

The Interaction between Cognitive Test-Taking Strategies, Reading Ability, and Reading Comprehension Test Performance of Iranian EFL Learners

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Abstract

The study scrutinized the probable interaction between using cognitive test-taking strategies, reading proficiency, and reading comprehension test performance of Iranian postgraduate students, who studied English as a foreign language. The study also probed the extent to which the participants' test performance was related to the use of certain cognitive test-taking strategies. The participants were 343 MA students, who took an English reading comprehension test and answered a test-taking strategy questionnaire. The gathered data were subjected to a set of parametric statistical analysis, including descriptive statistics, factorial, and regression analyses. The results showed that the participants at the high level of reading proficiency used comprehending and retrieval strategies more frequently than did the participants at the intermediate and low levels. The findings reflected that %33 of the variance in the test performance was due to the use of cognitive test-taking strategies. Thus, the observed scores cannot account for the actual language ability of test takers. The findings can help language teachers gain a better understanding of the strategic process of test taking and improve the validity of language tests. In addition, the findings can assist language teachers in interpreting test scores from a different angle to make a sound judgment about the actual ability of language learners and decrease error of measurement. The findings also recommend language teachers to pay systematic attention to the linguistic and strategic aspects of language learning and adopt their teaching approaches to the needs of language learners to improve their reading ability.

Keywords: test-taking strategies, strategic competence, classical true score measurement theory, retrieval strategies, memory strategies, comprehending strategies

1. Introduction

Since cognitive theory of learning matured in the 1970s, effective language learners have been considered as active constructors of knowledge, acting autonomously through using metacognitive skills. Under the influence of cognitive theory of learning, effective language learners are considered as active processors of information, who discover and construct their knowledge and take responsibility for their learning (Barr & Tagg, 1995). Active view of language learning has encouraged many researchers to work on the strategic process of learning and the interaction between learning strategies and different influential variables such as level of proficiency (Dreyer & Oxford, 1996; Wharton, 2000), learning style (Carson & Longhini, 2002; Ehrman & Oxford, 1990), gender (Ehrman & Oxford, 1995; Green & Oxford, 1995; Sung & Padilla, 1998), motivation (Cohen & Dörnyei, 2002; MacIntyre, 2002), anxiety (Gardner, 1985; Horwitz, 2001), beliefs (Horwitz, 2001; Su, 2005), learning tasks (Oxford et al., 2004), and cultural backgrounds (Ito, 2002; Littlewood, 2001; Ok, 2003; Oxford, 1990; Rao, 2006). The significance of such studies has been appreciated by the researchers placing great emphasis on the strategic process of language learning and the way languages are processed and learned (e.g. Dörnyei, 2005; Ellis, 1994).

Although the underlying strategic process of learning has been systematically explored in many studies, the number of systematic studies on the strategic process of test taking is not so extensive. Most of the studies on the strategic aspects of test taking are heuristic, not rooted in any theory of cognition. There are two possible explanations for the issue. One explanation is the complex interaction between learning and test-taking strategies that makes the distinction rather difficult. In other words, because learning and test-taking processes are highly

interrelated, separating particular strategies used in learning settings from the strategies merely used in test-taking settings is a highly complex process. It is rather difficult for the researchers to identify particular strategies used in test-taking settings regardless of their use in learning settings. As an example, the use of prior knowledge to comprehend reading texts is a cognitive strategy extensively used in both learning and test-taking settings. The other explanation is the extent to which test-taking strategies affect test performance. Bachman, et al. (1993) believed that the effect of test-taking strategies on test performance is direct in some circumstances whereas the effect may be indirect in the other circumstances.

Variation in the use of test-taking strategies is heavily dependent on the effect of multitudes of nonlinguistic variables on the process of test taking. In some situations, nonlinguistic variables exert more significant influence on the process of test taking than do linguistic variables. Investigating the interaction between linguistic and nonlinguistic variables is of primary importance in the assessment settings in which major decisions are made about the academic and occupational status of test takers. In reality, however, the correct interpretation of test scores is very difficult. The difficulty is due largely to the nonlinguistic factors that affect test performance and increase error of measurement. In his classical true score measurement theory, Bachman (1990) assumed that the observed score on a test comprises two components. The first component is true score concerned with a test taker's level of language ability. The second component is error score concerned with the factors other than language ability that affect test performance. Nonlinguistic factors are systematic and unsystematic. Systematic factors are concerned with test method facets and personal attributes. Personal attributes include topical knowledge, personal characteristics, affective schemata, and strategic competence. Strategic competence consists of a set of metacognitive strategies implemented to process language in any settings of language use, particularly test-taking settings. The output of using metacognitive strategies by language learners is to make plans for using language. The plans are executed through implementing cognitive strategies, which are the mental processes related directly to information processing. These strategies are used to obtain, store, retrieve, or use information in assessment settings (Bachman & Palmer, 2010). Cognitive strategies help learners form strong associations between new and already known information facilitating mental restructuring of information (O'Malley & Chamot, 1990; Oxford, 1990). Phakiti (2003, 2008) classified reading comprehension cognitive strategies into comprehending, memory, and retrieval strategies. Comprehending strategies are used by language learners to comprehend texts and extract meaning. Good examples of comprehending strategies are identifying main ideas, making inferences about the implied meaning, translating, making prediction, skimming, and scanning reading texts. Memory strategies are implemented by language learners to store information in memory. Good examples of memory strategies are rereading, note taking, underlining, summarizing, using mental image, and paraphrasing. Retrieval strategies are implemented by language learners to recall information such as using prior knowledge and applying grammatical rules.

The present study was an attempt to explore the interaction between using the three categories of cognitive test-taking strategies and reading comprehension test performance with regard to the participants' level of reading proficiency. The further dimension of the study was to explore the extent to which cognitive test-taking strategies affect the participants' test performance. As improving reading comprehension is of primary importance in most of English language teaching curriculums at universities, the study was conducted in the area of reading comprehension. In addition, as reading comprehension in English is of the essence for many postgraduate students who have to obtain academic information from English sources, the participants of the study were selected from MA students doing EAP courses in different fields of study. The findings can be significant as the differences in using cognitive test-taking strategies have been rarely explored systematically among the postgraduate students at different levels of reading proficiency. In addition, as reading comprehension is of crucial importance in many English teaching programs all over the world, the findings can provide useful information helping policy makers, curriculum planners, syllabus designers, language teachers, and test designers tailor effective instructional programs, syllabuses, teaching approaches, and tests to the particular needs of the students. The findings can remind language teachers of different factors affecting test scores, particularly test-taking strategies that are often totally ignored in many English teaching programs. The findings can encourage language teachers to interpret test scores from different sides to decrease error of measurement and adopt their teaching approaches to the actual needs of language learners.

2. Review of the Related Literature

It is well known that there exist many students with substantial second language knowledge yet unable to perform well in the tests. Thus, in many cases, the test results do not reveal the actual ability of the test takers in a second language. The assumption, as Cohen (1998) asserted, is that success in language tests not only depends on enough linguistic foundation but also depends on using appropriate test-taking strategies. This means if test

takers cannot identify what is expected from them, their answers to the questions do not reflect their actual language ability. Therefore, to improve fairness in language testing, the effectiveness of test-taking strategies cannot be neglected.

2.1 Test-Taking Strategies and Language Test Performance

Test-taking strategies are the strategies respondents often select consciously when taking a test. Similar to learning strategies, the element of conscious selection is of essential importance in implementing test-taking strategies. These strategies are diverse by nature. Effective application of test-taking strategies enables less proficient language learners to opt out on language tasks and constitute short cuts to elicit correct responses. In other words, test takers may use test wiseness to circumvent the use of their actual language knowledge to answer questions. Therefore, it is crucial for test constructors to find out what their tests actually measure during the pilot phase of test development (Shaw & Weir, 2007). However, in many test-taking settings, applying test-taking strategies do not enable test takers to opt out or use short cuts to elicit expected responses. In any event, as long as a language task is part of a language test, test takers may find themselves using certain strategies they may not use in leaning situations.

Test-taking strategies, as Bachman (1990) asserted, facilitate the test-taking process by reducing the negative effect of unfamiliarity with features of a given test method. Bachman offered a framework for the factors affecting test performance. The factors are communicative language ability, test method facets, personal attributes, and random measurement errors. As depicted in the framework, test-taking strategies are part of personal attributes affecting test performance. These strategies are a set of individual characteristics related to the amount and type of preparation required to take a particular type of test.

The importance of exploring test-taking process was emphasized by Bachman (1990) and Bachman and Palmer (1996, 2010), who believed if different sources of score variation are clearly identified, reasonable inferences about a test taker's actual linguistic ability can be drawn. Bachman and Palmer considered the use of test-taking strategies as one essential source of score variation. They emphasized that the detailed analysis of test takers' strategic patterns provides useful insights into the complex nature of test-taking process and potential sources of score variation. Bachman firmly insisted on the need to examine the processes or strategies applied in test-taking settings, particularly at the individual level to identify what makes language tests authentic. He believed that the detailed analysis of test-taking strategies clarifies the complicated nature of strategic competence as the most essential but elusive component in his model for the components of language ability.

2.2 Empirical Background

Investigating the relationship between test-taking process and implementing test-taking strategies by test takers has been of interest to the researchers (e.g. Cohen, 2006; Cohen & Upton, 2007; Weir, 2005). As an example, Cohen and Upton investigated how test takers' reading abilities and test-taking strategies interact in the process of completing the reading tasks in the reading section of the Langu Edge Course Ware Test, developed to familiarize prospective respondents with the new TOEFL test. The study sought to determine whether there was any variation in the type of strategies used when answering three broad categories of questions, including traditional single-selection, new selected-response, and reading to learn multiple-choice items. The participants were 32 upper intermediate and advanced nonnative speakers of English. The participants first took one form of the Test as a pretest, based on which their general levels of reading proficiency were determined. Then, they answered the major test. After completing two of the three sections of the reading test, the participants verbalized their test-taking processes under no time constraint. The findings demonstrated that the participants approaching the reading texts no more than test-taking tasks did not learn anything from the texts in the exam. Thus, for most of the test takers, the test did not truly constitute an academic reading task, but rather constitute a test-taking task in which the respondents implemented a vast array of test-taking strategies to find correct answers. Consistent frequent use of test-taking strategies revealed that the respondents were actively engaged in the test tasks in the way desired by the test designers. The participants used a variety of strategies to understand the texts, expectations of the questions, and meaning as well as implications to find correct answers. Qualitative analysis demonstrated that the three task formats in the Langu Edge prototypical tests appeared to assess similar components of academic reading as well as test-taking abilities. Some modifications were made to the basic comprehension item types by the researchers which led to the implementation of different sets of test-taking strategies by the test takers. Successful test takers applied certain strategies consistent with academic reading abilities to gain local and general understanding of the passages and answer the questions. Thus, the test was proved to be a valid measure of reading ability. In a similar study, Weir (2005) emphasized the importance of investigating what test takers actually do when taking language tests to improve the validity of the tests.

Yamashita (2003) further explored test takers' perspective on the cognitive process of taking a gap-filling reading test. The participants were 12 Japanese EFL students divided into the two groups of more skilled and less skilled learners based on their scores in the reading comprehension test that had been previously developed, validated, and administered to 241 Japanese students at four universities in Japan by Yamashita (1999). The participants had to take the 16 item gap-filling tests following a modified passage, originally taken from Lauer and Tsujii's (1995) EFL textbook. The participants had to provide concurrent think aloud verbal protocols either in Japanese or English. The detailed analysis showed that text level information was the only source most frequently used by the two groups. The findings manifested that the test tended to prompt the participants to activate their cognitive process by using text level information, regardless of their level of reading proficiency. However, there were differences between the two groups as well. The more skilled readers used text level information as well as wider range of textual constraints more frequently than did the less skilled readers. The findings also proved that the test-taking process was different in more skilled and less skilled readers. The more skilled readers were able to give proper weight to different information sources with regard to their importance in comprehending the text. For example, they substantially used clause level information to confirm their answers. On the other hand, the less skilled readers put heavier emphasis on local grammatical information and were less able to use textual level information. Thus, the test was a valid measure of reading comprehension ability discriminating well between more skilled and less skilled language learners.

As reading comprehension is a complex construct, the process of making sense of printed texts in testing settings is rather complex. Clearly, the design of items and selection of texts in reading comprehension assessment is rather complicated and should be done with great care. Responding to reading comprehension tests is also a rather complicated process, most consistent with accomplishing reading comprehension tasks in non-testing settings as far as isolated lower level skills are involved. However, the process may be very different as far as higher level skills are involved. Thus, assessing a certain level of textual comprehension with different test formats changes the test-taking process and requires supplementary processes unique to test-taking settings.

For the purpose of this study, Bachman's (1990) model of the components of language ability and Bachman and Palmer's (2010) conceptual framework of language use serve as the basic conceptual frameworks to examine the interaction between the two sets of linguistic and nonlinguistic factors. The factors are reading comprehension test performance of the participants or reading ability, as part of communicative language ability, and the use of cognitive test-taking strategies, as part of test-takers' strategic competence. In the mentioned models, the interaction between language knowledge, strategic competence, and language use, particularly test taking is explicitly depicted. However, the role of strategic competence acting as a mediator between the external situational context and the internal knowledge in the process of using language is more critical.

Thus, the present study is an attempt to scrutinize the relationship between level of reading proficiency and applying certain cognitive test-taking strategies in reading comprehension test performance of Iranian postgraduate students. The strategies are comprehending, memory, and retrieval strategies, as the three main subdivisions of cognitive strategies, based on Purpura's (1999) and Phakiti's (2003, 2008) classifications of cognitive strategies. The further concern of the study is to explore the extent to which different types of cognitive strategies affect the participants' test performance. The final concern is to probe the extent to which different subcategories of cognitive strategies are correlated.

The research questions are formulated as the following:

1. Is there a significant relationship between level of reading proficiency and use of cognitive test-taking strategies?
2. To what extent do different types of cognitive test-taking strategies affect reading comprehension test performance?
3. To what extent are different types of cognitive test-taking strategies correlated?

To probe the research questions, the method as well as the findings is discussed in the following sections.

3. Method

3.1 Participants

The participants were recruited from MA students doing EAP courses in different academic fields at Islamic Azad University of Mashhad in Iran. The accessible sample consisted of 343 students divided into the three groups of high, intermediate, and low reading proficiency, based on their scores in the reading comprehension section of a paper-based TOEFL Test (Longman, 2005). The frequency and percentage of the participants across the three groups of reading proficiency are shown in Table 1.

Table 1. Frequency and percentage of the participants at the three levels of reading proficiency

Reading level	Frequency	Percentage
Low	50	14.5
Intermediate	227	66.0
High	66	19.5
Total	343	100.0

As demonstrated in Table 1, the students at the intermediate level of reading proficiency formed the highest proportion whereas the students at the low level of proficiency formed the lowest proportion of the accessible participants. The distribution of the participants' mean scores is close to normal distribution.

3.2 Instruments

The following research instruments were used to collect data in the study:

3.2.1 Reading Comprehension Test

A reading comprehension section of a TOEFL test was utilized in this study to assess the reading ability of the participants. The test was selected from the paper-based version of Longman (2005), consisting of the four sections of Listening Comprehension, Structure and Written Expressions, Reading Comprehension, and Writing. Due to the need to assess the participants' reading ability as well as their strategic process of answering reading comprehension multiple-choice questions, only the Reading Comprehension section of the test was used in this study. The section included five reading comprehension passages, followed by 50 multiple-choice items. The standard time for taking the reading comprehension test was 55 minutes.

3.2.2 Test-Taking Strategy Questionnaire

A test-taking strategy questionnaire was utilized in this study. The questionnaire was derived from Purpura's (1999) cognitive test-taking strategy questionnaire. The questionnaire consisted of 30 statements, contextualizing the use of the three distinct subcategories of comprehending, memory, and retrieval test-taking strategies to answer reading comprehension questions. The questionnaire was organized on a 5-point Likert scale, in which the participants had to indicate the frequency of using each strategy during test-taking process through selecting one of the following adverbs of frequency:

a) never 1 b) seldom 2 c) sometimes 3 d) often 4 e) always 5

The questionnaire was piloted by a similar sample of 30 students. The reliability index of the questionnaire was calculated by using Cronbach alpha formula. The reliability index was ($r = .935$), which is high and acceptable.

3.3 Procedures

All the participants first took the reading test and then responded the test-taking strategy questionnaire in one session. The time allotted to accomplish the test was 55 minutes, including reading the instructions. The dedicated time to respond the test-taking strategy questionnaire was 15 minutes. Prior to taking the test and responding the questionnaire, the participants were briefed on the structure of the test, the questionnaire, and the way to answer them.

3.4 Data Analysis

The statistical procedures used in the study were Cronbach alpha formula, descriptive statistics, one-way analysis of variance, Tukey HSD test, and regression analysis through using the 17th version of SPSS software.

4. Results and Discussion

The findings of this study are reported and discussed in the following three subsections,

4.1 The Relationship between Level of Reading Proficiency and Use of Cognitive Test-Taking Strategies

To explore the first research question concerning the relationship between the participants' level of reading proficiency and using cognitive test-taking strategies, the descriptive statistics were calculated, the results of which are presented in Table 2.

Table 2. Descriptive statistics for using cognitive test-taking strategies by the three groups of proficiency

Reading Strategies	Reading Level	N	Mean	Std. Deviation
Comprehending Strategies	Low	50	3.1908	.59893
	Intermediate	227	3.2642	.61053
	High	66	3.6079	.65135
	Total	343	3.2740	.61584
Memory Strategies	Low	50	3.0798	.85544
	Intermediate	227	2.8535	.89060
	High	66	3.0263	.71635
	Total	343	2.8996	.87740
Retrieval Strategies	Low	50	2.8456	.60366
	Intermediate	227	2.9082	.65954
	High	66	3.1658	.57206
	Total	343	2.9144	.64781
Overall Strategies	Low	50	3.0306	.54747
	Intermediate	227	3.0443	.58248
	High	66	3.3216	.52267
	Total	343	3.1338	.59183

As shown in Table 2, among the three subcategories of cognitive test-taking strategies, the mean score of using comprehending strategies by the total test takers was the highest ($M = 3.2740$) whereas the mean score of using memory strategies was the lowest ($M = 2.8996$). In addition, the high proficiency test takers got the highest mean scores in using comprehending strategies ($M = 3.6079$) as well as retrieval strategies ($M = 3.1658$). In comparison, the low proficiency test takers used memory strategies ($M = 3.0798$) most frequently, but used retrieval ($M = 2.8456$) and comprehending strategies ($M = 3.1908$) least frequently. Overall test-taking strategies were used most frequently by the high proficiency test takers ($M = 3.3216$) and least frequently by the low proficiency test takers ($M = 3.0306$).

To probe the significant differences among the three proficiency groups in using the strategies, a one-way analysis of variance was run. The results are presented in Table 3.

Table 3. One-way analysis of variance for cognitive test-taking strategies

		Sum of Squares	df	Mean Square	F	Sig.
Comprehending Strategies	Between Groups	2.473	2	1.237	3.310	.038
	Within Groups	113.581	341	.374		
	Total	116.054	343			
Memory Strategies	Between Groups	2.374	2	1.187	1.547	.215
	Within Groups	233.197	341	.767		
	Total	235.571	343			
Retrieval Strategies	Between Groups	1.437	2	.718	1.720	.181
	Within Groups	126.980	341	.418		
	Total	128.417	343			
Overall Strategies	Between Groups	2.727	2	.700	2.126	.121
	Within Groups	119.865	341	.329		
	Total	122.592	343			

$P \leq 0.05$

As manifested in Table 3, significant differences were found among the mean scores of the three proficiency groups in using comprehending test-taking strategies, $F(2, 341) = 3.310$, $p = .038$. No significant differences were found among the test takers in using memory $F(2, 341) = 1.547$, $p = .215$; and retrieval test-taking strategies, $F(2, 341) = 1.720$, $p = .181$. No significant differences were found among test takers in using overall test-taking strategies, $F(2, 341) = 2.126$, $p = .121$. To compare the mean differences in using comprehending

strategies in pairs and locate the homogenous subsets of the mean scores, a Tukey HSD test was used, the results of which are demonstrated in Table 4 and Table 5.

Table 4. Tukey HSD test for the multiple comparisons between the mean scores in using comprehending test-taking strategies

Dependent Variable	(I) Reading Level	(J) Reading Level	Mean Difference (I-J)			95% Confidence Interval	
			Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Comprehending Strategies	Low	Intermediate	-.07342	.09665	.728	-.3010	.1542
		High	-.41706*	.16567	.033	-.8073	-.0269
	Intermediate	Low	.07342	.09665	.728	-.1542	.3010
		High	-.34364*	.14567	.050	-.6867	-.0005
	High	Low	.41706*	.16567	.033	.0269	.8073
		Intermediate	.34364*	.14567	.050	.0005	.6867

$p \leq 0.05$

As shown in Table 4, the mean difference between the high and low groups of reading proficiency ($I - J = .41706^*$) was significant at $p = .033$ in using comprehending test-taking strategies. The mean difference between the high and intermediate groups of reading proficiency ($I - J = .34364^*$) was significant at $p = .050$. However, the mean difference between the intermediate and low proficiency groups ($I - J = .07342$) was not significant at $p = .728$. Table 5 shows the subsets of the mean scores in using comprehending test-taking strategies through using Tukey HSD test.

Table 5. Tukey HSD test for the subsets of the mean scores in using comprehending strategies

Reading Level	N	Subset for alpha = 0.05	
		1	2
Low	48	3.1908	
Intermediate	240	3.2642	
High	19		3.6079
Sig.		.858	1.000

As revealed in Table 5, the mean scores of the low and intermediate groups were not significantly different at $p = .858$. However, significant differences were found between the mean scores of the low and high as well as the mean scores of the intermediate and high groups of reading proficiency at $p < .05$. Figure 1 demonstrates the relation between the participants' reading level and mean score of using comprehending strategies.

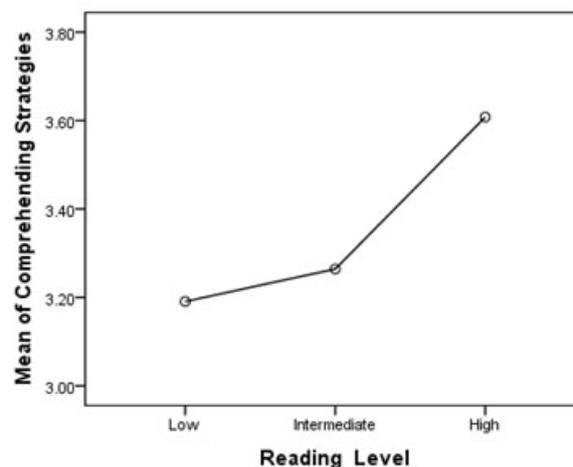


Figure 1. Relation between reading level and use of comprehending strategies

As demonstrated in Figure 1, the students at the high level of reading proficiency used comprehending test-taking strategies more frequently than did the students at the intermediate and low levels of reading proficiency. The mean score of using the strategies by the students at the low level of proficiency was the least.

Detailed analyses showed that the most frequent comprehending strategies used by the participants at the high level of reading proficiency were linking the main ideas of the reading texts with the questions, finding the main ideas of the reading texts through scanning and skimming, comprehending the reading texts without translating word for word, and guessing the meaning of unknown words through using the contextual clues. In comparison, the most frequent memory strategies used by the students at the low level of proficiency were grouping the words with similar meanings, visualizing new words, grouping the words with similar pronunciation, writing the main ideas of reading texts in key sentences, and reading passages several times.

The findings showed a relationship between the participants' reading ability and frequency of using cognitive strategies. The students with more linguistic knowledge used comprehending test-taking strategies more frequently to comprehend the reading texts and answer the questions. The findings imply that the students at the high level of reading proficiency used test-taking strategies as learning strategies to facilitate and improve comprehension process. In contrast, the students with lower linguistic knowledge used test-taking strategies as compensatory strategies to fill their linguistic gap to comprehend the reading texts and answer the questions.

The findings also proved that the test-taking process was different in more proficient and less proficient test takers. Thus, the test was a valid measure for assessing the reading comprehension ability of the test takers because it could discriminate well between more skilled and less skilled test takers. The findings pertain to the findings of the earlier studies analyzing the relationship between test-taking processes and implementing test-taking strategies (e.g. Cohen, 2006; Cohen & Upton, 2007; Weir, 2005; Yamashita, 2003).

4.2 The Extent of Relationship between Cognitive Strategies and Test Performance

To probe the second research question concerning the extent to which cognitive test-taking strategies affected the participants' test performance, a linear regression analysis was applied. The summary of the model for regression analysis is shown in Table 6. The participants' reading test performance was considered as the dependent variable and the use of cognitive test-taking strategies was considered as the independent variable in the regression analysis.

Table 6. Model summary for regression analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.183 ^a	.033	.024	6.94946

As shown in Table 6, the bivariate correlation between using cognitive test-taking strategies and the participants' reading ability was ($R = .183$). The R square value ($R^2 = .033$) indicated that 33% of the variance in the test performance was related to the use of cognitive test-taking strategies. Figure 2 reveals the relationship between the participants' test performance and use of cognitive strategies.

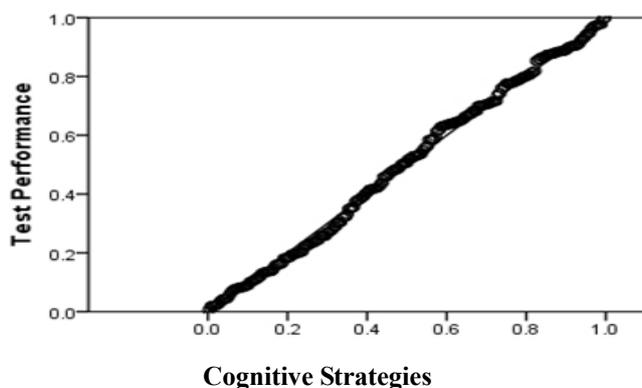


Figure 2. Relationship between test performance and use of cognitive test-taking strategies

As depicted in Figure 2, a positive linear relationship exists between the participants' test performance and use of cognitive test-taking strategies. The regression coefficients between the use of certain test-taking strategies and reading test performance are presented in Table 7.

Table 7. Regression coefficients between the use of cognitive test-taking strategies and reading test performance

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	T	
(Constant)	13.829	2.221		6.227	.000
Memory Strategies	-.736	.558	-.092	-1.320	.188
Retrieval Strategies	.535	.928	.049	.576	.565
Comprehending Strategies	1.972	.876	.173	2.250	.025

$P \leq .005$

As revealed in Table 7, the standardized coefficient between using comprehending strategies and the test performance was (Beta = .173) at $p = .025$, indicating a positive linear relationship between using comprehending test-taking strategies and the test performance. The standardized coefficient between using retrieval strategies and the test performance was also positive (Beta = .049) at $p = .565$. However, the standardized coefficient between using memory strategies and the test performance was negative (Beta = -.092) at $p = .188$, indicating a negative relationship between using memory test-taking strategies and the test performance.

The linear regression equations between the participants' test performance, as the dependent variable, and use of the three groups of cognitive strategies, as the independent variables, are formulated as the following.

$$\text{Memory Strategies: Test performance (predicted)} = 13.829 + -.736X \quad (1)$$

$$\text{Retrieval Strategies: Test performance (predicted)} = 13.829 + .535X \quad (2)$$

$$\text{Comprehending Strategies: Test performance (predicted)} = 13.829 + 1.972X \quad (3)$$

As indicated in the formulas, the effect of comprehending strategies on the test performance was the most whereas the effect of memory strategies on the test performance was the least and even negative. The effect of retrieval strategies on the test performance was positive and moderate. The equations show that the observed score on the test comprises two factors or components. The first factor is the actual ability of language learners, and the second factor is the use of certain cognitive test-taking strategies. In other words, observed scores are the combination of true scores and error scores. The use of test-taking strategies can be considered as one major source of measurement error based on Bachman' (1990) classical true score measurement theory and Bachman's framework for the factors affecting test performance. As mentioned earlier, % 33 of the variance in the test performance was due to the use of cognitive test-taking strategies. Thus, the effect of test-taking strategies on the test taking process cannot be ignored, and the observed scores are not reflective of the actual ability of language learners all on their own. The findings can help language teachers gain a better understanding of linguistic and psychological aspects of test-taking process and improve the design and validity of the tests. In addition, the findings can help language teachers interpret test scores with great care to make a sound judgment about the actual ability of language learners.

The findings provide an empirical evidence for Bachman's (1990) model of the factors affecting test performance as well as Bachman and Palmer's (2010) conceptual framework of language use, depicting the interaction between test performance and use of cognitive test-taking strategies.

4.3 The Correlation between Different Categories of Cognitive Strategies

To probe the final question of the study concerned with the extent to which different types of cognitive test-taking strategies are correlated, Pearson correlation coefficient analysis was applied. The results are shown in Table 8.

Table 8. Pearson correlation coefficients between cognitive test-taking strategies

Strategies	Correlation	Cognitive Strategies	Comprehending Strategies	Memory Strategies	Retrieval Strategies
Cognitive Strategies	Pearson Correlation	1	.878**	.678**	.909**
	Sig. (2-tailed)		.000	.000	.000
	N	343	343	343	343
Comprehending Strategies	Pearson Correlation	.878**	1	.408**	.692**
	Sig. (2-tailed)	.000		.000	.000
	N	343	343	343	343
Memory. Strategies	Pearson Correlation	.678**	.408**	1	.483**
	Sig. (2-tailed)	.000	.000		.000
	N	343	343	343	343
Retrieval Strategies	Pearson Correlation	.909**	.692**	.483**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	343	343	343	343
p ≤ 0.01					

As revealed in Table 8, the correlation coefficients between cognitive test-taking strategies, comprehending strategies ($r = .878^{**}$), memory strategies ($r = .678^{**}$), and retrieval strategies ($r = .909^{**}$) was significant at $p < .001$. The correlation coefficients between cognitive test-taking strategies and the three subcategories of strategies were positive and significant at $p < .001$. The highest correlation coefficient was found between cognitive test-taking strategies and retrieval strategies ($r = .909^{**}$) at $p < .001$. The lowest correlation coefficient was found between cognitive test-taking strategies and memory strategies ($r = .678^{**}$) at $p < .001$. As manifested in Table 8, the correlation coefficients between all the subcategories of cognitive strategies are positive and significant. Among the three subcategories of cognitive strategies, the correlation coefficient between comprehending and retrieval strategies ($r = .692^{**}$) was the highest whereas the correlation coefficient between comprehending and memory strategies ($r = .408^{**}$) was the lowest at $p < .001$.

The findings indicate considerable overlap between different subcategories of cognitive test-taking strategies in the reading comprehension test performance of the test takers. The positive significant relationship between different subcategories of cognitive strategies can be due to the shared underlying cognitive processes. However, the degree of the relation is different due to the multidimensional complex process of test taking. Thus, teaching different types of cognitive strategies in dissociated way is not reasonable and language teachers should pay attention to the mutual interaction between the strategies and teach the strategies interactively.

5. Conclusion

The findings of this study manifested an interaction between the participants' reading ability and use of cognitive test-taking strategies in reading comprehension test performance of Iranian postgraduate students majoring in different fields of study. The findings provide empirical evidences for the conceptual frameworks of language use offered by Bachman and Palmer (1996, 2010) as well as the theoretical framework of language use offered by Bachman (1990) due to the significant positive interaction found between the participants' reading ability and use of cognitive strategies as the components of strategic competence.

The positive interaction found between the participants' reading ability and use of cognitive strategies implies that linguistic and strategic aspects of language use cannot be dissociated and should be taught simultaneously in language teaching programs. Language teachers should teach linguistic and strategic aspects of a target language systematically devoting attention to either side. Language teachers should adopt their teaching approaches to the linguistic as well as strategic needs of language learners to fill the gap between more successful and less successful learners.

In general, the findings revealed that language competence and strategic competence act as the two major components of language ability, the combination of which provides language learners with the ability to comprehend reading comprehension texts and answer reading questions. In addition, the close interaction of reading test performance and use of cognitive test-taking strategies indicates that both linguistic and

nonlinguistic variables play an important role in the process of test taking. Thus, in any assessment settings, language teachers should be skillful enough to interpret the observed scores from different sides to form professional judgments on language learners' true ability.

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