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On the Relationship between Cognitive Self-Regulated Learning and Language Learning Strategies

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Abstract— To investigate the relationship between language learning strategies types and cognitive self-regulated learning components (rehearsal, elaboration, organization self-regulated learning, and critical thinking), 148 B.A level students majoring in English translation and English language teaching were selected. Data were gathered through the Strategy Inventory for Language Learning (SILL) and Motivated Strategies for Learning Questionnaire-MSLQ, and were analyzed using stepwise multiple regression analysis procedures. The findings revealed that memory strategies were the best predictor of rehearsal self-regulated learning. Moreover, meta-cognitive, affective, and memory strategies had predictive power on elaboration self-regulated learning. There were also significant relationships between meta-cognitive and cognitive strategies and organization self-regulated learning. Likewise, the results indicated that the combinations of cognitive, affective, compensation, and social strategies as well as affective, compensation, and social strategies were the predictors of critical thinking. The findings of the present study may have implications for L2 learners, teachers, and material developers.

Index Terms— Rehearsal Self-Regulated Learning, Elaboration Self-Regulated Learning, Organization Self-Regulated Learning, Critical Thinking, Language Learning Strategies.

1 Introduction

THE important role of students in education has led to a large number of studies in the field of human learning and human behavior. Some researchers (Corno, 1989; Henderson 1986; Mace, Belfiore, & Shea, 1989; Rohrkemper, 1989) refer to a number of theories that explain how students become self-regulated in their learning. According to Schraw, Crippen and Hartley (2006), self-regulated learning refers to students' ability to understand and control their learning environment. In addition, Boekaerts (1996) claims that self-regulated learning is a powerful learning theory which can transfer knowledge and skills to real-life situations and make students more independent of their teachers in education. Furthermore, some educational researchers have considered strategies used by pupils as important factors in their own learning. Weinstein and Mayer (1986) believe that behaviors and thoughts which a learner uses during the learning process are learning strategies which facilitate the learner's encoding process.

Although many studies have been done in the field of self-regulated learning and language learning strategies in education, few of them have considered the relationship between them, especially in the process of L2 learning. Thus, the purpose of this study is to investigate this relationship. More specifically, this study aims to answer the following research questions.

1. Which of the language learning strategies are better predictors of rehearsal self-regulated learning?
2. Which of the language learning strategies are better predictors of elaboration self-regulated learning?
3. Which of the language learning strategies are better predictors of organization self-regulated learning?
4. Which of the language learning strategies are better predictors of critical thinking?

2 Literature Review

Many researchers have tried to define self-regulated learning. Zimmerman and Schunk (1989) describe self-regulated learning as self-generated thoughts, feelings, and actions, which can systematically lead students to achieve their own goal. In recent decades, many educational psychologists have proposed theoretical models and of self-regulated learning (Boekaerts, 1999). Winne (1995) defines self-regulated learning as an inherently constructive and self-directed process. Several leading educational psychologists (e.g., De Corte, Verschaffel & Op't Eynde, 2000; Pintrich, 2000; Randi & Corno, 2000; and Zimmerman, 2000) believe that self-regulated learners employ a large amount of valuable information about the processes and environment which help them to acquire successfully new knowledge and skills.

Pintrich's (2000) model classifies self-regulated learning (SRL) into three categories as follows:

1) Cognitive learning strategies: Students with high level of these strategies can attend, select, detail and organize information in such a way that deep-level of comprehension occurs.

2) Meta-cognitive and regulation strategies: These strategies help learners to plan, monitor and control their cognitive strategies.

3) Resource management strategies: Pupils who can use these strategies more than others can manage and control the material, internal and external resources in the way to reach their goals.

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Schraw, et al.'s (2006) classification for components of self-regulated learning includes: 1) cognition, 2) meta-cognition, and 3) motivation.

Boekarts (1999) describes self-regulation learning in her three-layer model. The inner layer which is essential for describing the quality of students' self-regulation process, represents the typical way students learn. In other words, this layer shows regulation of cognitive strategies or learning styles. The middle layer refers to students' ability to use meta-cognitive knowledge and skills in directing learning or processing style. The third and outer layer of Boekaets' model refers to the motivation control system and represents information about self-perceptions of learners which are crucial for understanding self- regulation. It explains why learners do/do not what they may be expected to do based on their own wishes, needs, and expectancies.

Schraw, et al.'s (2006) classification shows that cognitive self-regulation involves cognitive strategies, problem solving strategies, and critical thinking. According to Boekaerts (1996), cognitive strategies refer to students' behavior during the learning process. In other words, Biggs (1987) and Entwistle (1988) claim that the manner in which learners organize and control cognitive processes indicates their learning styles. Boekaerts (1999) states that one of the key issues in self-regulated learning goes back to the way which students choose to combine and coordinate cognitive strategies. Moreover, Boekarts (1996) refers to cognitive strategies as cognitive processes and behaviors that lead toward achieving self-set goals and regulate individual's activities. She enumerates three complex skills for these regulatory strategies. The first skill involves the students' capacity to make a clear mental representation of the learning goal and to change it according to situation. The second skill refers to the ability to form a plan of action and to extend it when necessary. And, the third skill relates to the capability to observe one's behavior, to find out mismatches, and to determine the way to the learning goal.

Problem solving strategies are naturally more complex than cognitive strategies. Problem solving strategy instruction aims to help students to achieve a deeper level of understanding compared to others who do not receive this instruction (Schraw, et al., 2006). According to Linn (2000), critical thinking, as the third component of cognitive self-regulated learning, consists of various skills such as recognizing the source of information, analyzing its credibility, thinking about whether that information is consistent with their prior knowledge, and reaching conclusions based on their critical thinking.

In addition, other researchers have classified cognitive learning strategies in different ways. For example, Pintrich, Smith, Garcia, and Mckeachie's (1993) category includes rehearsal, elaboration, organizational strategies, and critical thinking. Rehearsal strategies can help learners to select important information from the text and keep it in the working memory. Practices such as recital or saying words or a piece of text aloud as one reads it and underlining or highlighting of the text involve rehearsal strategies, although they are not related to very deep levels of processing (Pintrich, 1999) .

Paraphrasing or summarizing the text, generating analogies, creating note-taking, citing the ideas about the materials to be learned to someone else, and asking and answering question are examples of elaboration strategies (Weinstein & Mayer's, 1986).

Organizational strategies, in contrast to rehearsal strategies, are deeper processing strategies which result in a deeper comprehension of the materials to be learned (Weinstein & Mayer's, 1986). Choosing the main idea of a text, outlining the material to be learned, and employing various techniques to select and organize the idea of the material, are behaviors which are included in this category (Pintrich, 1999).

Critical thinking refers to the ability of using strategies which can be useful in applying previous knowledge to new condition or making critical assessment of idea.

Learning strategies (LS) are also significant elements which are considered by a number of educational researchers. Wienstein and Mayer (1986) define learning strategies as learners' behavior and thought which can affect students' encoding process during learning. O'Malley and Chamot (1990) define learning strategies as cognitive or affective actions that learners use to learn both simple and complex materials. Green and Oxford (1995) offer a similar definition. With the development of second language learning studies, researchers have been interested in the investigation of strategies used in second language learning. Zarei and Elekaei (2012) refer to language learning strategies as an undeniable factor affecting language learning. According to Cotterall (2000), each person chooses different strategies during the learning process. That is why Oxford (1992) recommends that teachers be informed of language learning strategies.

Various taxonomies have been proposed for language learning strategies. As an example, Brown and Palinscar (1982) and O'Malley, Chamot, Stewner-Manzanares, Russo and Kupper (1985) offer a classification of learning strategies which consists of three categories:

1) Cognitive strategies are behaviors on language learning (e.g. repetition, translation, grouping, note taking, deduction imagery, elaboration, inferencing, etc.).

2) Meta-cognitive strategies include behaviors like advance organizers, directed attention, selective attention, self-management, functional planning, self-monitoring, delayed production, and self-evaluation.

3) Affective-social strategies/ socio-affective are associated with cooperation and request for clarification.

Oxford and Crookall (1989) propose a different taxonomy whit seven categories. They further classify socio-affective strategies into social and affective strategies and add memory, compensation, and communication strategies to the list. According to oxford and Crookall, memory strategies refer to techniques which help learners to store new information in memory and retrieve it when necessary. They also believe that compensation strategies are used to compensate for missing knowledge, inferencing or guessing while listening or reading, and using synonyms while speaking or writing. Communication strategies are those compensation strategies which are used while communicating.

Oxford (1990) refers to still another category in which strat-

egies divided into direct and indirect categories. Direct strategies are concerned with the mental processing of the new language. These strategies include memory, cognitive, and compensation strategies. Indirect strategies manage and contribute indirectly to the language learning process, and include meta-cognitive, affective, and social strategies.

A number of researchers have been interested in the field of self-regulated learning and language learning strategies. Heikkila and Lonka (2006) examined the relationship between learning approaches, self-regulation of learning and cognitive strategies as some aspects of successful and problematic study in higher education. 366 male and female university students were asked to fill in the Task Booklet of Learning and the strategy and Attribution Questionnaires. The students' academic achievement was assessed on the basis of the university archives. Pearson correlation analysis indicated that approaches to learning, regulation of learning, and cognitive strategies were related to each other, and to study success.

Hong-Nam and Leavell (2006) considered language learning strategies from another point of view; they investigated language learning strategy use of ESL students in an intensive English learning context. The analysis of data showed that intermediate level students used language learning strategies more than beginning and advanced level ones. More strategic learners had better performance in proficiency continuum than less strategic ones. Most of the students preferred to use meta-cognitive strategies over affective and memory strategies. Females used affective and social strategies more than males.

In another study, Zarei and Haghgoo (2012) addressed the relationship between critical thinking and L2 grammatical and lexical knowledge. 150 male and female B.A level students studying English as a foreign language were given a 60-item vocabulary and grammar subtest of the TOEFL test. Results showed that the correlation between vocabulary and critical thinking was not statistically significant, and there was no significant correlation between grammar and critical thinking.

Zarei and Hatami (2012) investigated the relationship between self-regulated learning components (planning, self-checking, effort, and self-efficacy) and L2 vocabulary knowledge and reading comprehension. To this end, 250 male and female college students majoring in English teaching, English language translation, and English literature were selected. In the next step, a vocabulary and reading comprehension TOEFL test was given to the students. Then they administered the Persian version of 'Self-regulation Trait Questionnaire' to the same participants. The obtained data were analyzed using Pearson correlation procedure. The result of data analysis indicated that the correlation between reading and self-check; and reading and effort was statistically significant while there was no significant correlation between vocabulary and planning; vocabulary and self-check; vocabulary and effort; vocabulary and self-efficacy; reading and planning; and reading and self-efficacy.

Zarei and Shahidi Pour (2013) examined language learning strategies as predictors of L2 idioms comprehension. The participants were 112 college students who received English Language Proficiency (MTELP), an idiom comprehension test, and the Strategy Inventory for Language Learning (SILL). In order to analyze the gathered data, multiple regression analysis was used. Cognitive and affective learning strategies were found to be the best predictors of L2 idioms comprehension.

To sum up, although several studies have been done on various aspects of both self-regulated learning (SRL) and language learning strategies (LLS), few of them have considered the relationship between types of LLS and SRL components. The present study, therefore, aims to fill part of the existing gap in this area.

3 METHOD

3.1 Participants

The participants of the present study were initially 245 male and female B.A. level students at Imam Khomeini International University in Qazvin and Islamic Azad University in Takestan majoring in English translation and English teaching. After homogenization and the administration of the questionnaires, only 148 homogeneous participants who had answered all of the questionnaires completely were selected as the participants of the study.

3.2 Instruments

1) In order to homogenize the participants, a general proficiency test (The Michigan English Language Proficiency Test) was administered. The test consisted of 100 grammar, vocabulary, and reading comprehension items in multiple-choice format.

2) In order to assess the general language learning strategies utilized by L2 learners, a Strategy Inventory for Language Learning with 60 strategy items on a five-point Likert scale from 'Never' to 'Always' was given to the participants. This version of SILL was designed by Oxford (1990) to collect information about seven types of strategies.

3) The last instrument used to assess the participants' cognitive self-regulation was "Motivated Strategies for Learning Questionnaire-MSLQ" developed by Pintrich, et al. (1993). It included 81 items in three general sections: cognitive strategies, meta-cognitive strategies, and resource management.

3.3 Procedure

To achieve the purpose of the study, the following procedures were followed. First, 245 participants with the aforementioned characteristics were selected. Second, the Michigan language proficiency test was administered. The time duration of this test was 60 minutes. After homogenization, 148 students who scored between one standard deviation above and below the mean remained as the participants.

Next, the Strategy Inventory for Language Learning (SILL) was given to the students. The participants were required to answer the questionnaire by choosing from the five-point Likert scale.

Then, the "Motivated Strategies for Learning Questionnaire-MSLQ" developed by Pintrich, et al. (1993) was administered to determine the participants' use of different cognitive

self-regulated learning components. It includes 81 items of which only 19 items were concerned with cognitive self-regulation. The participants were required to complete the questionnaire by choosing from among five alternatives, from ' almost never' to 'always'.

To analyse the collected data and to answer the research questions, four stepwise multiple regression analyses were used.

4 Results and Discussion

4.1 Investigation of the First Research Question

The first question attempted to see which types of language learning strategies are predictors of rehearsal self-regulated learning. To this end, a stepwise multiple regression procedure was used, which showed that memory strategies entered into the regression equation as the single predictor.

TABLE 1
VARIABLES ENTERED/REMOVED [a]

Model	Variables Entered	Variables Removed	Method
1	Memory	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

[a.] Dependent Variable: rehearsal

Model summary (Table 2) shows that memory strategies and rehearsal self-regulated learning share over 10% of variance.

TABLE 2
MODEL SUMMARY[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.330 [a]	.109	.103	2.61942	.109	17.880	1	146	.000

a. Predictors: (Constant), memory
b. Dependent Variable: rehearsal

Based on Table 3, the results of the ANOVA ($F(1, 146) = 17.88$, $p < .05$) show that the predictive power of the model is significant.

TABLE 3
ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	122.681	1	122.681	17.880	.000 [b]
	Residual	1001.759	146	6.861		
	Total	1124.440	147			

a. Dependent Variable: rehearsal
b. Predictors: (Constant), memory

To find out how strong the relationship between the rehearsal self-regulated learning and each of the seven predictors is, the unstandardized as well as standardized coefficients of the model, along with the observed t-values and significance levels were checked. Table 4 shows the results.

TABLE 4
COEFFICIENTS[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.714	1.117		7.801	.000
	Memory	.153	.036	.330	4.228	.000

a. Dependent Variable: rehearsal

Based on Table 4, the model shows that for every one standard deviation of change in memory strategies score, there will be .33 of a standard deviation change in rehearsal self-regulated learning score. Moreover, the relationship between memory strategies and rehearsal self- regulated learning is statistically significant.

4.2 Investigation of the Second Research Question

The second question attempted to see which types of language learning strategies are predictors of elaboration self-regulated learning. To this end, a second stepwise multiple regression was run (Table 5) which showed that meta-cognitive, affective,

and memory strategies entered into the regression equation.

TABLE 5
VARIABLES ENTERED/REMOVED[a]

Model	Variables Entered	Variables Removed	Method
1	Meta-cognitive	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	affective	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	memory	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: elaboration

Model summary (Table 6) shows that the meta-cognitive strategies and elaboration self-regulated learning share 14%, and meta-cognitive and affective strategies together share 19% of variance with elaboration self-regulated learning. Meta-cognitive, affective, and memory strategies collectively account for over 20% of the total variance in elaboration self-regulated learning.

TABLE 6
MODEL SUMMARY[d]

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate	Change Statistics				
					RSquare Change	F Change	df1	df2	Sig. F Change
1	.381a	.146	.140	3.76392	.146	24.868	1	146	.000
2	.449b	.201	.190	3.65116	.056	10.158	1	145	.002
3	.473c	.224	.208	3.61213	.022	4.150	1	144	.043

a. Predictors: (Constant), meta-cognitive
b. Predictors: (Constant), meta-cognitive, affective
c. Predictors: (Constant), meta-cognitive, affective, memory
d. Dependent Variable: elaboration

Based on Table 7, the results of the ANOVA ($F(1, 146) = 24.86$, $p < .05$; $F(2, 145) = 18.29$, $p < .05$); $F(3, 144) = 13.84$, $p < .05$) show that the predictive power of the three models are significant.

TABLE 7
ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	352.314	1	352.314	24.868	.000b
	Residual	2068.399	146	14.167		
2	Regression	487.726	2	243.863	18.293	.000c
	Residual	1932.987	145	13.331		
3	Regression	541.878	3	180.626	13.844	.000d
	Residual	1878.835	144	13.047		

a. Dependent Variable: elaboration
b. Predictors: (Constant), meta-cognitive
c. Predictors: (Constant), meta-cognitive, affective
d. Predictors: (Constant), meta-cognitive, affective, memory

To find out how strong the relationship between the elaboration self-regulated learning and each of the seven predictors is, the unstandardized as well as standardized coefficients of the three models, along with the observed t-values and significance levels were checked. Table 8 shows the results.

TABLE 8
COEFFICIENTS[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.096	1.514		7.990	.000
	Meta-cognitive	.207	.041	.381	4.987	.000
2	(Constant)	9.811	1.634		6.003	.000
	Meta-cognitive	.152	.044	.281	3.485	.001

	Affective	.143	.045	.257	3.187	.002
3	(Constant)	7.932	1.861		4.261	.000
	Meta-cognitive	.125	.045	.230	2.755	.007
	Affective	.125	.045	.224	2.753	.007
	Memory	.112	.055	.165	2.037	.043

a. Dependent Variable: elaboration

Based on Table 8, the first model shows that for every one standard deviation of change in meta-cognitive strategies score, there will be about .38 of a standard deviation positive change in elaboration self-regulated learning score. The second model shows that when meta-cognitive and affective strategies are taken together, for every one standard deviation change in meta-cognitive and affective strategies, there will be over .28 and .25 of a standard deviation positive change in elaboration self-regulated learning score, respectively. The third model shows that when meta-cognitive, affective, and memory strategies are taken together, for every one standard deviation change in meta-cognitive, affective score, and memory strategies, there will be .23, above .22, and .16 of a standard deviation positive change in elaboration self-regulated learning score, respectively. Meanwhile, all the standardized coefficients are statistically significant.

4.3 Investigation of the Third Research Question

The third question sought to investigate types of language learning strategies as predictors of organization self-regulated learning. To this end, a third stepwise multiple regression was run (Table 9).

TABLE 9
VARIABLES ENTERED/REMOVED[a]

Model	Variables Entered	Variables Removed	Method
1	Meta-cognitive	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Cognitive	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: organization

Model summary (Table 10) shows that the meta-cognitive strategies and organization self-regulated learning share over 14% and meta-cognitive and cognitive strategies together share above 18% of variance with organization self-regulated learning.

TABLE 10
MODEL SUMMARY[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.391a	.153	.147	2.69804	.153	26.363	1	146	.000	
2	.444b	.197	.186	2.63530	.044	8.035	1	145	.005	

a. Predictors: (Constant), meta-cognitive

b. Predictors: (Constant), meta-cognitive, cognitive

c. Dependent Variable: organization

Based on Table 11, the results of the ANOVA (F (1, 146) =26.36, p < .05; F (2, 145) = 17.83, p < .05)) show that the predictive power of both models is significant.

TABLE 11
ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	191.905	1	191.905	26.363	.000b
	Residual	1062.798	146	7.279		
2	Regression	247.707	2	123.853	17.834	.000c
	Residual	1006.996	145	6.945		

a. Dependent Variable: organization
b. Predictors: (Constant), meta-cognitive
Predictors: (Constant), meta-cognitive, cognitive

To find out how strong the relationship between the organization self-regulated learning and each of the seven predic-

tors is, the unstandardized as well as standardized coefficients of the two models, along with the observed t-values and significance levels were checked. Table 12 shows the result.

TABLE 12
COEFFICIENTS[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.735	1.085		7.128	.000
	Meta-cognitive	.153	.030	.391	5.134	.000
2	(Constant)	5.470	1.327		4.120	.000
	Meta-cognitive	.109	.033	.279	3.314	.001
	Cognitive	.116	.041	.239	2.835	.005

a. Dependent Variable: organization

Based on Table 12, the first model shows that for every one standard deviation of change in meta-cognitive strategies score, there will be about .39 of a standard deviation positive change in organization self-regulated learning score. The second model shows that when meta-cognitive and cognitive strategies are taken together, for every one standard deviation change in meta-cognitive and cognitive strategies score, there will be approximately .28 and .24 of a standard deviation positive change in organization self-regulated learning score, respectively. Meanwhile, all the standardized coefficients are statistically significant.

4.4 Investigation of the Fourth Research Question

The fourth question attempted to see which types of language learning strategies are predictors of critical thinking. To this end, a fourth stepwise multiple regression was run (Table 13).

TABLE 13
VARIABLES ENTERED/REMOVED[a]

Model	Variables Entered	Variables Removed	Method
1	cognitive	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	affective	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	compensation	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	social	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
5	.	cognitive	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: critical thinking

Model summary (Table 14) shows that the cognitive strategies and critical thinking share 18% of variance. Cognitive and affective strategies together could account for approximately 23% of the total variance in critical thinking. Cognitive, affective, and compensation strategies together share over 25% of variance with critical thinking. Cognitive, affective, compensation, and social strategies together also share over 27% of variance with critical thinking. Likewise, affective, compensation, and social strategies together share above 26% of variance with critical thinking.

TABLE 14
MODEL SUMMARY[f]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.431a	.186	.180	2.82911	.186	33.333	1	146	.000
2	.495b	.245	.235	2.73337	.059	11.407	1	145	.001
3	.521c	.271	.256	2.69538	.026	5.116	1	144	.025
4	.543d	.295	.275	2.65994	.024	4.863	1	143	.029
5	.532e	.283	.268	2.67366	-.012	2.489	1	143	.117

a. Predictors: (Constant), cognitive

b. Predictors: (Constant), cognitive, affective

c. Predictors: (Constant), cognitive, affective, compensation

d. Predictors: (Constant), cognitive, affective, compensation, social

e. Predictors: (Constant), affective, compensation, social

f. Dependent Variable: critical thinking

Based on Table 15, the results of the ANOVA show that the predictive power of the five models is significant.

TABLE 15
ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	266.792	1	266.792	33.333	.000b
	Residual	1168.565	146	8.004		
2	Regression	352.019	2	176.009	23.558	.000c
	Residual	1083.338	145	7.471		
3	Regression	389.187	3	129.729	17.857	.000d
	Residual	1046.170	144	7.265		
4	Regression	423.595	4	105.899	14.967	.000e
	Residual	1011.762	143	7.075		
5	Regression	405.981	3	135.327	18.931	.000f
	Residual	1029.375	144	7.148		

a. Dependent Variable: critical thinking
b. Predictors: (Constant), cognitive
c. Predictors: (Constant), cognitive, affective
d. Predictors: (Constant), cognitive, affective, compensation
e. Predictors: (Constant), cognitive, affective, compensation, social
f. Predictors: (Constant), affective, compensation, social

To see how strong the relationship between the critical thinking and each of the seven predictors is, the unstandardized as well as standardized coefficients of the five models, along with the observed t-values and significance levels were checked. Based on Table 16, the first model shows that for every one standard deviation of change in cognitive strategies score, there will be about .43 of a standard deviation positive change in critical thinking score. In addition, the results show that the relationship between cognitive strategies and critical thinking is statistically significant. The second model shows that when cognitive and affective strategies are taken together, for every one standard deviation change in cognitive and affective strategies score, there will be about .30 and .28 of a standard deviation positive change in critical thinking score, respectively.

TABLE 16
COEFFICIENTS[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.889	1.301		6.833	.000
	cognitive	.225	.039	.431	5.773	.000
2	(Constant)	7.640	1.310		5.831	.000
	cognitive	.156	.043	.299	3.641	.000
	affective	.119	.035	.277	3.377	.001
3	(Constant)	6.424	1.400		4.590	.000
	cognitive	.113	.046	.217	2.451	.015
	affective	.112	.035	.262	3.225	.002
	compensation	.087	.038	.184	2.262	.025
4	(Constant)	5.668	1.423		3.983	.000
	cognitive	.077	.049	.147	1.578	.117
	affective	.082	.037	.192	2.226	.028
	compensation	.092	.038	.196	2.428	.016
	social	.084	.038	.193	2.205	.029
5	(Constant)	6.362	1.360		4.677	.000
	affective	.095	.036	.222	2.632	.009
	compensation	.116	.035	.247	3.332	.001
	social	.104	.036	.241	2.908	.004

a. Dependent Variable: critical thinking

The third model shows that when cognitive, affective, and compensation strategies are taken together, for every one

standard deviation change in cognitive, affective, and compensation strategies score, there will be about .24, above .26, and .18 of a standard deviation positive change in critical thinking score, respectively. The fourth model shows that when cognitive, affective, compensation, and social strategies are taken together, for every one standard deviation change in cognitive, affective, compensation, and social strategies score, there will be above .14, .19, .19, and .19 of a standard deviation positive change in critical thinking score. All the standardized coefficients except of cognitive strategies are statistically significant. The fifth model shows that when affective, compensation, and social strategies are taken together, for every one standard deviation change in affective, compensation, and social strategies score, there will be above .22, .24, and .24 of a standard deviation positive change in critical thinking score. Moreover, all the standardized coefficients are statistically significant

4.5 Discussion

The present study attempted to investigate types of language learning strategies as predictors of cognitive self-regulated learning components. The results indicated that memory strategies are the best predictor of rehearsal self-regulated learning. In addition, meta-cognitive, affective, and memory strategies were found to be predictors of elaboration self-regulated learning. Meanwhile, meta-cognitive and cognitive strategies turned out to be significant predictors of organization self-regulated learning. Moreover, cognitive, affective, compensation, and social strategies as well as the combination of affective, compensation, and social strategies could be predictors of critical thinking.

Although many studies have been done in the field of LLS and SRL, few of them have considered the relationship between them. Nonetheless, the findings of the present study are partially in line with a number of previous studies, and in conflict with others. Based on the results of this study, there is a positive relationship between some types of LLS and cognitive self-regulated learning components. This finding corroborates the findings of Heikkilä and Lonka (2006), showing that approaches to learning, regulation of learning, and cognitive strategies were related to each other as well as to study success. On the other hand, Zarei and Haghgoo (2012) reported that the correlation between neither vocabulary and critical thinking nor grammar and critical thinking was statistically significant. The findings of the present study, on the one hand, lend support to Zarei and Shahidi Pour's (2013) findings based on which cognitive strategies were the best predictors of L2 idioms comprehension. On the other hand, these findings are in conflict with their finding that affective strategies have negative correlation with L2 idiom comprehension. The results of the present study are also in accordance with some aspects of Klassen's (1994) findings, which revealed that the most frequently used learning strategies were compensation strategies. The findings also share certain aspect with Rezaei and Almasian's (2007) results, which showed that the most commonly used strategies by both high and low creativity groups were meta-cognitive strategies.

Parts of the findings of Zarei and Azin (2013b) were to some extent similar to those of this study, and other parts were different from those of the present study. Although they did not work on LLS, they considered other predictors of cognitive self-regulated learning. They found that verbal and existential intelligences among other components of MI were best predictors of cognitive self-regulated learning.

5 Conclusion

The present study investigated language learning strategies as predictors of cognitive self-regulated learning components. The results indicated that memory strategies were a significant predictor of rehearsal self-regulated learning. Based on the results, meta-cognitive, affective, and memory strategies were positive predictors of elaboration self-regulated learning. The findings also showed that meta-cognitive and cognitive strategies were positive predictors of organization self-regulated learning. In addition, it turned out that cognitive, affective, and compensation strategies were significant predictors of critical thinking.

Based on the results, it is concluded that there are significant relationships between language learning strategies and cognitive self-regulated learning components. It can be concluded that LLS can be predictors of cognitive self-regulated learning components. Moreover, the findings showed that there are differences among the various combinations of language learning strategies as predictors of cognitive self-regulated learning because when cognitive, affective, and compensation strategies were taken together, all the standardized coefficients were significant, but when social strategies were added to this combination, the relationship between cognitive strategies and critical thinking became statistically insignificant.

The present study may have implications for teachers, learners and materials developers. The finding of the present study can help teachers to find better ways of teaching to introduce strategies and cognitive self-regulations components. If students learn about their ability and the way they use language learning strategies, they can enhance their success in language learning and monitor their own learning. Moreover, it can be useful for material developers and instructional book designers to consider the correlation of LLS and self-regulated learning in developing materials and course books which support learners with the best possible instruction.

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