

The Relationship between Cognitive and Meta-cognitive Strategy use and EFL Reading Achievement

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The present study examined the relationships between the use of cognitive and meta-cognitive strategies on the one hand and EFL reading achievement on the other hand. Data were collected from 30 randomly selected EFL learners studying English Language and Literature at Kashan University, Iran. The participants included six male (20%) and 24 female (80 %) learners, who were further classified into highly successful (n=6), moderately successful (n=19), and unsuccessful (n=5). The collected data included reading comprehension achievement scores and responses to a 35-item five-point likert-scale cognitive and meta cognitive questionnaire. Transcripts of retrospective interviews with 4 highly successful and 4 unsuccessful test-takers were also used to further clarify the quantitative analyses. Results of the analyses indicated that the correlation between reading achievement and meta cognitive and it was significant at the 0.05 level. However, the correlation between cognitive strategies and reading achievement was 0.128 and insignificant, showing only a slight trend and the correlation between meta-cognitive strategies and cognitive strategies was .630 and it is significant at the 0.01 level. MANOVA also showed that students at higher levels of reading ability use meta-cognitive strategies more often than less successful readers. The findings of the study suggest that the use of meta-cognitive strategies can account for variation in EFL reading achievement and needs to be promoted by EFL teachers. Gender did not have a determining role in the use of either cognitive or meta-cognitive strategies in this study.

Key Words: Cognitive strategies; Meta-cognitive strategies, EFL Reading, Reading achievement

Introduction

In second language teaching/learning situations for academic purposes, especially in higher education in English-medium universities or other programs that make extensive use of academic materials written in English, reading is paramount. Quite simply, without solid reading proficiency,

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second language readers can not perform at levels they must in order to succeed. Thus, for at least three groups of students (those in EFL contexts, those at advanced levels of proficiency, and those with a need for English for academic purposes), effective reading in a second language is critical. Professional in second language education should be concerned with approaches that can improve the reading skills of learners. Interactive approaches to reading hold much promise for our understanding the complex nature of reading, especially as it occurs in a second or foreign language and culture (Carrell, Devine & Eskey, 2000).

Reading is a receptive language process. It is a psycholinguistic process which starts with a linguistic surface representation encoded by a writer and ends with meaning which the reader constructs. There is thus an essential interaction between language and thought in reading. The writer encodes thought as language and the reader decodes language to thought (Carrell, Devine & Eskey, 2000).

Reading involves a variety of factors which may have an impact on learners' target language reading ability. Some of these factors are: learners' lack of target language proficiency and vocabulary (Kasper, 1993), unfamiliarity with the content and/or formal schemata of the texts to be read (Carrell & Floyd, 1987) and inefficient reading strategies (Carrell, 1989). Strategies have been investigated widely for reading comprehension in general and in second and foreign language contexts, in particular. These studies have discovered that readers spontaneously use different strategies in the reading process (Tercanlioglu, 2004, P.1). Many applied linguists (for example: Ellis, 1994) have commented on the lack of consensus about the definition of the term 'reading strategies'. This diversity is largely due to the way the term has been used in different contexts such as first, second or foreign language learning (Cohen, 1998). Reading strategies, as noted by Garner (1987), may be defined as an action or series of actions employed in order to construct meaning. Bamett (1989, P.66) has used the term reading strategy to refer to the mental operations involved when readers purposefully approach a text to make sense of what they read. In the light of these somewhat tangled concepts, definitions and arguments, the term 'reading strategy' is defined as specific actions consciously employed by the learner for the purpose of reading.

Now, the question which comes to mind is this: "why do we investigate reading strategies?" We know that reading comprehension is essential to academic learning areas, to professional success and to lifelong learning. Grabe (1991) points out that the crucial importance of reading skills in academic contexts has led to considerable research on reading in a second

language. Shuyun and Munby (1996) note that ESL academic reading is a very deliberate, demanding and complex process in which the students are actively involved in a repertoire of reading strategies. Existing research has shown that professional readers make choices as to what to read. When readers encounter comprehension problems, they use strategies to overcome their difficulties. Different learners seem to approach reading tasks in different ways and some of these ways appear to lead to better comprehension. It has been noted that the paths to success are numerous and that some routes seldom lead to success. The hope is that if the strategies of more successful readers can be described and identified, it may be possible to train less successful learners to develop improved strategies (Tercanlioglu, 2004, P.2).

The present study was conducted to report on an investigation into the relationship of test-takers' use of cognitive and meta cognitive strategies to the EFL reading test performance. Bachman and Palmer's (1996) current model of language ability serves as a basic framework for the present study to examine two sets of factors, i.e., English reading comprehension ability as communicative language ability and cognitive and meta cognitive strategy use as part of test-taker characteristics. In their model, language knowledge, strategic competence and affect are demonstrated to interact with one another during language use. Communicative language ability interacts with characteristics of language use contexts, test tasks and other mental schemata. Bachman and Palmer (1996) use meta cognitive strategies as the definition of strategic competence, which differs from the previous uses in Bachman (1990). Strategic competence is a mediator between the external situational context and the internal knowledge in communicative language use. Despite the attempt to specify the model of CLA, the current theory of strategic competence influencing second language test performance remains in the early developmental stage. Mc Namara (1996: 75) points out that the model proposed by Bachman and Palmer (1996) is only preliminary as such strategic use in their model touches on major topics in cognitive and social psychology and pragmatics. The depiction of meta cognitive strategies in their model is also not based on empirical research (Purpura, 1999). Only a few researchers have empirically investigated this issue (e.g., Purpura, 1997; 1998; 1999). Accordingly, validation research on the relationship of strategic competence to language test performance is needed.

Meta cognition or meta cognitive knowledge is defined as knowledge of the mental processes which are involved in different kinds of learning. Metacognition has two fundamental aspects: knowledge about cognition and

self-directed thinking. Self-directed thinking is governed by evaluation, planning, and regulation activities (Glenberg, 2005).

Meta cognition involves active monitoring and consequent regulation and orchestration of cognitive processes to achieve cognitive goals. Meta cognition is deliberate, planned, intentional, goal-directed and future-oriented mental processing that can be used to accomplish cognitive tasks (Flavell, 1971). Learners are said to be capable of becoming aware of their own mental processes. This includes recognizing which kinds of learning tasks cause difficulty, which approaches to remembering information work better than others and how to solve different kinds of problems. Meta cognitive knowledge is thought to influence the kinds of learning strategies learners choose (Richards & Schmidt, 2002).

In order for people to use meta cognition to enhance their learning, they need to be aware of their own learning tendencies and be willing to be introspective (Bokowski, Carr, Rellinger & Pressley, 1990; Paris, Lipson & Wixson, 1983; White, 1998). Through a willingness to consider conditional aspects such as when it is appropriate to use particular strategies (Siegler, 1990) it is more likely that students will develop abilities to evaluate, selfdirect and self-regulate their learning (Boekaerts, 1997; Paris & Winograd, 1990; Winne, 1996). Various studies have shown that learning can be enhanced if students use meta cognitive processes, that is, if they are aware of, monitor and control their own learning (Baird, 1998; Hacker, 1998; White & Gunstone, 1989). In general terms, good learners have been shown to be meta cognitively adept and poor ones meta cognitively deficient in how they tackle learning tasks in most subjects (Baird, 1986, 1992, 1998; Shuell, 1988; Wang & Peverly, 1986; Conner, 2006).

In the present study, meta cognitive strategies consist of two interrelated strategies: a) monitoring and b) planning strategies. Planning strategies are test-takers' action of previewing or over viewing tasks to complete in order to develop directions of what needs to be done, how and when to do it. They are directed at the regulations of the course of their own thinking (Kluwe, 1982: 212). Monitoring strategies are deliberate action used by test-takers to check, monitor and evaluate their thinking and performance so that verifications can be made if necessary to perform the given task successfully. Cognitive strategies are different from meta cognitive strategies. They are ongoing mental activities used by test-takers to utilize their world knowledge and language to solve the given tasks. There are different types of cognitive strategies. Making prediction, summarizing, translating, and guessing meaning from context and use of grammatical rules are some examples of cognitive strategies (Oxford, 1990).

The current explosion of research in second language reading has begun to focus on readers' strategies. Reading strategies are of interest for what they reveal about the way readers manage their interaction with written text and how these strategies are related to text comprehension. Research in second language reading suggests that learners use different strategies to help them with the acquisition, storage, and retrieval of information (Rigney, 1978). In the context of second language learning, we can make a distinction between strategies that make learning more effective and strategies which improve comprehension.

Comprehension or reading strategies show how readers conceive of a task, how they make sense of what they read, and what they do when they do not understand. In short, such strategies are processes used by the learner to enhance reading comprehension and overcome comprehension failures (Singhal, 2001:1).

Since the early seventies, research in this area has focused on teaching second language students to utilize different language strategies to read better. These strategies consist of a whole range of varieties including skimming and scanning, contextual guessing and recognizing text structure and so on. However, empirical investigations into reading strategies used by successful and unsuccessful second language learners have been less common (Singhal, 2001:1).

Since much of the research in the area of reading strategies has stemmed from first language studies in reading, a view of both the major research in first language and second language learning is included. In my first language studies, the use of various strategies has been found to be effective in improving students' reading comprehension (Baker & Brown, 1984; Brown, 1981; Palinscar & Brown, 1984). Some studies have also investigated the reading strategies used by successful and unsuccessful language learners. In a second language study, Hosenfeld (1977) used a think-aloud procedure to identify relations between certain types of reading strategies and successful or unsuccessful second language reading. The successful reader, for instance, kept the meaning of the passage in mind while reading and skipped less important words but the unsuccessful reader lost the meaning of the sentences when decoded and seldom skipped unimportant words.

Research in the area of reading has begun to concentrate on the role of meta cognition. While previous research has focused on strategy use, researchers are studying readers' awareness of strategies during the reading process—their meta cognitive awareness. Meta cognition is a relatively new label for a body of theory and research that addresses learners' knowledge and use of their own cognitive resources (Garner, 1987). Meta cognitive knowledge or

awareness is knowledge about ourselves, the tasks we face, and the strategies we employ (Baker & Brown, 1984). Knowledge about ourselves may include knowledge about how well we perform on certain types of tasks or our proficiency levels. Knowledge about tasks may include knowledge about task difficulty level. Baker and Brown (1984) have investigated several different aspects of the relationship between meta cognitive ability and effective reading. Two dimensions of meta cognitive ability have been recognized: 1) knowledge of cognition or meta cognitive awareness; and 2) regulation of cognition which includes the reader's knowledge about his/her own cognitive resources, and the compatibility between the reader and the reading situation (Singhal, 2001:5).

Methodology

The study was carried out at Kashan University, using a fundamental English course in which reading comprehension skills were emphasized in the assessment of students' achievement. The data were gathered during the final examination. There were 30 Iranian students for quantitative data analyses, made up of six males (20%) and 24 females (80%). There were six highly successful, 19 moderately successful and 5 unsuccessful test-takers. 8 (i.e. 4 highly successful and 4 unsuccessful) test-takers were selected for retrospective interviews. They were at the age of 23 and had been studying English in Iran for about nine years. In the present study, the criterion used to classify success levels among the test-takers is:

The score below 15 = unsuccessful

The score at 15 or between 15 and 18 = moderately successful

The score at 18 or above 18 = highly successful

Instruments

The following were research instruments in the study: a) Reading comprehension test:

The following are examples of the objectives of the English course in teaching reading skills:

- 1) Improving language learners' reading comprehension in English
- 2) Enhancing language learners' reading rate in English
- 3) Helping language learners become more able to understand the meaning of unfamiliar
- 4) words in linguistic context
- 5) Helping language learners to increase their abilities to guess the meaning from context

6) Increasing language learners’ ability to read English texts for main ideas and details The reading comprehension test was developed by the university teacher at Kashan University. The test was developed to measure the test-takers’ ability to read and comprehend English texts as well as other objectives defined in the course syllabus. The topics in the test were related to the topics taught in the class.

b) Cognitive and meta cognitive questionnaire: The researcher used a questionnaire to measure cognitive and meta cognitive strategies. The questionnaire items in the study were similar to Purpura’s (1999) but adjusted to suit a reading test. Since the questionnaire (see Appendix A) was given after students had completed the test, ‘past tense’ was used to express their thinking. The questionnaire used a 5-point Likert scale:

1(Never), 2(Sometimes), 3(Often),4 (Usually) and 5 (Always).

Table 1: A taxonomy of the cognitive- meta cognitive strategy questionnaire

Processing	Subscale	Items used
1. Cognitive strategies	Comprehending	5, 2, 6, 7, 8, 9,1, 3
	Retrieval	4, 10,20, 28
2. Meta cognitive strategies	Planning	14, 16,18, 21, 22, 24, 25,29, 31,32,33, 12, 13,11
	Monitoring	15,17,19,23,26,27,30, 34,35

c) Retrospective interview: Triangulation is data gathering and reconciling from several sources and / or from different data gathering techniques to recheck or reassure what counts as evidence (Lynch, 1996). The only relevant qualitative data in this study is what the test-takers have to say about their own strategy use. In the study, triangulation was accomplished by combining the test and questionnaire data with retrospective interview data. The interviews were carried out to gather extra information in relation to the research questions. The advantage of this combination is that the researcher can use the interview data to arrive at useful explanations for some quantitative findings.

The interviews were conducted in Farsi and lasted about 30 minutes. The names were kept secret. First, the participants were asked about their attitudes towards learning English and reading in English. They were then asked to report on strategies they used when attempting to complete the reading comprehension test in their final examination. At this stage, test-takers were provided with the reading comprehension test designed to stimulate a test situation and help remind them of how they thought. This activity was not equivalent to a test because it did not influence their life as

the main test did. Nevertheless, the participants were asked to carry out this activity the way they would do in a real test. They were then asked about their strategy use when trying to comprehend the reading passage and complete the questions. The interviews were transcribed and translated into English. The transcripts were checked for accuracy.

Data analyses

In the quantitative data analysis, SPSS version 13 was used to compute descriptive statistics, MANOVA and Pearson product moment correlations. Pearson product moment correlations were conducted to simply investigate the relationship between strategies and the reading test performance. MANOVA was used to compare groups of test-takers (i.e. highly successful, moderately successful and unsuccessful) exposed to two or more levels of independent variables. Factorial MANOVA can accomplish the task of examining the effects of independent variables (i.e. success levels and gender in this study) including both main and interaction effects on dependent variables (e.g., meta cognitive strategies and cognitive strategy use). The advantages of MANOVA are that it provides tests of the effects of several independent variables and the effects of treatment combinations within a single analysis. MANOVA also reduces the likelihood of Type and errors.

Table 3 presents the distributions for the cognitive and meta cognitive strategies. Table 4 presents the distributions of the composite variables. Table 5 presents the descriptive statistics of the test-takers' reading test performance and GPA. Table 6 presents the descriptive statistics of the test-takers' test scores and strategy use categorized by success.

Relationships between cognitive and meta cognitive strategies and EFL reading performance

As mentioned before, the purpose of the study was to investigate the relationship of cognitive strategies and meta cognitive strategies to the reading test performance. For this purpose, Pearson product moment correlations between cognitive and meta cognitive strategies and reading test performance were conducted.

As you see the results in the table above, the correlation between reading achievement and meta cognitive strategies is .388 and it is significant at the 0.05 level. Table 2 also shows that the correlation between cognitive strategies and reading achievement is .128 and it is not significant. Finally, the results obtained from conducting Pearson product moment correlations showed that the correlation between meta cognitive strategies and cognitive strategies is .630 and it is significant at the 0.01 level.

Table 2: Pearson product moment correlations between cognitive strategies and meta cognitive strategies and reading test performance

		Meta cognitive	Cognitive	Reading Achievement
Cognitive	Pearson correlation	.630**		.128
	Sig. (2- tailed)	.000		.500
	N	30		30
Meta cognitive correlation	Pearson		.630**	.388
	Sig. (2- tailed)		.000	.034
	N		30	30
Reading Achievement	Pearson correlation	.388	.128	
	Sig. (2- tailed)	.034	.500	
	N	30	30	

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

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

Table 3 shows the distributions for the cognitive and meta cognitive strategies used by test-takers in reading test. The table above shows that the mean for strategy 19 is 4.63, which is more than that for other strategies and the mean for strategy 2 is 2.03, which is less than that for other strategies. It means that strategy 19, which is a meta cognitive strategy, is used more often than other strategies. In addition, the table above shows that a few test-takers prefer to use translation in completing the reading test. Another point which is not shown in Table 3 but is worth mention is that 21, 7 and 2 out of 30 test-takers have claimed that they always, usually and often use strategy 19, respectively. Furthermore, 16 test-takers never and 2 test-takers always use strategy 2.

Table 3: Distributions for the cognitive and meta cognitive strategies

Item	Mean	SD	Skewness	Kurtosis	Median	Mode
1	3	1.339	0.185	-1.068	3	2
2	2.03	1.351	1.013	-0.341	1	1
3	2.93	1.437	0.124	-1.296	3	2
4	3.77	1.073	-0.577	-0.068	4	3
5	3.47	1.383	-0.429	-1.141	4	5
6	3.37	1.377	-0.466	-1.042	4	4
7	4	1.050	-0.574	-0.968	4	5
8	3.30	1.264	0.046	-1.395	3	2
9	3.63	1.217	-0.087	-1.607	3.50	5
10	2.93	1.230	-0.104	-1.234	3	4
11	2.37	1.245	0.728	-0.508	2	2

Continue						
12	2.37	1.326	0.689	-0.569	2	1
13	3.03	1.377	0.191	-1.155	3	2
14	3.70	0.952	-0.878	1.095	4	4
15	3.93	1.172	-0.963	-0.021	4	5
16	4.03	1.129	-0.993	0.263	4	5
17	3.80	1.186	-0.648	-0.578	4	5
18	3.33	1.213	0.170	-1.099	3	3
19	4.63	0.615	-1.503	1.332	5	5
20	3.50	1.253	-0.169	-1.254	3.50	5
21	4.03	0.850	-0.427	-0.594	4	4
22	3.27	1.285	-0.433	-0.785	4	5
23	3.97	0.999	-0.596	-0.673	4	5
24	4.27	0.785	-0.983	0.903	4	4
25	3.97	0.809	-0.356	-0.343	4	4
26	3.70	1.149	-0.821	0.253	4	4
27	3.83	1.117	-0.604	-0.289	4	5
28	3.30	1.119	-0.013	-0.854	3	3
29	3.67	1.115	-0.437	-0.675	4	5
30	3.40	1.133	-0.116	-0.841	3	3
31	3.60	1.102	-0.106	-1.285	4	3
32	3.73	1.048	-0.383	-0.965	4	4
33	3.53	1.008	-0.638	0.074	4	4
34	4.30	0.988	-1.582	2.766	5	5
35	3.77	1.165	-0.632	-0.511	4	5

Table 4: Distributions for the cognitive and meta cognitive strategy use variables

Variable	Mean	SD	Skewness	Kurtosis	Median	Mode
Cognitive Strategies	39.2333	8.27828	.501	.382	39.5000	43.00
Meta cognitive Strategise	84.2333	13.29683	-.202	.438	84.5000	84.00

Table 4 shows the distributions for the cognitive and meta cognitive strategy use variables. As earlier mentioned, strategies can be cognitive or meta cognitive. The table above shows the mean for cognitive strategy, which is 39.2333, and the mean for meta cognitive strategy, which is 84.2333. As we see above, the mean difference between the two is significant. It also shows that test-takers use meta cognitive strategies more than cognitive strategies.

Table 5: Descriptive statistics of the test-takers' reading test performance and GPA

Grade Point Average	Mean	SD	Variance	Maximum	Minimum
Reading	15.5853	1.15823	1.341	18	14
Performance	16.0833	1.62461	2.639	20	13.50

Table 6: Descriptive statistics by success

Variables	Success	Mean	SD
EFL reading performance	Unsuccessful	14.2000	.44721
	Moderately successful	15.7632	.85584
	Highly successful	18.6667	.75277
Cognitive strategies	Unsuccessful	35.8000	5.67450
	Moderately successful	40.0000	9.13479
	Highly successful	39.6667	7.55425
Meta cognitive strategies	Unsuccessful	76.2000	18.96576
	Moderately successful	83.4737	12.09393
	Highly successful	93.3333	6.71317

As mentioned earlier, test-takers were divided into three groups based on the level of success, namely, unsuccessful, moderately successful and highly successful. Table 6, as seen above, shows the mean and standard deviation for the three dependent variables across different levels. As shown above, the mean for meta cognitive strategies for unsuccessful test-takers is 76.2000 but that for cognitive strategies for unsuccessful test-takers is 35.8000. It shows that these unsuccessful test-takers use meta cognitive strategies more than cognitive strategies. The table above also shows that successful test-takers use meta cognitive strategies more than cognitive strategies. This is also the case for moderately successful test takers.

In addition, Table 6 shows that the mean for cognitive strategies for both moderately and highly successful test-takers is almost the same and unsuccessful test-takers are less cognitive than successful and moderately test-takers. As a whole, the table shows that these three groups of test-takers are more meta cognitive than cognitive. Table 7 shows the results of the Factorial MANOVA. The tests of between-subjects effects showed that there was no relationship or interaction between gender, which is an independent variable, and dependent variables (reading achievement, cognitive and meta cognitive strategies) but the result showed that the correlation between success, which is another independent variable, and reading achievement,

which is a dependent variable, is .860 and the correlation is significant at the 0.01 level. In addition, the results showed that the correlation between success and meta cognitive strategies is .400 and it is significant at the 0.05 level.

Table 7: Factorial MANOVA results for success levels

Dependent Variables	df	F	n^2	D^2
EFL reading performance	2	47.943	.780	1.000
Cognitive strategise	2	.502	.036	1.000
Meta cognitive strategise	2	2.609	.162	1.000

Concluding remarks

The results of the present research showed that the test-takers use meta cognitive strategies more than cognitive strategies. In addition, the findings of the present study suggest that the use of cognitive and, particularly, the use of meta cognitive strategies can account for variation on language test performance across different achievement groups but the point

worth mention is that the use of cognitive and meta cognitive strategies, as the interview showed, between successful and unsuccessful test-takers did not differ qualitatively but differed quantitatively. In other words, the quantitative data showed that the correlation between level of success and use of meta cognitive strategies was significant and gender did not have a determining role in the use of cognitive or meta cognitive strategies. The results

obtained from the study have opened more areas of investigation into the relationship of cognitive and meta cognitive strategies in L2 testing. It is suggested that other researchers replicate the same study in the hope that performance consistency in the use of cognitive and meta cognitive strategies could be observed , not only to find out whether the results would be similar or different in other contexts such as ESL or foreign languages except English.

Finally, the researchers can conduct a study to identify the extent to which the use of cognitive and meta cognitive strategies in a reading comprehension test is similar to use of cognitive and meta cognitive strategies in nontest reading comprehension. Based on this identification, the researchers can make inferences on actual reading ability measured and also they can identify whether some meta cognitive strategies should be considered a source of measurement error (i.e., construct-irrelevant; Messick, 1996).

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