

Exploring the Relationship Between Critical Thinking, Reading Comprehension and Reading Strategies of English University Students

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Abstract: Active learning takes place in a context in which freedom of action is dominant and opportunities for the realization of integrative critical thinking and language skills are provided. Critical thinking is that sort of higher order thinking that helps learners act critically through using problem-solving strategies [1]. In the same vein, reading as a problem solving activity [2] necessitates a good command of thinking on the part of learners. This study investigated the relationship of critical thinking ability, reading comprehension and reading strategy use among 70 male and female Iranian university students majoring in English Translation and English Literature. The data was collected through the TOEFL (Test of English as a Foreign Language) reading comprehension test, a critical thinking ability test and Reading Strategy Inventory. The findings reveal that there was a significant positive relationship between Iranian English as a Foreign Language (EFL) readers' critical thinking ability and reading strategy use, in general and metacognitive and cognitive reading strategy use, in particular. Moreover, a significant positive relationship was observed between critical thinking and reading compensation. The results also revealed that cognitive and affective strategies along with critical thinking ability act as the best predictors of reading comprehension.

Key words: Reading • Critical Thinking ability • Comprehension • Strategies • Cognitive Strategies
• Metacognitive Strategies

INTRODUCTION

We live in a century, which has been described as "Information Era". This refers to the age in which information is rapidly changing and developing day to day. To be able to keep up with such increasing changes and developments, not only should individuals be able to send and receive messages effectively and negotiate meaning, but they should also be able to think critically on what happens around them. As individual human being is constantly receiving a great deal of data from different sources of information all over the world, this large bulk of information necessitates him/her to select the data through thinking critically. The same is true for language learners. They are constantly exposed to different types of texts which require them to be able to use reading as well as thinking skills simultaneously. As far as language education is concerned, enabling students to become good language learners has always

occupied the minds of authorities and they have been always attempting to find easy ways to facilitate it.

Elder and Paul pointed out that "to learn well, one must read well" [3] (p. 37). Likewise, Cook regarded reading primarily as a thinking process and highlighted the importance of engaging the students in talking about the text they read while using reading strategies [4]. The readers are constantly dealing with a complex interaction between text, setting, reader, reader background, reading strategies, the L1 and L2 and reader decision-making [5]. It necessitates them to be able to evaluate the text critically. In other words, in order to understand the text and facilitate this complex interaction, they need to be critical thinkers; that is, to learn to value their own thinking, to compare their thinking and interpretations with others, to reexamine or reject the parts of the process in which they value their thinking and interpretations and to compare them with others when it is necessary [6].

Strategies are defined as intentional actions facilitating reading at any level of processing. The idea of strategic learning of reading became the matter of investigation in recent years [5]. In fact, considering reading as a problem-solving activity [2], which is affected by diverse factors, leads to adopting a strategic approach in learning the skill. A plethora of research has been done over the last decade on the relationship between reading comprehension ability and the use of reading strategies. However, a few studies (e.g., [27], [28]) have dealt with the role of critical thinking in second language (L2) reading. It seems that the role of critical thinking ability as a process of problem solving and decision making has been ignored in the process of reading these years. This study sought to fill the gap and find out whether there is any relationship between Iranian university students' critical thinking ability, reading comprehension and reading strategy use.

Reading Strategies: Reading is a complex and long lasting process [7]. In the process of reading, readers and writers interact through a text [8]. That means, readers extract meaning from the text and reconstruct it by combining information from text and their background knowledge. Firstly, this definition reflects the idea that three factors are equally influential in the process of reading: writer, reader and text. Secondly, it implies that *comprehension* is the main goal of reading; and from a psycholinguistic point of view, this comprehension is the end product of a rather complicated mental process in which the author encodes thought in the form of language (linguistic data) and the reader decodes language to thought [9]. Therefore, from this perspective, reader plays the role of an "active information processor" [9] (p. 3).

A plethora of researchers has considered reading strategies as the quintessence of successful comprehension (e.g., [7]). In the same vein, strategies are defined as intentional actions facilitating reading at any level of processing [5]. Researchers have differently classified learning strategies (e.g., [10]) but one classification which is more comprehensive is based on the work of [11]. In this classification, learning strategies consist of cognitive, metacognitive, compensation, memory, affective, social and textual strategies.

Ozek and Civelek conducted a study on different strategies used by native and non-native English speakers while reading academic materials. The results were fourfold. Firstly, all the participants demonstrated awareness of almost all of the strategies. Secondly,

metacognitive strategies and cognitive strategies were among those to which the participants regardless of their level of reading ability and gender, attributed the same order, respectively. Thirdly, the participants with high reading ability manifested a proportionate degrees of higher use of cognitive and metacognitive reading strategies than the low-reading ability participants [13].

Types of reading strategies which were mostly adopted by ELT students when reading a text and for which reading strategies were needed to be developed in order for better understanding of the text were also investigated. The researchers found that there were some significant differences on the effective use of cognitive reading strategies with regard to students' gender, age and proficiency in reading and duration in learning English [13].

In the study conducted in 2008 [14], students were taught metacognitive strategies. The purpose of the researcher was to determine the effectiveness of systematic direct instruction of multiple metacognitive strategies which aid students in comprehending text. The findings suggested a significant positive impact of metacognitive strategy training on enhancing reading comprehension skills.

In the same vein, the role of underlining strategy intervention was investigated in order to see how strategy training could be implemented most effectively with the aim of improving EFL students' reading comprehension. Here, strategy training that was engaged to facilitate Iranian university learners' EFL reading comprehension had a strong effect on the reading comprehension outcomes. In addition, findings indicated that proficiency could not play a significant role in underlining strategy intervention [15].

Critical Thinking: Critical thinking approach to learning has been applied 2000 years ago for the first time by Socrates who was interested in carefully questioning peoples' claims, seeking evidence and reasons and analyzing concepts to figure out what to believe [16]. John Dewey, the American philosopher, psychologist and educator, calls it "reflective thinking" and defines it as "the kind of thinking that consists in turning a subject over in the mind and giving it serious consecutive considerations" (cited in [17], p. 112). Later on, scholars in the field proposed a variety of definitions. But there is a large area of overlap among these definitions [18]. For instance, it has been defined as healthy skepticism [19] or as "reasonable and reflective thinking that is

focused upon deciding what to believe and do” [20] (p. 2). Levy [21] also defines critical thinking as an active and systematic cognitive strategy to examine, evaluate, understand events, solve problems and make decisions based on sound reasoning and valid evidence. Therefore, it can be stated that critical thinking involves a number of abilities such as identifying a problem and the assumptions on which it is based, analyzing, understanding and making use of inferences, inductive and deductive logic and judging the validity and reliability of assumptions and sources of data. From another point of view, critical thinking is defined as learning how to ask and answer questions of analysis, synthesis and evaluation [22]. It seems that the top three categories of Bloom's cognitive Taxonomy of educational objectives (analysis, synthesis and evaluation) are equated with critical thinking [17]. Over the last 20 years, a number of educators and psychologists (e.g., [23]) have highlighted the inclusion of critical thinking skills in the curriculum, since it is believed that the principal purpose of education is to teach learners how to think critically in order to be effective and competent citizens in real world [17]. Besides, Dewey points out that if learners do not reflectively think about the content they are studying, the knowledge cannot be useful. That is, memorizing content knowledge means ignoring the development of critical thinking [17]. As a result, Clement and Lochhead claimed that the principal purpose of education is to teach learners how to think rather than what to think (cited in [23]).

As far as language education is concerned, the main goal is to educate learners to master four principal skills of reading, writing, listening and speaking. To fully understand a text and having this process facilitated, language learners need to master reading skill as a complex problem-solving activity [2]. Several studies confirmed that critical thinking is related to language learning in general and reading comprehension, in particular.

For example, a research was conducted on the relationship between the critical thinking ability of test takers and their performance on the reading section of PBT (paper-based TOEFL). Eighty-nine advanced female students from a variety of academic backgrounds, learning English at a private language institute in Iran were administered three tests, namely Watson–Glaser Critical Thinking Appraisal-Form A, the Reading Section of general training IELTS and the Reading Section of PBT (paper-based TOEFL). The results indicated that there was a positive, high correlation between the two

variables. The researcher finally mentioned some implications regarding MDI (Measurement-Driven Instruction) reading courses which aimed at providing learners with some handy strategies to boost their performance on high stakes language proficiency tests [24].

The impact of structured reading lessons on the development of critical thinking skills in college students learning English as a foreign language was examined; the findings showed that students, who received structured reading lessons, had better performance on California Critical Thinking Skills Test (CCTST) in comparison to those who received traditional reading instruction [25].

A research project on measuring the high-school students' level of critical reading skills and identifying the relationship (if any) between students' critical reading levels and critical thinking dispositions and reading frequency in both English and Turkish was done by Isik. Data were gathered through two scales, namely, Critical Reading Scale and California Critical Thinking Dispositions Inventory. The results revealed a positive and direct correlation, though not significant, between the students' critical reading levels and their critical thinking dispositions. Regarding the relationship between the students' critical reading levels and reading frequency, the findings showed that there is no relationship between these two variables [26].

The relationship between critical thinking ability, resilience and reading comprehension of texts containing unfamiliar vocabulary items was examined by Fahim and Kamali. They found that learners with higher critical thinking ability and resilience had better performance on reading texts with unknown words [27].

Finally, Fahim and Saeepour investigated the impact of teaching critical thinking skills on reading comprehension of Iranian EFL learners. Using debate in the classroom as a kind of critical thinking activity, the researchers administered a validated reading comprehension test and a standard critical thinking appraisal test to the participants. After the treatment, the results showed that teaching critical thinking skills could enhance readers' reading comprehension ability [28].

Method

Participants: The participants were 70 randomly selected junior and senior EFL students, who were homogeneous in terms of their language proficiency, majoring in English Literature and English Translation at Arak University and Shahrekord University. The participants consisted of both

male and female students, ranging in age from 21 to 27 years old. They were a representative sample of Iranian EFL learners because they were admitted from all over the country.

Instrumentation

TOEFL Reading Comprehension Test: First, the TOEFL reading comprehension test (1996) was used in order to find out the learners' reading comprehension ability. The test was composed of 50 multiple-choice items and students were expected to answer them in 45 minutes. The test is a standard test and its reliability and validity is approved. However, for the purpose of this study, the researcher piloted it on a group of 130 Iranian EFL learners in the context of Iran and the Cronbach's alpha was 0.88.

Reading Strategies Inventory: To determine the reading strategies of the participants, a 34-item reading strategies inventory was used. It is a 4-point Likert scale ranging from 'not at all' (1) to 'most of the time or frequently' (4). The reliability estimate of the test using Cronbach's alpha was assessed via a study examining the positive influence of the reading strategy instruction on students' reading comprehension. Its reliability is .78 [29].

Critical Thinking Ability Test: A Persian version of the California Critical Thinking Skill Tests (CCTST), Form B was used to determine participants' critical thinking ability. This test is considered as a standard test and has been used in most studies in the fields of Education and Psychology extensively. The Form B of the test has been designed to measure individuals' critical thinking skills at university level. The CCTST measures five core skills listed as follows:

Analysis: The ability of classification, interpretation, recognition and analysis of ideas;

Inference: The ability to draw inferences and evaluate the truth and falsity of inferences drawn from given data;

Evaluation: The ability to distinguish claims and opinions from argument, give reasons and express outcomes;

Deductive Reasoning: The ability to determine whether certain conclusions necessarily follow from information in given statements or premises;

Inductive Reasoning: The ability to conclude from the statements and arguments and to make judgment based on the assumptions, facts, ideas and logical reasoning.

The CCTST consists of 34 items each followed by four or five alternatives. The recommended time for participants to complete the test is 45 minutes. It should be stated that for answering these questions, participants do not need to possess knowledge in specific area. The test developers maintain that the CCTST has been designed based on some general background knowledge, developing gradually in the process of natural maturation and within the years of education in schools or academic settings.

The reliability of the test computed through Kuder-Richardson Formula (KR-20) is reported between 0.78 and 0.80. In this study, the Persian version of the test of which the reported reliability is 0.62, was used. In addition, the test enjoys an acceptable level of concurrent validity [30].

Procedure: First, the TOEFL reading comprehension test was administered. Second, to determine the learners' critical thinking ability, the 34-item critical thinking skills test was used. Finally, the Reading Strategy Inventory was used to indicate the extent to which the Iranian EFL readers utilize reading strategies.

Data Analysis: The data were submitted to the Statistical Package for the Social Sciences (SPSS version 15) for analysis. To determine the critical thinking ability and reading strategies of the participants, the descriptive statistics were computed. Then, Pearson product-moment correlation was run to find the relationship among the participants' critical thinking, reading comprehension and each type of reading strategies. In order to predict the value of dependent variable (reading comprehension), from a number of independent variables (critical thinking and reading strategies) and to see which variables are the best predictor of dependent variable (reading comprehension), multiple regression analysis was run.

The descriptive statistics was first obtained to find out the participants' critical thinking ability and most frequent use of reading strategies. The results are displayed in Table 1.

As Table 1 shows, the mean scores of students in terms of critical thinking was 12.01 ($SD=4.12$). The mean scores of students in terms of their reading comprehension ability was 15.7. The mean scores of reading strategies utilized by the Iranian L2 readers

Table 1: Results of the Descriptive Statistics for Reading Strategies

Category	N	Min	Max	Mean	Std. Dev.
Critical thinking	70	5	20	12.01	4.12
Reading comprehension	70	4	27	15.7	7.58
Cognitive	70	17.00	38.00	28.71	5.63
Compensation	70	3.00	4.00	3.47	.53
Memory	70	5.00	15.00	9.94	2.66
Metacognitive	70	13.00	28.00	19.97	4.76
ffective	70	0.00	4.00	2.54	1.16
Social	70	0.00	11.00	8.52	1.91
Textual	70	3.00	12.00	9.12	1.91
Valid N (listwise)	70				

Table 2: Results of Pearson Product-moment Correlation for Critical Thinking, Each Reading Strategies and Reading Comprehension

Variables	Cog.	Compen	Memory	Metacog.	Affect.	Social.	Tex	Reading com.	CT	N
Cognitive		-.163	.190	.0494**	-.42	-.168	-.02	.722**	.768**	
Sig. (2-tailed)	1	.178	.116	.000	.728	.164	.987	.000	.000	70
Compensation	-.163		-.032	-.046	.190	.122	.282*	-.097	-.102	
Sig. (2-tailed)	.178	1	.794	.705	.116	.315	.018	.425	.392	70
Memory	.190	-.032		.224	.131	-.065	.010	.133	.236*	
Sig. (2-tailed)	.116	.794	1	.062	.278	.594	.935	.271	.050	70
Metacognitive	.494**	-.046	.224		.000	.157	.156	.681**	.739**	
Sig. (2-tailed)	.000	.705	.062	1	.999	.194	.196	.000	.000	70
Affective	-.042	.190	.131	.000		.227	.086	.058	.002	
Sig. (2-tailed)	.728	.116	.278	.999	1	.059	.481	.635	.989	70
Social	-.168	.122	.065	.157	.227		.302*	-.043	.010	
Sig. (2-tailed)	.164	.315	.594	.194	.059	1	.011	.721	.934	70
Textual	-.002	.282*	.010	.156	.086	.302*		-.019	-.046	
Sig. (2-tailed)	.987	.018	.935	.196	.481	.011	1	.875	.704	70
Reading Comprehension	.722**	-.097	.133	.681**	.058	-.043	.019		.905**	
Sig. (2-tailed)	.000	.425	.271	.000	.635	.721	.875	1	.000	70
Critical Thinking	.768**	-.102	.236*	.739**	-.002	.010	-.046	.905**		
Sig. (2-tailed)	.000	.399	.050	.000	.989	.934	.704	.000	1	70

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

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

Table 3: Results of Pearson Product-moment Correlation for Critical Thinking, Reading Comprehension and Reading Strategies in general

Variables	Reading strategies	Critical Thinking	Reading Comprehension
Reading strategies	1	.785**	.701**
Sig. (2-tailed)		.000	.000
Critical Thinking	.785**		.905**
Sig. (2-tailed)	.000	1	.000
Reading Comprehension	.701**	.905**	
Sig. (2-tailed)	.000	.000	1

Table 4: The Model Summary of Standard Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.917 ^a	.841	.821	3.23691

^a. Predictors: (Constant), Textual, Metacognitive, Memory, Compensation, Cognitive, affective, Social, Reading strategy and critical thinking

Table 5: The ANOVA Results of Standard Multiple Regression Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3389.567	8	423.696	40.438	.000 ^a
	Residual	639.133	61	10.48		
	Total	4028.700	69			

Table 6: Results for Regression Analysis of Reading Strategies, Critical Thinking and Reading Comprehension

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	-2.542	4.468		.569	.572
	Reading Strategy	.075	.352	.211	2.123	.037
	Critical thinking	1.583	.203	.855	7.813	.000
	Cognitive	.055	.117	.063	.472	.619
	Metacognitive	.098	.131	.061	.753	.454
	Compensation	.303	.791	-.021	-.383	.703
	Memory	-.313	.153	-.109	-2.039	.046
	affective	.637	.354	.097	1.798	.077
	Social	-.370	.232	-.093	-.1594	.116
	Textual	.150	.234	.038	.642	.523

a. Dependent Variable: Reading comprehension

ranged from 3.47 to 28.71. The affective and compensation strategy categories received the minimum score and the cognitive and metacognitive strategy categories the maximum score. The above results revealed that the participants perceived themselves stronger at metacognitive ($M = 19.97$, $SD = 4.76$) and cognitive ($M = 28.71$, $SD = 5.63$) and weaker at affective ($M = 2.54$, $SD = 1.16$) and compensation ($M = 3.47$, $SD = .53$) strategies.

Pearson product-moment correlation coefficients were computed to explore the relationship between reading strategies and critical thinking ability. Furthermore, preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results are presented in Table 2.

The results from Table 2 indicate that there was a large positive relationship between Iranian L2 readers' critical thinking, in general and cognitive strategies ($r=.768$, $n=70$, $p=.000$), metacognitive strategies ($r=.739$, $n=70$, $p=.000$) and reading comprehension ($r=.905$, $n=70$, $p=.000$). Moreover, a large, positive relationship was found between reading comprehension, in general and cognitive strategies ($r=.722$, $n=70$, $p=.000$) and metacognitive strategies ($r=.681$, $n=70$, $p=.000$) in particular. Moreover, a small, positive relationship was found between critical thinking and memory strategies ($r=.236$, $n=70$, $p=.050$).

In order to find out whether there is a relationship between reading strategies in general and reading comprehension and critical thinking, Pearson product-moment correlation coefficients were also computed. The results are displayed in Table 3.

As Table 3 shows, there is a large, positive relationship between Iranian EFL readers' reading strategies, in general and critical thinking ($r=.785$, $n=70$, $p=.000$) and reading comprehension ($r=.701$, $n=70$, $p=.000$).

Moreover, there is a large, positive relationship between critical thinking and reading comprehension ($r=.905$, $n=70$, $p=.000$).

A standard multiple regression was run to assess the ability of reading strategy use and critical thinking to predict the reading comprehension ability of the Iranian EFL readers. Preliminary analyses were also conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. The results supported the appropriateness of multiple regression analysis. The results for this regression analysis are presented in Tables 4, 5 and 6.

As Table 4 indicates, 84 per cent of the variance in Iranian EFL readers' reading comprehension was explained by the model as a whole including textual, metacognitive, memory, compensation, cognitive, affective, social, general reading strategy use and critical thinking ability.

Table 5 and 6 show that the model reached a statistical significance, $F(8, 61)$, $p < 0.0005$. The B-values for the variables affective strategies (.097, $p=.077$), critical thinking (.855, $p=.000$) and general reading strategy use (.211, $p=.037$) were significant; that is, affective, critical thinking and general reading strategy use made statistically significant contributions to the prediction of the participants' reading comprehension.

RESULTS AND DISCUSSION

The results indicated that there was a large, positive relationship between the Iranian EFL learners' use of cognitive strategies and their reading comprehension ability and critical thinking. This result is in line with [31]. In that study, there was a significant relationship between Iranian EFL learners' critical thinking and their use of direct language learning strategies including cognitive,

metacognitive and compensation strategies. In terms of the relationship between the use of indirect strategies and critical thinking, only the social strategy was found to have such a relationship. This finding of [31] was not in consistence with that of the present study.

Moreover, the other result of the present study was that affective, general reading strategy use and critical thinking made significant contributions to the prediction of participants' reading comprehension ability. This finding is not in line with that of [31]. That study found that indirect language learning strategies including cognitive, metacognitive and social strategies were considered as the predictor variables. In fact, reading is considered as an information processing activity which includes a series of complex cognitive processes. It seems poor readers suffer from problems in multiple reading processes and if they are instructed how to apply reading strategies when encountering with problem, their performance improves [32].

The other finding of the present study was that a small, positive relationship was found between Iranian EFL readers' use of memory strategies and their critical thinking ability. Memory is the simplest and lowest levels of thinking and requires the recall and recognition of information. It involves the ability to remember or identify information that has already been provided. Thus, an activity employing this level of thinking would occur if the students were asked to re-order a jumbled set of instructions relating to a text of some kind that they had been studying [33]. The results of this study confirmed the fact that critical thinking necessitates the presence of memory capacity on the part of readers while reading a text.

The results also indicated that Iranian EFL learners had used more cognitive and metacognitive strategies in comparison with affective, memory, social and textual strategies. This finding is similar to that of [34] and [35]. They found that the use of cognitive and metacognitive strategies was higher among good readers. Metacognition is an indispensable part of reading skills and effective reading necessitates some awareness and control of the cognitive activities on the part of readers [36]. On the other hand, participants in this study utilized affective and compensation strategies less frequently. In the study conducted by Paris and Meyers [35], a contradictory piece of finding was found. They observed compensation strategy use as the most frequently utilized types of strategy among readers. Furthermore, they asserted that "the acquisition of strategic reading depends on the corresponding development of cognitive and metacognitive capabilities" [37] (p. 217).

The findings of this study confirmed the large, positive relationship between learners' reading comprehension ability and their critical thinking, which is in line with [24]. That study came to the conclusion that test takers with higher critical thinking abilities showed better performance on reading comprehension section of TOEFL. Fahim and Kamali has also found that learners with higher critical thinking ability and resilience had better performance on reading texts with unknown words [27]. Moreover, Fahim and Saeepour investigated the impact of teaching critical thinking skills on reading comprehension of Iranian EFL learners [28]. Gomez also concluded that students, who received structured reading lessons had better performance on critical thinking skills test in comparison with those who received traditional reading instruction [25].

CONCLUSION

To sum up, this study showed that there is a large, positive relationship between critical thinking and reading comprehension ability of Iranian EFL learners in general. Moreover, a large, positive relationship was observed between Iranian EFL learners' critical thinking and their reading strategies. In terms of the sub-strategies of reading, a large, positive relationship was found between EFL readers' use of cognitive and metacognitive strategies and their critical thinking ability. It was also shown that affective strategies along with critical thinking and general reading strategy use were among the predictors of learners' reading comprehension ability.

These findings might be helpful to those who develop curriculum for EFL teachers to include purposeful course(s) of reading with the purpose of training capable and competent critical readers as well as critical thinkers. In addition, it might be of benefit to those who teach English, particularly reading courses to employ their creativity and include appropriate tasks and activities to enhance learners' critical reading skill along with their critical thinking ability.

As far as language education is concerned, in the context of English as a foreign language, learners should be prepared for the world outside their societies. Moreover, evidence shows many students' readiness for and need of critical thinking abilities [38]. In the same vein, to be able to think like members of the target community, EFL learners must be exposed to teaching which enables them to have freedom of voicing their thoughts and experiences. This can be accomplished in language learning/teaching context. Indeed, such a context provides learners with opportunities for

developing their critical thinking [39]. The present study may encourage the instructional training of the underlining strategy in facilitating Iranian university students' EFL reading comprehension.

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