

Investigating the Relationships among Cognitive Learning Styles, Motivation and Strategy Use in Reading English as a Foreign Language

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Abstract

This study aimed at investigating the correlations among three major dimensions of individual differences, learning styles, motivation and strategy use in reading English as a foreign language (EFL). Subjects were 422 Taiwanese undergraduate students from different levels who were classified into two groups according to their reading performance. Three questionnaires were adapted from various researchers and revised for measuring students' learning styles, motivation and reading strategies. Significant differences were found between skilled and less-skilled readers on visual style and reflective style. Skilled readers were more intrinsically, integratively and instrumentally motivated than less-skilled readers. Moreover, skilled readers were more capable of using metacognitive and cognitive strategies than their less-skilled counterparts. The correlation analysis revealed that there was a strong correlation between motivation, reading strategy use and reading performance, whereas no correlation between learning styles and reading performance was confirmed. Moreover, learning styles, motivation and reading strategies were intercorrelated with each other.

Keywords: cognitive learning styles, learning motivation, strategy use, English reading comprehension

1. Introduction

Reading in a foreign language is a complicated process involving both lower-level and higher-level processing skills with the interaction of first and second language. In order to help learners to overcome their reading difficulties, numerous researchers have devoted themselves to identify comprehension problems with the purpose of developing comprehension strategies in struggling readers. For more than two decades, strategy-based instruction has been regarded as an effective approach to enhance reading comprehension (e.g. Janzen & Stoller 1998; Souvignier & Mokhlesgerami, 2006; and Sung, Chang, & Huang, 2008). Recently, it has been recognized that individual differences may influence the effect of reading strategy instruction and students' reading performance. Major learner differences include factors associated with learning styles, learning strategies and affective variables, such as motivation, self-efficacy, tolerance of ambiguity, and anxiety, among others (Ehrman, Leaver, & Oxford, 2003).

The term learning style refers to the general approach of the student to learn a subject, a language or solve problems (Oxford, 2003). In contrast, strategy is regarded as a specific plan that is consciously used to achieve a goal, such as learning a foreign language (Cohen, 1998). Various theories of learning styles have been proposed by Kolb (1984), Dunn and Dunn (1993), Felder and Silverman (1988), Felder and Soloman (2004), Gardner (2001) and Reid (1995). In the field of language teaching, the well-known Gardner's (2001; Masgoret and Gardner, 2003) multiple intelligences model has been applied in curriculum design to support language teaching (e.g. Gabala and Lange, 1997). Concerning the relationship between learning styles and foreign language performance, Ehrman's (1994) study suggested that introverts and intuitives had higher performance in speaking, while introverts, intuitives, and thinkers performed better in reading. In a research conducted by Sunderland (1992), no association was found between learning style and language proficiency among students learning English as a second language (ESL).

Recently, because of the advances and easy access to the Internet, some researchers have integrated students' learning styles in the construction of online learning systems. In this regard, Felder and Silverman's (1988) model has been widely applied in adaptive education systems integrating individual learning styles and cognitive traits (e.g. Graf, Liu, Kinshuk, Chen, & Yang, 2009). This is the major reason why this model was selected for this study.

Aspects about language learning strategy have been categorized in diverse ways in the past three decades. In order to make learning strategies more comprehensive, Oxford (1990) classified language learning strategies into direct and indirect strategies. Language learning strategies which directly involve the target language are called direct strategies. Direct learning strategies are executed differently by learners for various purposes, such as memory, cognitive and compensation strategies. Another type of strategies is called indirect strategies which are used to support and manage language learning without directly involving the target language. Indirect strategies can be further divided into metacognitive, affective and social strategies. Following the taxonomy of Oxford (1990; 2001) and Chamot and O'Mally (1996), reading strategies involved in this study were divided into three categories: cognitive strategies, metacognitive strategies, and social/affective strategies. According to Chamot and O'Mally (1996), metacognitive strategies refer to strategies that the students use to plan, monitor, and evaluate their learning goals and processes. Cognitive strategies are used to accomplish both language and content tasks, including elaborating on prior knowledge, making inferences, and using imagery or linguistic transfer. Students may also use social and affective strategies to "complete a learning or communication task" (p. 264) through asking questions or cooperating with classmates.

Despite the difference between learning styles and strategies, some authors postulate that there is a close relationship between learning styles and learning strategies (Ehrman, et al., 2003). For example, Lie & Qin's (2006) study strongly suggests that learning styles have a significant influence on learners' learning strategy choices. In their study, the comparison between high and low achievers showed that high achievers are more capable of practicing strategies that are not typically associated with their preferred learning styles. However, low achievers used limited range of strategies. Furthermore, Dörnyei (1995) and Oxford (2001) have documented mixed results of strategy instruction, which may result from the diversity of learners' learning styles.

Other authors mentioned about the importance of motivational factors which need to be integrated with cognitive strategy to achieve a more complete reading comprehension (Chan, 1996; Guthrie & Wigfield, 2000). The study of motivation can be traced back to early 1950s, when Gardner and associated proposed the Socio-Educational model of Language Learning (Gardner, 2001). In this framework, motivation was divided into two categories: integrative and instrumental. In more recent works, Csizer and Dörnyei (2005a, 2005b) have investigated language learners' motivation in terms of seven components: Integrativeness, Instrumentality, Vitality of the L2 Community, Attitudes toward the L2 Speakers/Community, Cultural Interest, Linguistic Self-confidence and Milieu. In their study on learning motivation and self-identity changes among Chinese English learners, Gao, Zhao, Cheng, & Zhou (2007) have identified seven motivation types: intrinsic interests, immediate achievement, individual development, information medium, going abroad, social responsibility and learning situation. It revealed that motivation and changes of self-identity was strongly correlated in various forms. The interrelations among them are supporting each other to influence the outcome of language learning. Though these studies have demonstrated the contribution of motivation to the learning of a second/foreign language, as to which type of motivation is more influential is still controversial. Some researchers postulated that integrative orientation or intrinsic motivation is more important than instrumental or extrinsic motivation (Gardner, 2007; Gardner, Moorcroft, & Metford, 1989; Noels et al., 2001). In a study by Liu (2007) to Chinese students', it was found that students' attitudes and motivation were positively correlated with their English proficiency. However, the students were more instrumentally than integratively motivated to learn English.

According to Guthrie & Wigfield (2000) motivational factors coordinate cognitive goals and strategies in reading (p. 408). Some authors also emphasize that motivation is crucial for the acquisition and application of reading strategies, for "reading motivation activates and guides reading behavior" (Aarnoutse, & Schellings, 2003, p. 387). It is contended that good readers are more motivated in learning a foreign language and have access to diverse reading strategies even not associated with their own learning styles in order to achieve a better understanding of the text. The study of Lau & Chan (2003) clearly demonstrates that significant differences exist between good poor readers on their strategy use and reading motivation. Poor readers often demonstrate low motivation to read. Therefore reading programs enhancing reading skills and reading motivation would help poor readers become proficient. Moreover, Sungur's (2007) model of the relationships among motivational beliefs, metacognitive strategy use and effort regulation shows that learners should have motivation to use metacognitive strategies successfully. In their extensive review, Morgan and Fuchs (2007) also provide substantial support for a bidirectional relationship between early reading skill and motivation. They argued that young children's reading and motivation influence each other bidirectionally to affect their later reading achievement.

The above-mentioned studies indicate learning styles, learning motivation and reading strategy use may be correlated with each other to act on students' reading comprehension performance. However, many researchers have investigated isolated dimensions and how the interrelationship is manifested among skilled and less-skilled EFL learners is less known. Moreover, relatively few studies have focused the interrelationships of these three dimensions on reading comprehension. Hence the purpose of this study is to investigate the interrelationships among learning styles, motivation and reading strategy use among skilled and less-skilled EFL readers. Two research questions are raised as follows:

- 1) What are the differences of learning styles, motivation and reading strategy use between skilled and less-skilled EFL readers?
- 2) What are the relationships among learning styles, learning motivation, and reading strategy use in EFL reading comprehension?

2. Research methodology

2.1 Subjects

A total of 731 students learning English as a foreign language (EFL) at a university in Taiwan participated in this study. These students (335 males and 395 females) were between the ages of 18 and 27 ($M = 18.79$, $SD = 1.11$). Among them 243 students were English majors, whereas 488 students were non-English majors. In order to explore the differences of learning styles, motivation and reading strategy use between skilled and less skilled readers, the sample was divided into two groups. Those who performed in the top 30% in the reading comprehension test were determined to be skilled readers ($N = 204$, $Mean = 75.78$, $SD = 8.05$) and those who performed in the bottom 30% were deemed to be less-skilled readers ($N = 218$, $Mean = 31.51$, $SD = 11.27$).

2.2 Instruments

One reading comprehension test and three questionnaires were used as research instruments for eliciting data for the purpose of this investigation. The reading comprehension test was used to evaluate the students' reading comprehension, based on which the students were classified into two groups. A questionnaire on learning styles was employed to elicit data regarding EFL learners' learning styles. A questionnaire on learning motivation was constructed to examine EFL learners' motivation to learn English. A reading strategy questionnaire was used to discover EFL learners' strategy use during reading. These instruments were initially adapted from inventories developed by other researchers for similar research purposes, and then revised for the particular investigation of the present study. More details of the instruments are given in the following section.

2.2.1 Reading Comprehension Test

Students' English reading comprehension was measured by the reading comprehension section of the General English Proficiency Test (GEPT) published by the Language Training and Testing Center. The GEPT is a commonly used test for assessing English proficiency in Taiwan, which include the measure of reading comprehension, writing, listening and speaking ability for primary, intermediate, high-intermediate and advanced level. In this study only students' reading comprehension scores in the GEPT for intermediate level were used. The reading comprehension test consists of 40 multiple choice questions.

2.2.2 Questionnaire on Learning Styles

A questionnaire was constructed to determine students' cognitive learning styles preference. This instrument was selected from the Index of Learning Styles created by Felder and Soloman (2004), with some small modifications made by the authors because of the Chinese version. The questionnaire consists of 30 items and the learning styles were classified into six categories: visual (item 1 to 5), verbal (items 6 to 10), active (item 11 to 15), reflective (item 16 to 20), sensing (item 21 to 25) and intuitive (item 26 to 30). A five-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to display the students' varying degrees of agreement or disagreement with each statement of learning styles. Internal consistency reliability of the questionnaire, as measured by Cronbach's alpha, was 0.80.

2.2.3 Questionnaire on learning motivation

The instrument for examining students' learning motivation was developed from the questionnaire previously employed by Gao, Zhao, Cheng, & Zhou (2007), which have adapted the categories of motivation from Gardner (1988), Dörnyei (1995) and Csizer & Dörnyei (2005a; 2005b).

There were 30 items altogether, consisting of four types of learning motivation: intrinsic motivation (item 1-8), learning situation (item 9-13), integrative orientation (item 14-21), and instrumental orientation (item 22-30). Participants were requested to check each question on a five-point LIKERT scale from 1 (strongly disagree) to 5 (strongly agree). The estimated reliability (Cronbach's alpha) was placed at 0.93.

2.2.4 Questionnaire on reading strategy use

A questionnaire was constructed to investigate the learners' perception of strategy use. The distinction of strategies made in the taxonomy among metacognitive, cognitive and social/affective strategies is similar to that employed in Chamot and O'Malley (1996), Oxford (1990) and Smidt and Hegelheimer (2004). The questionnaire consisted of 30 items, including metacognitive strategies (item 1-10), cognitive strategies (item 11 – 25) and social-affective strategies (item 26-30). Using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) the questionnaire elicited students' frequency of using strategies to enhance reading comprehension. The approximate overall reliability estimate for the strategy items was placed at 0.88.

2.3 Procedure

The data were collected in English language classes offered to students at freshman and sophomore levels who were taking Freshman English or reading comprehension courses within an undergraduate English program. Classes were held two periods (90 minutes duration) each week. In the first period, the English reading comprehension test was administered. In the second period, the students were requested to fill in the questionnaires on learning styles, learning motivation and reading strategy use. All students completed the reading comprehension test within the first 45 minutes, and the questionnaires within the next 45 minutes. There was a 10-minute break interval. The test and questionnaires were then collected by the instructors and returned to the researcher.

4. Results

4.1 Differences between skilled and less-skilled readers on learning styles

Different statistical methods were employed in order to explore the relationship among learning styles, learning motivation and reading strategy use of the students with different levels of English reading comprehension. Independent T-tests were separately performed to examine the differences between skilled and less-skilled readers. Table 1 shows the means and standard deviations of learning styles. Overall results suggested that the difference of learning styles between skilled and less-skilled readers was not significant (Sheffe's $F = 0.956$, $p > 0.05$). Among six categories, only two categories of visual (Sheffe's $F = 0.976$, $p < 0.001$) and reflective styles (Sheffe's $F = 1.328$, $p < 0.001$) showed significant difference. The responses of the students indicated that reflective was the most preferred learning style for both groups of the students, whereas intuitive was the least preferred style. The results suggested that students with visual and reflective styles may have higher performance in reading comprehension.

Table 1. Differences between skilled and less-skilled readers on learning styles.

Learning style	Group	Mean	SD	F	Sig.
Visual	Skilled	3.92	0.51	0.976	0.004**
	Less-skilled	3.78	0.49		
Active	Skilled	3.74	0.58	0.317	0.828
	Less-skilled	3.73	0.87		
Verbal	Skilled	3.37	0.84	0.200	0.367
	Less-skilled	3.31	0.63		
Reflective	Skilled	4.04	0.44	1.328	0.000***
	Less-skilled	3.83	0.48		
Sensing	Skilled	3.73	0.52	0.990	0.611
	Less-skilled	3.71	0.60		
Intuitive	Skilled	3.21	0.62	0.001	0.067
	Less-skilled	3.32	0.63		
Total	Skilled	3.67	0.37	0.054	0.117
	Less-skilled	3.61	0.37		

*: Difference is significant at 0.05 level (2-tailed); **: Difference is significant at 0.01 level (2-tailed);

*** Difference is significant at 0.001 level (2-tailed)

4.2 Differences between skilled and less-skilled readers on learning motivation

Table 2 displays the means and standard deviations for each category of learning motivation of the students. In order to examine the differences between skilled and less-skilled readers on these categories, further independent T-tests were done and significant main effect was found ($F = 8.418$, $p < 0.01$). Moreover significant differences were found in three out of four categories of learning motivation, including intrinsic motivation ($F = 5.025$, $p < 0.001$), integrative orientation ($F = 2.160$, $p < 0.05$) and instrumental orientation ($F = 3.588$, $p < 0.001$). No difference was found between skilled and less-skilled readers in the category of learning situation. According to the responses to the survey, most students disagreed that the aspects concerning English teacher, fellow students, the textbook or the quality of English class would affect their motivation of English learning. Overall skilled readers had a higher level of motivation compared to their less-skilled counterparts.

Table 2. Differences between skilled and less-skilled readers on learning motivation.

Motivation	Group	Mean	SD	F	Sig.
Intrinsic motivation	Skilled	3.45	0.70	5.029	0.000***
	Less-skilled	3.29	0.76		
Learning situation	Skilled	3.09	0.74	0.585	0.827
	Less-skilled	2.96	0.72		
Integrative Orientation	Skilled	3.67	0.60	2.160	0.018*
	Less-skilled	3.62	0.63		
Instrumental Orientation	Skilled	3.83	0.61	3.588	0.000***
	Less-skilled	3.72	0.63		
Total	Skilled	3.50	0.50	8.418	0.004**
	Less-skilled	3.38	0.53		

*: Difference is significant at 0.05 level (2-tailed); **: Difference is significant at 0.01 level (2-tailed);

*** Difference is significant at 0.001 level (2-tailed)

4.3 Differences between skilled and less-skilled reading on reading strategy use

Means and standard deviations for each category of reading strategies are presented in Table 3. Independent t-tests were used to examine the significant effects of each variable. As shown in Table 3, there were significant differences on metacognitive strategies ($F = 3.443$, $p < 0.000$), and cognitive strategies ($F = 0.906$, $p < 0.000$). The result supported the findings from Lau and Chan's (2003) study, where they found poor readers were less effective to use cognitive and metacognitive strategies to enhance their reading comprehension. No difference was found in the category of social-affective strategies. Though skilled readers employed in general more strategies than the less-skilled readers, the main difference was found in the category of metacognitive strategies.

Table 3. Differences between skilled and less-skilled readers on reading strategy use.

Reading strategy	Group	Mean	SD	F	Sig.
Metacognitive	Skilled	3.944	0.342	3.443	0.000***
	Less-skilled	3.627	0.405		
Cognitive	Skilled	3.701	0.401	0.906	0.000***
	Less-skilled	3.512	0.442		
Social-affective	Skilled	3.742	0.540	0.592	0.057
	Less-skilled	3.642	0.537		
Total	Skilled	3.796	0.363	0.080	0.000***
	Less-skilled	3.594	0.383		

*: Difference is significant at 0.05 level (2-tailed); **: Difference is significant at 0.01 level (2-tailed); *** Difference is significant at 0.001 level (2-tailed).

4.4 Relationships among learning styles, motivation, reading strategy use and reading comprehension

To further investigate the relationships of the variables with reading comprehension, the zero-order correlations among each category of variables in the study were examined.

As predicted, the results showed that reading comprehension correlates significantly with reading motivation ($r = 0.331$, $p < 0.000$) and reading strategy ($r = 0.244$, $p < 0.001$), but not learning styles ($r = 0.068$, n.s.). The results indicated that the differences between skilled and less-skilled readers on their motivation and reading strategy use were better predictors of their reading comprehension. Table 4 displays the correlations between learning styles and motivation. There was a significant correlation between learning styles and motivation ($r = 0.363$, $p < 0.000$). Though the correlation coefficients were not very high, three (intrinsic motivation, integrative orientation, and instrumental orientation) among four categories of motivation were significantly correlated with all categories of learning styles. Only the variable of learning situation was not correlated with learning styles.

Table 4. Correlations between learning styles and motivation.

	READ	INTR	LEARN	INTE	INST
READ		0.442**	0.037	0.229**	0.271**
VIS	0.140**	0.164**	0.073	0.272**	0.237**
VERB	0.026	0.189**	0.091	0.215**	0.192**
ACT	0.020	0.188**	-0.007	0.249**	0.287**
REF	0.212**	0.266**	0.012	0.312**	0.332**
SEN	0.014	0.167**	0.001	0.226**	0.234**
INTU	-0.095	0.121*	0.136**	0.159**	0.161**

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

READ: reading comprehension; VIS: Visual style; ACT: Active style; VERB: Verbal style; REF: Reflective style; SEN: Sensing style; INTU: Intuitive style; INTR: Intrinsic motivation; LEARN: Learning situation; INTE: Integrative orientation; INST: Instrumental orientation.

The correlations between motivation and reading strategy use was presented in Table 5. Reading strategy use had a significant correlation with motivation ($r = 0.537$, $p < 0.000$). Similar to the results in Table 4, higher correlations were found between reading strategies and three categories (intrinsic motivation, integrative orientation, and instrumental orientation). This indicates students who practiced more reading strategies tended to have intrinsic, integrative, and instrumental motivation. In comparison, the correlations between learning situation and reading strategies were lower or not significant.

Table 5. Correlations between motivation and reading strategy use.

	READ	INTR	LEARN	INTE	INST
READ		0.442**	0.037	0.229**	0.271**
META	0.388**	0.485**	0.099*	0.415**	0.448**
COG	0.194**	0.495**	0.195**	0.521**	0.521**
SOC	0.077	0.281**	0.078	0.355**	0.348**

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

READ: reading comprehension; INTR: Intrinsic motivation; LEARN: Learning situation; INTE: Integrative orientation; INST: Instrumental orientation; META: metacognitive strategy; COG: cognitive strategy; SOC: social affective strategy.

Table 6 shows the correlations between reading strategy use and learning styles. As shown in Table 6, reading strategy was highly correlated with learning styles ($r = 0.721$, $p < 0.000$). All categories of reading strategies were correlated with all categories of learning styles. The highest correlation was found between reflective style and metacognitive strategy ($r = 0.539$, $p < 0.000$). In fact, students with reflective styles tended to practice more reading strategies, also including cognitive ($r = 0.492$, $p < 0.000$) and social-affective strategies ($r = 0.465$, $p < 0.000$), in that the correlations were higher than those between other categories of learning styles and reading strategies.

To explore further the contribution of different variables on reading comprehension, a multiple linear regression using reading comprehension as dependent variable and learning styles, reading strategies and motivation as independent variables was performed. Results indicated a statistically significant relation between reading comprehension and the three variables, $F(3, 418) = 22.175$, $p < 0.000$. These variables explained 13.7% of reading comprehension.

Table 6. Correlations between reading strategy use and learning styles.

	READ	META	COG	SOC
READ		0.388**	0.194**	0.077
VIS	0.140**	0.348**	0.336**	0.421**
VERB	0.026	0.344**	0.338**	0.290**
ACT	0.020	0.402**	0.444**	0.412**
REF	0.212**	0.539**	0.492**	0.465**
SEN	0.014	0.366**	0.384**	0.448**
INTU	-0.095	0.235**	0.307**	0.298**

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

READ: Reading comprehension; VIS: Visual style; ACT: Active style; VERB: Verbal style; REF: Reflective style; SEN: Sensing style; INTU: Intuitive style; META: metacognitive strategy; COG: cognitive strategy; SOC: social affective strategy.

5. Discussion

Based on the results, several major findings can be confirmed. First of all, the results of this study indicated significant differences between skilled and less-skilled readers on their motivation and reading strategy use. It can be inferred that skilled readers are capable of using more strategies within various categories to increase their comprehension in reading English. On the other hand, the less-skilled readers do not practice as many strategies as the skilled counterparts which may be a reason why they had a lower achievement in L2 reading comprehension. A similar result was also found in Taillefer & Pugh (1998). In Taillefer & Pugh's study, the skilled practiced more reading strategies than their less-skilled counterparts in reading a second language. In a study by Zhang (2002), differences were also found between high-scorers and low-scorers of IELTS on the metacognitive awareness of reading strategies. The finding of the present study supported previous studies that skilled readers were more capable of using metacognitive and cognitive strategies compared to less-skilled readers (Dole, Brown & Trathen, 1996; Lau & Chan, 2003).

Secondly, there was a strong correlation between motivation, reading strategy use and reading performance, whereas no correlation between learning styles and reading performance was confirmed. The results indicate that students' reading performance has a close relationship with motivation and reading strategy use, but whether learning style would affect the students' reading performance is not obvious. Specifically, students' reading comprehension was strongly correlated with intrinsic motivation, integrative orientation, and instrumental orientation. In the present study, skilled readers had higher intrinsic motivation than less-skilled readers. The correlation also showed intrinsic motivation was highly correlated with reading comprehension. This finding is consistent with the result in Gao et al. (2007), where the authors found intrinsic interest had relatively high loadings in learning motivation among Chinese students. Similar to the motivation type of their Chinese counterparts, Taiwanese students also showed admiration of the target language and culture. In their study, Csizer & Dörnyei (2005a) also pointed out that integrativeness, through the medium of instrumentality, was the core factor of motivation among language learners. The results indicated that learning situation was less relevant for the subjects of this study. In other words, the students did not learn English because of aspects of the learning environment, such as the equipments, teachers, teaching materials, and the peers. This may be attributable to the fact that teachers are regarded as the authority in Taiwanese classrooms. Many students wouldn't challenge teachers' teaching styles and materials.

It was found that reading comprehension was correlated with metacognitive and cognitive strategies but not with socio-affective strategies. The results showed that Taiwanese EFL college students used metacognitive reading strategy most, followed by cognitive and social/affective strategies. The finding supported previous studies (Cheng; 2009; Hsu, 2009; Hong-Nam & Leavell, 2006), in that the ESL college students in the USA and the EFL college students in Taiwan both preferred to use metacognitive strategy most frequently. In Hong-Nam & Leavel's (2006) study, where the sample was comprised of 55 ESL students from different countries, the subjects also preferred to use metacognitive strategies most and social-affective strategies least. The majority of the subjects came from Asia, such as Japan, Taiwan, Korea and China. This finding indicates that Taiwanese students tend to think alone, instead of asking questions or having interactions in groups to solve their reading comprehension problems.

Finally, learning styles, motivation and reading strategies were intercorrelated with each other. Reading strategies were highly correlated with learning styles ($r = 0.721$, $p < 0.01$) and motivation ($r = 0.537$, $p < 0.01$). The result is in line with other studies that learning styles appear to have significant influence on their strategy use (Carson & Longhini, 2002; Ehrman and Oxford, 1990; Li, & Qin, 2006; Littlemore, 2001). All categories of learning styles were significantly correlated with all types of reading strategies, with which reflective style achieved higher correlations, especially with metacognitive strategies ($r = 0.539$, $p < 0.01$). Reflective learners' characteristics of thinking, planning, and controlling the reading process may well explain their preference of metacognitive strategies which include monitoring, planning, predicting and self-evaluating strategies in the present study. Students with visual styles tended to use social-affective strategies ($r = 0.421$). Active learners used cognitive strategies most ($r = 0.444$, $p < 0.01$). Students with sensing style preferred social-affective strategies ($r = 0.448$, $p < 0.01$), while intuitive learners liked cognitive strategies ($r = 0.307$, $p < 0.01$). The findings in general support the study of Ehrman and Oxford (1990), where they found thinkers preferred metacognitive strategies while feelers liked social strategies.

In accordance with previous studies, the present study clearly demonstrates a strong relationship between reading strategies and motivation (Aarnoutse, & Schellings, 2003; Lau & Chan, 2003; Morgan & Fuchs, 2007; Sungur, 2007). The correlations were mainly manifested between all three types of reading strategies and intrinsic motivation, integrative orientation and instrumental orientation. Learning situation showed a low or no correlation with reading strategies, which indicates that learning situation wouldn't affect students' practice of reading strategies in the present study. The finding supports Lau & Chan's (2003) study, where they found intrinsic motivation was strongly correlated with reading strategies. The result suggests that students who are more motivated tend to use more reading strategies.

6. Conclusions

The purpose of this research was to investigate the differences among skilled and less-skilled readers on learning styles, motivation and strategy use in EFL reading comprehension and how the interrelationships of these three factors are manifested. First, significant differences were found between skilled and less-skilled readers on motivation and reading strategy use. Second, reading comprehension was strongly correlated with motivation and reading strategies, while no correlation was found between learning styles and reading performance. Third, learning styles, motivation and reading strategies were intercorrelated with each other, while reading strategies were highly correlated with learning styles and motivation.

In conclusion, the findings of this study indicated that both motivation and reading strategies are more relevant factors attributing students' reading performance than learning styles. In accordance with previous studies, the present research suggests positive effects of reading strategy instruction on EFL reading comprehension. Since reading strategies were significantly correlated with learning styles, a program matched with students' learning styles would be supportive. Moreover, instructors can help the students identify their learning goals and foster their intrinsic motivation, then develop reading programs in association with motivational strategies in order to help the students become better readers.

References

- Aarnoutse, C., & Schellings, G. (2003). Learning reading strategies by triggering reading motivation. *Educational Studies*, 29(4), 387-409.
- Carson, J. G., & Longhini, A. (2002). Focusing on learning styles and strategies: a diary study in an immersion setting. *Language Learning*, 52(2), 401-38.
- Chamot, A. U., & O'Malley, J. M. (1996). The Cognitive Academic Language Learning Approach: A model for linguistically diverse classroom. *The Elementary School Journal*, 96, 259-273.
- Chamot, A. U., O'Malley, J. M., Barnhardt, S., El-Dinary, P., & Robbins, B. (1999). *The learning strategies handbook*. New York: Longman.
- Chan, L. K. S. (1996). Combined strategy and attributional training for seventh grade average and poor reader. *Journal of Research in Reading*, 19, 111-127.
- Cheng, M. L. (2009). Influence of grade level on perceptual learning style preferences and language learning strategies of Taiwanese English as foreign language learners. *Learning and Individual Difference*, 19, 304-308.

- Cohen, A. D. (1998). *Strategies in learning and using a second language*. Harlow, Essex: Longman.
- Cook, D. (2005). Learning and cognitive styles in web-based learning: Theory, evidence, and application. *Academic Medicine*, 80(3), 266-278.
- Csizer, K., & Dörnyei, Z. (2005a). Language learners' motivational profiles and their motivated learning behavior. *Language Learning*, 55(4), 613-659.
- Csizer, K., & Dörnyei, Z. (2005b). The internal structure of language learning motivation and its relationship with language choice and learning effort. *The Modern Language Journal*, 89(5), 19-36.
- Dole, J. A., Brown, K. J., & Trathen, W. (1996). The effects of strategy instruction on the comprehension performance of at-risk students. *Reading Research Quarterly*, 31, 62-88.
- Dörnyei, Z. (1995). On the teachability of communication strategies. *TESOL Quarterly*, 29, 55-85.
- Dörnyei, Z. (2005). *The psychology of the language learner: Individual differences in second language acquisition*. Mahwah, NJ: Lawrence Erlbaum.
- Duffy, G.G. (1993a). Teachers' progress toward becoming expert strategy teachers. *The Elementary School Journal*, 94, 109-120.
- Duffy, G.G. (1993b). Rethinking strategy instruction: Four teachers' development and their low achievers' understanding. *The Elementary School Journal*, 93, 231-247.
- Dunn, R., & Dunn, K. (1993). *Teaching elementary students through their individual learning styles: Practical approaches for grade 7-12*. Boston: Allyn & Bacon.
- Ehrman, M. E. (1994). The type differentiation indicator and adult foreign language learning success. *Journal of Psychological Type*, 30, 10-29.
- Ehrman, M. E., Leaver, B. L., & Oxford, R. L. (2003). A brief overview of individual differences in second language learning. *System*, 31, 313-330.
- Ehrman, M. E. & Oxford, R. (1990). Adult language learning styles and strategies in an intensive training setting. *Modern Language Journal*, 74, 311-327.
- Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering Education*, 78(7), 674-581.
- Felder, R.M., & Soloman, B. A. (2004). Index of Learning Styles questionnaire. Retrieved December 14, 2009, from <http://www.ncsu.edu/felder-public/ILSpage.html>.
- Gabala, P. M., & Lange, D. L. (1997). Multiple intelligences: Multiple ways to help students learn foreign language. *Northeast Conference Newsletter*, 41, 29-34.
- Gao, Y., Zhao, Y., Cheng, Y., & Zhou, Y. (2007). Relationship between English learning motivation types and self-identity changes among Chinese students. *TESOL Quarterly*, 41(1), 133-155.
- Gardner, R. C. (1988). The socio-educational model of second-language learning: assumptions, findings, and issues. *Language Learning*, 38, 101-26.
- Gardner, R. C. (2001). Language learning motivation: the student, the teacher, and the researcher. *Texas Papers in Foreign Language Education*, 6(1), 1-18.
- Gardner, R. C. (2007). Motivation and second language acquisition. *Porta Linguarum*, 8, 9-20.
- Gardner, R. C., Moorcroft, R., & Metford, J. (1989). Second language learning in an immersion program: Factors influencing acquisition and retention. *Journal of Language and Social Psychology*, 8, 287-305.
- Graf, S., Kinshuk, & Liu, T. C. (2009). Supporting teachers in identifying students' learning styles in learning management systems: An automatic students modelling approach. *Educational Technology & Society*, 12(4), 3-14.
- Graf, S., Liu, T. C., Kinshuk, Chen, N. S., & Yang, S. J.H. (2009). Learning styles and cognitive traits – Their relationship and its benefits in web-based educational systems. *Computers in Human Behavior*, 25(6), 1280-1289.
- Guilloteaux, M. J., & Dörnyei, Z. (2008). Motivating language learners : A classroom-oriented investigation of the effects of motivational strategies on students motivation. *TESOL Quarterly*, 42(1), 55-77.
- Guthrie, J. G., & Wigfield, A. (2000). Engagement and motivation in reading. In M.L. Kamil, P. B., Mobenthal, P.D. Pearson & R. Barr (Eds.), *Handbook of reading research*, Vol. 3 (pp. 403-420). New York: Longman.
- Hong-Nam, K., & Leavell, A. G. (2006). Language learning strategy use of ESL students in an intensive English learning context. *System*, 34, 399-415.

- Hsieh, P. H., & Dwyer, F. (2009). The instructional effect of online reading strategies and learning styles on student academic achievement. *Educational Technology and Society*, 12(2), 36-50.
- Hsu, S. C. (2009). Reading strategies used by technical students. *English Teaching e-Monthly*, 22, Retrieved September 13, 2009, from <http://etlc.wtuc.edu.tw/>
- Janzen, J., & Stoller, F. (1998). Integrating strategic reading in L2 instruction. *Reading in a Foreign Language*, 12(2), 251-269.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.
- Lau, K.L., & Chan, D. W. (2003). Reading strategy use and motivation among Chinese good and poor readers in Hong Kong. *Journal of Research in Reading*, 26(2), 177-190.
- Lie, J., & Qin, X. (2006). Language learning styles and learning strategies of tertiary-level English learners in China. *Regional Language Centre Journal*, 37(1), 67-90.
- Littlemore, J. (2001). An empirical study of the relationship between cognitive style and the use of communication strategy. *Applied Linguistics*, 22(2), 241-65.
- Liu, M. (2007). Chinese students' motivation to learn English at the tertiary level. *Asian EFL Journal*, 9(1), 126-146.
- Masgoret, A. M., & Gardner, R. C. (2003). Attitudes, motivation, and second language learning: a meta-analysis of studies conducted by Gardner and associates. *Language Learning*, 53, 167-210.
- Morgan, P.L., & Fuchs, D. (2007). Is there a bidirectional relationship between children's reading skills and reading motivation? *Council for Exceptional Children*, 73(2), 165-183.
- Noels, K. A., Clement, R., & Pelletier, A. G. (2001). Intrinsic, extrinsic, and integrative orientations of French Canadian learners of English. *The Canadian Language Review*, 57, 424-442.
- Oxford, R. L. (1990). *Language Learning Strategies: What Every Teacher Should Know*. Boston, MA: Heinle and Heinle.
- Oxford, R. L. (2001). Integrated skills in the ESL/EFL classroom. *ERIC Digest #EDO-FL-01-05*.
- Oxford, R. L. (2003). Language learning styles and strategies: Concepts and relationships. *IRAL*, 41, 271-278.
- Paris, S. G., & Paris, A.H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36, 89-101.
- Pressley, M., Johnson, C. J., Symons, S., McGoldric, J.A., & Kurita, J.A. (1989). Strategies that improve children's memory and comprehension of text. *Elementary School Journal*, 90, 3-32.
- Reid, J.M. (1995). *Learning styles in the ESL/ EFL classroom*. Boston: Heinle & Heinle.
- Smidt, E. & Hegelheimer, V. (2004). Effects of online academic lectures on ESL listening comprehension, incidental vocabulary acquisition, and strategy use. *Computer Assisted Language Learning*, 17(5), 517-556.
- Souvignier, E. & Mokhlesgerami, J. (2006). Using self-regulation as a framework for implementing strategy instruction to foster reading comprehension. *Learning and Instruction*, 16, 57-71.
- Sunderland, J. (1992). Gender in the EFL classroom. *ELT Journal*, 46, 81-91.
- Sung, Y.T., Chang, K. E., & Huang, J. S. (2008). Improving children's reading comprehension and use of strategies through computer-based strategy training. *Computers in Human Behavior*, 24, 1552-1571.
- Sungur, S. (2007). Modeling the relationships among students' motivational beliefs, metacognitive strategy use, and effort regulation. *Scandinavian Journal of Educational Research*, 51(3), 315-326.
- Taillefer, G., & Pugh, T. (1998). Strategies for professional reading in L1 and L2. *Journal of Research in Reading*, 21(2), 96-108.
- Zhang, L. J. (2002). Exploring EFL reading as a metacognitive experience: Reader awareness and reading performance. *Asian Journal of English Language Teaching*, 12, 65-90.