

The Effect of Metacognitive Strategies Training on Reading Comprehension of Field-dependent / Field-independent Learners

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Abstract

This study investigated how English as Foreign Language (EFL) learners with different learning styles (Field dependent and field independent) boost up their reading comprehension abilities as they develop their metacognitive skills. To conduct this research, 60 participants were randomly invited to sit PET (Preliminary English Test) to ensure homogeneity of the participants in terms of language proficiency level. A Group Embedded Figure Test (GEFT) was then administered to distinguish field dependent and field independent learners. Two groups of 30 students were made; field dependent and field independent groups. Prior to any instruction on metacognitive strategy, groups of students attended a reading test as a pretest. Students were then received instruction with the focus on metacognitive strategies including inferring meaning through word analysis, using background knowledge, guessing the later topic, centering learning, arranging and planning leaning and elaborating as a treatment. After the instruction was completed the students were given a posttest in relation to the reading skills. The within and between group analysis of data gathered from this quasi experimental research using a series of t-test and analysis of covariance (ANCOVA) indicated that field dependent learners outperformed field independent learners in reading comprehension after the treatment. The finding suggested a need for principled decisions and planning on metacognitive strategy training in language teaching and materials development.

Keywords: Cognitive and metacognitive strategy training, Field dependent and field independent learners, Learning styles, Reading comprehension.

INTRODUCTION

Many researches in second/foreign language learning suggested that successful language learners use variety of strategies to help them to acquire a new language (e.g. Brown, 1980; Ellis, 1986; Halliday, 1975, Xiao, 2007; Wa, 2011). Several research studies in cognitive psychology (Monfared, 2014; O'Malley, 1987; Rubin, 1981;

Wa, 2011; Wenden, 1987; Xiao, 2007) reported that to improve learning, it is most effective to teach both cognitive and metacognitive strategies to students. In a study conducted by Vandergrift (2005) it was indicated that successful learners more than unsuccessful learners used metacognitive strategies.

Many researchers focused on how learners process new information and the kinds of strategies they use to understand, learn or remember

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the information in the area of second or foreign language learning (Lee, Chien Kuo, 2010). Oxford (1990) described that the strategies have serious effects on motivating and promoting/developing students' reading comprehension. Rekabdar, et al (2015) believed that identifying errors both in understanding and producing the language and also recognizing the sources of errors and eliminating them refer to metacognitive strategies. Teaching metacognitive strategies is one of the methodologies that has been proposed and researched in recognition of the need for better reading comprehension.

Brown (1980) differentiated between metacognitive and cognitive processes, the former as reader controlled strategies that included selecting and studying the significant part of a text, selecting retrieval cues, and estimating readiness for tests. Since metacognitive strategies can manage language learning and personality traits determine learners' behavior in acquiring language (Oxford, 1997), investigating the effect of metacognitive strategies on reading comprehension of field-dependent/ field-independent is of prime importance.

Oxford's (1989) classification for metacognitive language learning strategies (MCLSs) is the most comprehensive one. In this classification MCLSs are divided into three types. The first type is "centering your learning"; it refers to learner's attempt to converge attention and it includes "overviewing and linking with already known material, paying attention, and delaying speech production to focus on listening". The second type is "arranging and planning your learning"; it includes "finding out about language learning, organizing, setting goals and objectives, identifying the purpose of a language task, planning for a language task, and seeking practice opportunities. And the third type is "evaluating your learning", which includes "self-monitoring and self-evaluating" (p. 65).

Meanwhile, the personal features of the learners classified under the cognitive styles are also of a major importance to the effectiveness of metacognitive strategies in relation to reading

comprehension. Several studies demonstrated that people show different behaviors in the same educational setting. These disparities are originated from individual variations (Busch, 1982; James & Gardner, 1995; Shannon, 2008). Each learner is a complicated person and has psychological, biological, physical, social, cognitive and effective characteristics, which identify his/her position and capability toward language learning. Among all these attribution, affective factors, especially one of its particular dimensions, 'personality traits' play an underlying role in language learning. Hosseini Fatemi and Asghari (2012) proposed that personality is one of the influential factors affecting learning in general and language learning in particular.

James and Gardner (1995) defined learning style as "the complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn" (p. 20). Griggs and Dunn (1988), similarly, defined learning style as "the way in which each individual starts to concentrate on, process, and retain new information". Gregorc (1979) asserted that learning styles are distinctive behaviors, which serve as indicators of how individuals learn and adapt to their environment.

Purpose of the study

Learning style can be defined as those unchanging and prevalent characteristics of an individual, which are conveyed through the interaction of one's behavior (Garger & Guild, 1984) and includes cognitive, affective, and physiological styles (Keefe, 1979). Among the various identified cognitive styles, field-dependence (FD) and field-independence (FI) have been suggested by Freeman and Long (1991) as "potentially important in second language acquisition" (p. 193).

Riding and Rayner (1998) described FD/FI as the extent to which participants' percept general field or parts. According to the results of different researches (Abraham, 1985; Chapelle and Roberts, 1986; Ehrman & Oxford, 1989) students' choice of learning strategies is influenced by the

learning styles of the learners and both styles and strategies can affect learning outcomes. The purpose of this study was, therefore, to indicate the effect of metacognitive strategies on reading comprehension of FD/FI learners.

According to Brown (1987) using language learning strategies affect EFL students' Language performance. Rare research studies, however, were conducted on investigating the effect of metacognitive strategies on personality types particularly field-dependent/field-independent. This study attempted to add evidence to the findings of the effects of metacognitive language learning strategies on reading comprehension of field-dependent/field-independent learners. Following research questions, therefore, were set to be answered:

1. Does the use of metacognitive strategies have any significant effect on reading achievement of Field-dependent learners?
2. Does the use of metacognitive strategies have any significant effect on reading achievement of field-independent learners?
3. Is there any significant difference between the effect of the use of metacognitive strategies on reading achievement of Field-dependent/field-independent learners?

METHODS

Firstly, the researchers used PET (Preliminary English Test), which is a test measuring English proficiency test to ensure homogeneity of the proficiency level of 60 EFL intermediate learners. Second, a GEFT questionnaire (Group Embedded Figure Test) developed by Witkin, Oltman, Raskin and Karp (1971) was run to identify the students learning style preferences; Field Dependent (FD) or Field Independent (FI). Students were then divided into two groups of 30 field-dependent and field-independent groups. It should be mentioned that it was difficult to have clear cut dependent and independent groups but the care was taken to exclude the field dependent students' scores from analysis of performance of the groups with majority of field independent students and vice versa. Both groups received

the same treatment after the pretest and before the post test.

Two tests of reading comprehension, which contained four reading comprehension passages, followed by twenty-five multiple-choice items were used in this study. The tests were extracted from "Cover to Cover Reading Comprehension 2" which is a book of practicing reading skill (Day & Harsch, 2007). All four passages were similar in length and level of difficulty as their readability level was calculated to be at the intermediate level through Flesch Readability formula. 30 participants piloted the content of the tests and the reliability index was calculated and it was 0.73 and they were used as pretest and posttest.

The students in two groups received 10 sessions of 45-minute treatment, three sessions of a week, which contained teaching reading comprehension through metacognitive strategies (inferring meaning, using background knowledge, guessing the later topics, centering learning, arranging and planning learning, evaluating learning).

Quasi-experimental research design was used employed since there was no random selection and also there was no control over the enrollment of the participants in the institute or including any member to the groups of the study (Hatch & Farhady, 1981). A pretest and posttest were also administered to the intact groups for the research purpose, respecting the design of the study; both experimental groups had the same condition for the treatment. Then, a paired sample T-Test was applied to compare the mean scores of pre-test and posttest in field-dependent group. Another paired sample T-test was also used to compare the mean score of pre-test and posttest in field-independent group. Then, ANCOVA was used to find the exact difference between groups.

Data Analysis

To achieve the objective of the study, which was comparing the field independent and field independent students reading comprehension ability after being taught the metacognitive strategies,

the following analyses were undertaken by the researchers.

Homogenizing procedure

To include homogeneous participants, in the study, in terms of PET scores, those participants who had scored within one standard deviation below and above the mean were chosen as the final participants of the study. Based on Table 1, the mean PET score of all the participants is 29.97, and the standard deviation is 8.45. This means that all the PET scores within 21.52 and 38.42 could be chosen as the homogeneous scores which should be included in the final phase of the study. Figure 1 below displays the distribution of the PET Test scores on a normal curve.

Table 1
PET Descriptive for All Initial Participants

	Statistic	Std. Error
Mean	29.9767	.48813
95% Confidence Interval for Mean	Lower Bound	29.0161
	Upper Bound	30.9373
5% Trimmed Mean	30.1667	
Median	30.5000	
Variance	71.481	
Std. Deviation	8.45465	
Minimum	7.00	
Maximum	45.00	
Range	38.00	
Interquartile Range	12.00	
Skewness	-.324	.141
Kurtosis	-.549	.281

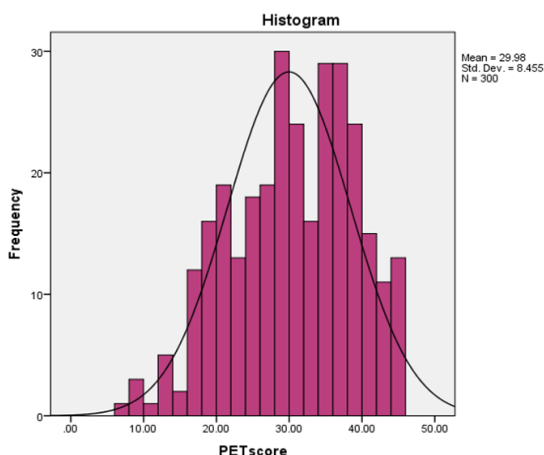


Figure 1 Normal distribution of PET scores

Readability of pre-test and post-test

Mousavi (1999) defined readability as “a measure of understandability of written text as given by an analysis of a variety of factors including syntax, vocabulary, thematic expression and continuity of themes” (p. 310).

In this study the readability indexes of eight reading passages of pre-test and post-test were calculated through Flesch Readability formula. The score in this formula is on a scale of 0 to 100, the lower the score the more difficult the writing passage is to read. Table 2 shows the readability of reading comprehension texts in pre-test.

Table 2
Readability Indexes of Pre-test Reading Comprehension Based on Flesch Readability Formula

Text	1	2	3	4	mean
readability	64.3	52.7	63.3	66.1	61.6

As the result shows the obtained mean score of four reading comprehension passages is 61.6, which shows the texts are standard according To Flesch readability formula. Table 3 shows the readability of reading comprehension texts in post-test.

Table 3
Readability Indexes of Posttest Reading Comprehension Based on Flesch Readability Formula

Text	1	2	3	4	mean
readability	61.3	59	58.3	63.3	60.47

As the result shows the obtained mean score of four reading comprehension passages is 60.473, which shows the texts, are standard according To Flesch readability formula.

Pilot study

In order to determine validity of pre-test, both pre-test and PET reading test were given to a group of 20 people in a pilot study, and then the researcher studies the reliability of reading comprehension through Pearson Product moment correlation. It is a measure of the strength of the relationship between two sets of data. According to this, correlation coefficient between two variables result in a value that ranges from -1.00 to

+1.00, the more the value is close to +1.00, the more reliable the text is. Table 4 shows the reliability analysis of pre-test reading comprehension and PET reading test. Also, Table 5 demonstrates the reliability analysis of post-test reading comprehension and PET reading test.

Table 4
The Reliability Analysis of Pre-test Reading Comprehension and PET Reading Test

Correlations			
		PET-test pilot	pre-test pilot
PET-test pilot	Pearson Correlation	1	.512*
	Sig. (2-tailed)		.021
	N	20	20

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

Table 5
The Reliability Analysis of Posttest Reading Comprehension and PET Reading Test

Correlations			
		PET-test pilot	post-test pilot
PET-test pilot	Pearson Correlation	1	.459*
	Sig. (2-tailed)		.042
	N	20	20

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

The reliability of both pre-test and post-test are shown in the Tables 4 and 5.

Field-dependent and Field-independent Questionnaire

Group Embedded Figure Test (GEFT) was used to assess subjects' degree of field dependency and independence. Table 6 shows the results of this analysis.

Table 6
Descriptive Statistics for Field-dependent and Field-independent

	Statistic	Std. Error
Mean	11.9500	.33795
95% Confidence Interval for Mean	Lower Bound	11.2836
	Upper Bound	12.6164
5% Trimmed Mean	12.0333	
Median	12.0000	
Variance	16.842	
Std. Deviation	2.77930	
Minimum	5.00	
Maximum	18.00	
Range	13.00	
Interquartile Range	6.00	
Skewness	-.266	.172
Kurtosis	-.013	.342

The above Table 6 demonstrates that the mean score of students in the questionnaire was 11.95 and the standard deviation was 2.77. According to the used questionnaire interpretation code, it is believed that 16 percent of the participants which are at one side of the extreme below the mean (i.e. two and more Standard Deviation below the mean) are field-dependent and 16 percent of the participants which are at one side of the extreme above the mean (i.e. two and more Standard Deviation above the mean) are field-independent learners.

The Effect of Metacognitive Strategy Training on Field Dependent Learners

In order to investigate the effect of Metacognitive strategy training on field dependent learners, it was necessary to compare the pre-test mean of Field-dependent group with its relevant post-test mean to see whether there is any significant difference between pre-test and post-test or not. Table 7 presents the results of normality tests, which indicate that the pre-test and post-test

scores are not significantly deviant from normal distribution ($p > .05$); therefore, it was possible to employ the non-parametric paired-samples t- test

to compare the pre-test and post-test means of the Field-dependent group.

Table 7
Kolmogorov-Smirnova Test of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	.118	32	.200*	.978	32	.748
Post-test	.134	32	.150*	.958	32	.236

*. This is a lower bound of the true significance.

Lilliefors Significance Correction

Table 8 presents the descriptive statistics of the Field-dependent group's pre-test and post-test means. Evidently, the post-test mean is much larger than the pre-test mean; however, this

difference is tested for statistical significance by employing paired-samples t test, the results of which are presented in Table 9.

Table 8
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
		Pair 1	Pre-test	18.0625	32
	Post-test	21.3438	32	2.50946	.44361

The results of paired-samples t- test in Table 4.9 demonstrate that there is a significant difference between the pre-test and post-test means of the Field-dependent group; $t(31) = -4.539$, $p <$

.05). In sum, metacognitive strategies positively affect reading achievement of Field-dependent Iranian EFL learners.

Table 9
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair1	Pre-test – Post-test	-3.28125	4.08960	.72295	-4.75571	-1.80679	-4.539	31	.000

The Effect of Metacognitive Strategy Training on Field Independent Learners

To evaluate the effect of metacognitive strategy training on field independent learners, it was necessary to compare the pre-test mean of field-independent group with its relevant post-test mean to see whether there is any significant difference between pre-test and post-test or not.

Table 10 demonstrates the results of normality tests, which indicate that the pre-test and post-test scores are not significantly deviant from normal distribution ($p > .05$); therefore, it was possible to employ the non-parametric paired-samples t- test to compare the pretest and posttest means of the field-independent group.

Table 10
Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	.133	32	.160	.939	32	.069
Post-test	.150	32	.063	.963	32	.334

a. Lilliefors Significance Correction

Table 11 shows the descriptive statistics of the field-independent group's pre-test and post-test means. Evidently, the post-test mean is a little larger than the pre-test mean; however, this dif-

ference is tested for statistical significance by employing paired-samples t-test, the results of which are presented in Table 12.

Table 11
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	17.1563	32	3.57509	.63199
	Posttest	17.3438	32	2.39097	.42267

The results of paired-samples t- test in Table 4.12 demonstrate that there is no significant difference between the pre-test and post-test means of the field-independent group; $t(31) = -.226$, $p >$

.05). In sum, metacognitive strategies negatively affect reading achievement of field-independent Iranian EFL learners

Table 12
Paired Samples Test.

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-.18750	3.98738	.70488	-1.62510	1.25010	-.226	31	.792

Cross Comparison of the Effect of Metacognitive Strategy Training on Field Dependent and Field Independent

In this cross comparative analysis, we must know that the results above indicated that the Field-dependent group improved significantly in its means from pre-test to post-test. But field-independent group improved a little in its means from pre-test to post-test. At this point, it was necessary to compare the post-test of the experimental groups to see which has improved more on the post-test in comparison to its pre-test. In order to do this comparison, it was necessary to include the pre-test means of the two groups as well as the covariate since it was not clear whether the groups were equal on their pre-test or not. By employing analysis of covariance (ANCOVA) it was possible to compare the post-

test and at the same time take into account the differences between the two groups in terms of their pre-test means.

Employing ANCOVA requires the observation of several assumptions the first of which is normality which was found met in the previous sections. The second assumption is to do with the homogeneity or equality of variances which was found met as the Leven's test results indicate in Table 13 ($p > .05$).

Table 13
Levene's Test of Equality of Error Variancesa
Dependent Variable: Posttest

F	df1	df2	Sig.
.181	1	62	.672

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + pretest + treat

Table 14 presents the mean scores of the two experimental groups without taking into account the initial differences on the pre-test (covariate). Evidently, the field-dependent group is of higher mean score on the post-test, however, this difference needs to be checked for statistical significance by employing ANCOVA.

Table 14
Descriptive Statistics
Dependent Variable: Posttest

Group	Mean	Std. Deviation	N
Field-dependence	21.34	2.509	32
Field-independence	17.34	2.391	32
Total	19.34	3.158	64

Table 15 provides the main ANCOVA results as well as the results of the check for the

Table 15
ANCOVA Results

Source	df	Mean Square	F	Sig.	Partial Eta Squared
treat * pretest (interaction)	1	.637	.104	.748	
Pretest	1	4.120	.682	.412	.011
treat	1	243.214	40.281	.000	.398
Error	61	6.038			
Total	64				
Corrected Total	63				

DISCUSSION AND CONCLUSIONS

This study attempted to gain more insights into the effect of metacognitive strategies on reading achievement of field-dependent/field independent learners. The results of the present study were compared with those of other researchers. To determine any significant change in the reading achievement of our group of subjects, in particular, field-dependent/field-independent learners after receiving treatment, the result of the performance of each group at the pre-test was compared with the result of its performance at the posttest stage through applying paired sample t-test. It revealed a significant difference in reading achievement of field-dependent group; that means that the field-dependent students benefited significantly from the treatment, which was conducted. Performing paired sample t-test between

assumption of homogeneity of regression slopes for ANCOVA. Evidently, this assumption is met since there is no interaction between the covariate and the dependent variable ($p > .05$).

The main results of ANCOVA in Table 15 also shows that the groups are not significantly different on their pre-tests; $F(1, 29) = .682, p > .05$, however, they are significantly different on the post-test after taking into account the initial differences on the pre-test; $F(2, 29) = 40.281, p < .05$. In other words, the two experimental groups improved on the post-test to some extent, the field-dependent group improved significantly but the field-independent group improved to a small degree. That is to say, in field-dependent group metacognitive strategies affected the reading comprehension of Iranian Intermediate learners. In other words, the field-dependent group has significantly improved in reading achievement.

pre-test and posttest scores in field-independent group revealed no significant effect of treatment on reading achievement of learners.

Performing ANCOVA between the posttests of two groups by including the pre-test means of the two groups as well as the covariate since it was not clear whether the groups were equal on their pre-test or not. The result of ANCOVA revealed that the pre-tests were significantly the same and the post-test were significantly different. So, the field-dependent group had a better mean in posttest, which showed the significant effect of metacognitive strategies on reading achievement.

Nowadays, practitioners and administrators try to recognize language teaching in such a way that learners' variables are taken into consideration. They focus on the learners' performance,

styles and individual differences. Lee and Baylor (2006) asserted that in order to better help students, teachers should understand how external factors get along with personality traits form the individual styles. On the other hand, using some strategies including inference and note taking and note taking are useful to improve learners' proficiency. According to Celce-Murcia (2001) students who frequently employ learning strategies, in their language use, enjoy a high level of self-efficiency.

Anderson (2002) postulated that learning strategies involve an active control of learning through steps such as planning, monitoring and evaluating learning process (Anderson, 2002, p.37). Movahed (2014) differentiated between metacognitive and cognitive processes, the former included selecting and studying the most important part of text, selecting retrieval cues, and estimating readiness for tests. This could be the same as the metacognitive strategies that students used in this study, which was related to the technique of studying the most important part of the text.

Findings of the study revealed that the application of metacognitive strategies in the field-dependent/field-independent groups had different effects. In field-dependent group, using metacognitive strategies led to a better performance in reading achievement of learners in post-test. But in field-independent group, metacognitive strategies did not have a significant effect on the reading achievement of learners. It was inferred, from the results, that metacognitive strategies could have significant effect on reading achievement of field-dependent learners.

Given metacognitive strategy instruction seems to have an impact on the desirable noticing of strategy use in terms of raising awareness, it is worth implementing metacognitive strategy instruction to help L2 speakers to cope with ESL oral tasks, thereby providing a means to help students improve in language and facilitate task completion. Xiao (2008) studied how changes in learning new policies that highlight and foster self regulated learning brought changes to learn-

ing objectives and content in China. He mentioned that metacognitive strategy training is one to encourage self regulated learning and learner autonomy.

The new trend of self efficacy and self regulated language learning suggests the use of any teaching techniques by which teachers can maximize learning opportunities (Wa, 2011). It may also be desirable to incorporate planning time and space into strategy instruction with a view to promoting the effective use of metacognitive strategy instruction in the language classroom. Regarding the findings of this study and the urge of new education policies, learning preferences and styles learners have can be directed in such a way that they manage their own leaning processes and outcome efficiently.

The result and conclusion of this study indicated that being field-dependent and field-independent is an important factor in using metacognitive strategies in reading comprehension. Knowing from the previous researches that metacognitive strategies use leads to comprehension and more successful reading, the findings of this study imply more careful planning in reading strategy instruction. The findings imply that an adequate explicit metacognitive strategies instruction is necessary for field-dependent learners and they must be given adequate opportunities to practice all sort of metacognitive strategies.

CONTRIBUTION TO NEW KNOWLEDGE

The findings of this research study could assist learners to develop a greater sense of their own agency in their language learning process. As noted earlier, there are several benefits attributed to the importance of learners' role in recognizing their learning preferences and needs, understanding how they can manage their potentials by identifying what they have at their disposal. Language teachers can also facilitate this individual and language development by providing appropriate explanation, modeling and practice opportunities. This study also contributes to the literature by providing additional data and analysis on the effect of metacognitive strategies, and would

encourage language learners to be aware of these kinds of strategies. It will be beneficial for the students in general to gain insight into possible contributing factors to their own language learning, and therefore make better decisions on how to enhance their performance. EFL teachers would also benefit from the results of this study in deciding how to implement their teaching goals in accordance with students' various choice of metacognitive strategies related to their extroversion-introversion personality styles.

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