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Meta-cognitive Awareness of Reading Strategies of Iranian Graduate Students across Different Disciplines

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Abstract

The current study aimed to investigate meta-cognitive awareness of reading strategies among Iranian graduate students across different disciplines and the possible differences in meta-cognitive awareness and using categories of meta-cognitive strategies as well as the reasons of high meta-cognitive awareness of some students. This study conducted a mixed method approach. For the quantitative part, 80 graduate students filled out *Survey of Reading Strategies (SORS)* by Mokhtari and Sheorey (2002) and for the qualitative part, 30 graduate students took part in semi- structured interviews. The results of this study indicated that all participants were generally highly aware of meta-cognitive reading strategies. One- Way ANOVA showed that there was a significant difference in using categories of meta-cognitive reading strategies. Interview findings also demonstrated that highly meta-cognitive aware students had a background in learning reading strategies. The SORS questionnaire could be modified by adding two more strategies of “Reviewing” and “Making the English word resemble a word in the mother tongue” disclosed through the interview analyses.

Keywords: Meta-cognition, Meta-cognitive reading strategies, Global reading strategies, Problem-solving reading strategies, Support reading strategies.

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Introduction

Goodman (1995) considered reading (in AD-Heisat et al, 2009) as the receptive process of written communication. According to him reading begins with a linguistic surface expression encoded by a writer and ends with meaning which the reader decodes. On the other hand, Grabe (1991) stated that reading is not merely a receptive process of picking up information from the page in a verbatim manner but it is a selective process which is characterized as an active process of comprehending.

The task of reading necessitates a bulk of strategies including “adjusting the reading speed, skimming ahead, considering titles, heading, pictures and text of structure information, anticipating information to come, and so on” (Grabe, 1991, p. 379). Therefore, integration and application of multiple strategies or skills such as control of planning, monitoring, repairing, revising, summarizing, and evaluating used by readers indicate their meta-cognitive awareness. Oxford (2003) stated that meta-cognitive reading strategies are used to manage the learning process overall. Meta-cognitive strategies refer to activities done by readers to control or monitor and evaluate their own comprehension while reading texts. Meta-cognitive reading strategies help the EFL readers to understand, control, and manipulate their reading strategies and choose the right tools to solve their problems while reading articles in English. Successful readers are usually aware of the reading strategies and use them effectively to increase their reading comprehension. In order for the students to be strategic learners, it is essential to enhance their awareness of reading strategies. Being aware of such reading strategies, graduate students would be able to apply and convey the learned knowledge in reading skill to the writing skill and improve their writing skill as well.

Reading skill has a paramount position in academic contexts. Generally speaking, Iranian University students particularly those majoring in different disciplines such as Social Sciences programs including TEFL and Linguistics, Natural Science programs, and Engineering programs at graduate level have to read academic research articles in English as part of their program requirements. To accomplish this task, they use different reading strategies including meta-cognitive reading strategies.

Literature Review

Meta-cognition

John Flavell first introduced the term meta-cognition in 1970s to mean “cognition about cognitive phenomena” (Flavell, 1979, p. 906). Further, a more comprehensive definition was presented by Hennessey as follows (1999, p. 3):

meta-cognition is awareness of one’s own thinking, awareness of the content of one’s conceptions, an active monitoring of one’s cognitive processes, an attempt to regulate one’s cognitive processes in relationship to further learning, and an application of a set of heuristics as an effective device for helping people organize their methods of attack on problems in general.

Meta-cognition has two constituents: knowledge about cognition (meta-cognitive awareness) and meta-cognitive regulation or control (Flavell, 1987, Cross & Paris, 1988; Singhale, 2001; Karbalaeei, 2010). Flavell (1979) stated that cognitive knowledge is the knowledge about variables and factors that influence the description and outcome of cognitive enterprises. He classified this Knowledge into three categories: *person knowledge*, *task knowledge*, and *strategy knowledge*. 1) *Person knowledge* refers to the beliefs about oneself or others as cognitive processors. 2) *Task knowledge* includes knowledge about understanding the demands of different tasks and 3) *strategy knowledge* is related to knowledge of what strategies are effective to accomplish goals and subgoals in cognitive undertakings. Flavell (1979) noted that these different types of knowledge can interact, as in the belief that one should use strategy A (versus strategy B) to solve task X (rather than task Y).

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Other researchers offered a different category for meta-cognitive knowledge which includes declarative, procedural, and conditional knowledge (Jacobs & Paris, 1987; Schraw & Moshman, 1995). Schraw et al. (2006) portrayed declarative cognitive knowledge as knowledge about oneself as a learner and what factors might influence one's performance. Procedural knowledge, in contrast, refers to knowing "how" to do things (Schraw, 1995, p. 114). Finally, Schraw (1995) defined conditional knowledge as knowing the "why" and "when" aspects of cognition (p. 114).

The other component of meta-cognition is meta-cognitive regulation or control which Schraw (1995) referred to as "a set of activities that help students control their learning [which] improves performance in a number of ways, including better use of attentional resources, better use of existing strategies, and a greater awareness of comprehension breakdowns" (p. 114). Meta-cognitive regulation includes three categories of planning, monitoring or regulating, and evaluation (Cross & Paris, 1988; Paris & Winograd, 1990; Schraw & Moshman, 1995; Schraw et al, 2006; Whitebread et al., 2009). Planning involves the choice of particular strategies to reach desired goals and includes "goal setting, activating background knowledge, and budgeting time" (Schraw et al, 2006, p. 114). On the other hand, monitoring includes the self-testing skills necessary to control learning. And evaluation refers to "appraising the products and regulatory processes of one's learning; typical examples include re-evaluating one's goals, revising predictions, and consolidating intellectual gain" (Schraw et al, 2006, p. 114).

Meta-cognition and reading

Meta-cognitive knowledge involves monitoring of successful comprehension of written materials by readers as well as active use of reading strategies to promote and repair comprehension problems (Dhanapala, 2010). When learners who are meta-cognitively aware, confront difficulties in learning, they know what to do. In other words, they possess strategies that help them find out what they are required to do. When meta-cognitive strategies are utilized, particularly among learners who are struggling, they ignite one's thinking and lead to deeper learning and improved performance (Ramesh, 2009).

Successful readers generally indicate a higher degree of meta-cognitive awareness, which enables them to use reading strategies more effectively and efficiently than their unsuccessful peers (Sheorey & Mokhtari, 2001; Zhang, 2001). Investigation of reading comprehension among skilled and unskilled readers has shown the importance of meta-cognitive awareness (Mokhtari & Reichard, 2002). Paris and Jacobs (1984) expressed that skilled readers are often involved in "deliberate activities that require planful thinking, flexible strategies, and periodic self-monitoring. They think about the topic, look forward and backward in the passage, and check their own understanding" while poor readers do not employ those skills and apparently overlook using these strategies (Mokhtari and Reichard, 2002, p. 249).

Studies on the effect of reading-strategy instruction on reading improvement (Macaro & Erler, 2008; Farrell, 2001) have shown that reading strategies can be taught and that once students' meta-cognitive knowledge about reading strategies and strategy use is developed, they will become better readers (Zhang, 2008). Researchers have shown that students' awareness of their own reading comprehension processes can be enhanced through systematic, direct instruction (Paris & Winograd, 1990).

Many studies have investigated students' meta-cognitive awareness of reading strategies. Xianming (2007) conducted a study on the meta-cognitive awareness of 74 freshman college students by asking them to accomplish the Meta-cognitive Awareness of Reading Strategies (MARS) questionnaire (Mokhtari & Reichard, 2002). Then the participants were interviewed and observed. The results of the study indicated that the most common strategies used were re-reading, encircling and underlining, translating English words into Chinese and answering reading questions before beginning to read. In another study done by Zhang and Wu (2009) meta-cognitive awareness of 270 Chinese high school students were assessed using the Survey

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of Reading strategies (SORS) questionnaire. The results showed that the students used three categories of global, problem solving, and support strategies at a high-frequency level.

Some other studies have compared EFL and ESL readers. Karbalaei (2010) used the same MARSII questionnaire to examine whether there were any significant differences between Iranian EFL students and Indian ESL students in the use of meta-cognitive reading strategies while reading academic texts in English. The findings of this study reported some differences and similarities between EFL and ESL readers in their use of meta-cognitive strategies. The reported differences referred to the use of two subscales of meta-cognitive reading strategies: global and support reading strategies. Concerning the global reading strategies, Indian students scored higher. With respect to support reading strategies, again the Indian students enjoyed the upper hand. However, both subject groups used problem-solving reading strategies in the same way. In other words, no significant differences in using problem-solving reading strategies were found between the two groups.

Ghyasi, Safdarian, and Amini Farsani (2011) conducted a study on meta-cognitive awareness of reading strategy of Iranian EFL learners at higher education level. A total of 194 undergraduate students majoring in English at different universities in Tehran filled out the *Survey of Reading Strategy (SORS)* by Mokhtari and Sheorey (2002). 16 students were also interviewed. The findings of the study represented that the participants were moderately aware of reading strategies and the most frequently used strategies were problem-solving, followed by global, and then support strategy. Interview findings revealed that some problem-solving strategies (e.g. making connections between text and one's prior knowledge, searching for the main ideas of each paragraph, skimming/scanning, etc.) were not covered in the questionnaire. On the other hand, the support strategies, which were mostly assessed by the questionnaire, were not reported by the interviewees.

The significance of this study lies in the fact that although there are large number of researches which have investigated meta-cognitive awareness of reading strategies and their related areas (Ilustre, 2011; Temur & Bahar, 2011; Dhanapala, 2010; Tercanlioglu, 2004; Sheorey & Mokhtari, 2001; Hong-Nam & Leavell, 2011; Chen, Gualberto, & Tameta, 2009; Ciascai & Haiduc, 2011), few studies have dealt with the investigation of meta-cognitive awareness of reading strategies used by Iranian university students particularly at M.A. level across different disciplines in spite of the need (Shokrpour & Nasiri, 2011; Tahamtani Torkamani, 2010; Keshavarz & Assar, 2009; Zaree-ee, 2007). Therefore, the present study makes an attempt to fill this gap. So, this study was guided by the following research questions:

1. Are Iranian graduate students across different disciplines aware of meta-cognitive reading strategies while reading English research articles?
2. Are there any differences among Iranian graduate students of different academic disciplines with respect to the meta-cognitive awareness of reading strategies and categories of meta-cognitive strategies while reading English research articles?
3. How come some Iranian graduate students are more aware of meta-cognitive reading strategies?

Methodology

Design of the study

This study followed a mixed method approach to explore meta-cognitive awareness of Iranian graduate students across different disciplines while reading academic research articles in English. Mixed method integrates both quantitative and qualitative research method approaches to provide a much more detailed and comprehensive picture of the issue under study.

Quantitative method was used in this research to answer the first two research questions through the *Survey of Reading Strategies (SORS)* by Mokhtari and Sheorey (2002) and One- Way

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ANOVA. Qualitative method was employed in this research to answer the third research question by semi-structured interviews.

Participants

In the quantitative phase, 80 graduate students (39 males and 41 females) majoring in different disciplines from three colleges of Language and Humanities (7 TEFL (Teaching of English as a Foreign Language), 7 Linguistics, 9 Geography students), Natural Science (8 Biology, 11 Chemistry, and 8 Physics students), and Engineering (8 Electronic Engineering, 6 Mechanical Engineering, 7 Computer Engineering, and 9 Civil Engineering students) from Razi University of Kermanshah, Iran were chosen based on the availability to fill out Survey of Reading Strategies (SORS). Some of the participants were in the first year of the graduate program while others were in their second year or about to be graduated. The age of the participants of this study ranged from 22- 40. The participants for the qualitative phase consisted of 30 graduate students (15 males and 15 females), who had filled out SORS. The results of analyzing quantitative data indicated that some students were more aware of meta-cognitive reading strategies according to Mokhtari and Sheorey's (2002) interpretation key of the SORS questionnaire considering mean level of strategy use by participants which were presented as high (mean of 3.5 or higher), moderate (mean of to 3.4), and low (mean of 2.4 or lower moderate (2.5 to 3.4), and low (2.4 or lower). Therefore, mostly those students who fell into "highly aware" category were chosen purposefully to be interviewed.

Data collection instruments

The present study used the *Survey of Reading Strategies (SORS)* instrument, developed by Mokhtari and Sheorey (2002) to find out Iranian graduate students' meta-cognitive awareness and differences in their strategy use across different disciplines while reading research articles in English. SORS is an adaption of *Meta-cognitive Awareness of reading strategies Inventory (MARS)* developed by Mokhtari and Reichard (2002) which was utilized to measure native adolescent and adult English readers' meta-cognitive awareness and perceived use of reading strategies while reading academic or school-related materials. Then, Mokhtari and Sheorey (2002) developed *The Survey of Reading Strategies (SORS)* revising MARS to measure EFL/ESL readers' meta-cognitive awareness and their perceived use of reading strategies.

SORS measures three broad categories of reading strategies, namely, global reading strategies, problem-solving strategies, and support strategies. These categories are defined by Mokhtari and Sheorey (2002) as follows:

Global Strategies (GLOB) which contained 13 items refers to those intentional, carefully planned techniques by which learners monitor or manage their reading, such as having a purpose in mind, previewing the text as to its length and organization, or using typographical aids and tables and figures.

Problem-Solving Strategies (PROB) containing 8 items are the actions and procedures that readers use while working directly with the text. These are localized, focused techniques used when having problems in understanding textual information; examples include adjusting one's speed of reading when the material becomes difficult or easy, guessing the meaning of unknown words, and rereading the text to increase comprehension.

Support Reading Strategies (SUB) including 9 items are basic support mechanisms intended to aid readers in comprehending the text such as using a dictionary, taking notes, underlining or highlighting textual information (p. 4).

The overall score averages show how often students use all the strategies in the inventory when reading academic materials. The average for each subscale in the survey shows which group of strategies (e.g., Global, Problem solving, and Support strategies) students use most or least

when reading academic research articles in English.

The current study utilized SORS (See Appendix A) for the quantitative part and for the qualitative part of this study semi-structured interviews (See Appendix B) were conducted. The interview questions consisting of 8 questions were adapted from both Zhangs' (2001) interview questions (See Appendix 2, p. 287-288) and Xianmings' (2007) interview questions. (See Appendix 3, p. 106-107)

Data collection procedure

An overview of the purpose of the study and a description of the SORS questionnaire with an explanation of the steps involved in completing it was presented to the participants. The SORS questionnaire was translated into Persian to conduct it easier for different disciplines but English format of the survey was administered for TEFL and Linguistics majors since these participants had already enough English knowledge to fill out the survey in English. It took each student almost 10 -12 minutes to fill out the survey.

Qualitative data were collected through face to face interviews. 30 students participated in semi-structured interviews. The interviews were conducted one by one in a relaxed atmosphere at three faculties of Language and Humanities, Natural Science, and Engineering faculties of Razi University. Except for TEFL and Linguistics interviewees, the rest of the participants were interviewed in Persian. It took a couple of weeks to do all the interviews. The time took for each interview was different ranging from 2:58 to 8:42 minutes. Each interview was recorded and transcribed.

Data analysis

This study used Mokhtari and Sheorey's (2002) classification of reading strategies, namely, global, support, and problem-solving strategies as the theoretical framework. This classification scheme utilized for the purpose of the current study was useful in indicating participants' meta-cognitive awareness of reading strategies as well as differences in employing the strategy type. Therefore, to analyze the quantitative data of this study, descriptive statistics (mean) and One-Way ANOVA were employed. Frequency of each category of reading strategies was calculated. Three levels of strategy use according to Mokhtari and Sheorey (2002) were presented as high (3.5 or higher), moderate (2.5 to 3.4), and low (2.4 or lower). The average for each sub-scale in the survey showed which groups of strategies were used most or least. As for the qualitative analysis of this study, the content of the interviews were analyzed to find out the reasons why some of the Iranian graduate students were more aware of meta-cognitive reading strategies.

Results

Quantitative data analysis

Regarding the answer to the first research question, it was found out that among three categories of reading strategies, the most frequent one was problem-solving strategies with the mean 3.83, followed by global strategies with the mean 3.61, and then support strategies with the mean 3.19. The overall mean for the three categories of strategies was 3.54 showing that participants were highly aware of meta-cognitive reading strategies and could be considered high strategy users. However, the mean for support strategies was 3.19 which were regarded as moderate. The results showed that among 30 strategies, 20 strategies fell into the high-usage level ($M \geq 3.5$), 9 strategies went to the medium level ($M \geq 2.5$), and 1 strategy was low usage level ($M \leq 2.4$).

It should be noted that the most frequent reading strategy employed by all students was *when text becomes difficult, I pay closer attention to what I am reading* with the mean of 4.18 while the least frequent reading strategy used by all students was *when text becomes difficult, I read aloud to help me understand what I read* ($M = 2.36$). Therefore, all the participants of this study were generally highly aware of meta-cognitive reading strategies according to the obtained data.

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To answer the second research question, three categories of reading strategies (global, problem-solving, support) used by graduate students within three faculties of Language and Humanities, Natural Science, and Engineering were computed respectively. It was discovered that among students majoring in TEFL, Linguistics, and Geography in Language and Humanities faculty, the most frequent type of strategy was problem-solving strategies with the mean 3.89, followed by global strategies with the mean 3.55, and then support strategies with the mean 3.35. The overall mean for the three categories of strategies was 3.58 showing that participants were highly aware of meta-cognitive reading strategies. So, they were considered as high strategy users. However, the mean for support strategies was medium (M= 3.35).

Therefore, comparing the overall mean score of reading strategies for students majoring in TEFL, Linguistics, and Geography, it was revealed that TEFL students (M= 3.67) were more aware of meta-cognitive reading strategies in comparison with Linguistics (M= 3.61) and Geography students (M= 3.58).

Students majoring in Biology, Chemistry, and Physics in Natural Science had a high preference to problem-solving strategies (M= 4.12) as their prime choice, followed by global strategies (M= 3.89) and support strategies (M= 3.30). The overall mean for these three categories of reading strategies was 3.78 which is regarded as high. So these students were generally highly aware of meta-cognitive reading strategies. The mean for support strategies was 3.30 which is moderate, though. The overall mean scores of reading strategies for Natural science majors showed that Biology students (M= 3.85) were more aware of meta-cognitive reading strategies in comparison with Chemistry students (M= 3.81), and Physics students (M= 3.56).

Lastly, students majoring in Electronic Engineering, Mechanical Engineering, Computer Engineering, and Civil Engineering in Engineering faculty mostly preferred to use problem-solving strategies (M= 3.54) and then global strategies (M= 3.40) but least preferred to use support strategies (M= 2.98). The overall mean for the three categories of strategies was 3.31 showing that participants are moderately aware of meta-cognitive reading strategies.

The overall mean scores of reading strategies for students majoring in Electronic Engineering, Mechanical Engineering, Computer Engineering, and Civil Engineering in Engineering faculty indicated that Electronic Engineering students (M= 3.49) were more aware of meta-cognitive reading strategies compared to Mechanical Engineering students (M= 3.29), Computer Engineering students (M= 3.23), and Civil Engineering students (M= 3.21).

Furthermore, One-way ANOVA to examine the differences in using three categories of meta-cognitive reading strategies within three faculties of Language and Humanities, Natural science, and Engineering in table 1 denotes that the F- value within these three faculties was .911 (P = .000 ≤ .05) and p- value was equal to .00 which was less than .05. Thus, it can be stated that there was significant and meaningful differences in using categories of meta-cognitive reading strategies within these three faculties.

Table 1. One- Way ANOVA for three categories of meta-cognitive reading strategies among three faculties of Language and Humanities, Natural Science, and Engineering

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3.170	2	1.585	9.11	.000
Within Groups	13.388	77	.174	5	
Total	16.557	79			

The post-hoc Tukey's tests in table 2 indicated that Natural Science faculty with the mean score of 3.78 outperformed the other two faculties of Language and Humanities with the mean score of 3.58 and Engineering with mean score of 3.11 in using categories of meta-cognitive reading strategies respectively and Language and Humanities outperformed Engineering faculty in using categories of meta-cognitive reading strategies. The p-value is .00 which is less than .05.

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Table 2. Post Hoc Tukey’s Tests for using three categories of meta-cognitive reading strategies among three faculties of Language and Humanities, Natural Science, and Engineering

(I) Faculty	(J) Faculty	Mean Difference (I-J)	Mean	Sig.
Language and Humanities	Natural Science	-.19619	3.7802	.228
	Engineering	.27295	3.3111	.053
Natural Science	Language and Humanities	.19619	3.5841	.228
	Engineering	.46914*	3.3111	.000
Engineering	Language and Humanities	-.27295	3.5841	.053
	Natural Science	-.46914*	3.7802	.000

*. The mean difference is significant at the 0.05 level.

Qualitative data Analysis

In response to the third research question regarding why some of the graduate students are more aware of meta-cognitive reading strategies, the interview findings showed that those students who were more aware of meta-cognitive reading strategies TEFL and Linguistics students had either passed some courses in reading strategies in their undergraduate program or they had educated themselves by reading teaching methodology books, or they had taken English courses like TOEFL. Some also mentioned that they had learned reading strategies through their own personal experiences- they somehow discovered them.

Other findings were also obtained through interview analyses. It was revealed that the purpose behind reading articles differed based on the participants’ fields of study. Some of the students majoring in TEFL and Linguistics focused on getting the gist of the article and main ideas while others attended to the methodology section more than other parts.

Also students had different perspectives as to the most difficult aspect of reading articles. Some of the Language and Humanities students considered getting the main idea of the article the most difficult aspect of reading articles whereas Natural Science students considered discussion section as the most difficult part; Engineering students, on the other hand, mainly struggled with the introduction.

Furthermore, two more strategies of “Reviewing” and “Making the English word resemble a word in the mother tongue” were discovered through the analysis of the interviews. These two strategies were not originally included in the SORS questionnaire.

Eventually, interviews revealed that some of participants approached the articles as models to base their own writing on; in other words, in addition to reading the article for content, they read the articles organization, argumentation, grammar and mechanics of writing, etc.

Discussion

The results of the quantitative data analyses to examine Iranian graduate students’ meta-cognitive awareness of reading strategies across different disciplines revealed that all graduate students participated in this study were generally aware of meta-cognitive reading strategies and they employed problem-solving strategies as their most preferred category of reading strategies followed by global and support reading strategies. With respect to differences in meta-cognitive reading awareness and strategy use through comparing the overall mean score of reading strategies, it was found out that some students were more aware of meta-cognitive reading

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strategies. The reason could be that more meta-cognitively aware students had higher proficiency in English than other students so that this higher proficiency in English could help them use more meta-cognitive reading strategies while reading research articles in English. This difference in meta-cognitive reading awareness and strategy use might also refer to the English instruction they have already had. First, some of these high proficient readers including TEFL and Linguistics students had already passed some courses relevant to reading and reading strategies. Another reason for this difference in meta-cognitive reading awareness and strategy use is that some of these high proficient readers had taken English courses in private language institutes. So, this meta-cognitive awareness and strategy use could be the effect of the instruction they have had before. Some studies (Zhang, 2001; Dhanapala, 2010; Lau and Chan. W., 2003) supported this argument that high proficient readers prefer to employ more reading strategies than low proficient readers. Zaree-ee (2007) examined the meta-cognitive awareness of 30 Iranian students majoring in English language and Literature and classified them into highly successful, moderately successful, and unsuccessful. The study indicated that students at higher levels of reading ability utilized meta-cognitive strategies more often than less successful readers, which supports the findings of the present study.

One-Way ANOVA also revealed that there was a significant and meaningful difference in using three categories of meta-cognitive reading strategies within three faculties of Language and Humanities, Natural Science, and Engineering. Natural Science students were somehow better than both Language and Humanities and Engineering students in using categories of meta-cognitive reading strategies.

The findings of the interview data analysis demonstrated that some of more meta-cognitively aware such as TEFL and Linguistics students have already passed some courses in reading strategies and teaching methodology. So, such students were explicitly and systematically instructed of reading strategies while other disciplines have not had such courses and instruction. Other meta-cognitively aware students majoring in other disciplines such as Biology and Electronic have either taken private English courses like TOEFL or have discovered these strategies through their own experiences and personal studies. In a study on the effectiveness of meta-cognitive strategies instruction on the reading comprehension performance of the EFL students and their awareness to meta-cognitive strategies, Takallou (2011) found out that meta-cognitive strategy instruction contributed to the improvement of students' reading comprehension performance. The results of the research by Salataci and Akyel (2002) indicated that reading strategy instruction affected the participants' use of reading strategies in which the frequencies with which the participants employed meta-cognitive strategies were statistically higher during the reading process in English after the instruction and this is concurred with the findings of the present study suggesting that more meta-cognitively aware readers had already been instructed of reading strategies directly or indirectly. Apparently English instruction and exposure to English out of academic settings has contributed to developing reading strategies. Therefore, learning English has a paramount position in academic settings.

Learning English is mainly taken as an end for English language students such as TEFL and Linguistics while it is considered as a tool for other students majoring in Natural Science and Engineering disciplines. As it was pointed out before, Natural Science students were more concerned about research methods and procedures while reading articles. These students have been told directly or indirectly by their instructors at some point early in the academic program what sections are significant to notice while reading articles or they have learned to notice the important sections of the articles through their own personal experiences. Consequently, these students learn what parts of the articles are important and significant to be read. It can be implied that one of the differences between English disciplines and other disciplines is that reading strategies are instructed to English disciplines whereas reading strategies are explored through using various reading strategies by other disciplines.

Theoretical and Pedagogical implications

This study contributed to investigating Iranian graduate students' meta-cognitive awareness of reading strategies while reading research articles in English. Based on the results of this study, it can be stated that graduate students participating in this research were all aware of meta-cognitive reading strategies to meet their needs or purposes in reading academic materials; however, some of them were more aware of reading strategies. The high awareness of meta-cognitive reading strategies might suggest that they had high levels of English proficiency due to the reading courses taken during their undergraduate program or TOEFL courses taken out of school or their personal studies or experiences. As a result, instruction of reading strategies plays an important role in enhancing students' awareness of such strategies and in assisting them to become better and more successful readers of English texts. Teachers also play a part in enhancing students' meta-cognitive awareness of strategies as well as making them aware of their strengths and weaknesses in reading comprehension. Teaching students to become constructively responsive readers can promote skillful academic reading, which, in turn, can enhance academic achievement (Sheorey & Mokhtari, 2001). The awareness of reading strategies can lead to actual use of these strategies efficiently by readers.

The results of the present study can assist scholars to take instruction of reading strategies at academic settings into consideration in order to increase meta-cognitive awareness of reading strategies and help the students become strategic readers. So, students' knowledge in reading strategies can increase their performances in reading tasks. Furthermore, students can profit from developing their reading ability so that they can develop their writing ability too if they want to write articles in English. Students can employ articles' organization, argumentation, grammar and mechanics of writing as models to write their own theses or articles.

Last but not least, interview analyses revealed two more strategies of "Reviewing" and "Making the English word resemble a word in the mother tongue" which were not originally included in the SORS questionnaire. Thus, these two strategies could be added to the SORS questionnaire; in other words, the present study might have eventually modified this questionnaire, albeit to a little extent.

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