to use a variety of appropriate strategies to reach their learning goals, while less effective readers not only use strategies less frequently but often do not choose the appropriate or sophisticated strategies for tasks. Taken together, the finding of the first research question implies that teaching how to use a variety of reading strategies effectively should be considered when investigating the reading difficulties of students with low proficiency (Lau & Chan, 2003).

More importantly, although students perceived the same strategy instruction in the same group, the group of students who were matched with their cognitive learning style outperformed the group of students who were the opposite. This finding is important in the reading instruction because it implies that the matching effect provides stronger assistance to the improvement of reading comprehension for college EFL low achievers.

2. The Effects of Inference Strategy Instruction on Reading Achievement

The findings also indicated that the higher improvement in the inference section happened after the strategy instruction. This implies that the effective inference process occurs if inference strategy instruction which is congruent with students' cognitive learning style is implemented. In this sense, this finding implies that in the inference items of reading comprehension, a significant effect can be expected when FI/FD is considered an important factor in reading instruction.

In an EFL context, subjects' low proficiency in L2 reading might be the factor that caused the difficulties in inferring meanings in reading successfully. Among several possible accounts for this result, one explanation can be found in the way in which subjects had been taught reading in their English classes of middle and high schools. In EFL classes, grammar-dominating instruction is still prevalent, and reading is based on a bottom-up approach, such as a sentence-level interpretation. Therefore, the subjects of the study who had long been exposed to grammar-oriented instruction in their EFL classes were likely to use a bottom-up approach. In this aspect, one plausible explanation is that subjects had been instructed with a decoding approach in reading class, and this might not have enabled them to develop inference skills and strategies. In addition, the low achievers in an EFL context usually have low motivation and low self-efficacy and were found to be less skilled readers. Research supported that motivation is one of the main determinants of L2 learning achievement, and students' motivation and attitude have a great effect on their classroom achievement (Krieger, 2005). In this sense, to produce highly effective treatment effect for low achievers, considering learning style as an important motivational factor is necessary,

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and it is suggested that cognitive learning styles (FI/FD) should be regarded as significant in designing reading instruction.

3. Pedagogical Implications

This research has a significant pedagogical implication in that teachers may better understand the difficulties for some learners in specific tasks and can adapt their teaching strategies and materials for students with different learning styles (Hoftman, 1997). This is considered an important finding which has implications for the teaching/learning situation in language classrooms (Tulbure , 2011).

First of all, it is recommended that teachers use strategy-based approaches for reading instruction, and strategies should be taught through direct explanation and explicit teacher modeling. More importantly, less capable EFL readers should be given strategy training for a long period; teaching of strategies without direct explanation and explicit modeling for a short period would not have a long term effect on students and effectively help them develop as strategic readers. While planning and carrying out reading comprehension instruction, instructors should also keep in mind that teaching a few comprehension strategies well is more effective than teaching many strategies poorly (Brown, 2002). That is, it implies that reading instructors should teach students to use strategies flexibly, adapting them to their needs, their individual preferences, and the text at hand (Pressley, 2002). It is important to note that many of the strategies that seem to match well with particular students in reading comprehension are well tested; that is, the keys to effective instruction lie in the teacher's keen observational skills, and the expansion of teaching directly addresses the needs of students (Sternberg & Grigorenko, 1997).

This research can also contribute to the college EFL reading field in that little addressed inference generation as an outcome measure or employed a standardized reading test to measure changes in comprehension. In this sense, this study has significant implication in that examining the college EFL learners' inference ability in reading can offer important insight to EFL teachers by giving them a better understanding of the importance of inference skills.

This research indicates that a mismatch between instruction and learning styles caused relatively low achievement, and this has implications for both learners and teachers. One clear implication is that the more teachers know about their students' style preferences, the more effectively they can orient their reading instruction. Without adequate knowledge about students' individual style preferences, teachers cannot systematically provide the instructional variety. In this sense, teachers can use the learning style survey results to identify strong style patterns in their classes. In this way, students can learn in ways that best suit their styles and develop their modality strengths (Kroonenberg, 1995).

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In reality, however, it could be a great challenge to meet the wide range of needs of students in a classroom. As learning styles within a class generally differ, perhaps a better approach would be to strive for a balanced teaching style that does not excessively favor any one learning style. In other words, teachers can present new information and materials in a variety of modes and use a variety of activities. Because most classes consist of a mix of FI/FD, it is appropriate to provide both styles to respond to the specific needs of individual learners while at the same time encouraging development of both FIs and FDs. In fact, it may be even more important to make teachers aware of their own styles of FI/FD and ways of adapting their teaching strategies and materials to learners whose styles are different from their own. According to Hartnett (1985), learners whose styles match that of the instructor learn more quickly and retain what they learn better.

Also, research findings provide that reading instructional designers and course designers can use to select the optimal methods of instruction to bring about the desired changes for adult students (Koszalka & Bianco, 2001). The implication has to do with educating reading instructors on the importance of developing and using multiple teaching styles depending on the learning styles of students. Teachers must be willing to modify their instruction and materials in order to accommodate these students; also, teachers must be willing to take the time to develop a program that meets the specific needs of all students in that the teacher is the key to improving students' reading abilities and motivation to read, no matter students' achievement levels (Guthrie & Davis, 2003). Therefore, through workshops, seminars, and demonstration lessons, teachers can improve their understanding and skills in teaching reading. One promising strategy to improve teachers' understanding is to organize regular sessions in which teachers discuss an article or book on reading (Allington, 2001).

VI. CONCLUSION

So far, we've considered the effects of matching and mismatching cognitive learning styles defined as FI and FD and instructional strategies on college students' reading comprehension. Explicit and discovery types of instructional strategies were used to design two experimental groups, each of which generated a match and a mismatch condition for FI and FD learners. Measures of reading outcomes were given at the end of both the two experimental and one control groups. The results showed important discoveries, and they are noteworthy for significant EFL implications and applications. As this research has revealed, reflecting students' cognitive learning style on teaching reading should be an effective way to enhance reading comprehension.

Depending on implementation, the use of cognitive styles proved to have significant

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effects on the overall reading improvement as evidently witnessed at the end of the 15 week- period. The impact of the cognitive style dimension (FI/FD) is the unique aspect of this research in that the findings of interactive effects of cognitive learning styles and strategy instruction on the reading comprehension would provide meaningful implication to the EFL setting. Specifically, students who did not perceive strategy instruction in the Common group did not show significant effect in the interaction effect of reading instruction and learning styles on reading achievement, and this indicated the importance of applying the concept of learning style in reading instruction.

It also aimed to obtain answers for the differential effect on inference items. The findings of the research showed that the reading strategy instruction improved college students' overall reading proficiency and inference skill. That is, the study revealed that the students' ability of making inferences was enhanced, so these findings suggest that strategies can be taught, which will help college students improve their reading comprehension ability and inference skill.

Also, results showed that considering cognitive styles, FI and FD groups did perceive similar reading outcomes in reading comprehension performance. It suggested that improving reading outcomes of low achieving college readers can be accomplished by providing instruction that matches the learning styles of students. Significant results of this study suggest that FI/FD dimension itself is not the significant factor, but matching and/or mismatching learning styles and instructional strategies is the significant one influencing student’s reading achievement.

On the basis of findings of the research, several suggestions for EFL reading teachers can be made; enhancing classroom reading lessons focusing on providing more personalized instruction could be the solution for college EFL low achieving readers. Working in a customized reading environment, students at a lower level of proficiency can manipulate the reading text in order to deal with reading strategies. The customized reading environment will encourage the students to assume responsibility for their progress and to create meaning in reading.

Given the evidence that reading strategy instruction is consistently correlated with inference ability, this research has some implications for teachers. First, it suggests that teachers in the universities might not expect a favorable result from inference training when their students’ cognitive learning style is not considered. When the instruction is given to those with low proficiency, a systematic instruction matched with cognitive style might help college EFL learners benefit more.

In brief, this research will provide useful information to the reading teachers who consequently could modify their teaching instruction to incorporate those reading strategies in strategy training lessons and thus help their students, especially low proficiency students to achieve higher levels of reading comprehension of their reading texts. Developing

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specific reading curricula to help less proficient L2 learners could be difficult, but FI/FD can make it possible for reading instructors to design differentiated reading instruction. Therefore, FI/FD is considered best to take a cautious approach towards reading. As research continues in the FI/FD area, more powerful suggestions for reading instruction may be implicated.

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APPENDIX

Grasha-Reichmann Student Learning Style Scales (GRSLSS)

The following is a Grasha-Riechmann Student Learning Style Scales. It has been designed to help

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you clarify your attitudes and feelings toward the courses you have taken thus far in college. There are no right or wrong answers to each question. However, as you answer each question, form your answers with regard to your general attitudes and feelings towards all of your courses. Respond to questions below by using the following rating scale.

Respond to the items listed below by using the following scale.

1.	I prefer to work by myself on assignments in my courses.
2.	I want teachers to state exactly what they expect from students.
3.	My ideas about the content often are as good as those in the textbook.
4.	I rely on my teachers to tell me what is important for me to learn.
5.	I study what is important to me and not always what the instructor says is important.
6.	I want clear and detailed instructions on how to complete assignments.
7.	I learn a lot of the content in my classes on my own.
8.	I complete assignments exactly the way my teachers tell me to do them.
9.	I feel very confident about my ability to learn on my own.
10.	Trying to decide what to study or how to do assignments makes me uncomfortable.
11.	I like to develop my own ideas about course content.
12.	Students should be more closely supervised by teachers on course projects.
13.	I have my own ideas about how classes should be run.
14.	My notes contain almost everything the teacher said in class.
15.	If I like a topic, I try to find out more about it on my own.
16.	I prefer class sessions that are highly organized
17.	I prefer to work on class projects and assignments by myself.
18.	Students should be told exactly what material is to be covered on exams.
19.	When I don't understand something, I first try to figure it out for myself.
20.	I want teachers to have outlines or notes on the board.

1 = strongly disagree | 2 = moderately disagree | 3 = undecided | 4 = moderately agree | 5 = strongly agree

	Low	Moderate	High
Independent	[1.0-2.7]	[2.8-3.8]	[3.9-5.0]
Dependent	[1.0-2.9]	[3.0-4.0]	[4.1-5.0]

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Examples in: English
Applicable languages: English
Applicable Levels: Tertiary

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