Investigating Strategic Processes of L2 Reading Comprehension Among Collegiate Iranian ESP Learners Across Three Academic Fields of Study

L'ETUDE DES PROCESSUS STRATEGIQUES DE LA COMPREHENSION DE LECTURE L2 PARMI LES APPRENANTS COLLEGIATE ESP IRANIENNE A TRAVERS TROIS CHAMPS D'ETUDES UNIVERSITAIRES

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Abstract

The current study has aimed to explore strategic processes of English reading comprehension among Iranian ESP learners across three academic fields of medicine, computer engineering and law. To this end, 90 intermediate ESP learners were selected from a population of 180 volunteers, based on their performance on a standard placement test (Edwards, 2007). Afterwards, participants completed Survey of Reading Strategies (SORS) (Mokhtari & Sheorey, 2002). The results of the statistical analysis uncovered the individual reading strategy preferences and weaknesses of ESP learners and also indicated that intermediate ESP learners moderately perceived the use of reading strategies while reading academic texts in English. Also, an attempt has been made to identify whether there are significant differences regarding the frequency of perceived individual and overall reading strategy use across the three disciplines. The findings of the study would help ESP teachers to gain a more profound understanding of ESP learners' strategic processes of L2 reading.

Key words: ESP; Reading; Strategy; Reading strategies; Metacognitive awareness of reading strategies

Résumé

L'étude actuelle a eu pour objectif d'explorer les processus stratégiques de la compréhension en lecture chez les apprenants en anglais ESP iranienne à travers trois champs théoriques de la médecine, le génie informatique et en droit. À cette fin, 90 intermédiaires apprenants ESP ont été sélectionnés parmi une population de 180 bénévoles, en fonction de leur performance sur un test de placement standard (Edwards, 2007). Ensuite, les participants ont rempli Enquête sur les stratégies de lecture (SORS) (Mokhtari & Sheorey, 2002). Les résultats de l'analyse statistique mis au jour les préférences individuelles stratégie de lecture et les faiblesses des apprenants ESP et a également indiqué que les apprenants intermédiaires ESP modérément perçu l'utilisation de stratégies de lecture en lisant des textes académiques en anglais. En outre, une tentative a été faite afin d'identifier s'il existe des différences significatives concernant la fréquence de l'utilisation perçue stratégie de lecture individuelle et globale dans les trois disciplines. Les résultats de l'étude pourrait aider les professeurs ESP pour acquérir une compréhension plus profonde des processus apprenants ESP de stratégique de la lecture en L2.

Mots clés: ESP; lecture; Stratégie; Stratégies de lecture; Conscience Métacognitive des stratégies de lecture

INTRODUCTION

English reading comprehension has deemed to be the main concern of ESP courses in EFL contexts such as that of Iran in that skilled reading assists specialists to keep up with developments in their field, mostly printed in English (Tabatabaei, 2007). Recognizing the importance of reading in ESP courses, the nature of reading rather than traditional view of decoding words and recoding meanings should be more profoundly considered. Jhons and Davis (1983) have redefined the role of ESP texts as a linguistic object (TALO) to a more process-oriented one; i.e., Text

as a Vehicle of Information (TAVI) in which extracting information accurately and quickly is more important than dealing with mere language forms. Alderson (1984) has depicted reading as a combination of both L2 proficiency and reading ability. Along with these developments in second language reading comprehension, Pressely and Afflerbach (1995) have characterized proficient readers as strategic ones, possessing both procedural and declarative knowledge of reading strategies, so as they are better at monitoring their comprehension strategies and more conscious of their use of reading strategies.

Researchers in the field of ESP have found that explicit strategy instruction promotes ESP learners' performance (Dheib-Henia, 2003; Hayati & Jalilifar, 2010). Also, Nuttal (2000) has supported explicit reading strategy instruction, arguing that "It is impossible to familiarize students with every text they will ever want to read; but what we can do is to give them techniques for approaching texts of various kinds, to be used for various purposes; that is the essence of teaching reading" (p. 38).

Despite the effectiveness of reading strategy instruction, it is impossible to instruct all L2 readers with the same set of reading strategies as the most effective ones, so the reading strategy instruction should be individualized in order to suit the particular reader, the reading task and the context of learning (Cohen, 1986; Kern, 1997). Also, Macaro (2001) has claimed that since L2 learners are literate at least in their L1; as a result, they have a well-developed repertoire of their L1 learning strategies and are not 'blank sheets of papers'(p.177); accordingly, the starting point of language learning strategy instruction is raising learners' awareness of the strategies they have already used. This assumption implies the fact that prior to any explicit reading strategy instruction program, decisions should be made regarding what reading strategies are needed by ESP learners at different academic fields of study.

Furthermore, despite the number of recorded studies in the field of learning strategies, there is no consensus among ESP practitioners regarding the variety of language learning strategic needs among the ESP learners at different academic fields of study. The research on the influence of major on strategy use was initially conducted by Politzer and McGroatry (1985) who found differences between humanities and engineering majors in terms of language learning strategy use. Other studies in the field also found that despite the existence of considerable similarities among different majors, there were also some significant differences in their strategy use (Oxford & Nyikos, 1989; Mochizuki, 1999; Peacock & Ho, 2003; Rao & Liu, 2010).

The current research has intended to describe strategic processes of ESP readers at three different academic majors and also an attempt has been made to investigate whether different academic majors of medicine, computer engineering and law differ significantly in their reading strategy knowledge.

1. LITERATURE REVIEW

1.1 Reading Strategies

Erler and Finkbainer (in Cohen & Macaro 2007) have defined reading strategies as consciously chosen actions in relation to levels of reading processes that facilitate effective processing. Various taxonomies for reading strategies have been defined. Block (1986) divided reading strategies into general and local reading strategies. In this taxonomy general strategies referred to strategies used to monitor the process of reading comprehension, e.g., using background knowledge, focusing on main ideas and recognizing text structure; while local strategies dealt with linguistic units of reading such as word level meaning, sentence structure and textual units.

Another perspective on reading strategies distinguished between cognitive and metacognitive strategic processing (Phakiti, 2003a, 2003b). Metacognitive strategies are defined as self-regulating thoughts that monitor cognition while cognitive strategies process the language for the task. Mokhtari and Sheorey (2002) defined three broad types of reading strategies including global, problem-solving and support raeding strategies. Based on this taxonomy, global reading strategies are carefully planned techniques by which learners monitor or manage their reading process, and problem-solving strategies are repair-oriented techniques used when problems occur in understanding textual information, finally support reading strategies aid the reader in the process of reading comprehension. This study has been based on Mohktari and Sheorey's (2002) reading strategy taxonomy.

1.2 Studies on the Metacognitive Knowledge or Perceived Use of Reading Strategies

Metacognitive knowledge or knowledge about cognitive phenomena was first introduced in the field of educational psychology by Flavell (1979). Metacognitive knowledge is related to the reading comprehension process through constructive theories of learning in which learners construct their own meaning based on their schemata knowledge and other cultural and societal factors (Pressley & Afflerbach, 1995).

Sheorey and Mokhtari (2001) conducted a survey among 105 high and low ability readers of native and non-native university students in the USA in order to investigate differences in the metacognitive awareness of reading strategies. They concluded that first, both US and ESL students showed a high level of various reading strategies awareness, indicating a clear preference for global reading strategies and while the US high reading ability students seem to consider support reading strategies to be relatively more valuable than low reading ability US students, ESL students attribute high value to support reading strategies, regardless of their reading ability level.

Also, Mokhtari and Reichard (2004) investigated whether significant differences exist between first and second language readers in their metacognitive awareness and perceived use of specific strategies when reading for academic purposes in English. Regarding this study, a total of 350 college students, including 141 American and 209 Moroccan students, completed Metacognitive Awareness of Reading Strategies Inventory, i.e. MARSI (Mokhtari, 1998-2000) in order to measure their perceived use of reading strategies. The results indicated that despite the fact that the two groups had been schooled in significantly different socio-cultural environments, they reported remarkably similar patterns of reading strategy awareness and use. Both groups of students reported a moderate to high strategy awareness level with a clear preference for using problem-solving strategies.

Karbalaei (2010) examined whether there are any significant differences regarding perceived use of reading strategies between EFL and ESL college students. In this study, participants were 190 Iranian and Indian college students who completed the Survey of Reading Strategies, i.e. SORS (Mokhtari & Sheorey, 2002). The results demonstrated that both EFL and ESL participants reported almost similar patterns of strategy awareness while reading; however, Indians reported more awareness of global, support and total metacognitive reading strategies than Iranians while no significant difference was reported when using problem-solving strategies.

In another study, Keshavarz and Assar (2009) have investigated the relationship between learners' ambiguity tolerance and their metacognitive awareness of reading strategies. To this end, they have selected 123 first year college students majoring in engineering with an age range of 19-25. Participants were sat for Nelson test of proficiency and a reading comprehension test and then based on their answers to the tolerance of ambiguity scale, they were divided into three groups of law-, mid- and high- ambiguity tolerant and they also completed the MARSI questionnaire. The results of the study indicated that there is significant differences between high and law ambiguity tolerance groups, in that high ambiguity tolerance group scored higher on reading comprehension test, and demonstrated higher metacognitive awareness of problem solving and global reading strategies. However, no significant difference was found between the middle group and the other two ambiguity groups. Also, concerning support reading strategies, there was no significant difference across three ambiguity tolerance groups.

1.2.1 Studies on the Metacognitive Awareness of Reading Strategies in Different Majors
Malcolm (2009) conducted a survey of reading strategy use with 160 first year and fourth year medical students in Bahrain in order to compare perceived reading strategy use of readers at varying English proficiency levels and years of study. While all students reported high usage of overall reading strategies, significant differences were found in perceived use of individual reading strategies such as 'translating from English to Arabic'. In fact, low proficiency level students and those in their first year reported translating strategy more, while upper year students translated less and used more global (metacognitive) strategies.

Also, Martinez (2008) investigated the metacognitive awareness of reading strategies among 157 Spanish non-native ESP students from the faculties of chemistry at the University of Oviedo. In this study participants completed MARSI (Mokhtari, 1998-2000). The results indicated a higher reported use of problem solving and global reading strategies among Spanish ESP learners. Moreover, females reported significantly higher frequency of strategy use and tended to use support reading strategies more than men.

Oranpattanachi (2010) conducted a survey in order to assess the metacognitive awareness of reading strategies among Thai pre-engineering high and low proficiency readers. The results of the study demonstrated that high reading ability students perceived their use of strategies more frequently than did low-reading ability students. Also, it was revealed that high proficiency readers employ top down strategies significantly more than did the low proficiency readers.

2. STATEMENT OF THE PROBLEM

In Iran, ESP teachers are supposed to direct ESP classes in a componental or skills-based approach in which teaching English vocabulary and grammar are viewed to be centrally important. Accordingly, memorizing vocabulary lists, structural drills and translation activities compose the majority of ESP learners' activities (Hassaskhah, 2005). In fact, L2 reading has been considered absolutely as a language problem, mostly concerned with the product of reading; therefore students' learning needs and processes of learning are not taken into consideration, leading the ESP courses to impose a large burden on the student's part. As a result, ESP is not viewed as an approach to language learning based on what scholars in the field have earlier put forward (Hutchinson & Waters, 1987).

This study has intended to identify the extent to which ESP students of different academic fields of study are aware of their reading strategy use while reading academic texts in English and also an attempt has been made to determine whether there are significant differences in self-reported reading strategies among different majors.

3. RESEARCH QUESTIONS

As mentioned previously, the current study primarily intended to describe the strategic processes of university learners as they read academic texts in English. Therefore, the followings research questions have been posed:
1. What is the mean frequency of individual and

overall perceived reading strategy use among ESP medical students?

2. What is the mean frequency of individual and overall perceived reading strategy use among ESP computer engineering students?

3. What is the mean frequency of individual and overall perceived reading strategy use among ESP law students?

4. Is there any significant difference among medical, computer engineering and law students regarding the mean frequency of the perceived individual reading strategies on the one hand and their overall reports on the other?

4. METHOD

4.1 Participants

Primarily, a population of 180 volunteer Iranian ESP learners in Azad University, Najafabad Branch participated in this study. In order to select homogenous participants, a Solutions Placement Test (Edwards, 2007) was run. Afterwards, 90 intermediate ESP learners were selected for the purpose of this research; including:

1- Medical group: 4 females and 26 males.

2- Computer-engineering group: 13 males and 17 females.

3- Law group: 12 males and 18 females.

The participants were studying in a similar instructional setting, studying English as a foreign language in a monolingual country in which learning English is confined to the classrooms. The researcher also conducted unstructured interviews with some of ESP learners in each of the three groups in order to discover their ESP classroom experiences. Participants in all of the three groups explained that their ESP classes are directed by language teachers who read the text aloud once and then emphasize on some technical vocabulary and repeat its meaning in L1 several times. Then, the teachers read the text and translate it word by word. While translating, they ask students some questions about the text and the technical terms. Finally students are asked to do comprehension and word-building exercises of their book. Another common factor in all of the three ESP groups was that they have not had any explicit instruction about reading strategies and all of them were unfamiliar with the metalinguistic notion of reading strategies.

4.2 Materials

4.2.1 Solutions Placement Test

The materials used in this study included Solutions Placement Test (Edwards, 2007), for selecting a group of homogenous participants. The test consists of three sections. The first part includes 50 multiple choice items that assess students' knowledge of key grammar and vocabulary; the second part contains 10 graded reading comprehension items and finally, the third section is a writing task which assesses students' ability to produce the language.

4.2.2 A reading Comprehension test

In order to activate reading strategy use among participants, a reading text was adopted from an intermediate book of Developing Reading Skills (Markstein & Hirasawa, 1981) that included a general content of interest to all three groups of ESP students.

4.2.3 The Background Questionnaire

The background questionnaire was used in order to collect demographic information about participants' gender, age, and major.

4.2.4 The Farsi Back-translated Version of Survey of Reading Strategies (SORS) developed by Mokhtari & Sheory (2002)

SORS was developed by Mokhtari & Sheory (2002) on the basis of Metacognitive Awareness of Reading Strategies Inventory (MARSI). Mokhtari (1998-2000) designed MARSI to measure the type and frequency of reading strategies used by native English speaking students.

Mokhtari & Sheory (2002) revised MARSI to enable it to be used with adult second or foreign language students. The instrument was field-tested extensively with diverse student populations including native and non-native speakers of English and was found to have well-established psychometric properties including validity and reliability (*Alpha* = .93) which are described in Mokhtari & Reichard (2002).

The SORS consists of 30 statements with a 5-point Likert scale ranging from 1= 'I never do this' to 5= 'I always do this.' The authors outlined the SORS instrument measures across three broad categories of strategies. These categories are:

(1) Global Reading Strategies (GLOB) which can be thought of as generalized or global strategies aimed at setting the stage for the reading act.

(2) Problem Solving Reading Strategies (PROB), which are localized, focused problem-solving or repair strategies used when problems develop in understanding textual information.

(3) Support Reading Strategies (SUP), which provide the support mechanisms or tools aimed at sustaining responsiveness to reading.

4.3 Procedure and Scoring Criteria

This study utilized a quantitative–retrospective design, according to which a Likert-scale self-report questionnaire (Mokhtari & Sheorey, 2002) was used immediately after participants had completed a reading task in order to gain a more valid picture of the participants' reading processes.

The same procedure was followed in order to collect the data in each of the three majors of medicine, computer-engineering and law. Accordingly, in each of

three academic fields of study, 6o ESP volunteer students in each discipline sat for solutions placement test at their regular class time in Najafabad Azad University. They were instructed to answer only grammar, vocabulary and reading section of the test and to ignore the writing section. Based on the test guidelines, 45 minutes was allotted to these 2 sub-tests. Afterwards, in each of three majors, 30 students whose scores were placed between+1SD and -1SD were chosen as the ultimate sample for the next step of the research. In the second phase of the study, the researcher explained the concept of reading strategies and modeled the reading strategy of 'using context clues and text features to guess the meaning of unknown words' in the reading task at hand in order to familiarize the participants with the application of reading strategies. In the next stage, 30 ESP intermediate participants in each of the three majors performed a reading comprehension task and answered the following 10 multiple choice items. Having completed the reading task, the participants in each of the three majors were explained briefly about the purpose of the SORS and how it would be completed. Participants were asked to read each of 30 Farsi statements of the survey, and tried to remember the strategies that they already have used while reading texts in English, and circle the number that best describes their reading strategy use. Furthermore, they were encouraged to ask questions, if any, of the researcher while completing SORS. Following this stage, the researcher distributed the background questionnaire and SORS among the participants concurrently and based on Mokhtari & Sheorey (2002) guidelines, 10 minutes was allotted for SORS completion and 2 minutes for completing the background questionnaire.

After discarding the incomplete forms of the survey, the obtained data was analyzed according to Mokhtari

and Sheorey (2002) defined criteria for scoring and interpretation. Their scoring method entailed calculating the mean frequency of each of individual or categories of reading strategy use perceived by a group of students while reading academic materials. They further employed the standard of Oxford and Burry-Stock (1995) to identify three levels of reading strategy usage. Accordingly, means of 3.5 or higher show high usage of reading strategies, those of 2.5 to 3.4 represent moderate usage and finally means of 2.4 or lower could be interpreted as low usage of reading strategies.

5. DATA ANALYSIS

5.1 Descriptive Statistics for Data Obtained from Medical, Computer –engineering and Law Subjects

Since the first three research questions are all concerned with the description of strategic reading behavior in terms of individual and overall perceived reading strategy use, the data obtained from medicine, computer-engineering and law subjects were examined descriptively. First, based on the aforementioned criteria (Oxford & Burry-Stock, 1995) three groups of usage for individual reading strategies among subjects of each major were identified: high (mean of 3.5 or higher), moderate (mean of 2.5 to 3.4) and low usage (mean of 2.4 or lower), second the percentage of each usage group was calculated . Third, the highest five and the lowest five individual reading strategies were identified in order to give a clear understanding of reading strategies strengths and weaknesses across three academic fields of medicine, computer-engineering and law. Finally, the overall reading strategy use of participants was reported in each of the three disciplines. (See Table 1)

Table1
Reported Individual and Overall Reading Strategies used by Medical, Computer Engineering and Law Participants

category	Reading strategy	Medical Participants		Computer engineering Participants		Law Participants	
		Mean	SD	Mean	SD	Mean	SD
PROB	reading slowly	4.30	.877	4.03	.890	4.17	.986
PROB	Trying to stay focused on reading	4.37	.890	3.70	.952	4.33	1.028
PROB	Adjusting reading rate	3.30	1.179	3.57	1.165	3.33	1.348
PROB	Paying close attention to the text	3.83	1.147	3.50	1.042	4.07	1.081
PROB	Pausing and thinking what is read	2.80	1.215	2.83	1.147	3.33	1.093
PROB	visualizing	3.30	1.368	3.50	1.137	3.10	1.373
PROB	re-reading	4.17	1.053	4.07	.980	4.03	1.299
PROB	guessing the meaning of unknown words	3.13	1.074	3.10	.923	2.93	1.015
GLOB	Setting purpose	3.80	.961	3.57	.817	3.73	1.258
GLOB	Using prior knowledge	3.87	.819	3.73	.907	3.70	1.088
GLOB	Previewing the text	2.90	1.447	3.30	1.291	3.60	1.303
GLOB	Checking fitness of content and purpose	2.90	1.372	2.70	1.088	2.93	1.015
GLOB	Skimming the text to note its characteristics	3.67	1.269	2.97	1.326	3.13	1.306
GLOB	Determining what to focus or ignore	3.70	1.208	3.40	1.221	3.30	1.317
GLOB	Using tables, figures and pictures	3.30	1.179	3.70	.952	3.33	1.322
GLOB	Using context clues	3.43	1.135	3.57	.935	2.97	1.217
GLOB	Using typographical aids	3.57	1.194	3.57	.898	3.07	1.363

Continued

To be continued

category	Reading strategy	Medical Participants		Computer engineering Participants		Law Participants	
		Mean	SD	Mean	SD	Mean	SD
GLOB	Evaluating text critically	2.93	.907	2.27	1.048	2.60	1.303
GLOB	Resolving conflicting information	3.30	1.055	3.10	1.062	3.10	1.155
GLOB	Using context clues	4.03	1.033	3.70	1.055	3.50	1.408
GLOB	checking the accuracy of predictions	2.33	1.061	2.20	.925	2.50	1.253
SUP	note-taking	2.93	1.388	2.63	1.245	4.17	.986
SUP	reading aloud	2.50	1.383	3.27	1.230	4.33	1.028
SUP	underlining and circling	4.20	1.064	3.53	1.408	3.33	1.348
SUP	Using reference materials	4.30	1.022	3.57	1.223	4.07	1.081
SUP	paraphrasing	4.03	.928	3.37	1.586	3.33	1.093
SUP	Going back and forth in the text	3.83	.986	3.20	.887	3.10	1.373
SUP	asking oneself questions	2.30	.877	2.53	.937	4.03	1.299
SUP	translating to native language	4.23	1.006	3.77	1.073	2.93	1.015
SUP	Thinking about information in both L2 and L1	3.63	1.129	2.97	1.159		
	Overall Reading Strategy Use	3.4956	.42622	3.2967	.31139	3.3489	.51018

As Table 1, shows, for medical students, the means of individual strategy use ranged from a high of 4.37 (getting back on track) to a low of 2.30 (asking questions oneself before reading the text) and the mean of overall strategy usage was 3.49 that showed a moderate overall strategy usage among medical participants.

A closer examination of Table1, demonstrates that for medical students,16 out of 30 reported strategies (53%) fell in the high usage category (mean of 3.5 or higher) and 12 strategies (40%) indicated moderate usage of these strategies (means between 2.5 to 3.43) and 2 strategies (7%) had means below 2.4 and fell in low usage strategy group. Also, it has been illustrated that:

The five highest mean of perceived individual reading strategies include just problem-solving and support types:

1- Problem solving: trying to stay focused on reading. (M= 4.37)

2- Support: using reference materials and Problem solving- reading slowly and carefully. (M= 4.30)

3- Support: translating to native language (M= 4.23)

4- Support: underlining or circling information in the text to help remembering (M= 4.20).

5- Problem-solving: re-reading for better understanding.($Mean$=4.17); And

The five lowest reported reading strategies included all of the three categories of problem solving, support and global:

1- Global- Checking how content fits purpose (M= 2.87).

2- Problem solving-Pausing and thinking about reading (M= 2.80).

3- Support-Reading aloud when text becomes hard (M= 2.50).

4- Global-Checking the accuracy of the predictions (M= 2.33).

5- Support- Asking oneself questions (M= 2.30).

Concerning the second research question, the descriptive statistics shows that for computer- engineering students means of individual reading strategies use varies between a high of 4.07 (re-reading for better understanding) to a low of 2.20 (checking the accuracy of predictions), and a moderate overall strategy use. (M=3.2). Also the percentage of reading strategies usage was determined as following:15out of 30 (50%) showed high strategy usage with means of 3.5 to 4.07, 13out of 30 (43.3%) reported strategies fell in the moderate strategy usage with means of 2.53-3.40, and 2 out of 30 reading strategies about 6.6% indicated low strategy usage.

As the Table1, has represented, computer-engineering subjects showed the use of reading strategies considering five highest and lowest means as follows: For computer engineering subjects, the top five means of individual reading strategies includes problem-solving, global and support strategies altogether:

1) Problem-solving: re-reading for better understanding. (M= 4.07)

2) Problem-solving: reading slowly and carefully. (M= 4.03)

3) Support: Translating to native language. (M= 3.77)

4) Global: using prior knowledge. (M= 3.73)

5) Global and Problem-solving: using text features (e.g., tables, figures and pictures and guessing by using the context clues and the problem-solving strategy of trying to stay focused on reading. (M= 3.70); And

The bottom five means of individual reading strategies also included all three types of problem-solving, global and support strategies:

1) Global: checking how the content fits purpose (M= 2.70).

2) Support: note-taking while reading (M= 2.63).

3) Support: asking oneself questions before reading (M= 2.53).

4) Global: critically evaluating what is read (M= 2.27).

5) Global: checking the accuracy of predictions (M= 2.20).

To shed light on the third research question, it was found that the self-reported use of individual reading strategies ranges from a high of 4.33 (getting back on

track, when losing concentration and underlining and circling) to a moderate strategy use of 2.5 (Checking the accuracy of questions) in the law participants. (See Table1). Accordingly, law participant fell into two strategy usage groups of high and moderate. In the law group, 11 out of 30 strategies indicated high strategy usage (M= 3.53 to 4.33) i.e., 36.6% and the moderate strategies (M= 2.5 to 3.3) were 19 of the total of 30 strategies i.e. 63.3%.Also, they reported a moderate overall strategy usage. (M = 3.34)

Regarding strategy preferences and weaknesses of law participants, the five highest and lowest mean of individual reading strategies were identified:

The top five means of individual reading strategies consisted of problem-solving and support reading strategies, as follows:

1- Problem-solving and Support: getting back on track and underlining, circling (M= 4.33).

2- Problem-solving: slow and careful reading (M= 4.17).

3- Problem-solving: attending more, when text becomes difficult (M= 4.07).

4- Problem-solving: re-reading with difficulty increase (M= 4.03).

5- Support: Paraphrasing (M=3.80).

The lowest five means of individual reading strategies consisting of all three categories of problem-solving, global and support strategies:

1- Support and Global: reading aloud and use of context clues (M= 2.97).

2- Problem-solving and Global: guessing the meaning of unknown words and checking fitness of content and purpose (M= 2.93).

3- Support: thinking about information in both L2 and L1 (M= 2.77).

4- Global and Support: critical reading and evaluation and asking questions liked to be answered in the text (M= 2.60).

5- Global: checking the accuracy of predictions (M= 2.50).

5.2 Inferential Statistics across Three Academic Fields of Medicine, Computer Engineering and Law

In order to answer the fourth research question, one-way ANOVAs was run to analyze the ESP learners' perceived reading strategies to find out whether there were any significant discrepancies across the three majors of medicine, computer engineering and law. The significance level was set at $p < 0.05$.

Table 2
One Way ANOVA for Individual Strategies across Three Majors

	Reading Strategies	F	Sig.
Global	Setting purpose for reading	.410	.665
Support	Note-taking while reading	.690	.504
Global	Using prior knowledge	.261	.771
Global	Previewing the text before reading	2.035	.137
Support	Reading aloud when text becomes hard	2.209	.116
Global	Checking how content fits purpose	.320	.727
Problem-solving	Reading slowly and carefully	.632	.534
Global	Skimming the text to note text characteristics	2.372	.099
Problem-solving	Trying to stay focused on reading	4.608*	.013
Support	Underlining information in the text	3.662*	.030
Problem solving	Adjusting reading rate	.416	.661
Global	Determining what to read	.833	.438
Support	Using reference materials	5.018*	.009
Problem solving	Paying close attention to reading	2.045	.136
Global	Using text features(e.g. tables, figures and pictures)	1.096	.339
Problem solving	Pausing and thinking what is read	2.015	.140
Global	Using context clues	2.451	.092
Support	Paraphrasing for better understanding	1.956	.148
Problem solving	Visualizing information read	.713	.493
Global	Using typographical aids(e.g. italics)	1.834	.166
Global	Critically evaluating what is read	2.764	.069
Support	Going back and forth in the text	2.754	.069
Global	Resolving conflicting information	.336	.716
Global	Using context clues	1.569	.214
Problem solving	Re-reading for better understanding	.115	.891
Support	Asking oneself questions	.712	.494
Global	Checking the accuracy of predictions	.573	.566
Problem solving	Guessing the meaning of unknown words	.340	.712
Support	Translating to native language	3.244*	.044
Support	Thinking about information in both L1 and L2	3.804*	.026

*. The mean difference is significant at *$p < 0.05$

As Table 2, illustrates, differences in the use of individual reading strategies were significantly different among the three majors in terms of only 5 reading strategies ($p<.05$), namely; 'trying to stay focused on reading', 'underlining information in the text', 'using reference materials', 'translating into native language' and 'thinking about information in both L1 and L2'.

Table 3
One Way ANOVA for Overall Reading Strategy Use across Three Majors

Major (1)	Major (2)	Mean Difference	Std. Error	Sig.
Law Medical	Medical computer and software	-.14667	.10943	.377
		.19889	.10943	.170
computer and software	Law	-.05222	.10943	.882

*. The mean difference is significant at *p<0.05

As Table 3, demonstrates there is no significant difference concerning overall reading strategy use among ESP learners across the three academic fields of study.

6. Discussion

The previous section presented the analysis and results for each research question. This section has been intended to pose each of the four research questions of the study and discuss them in the light of the findings obtained from other studies in the area of metacognitive awareness of reading strategies (e.g., Sheorey & Mokhtari, 2001; Mokhtari & Reichard, 2004; Malcolm, 2009; Martinez, 2008; Karbalaei, 2010).

6.1 Strategy use Preferences among ESP Medical Students

As for the first research question, probing into the individual reading strategies perceived by medical participants indicated a high awareness of the individual reading strategy of 'trying to stay focused on reading' (M= 4.37) as the most used reading strategy. This finding is surprisingly in agreement with all of the other SORS studies conducted by Sheorey and Mokhtari (2001), Mokhtari and Reichard (2004), Martinez (2008), Malcolm (2009) and Karbalaei (2010). In all of these studies regardless of language proficiency and socio-cultural context of learning, the individual strategy of' trying to stay focused on reading' fell into high usage category of reading strategy awareness. One possible reason for this consensus might be due to the fact that reading comprehension is a challenging activity requiring both bottom-up and top-down processing strategies which does not occur automatically, therefore it needs the involvement of learners' working memory which has a fixed capacity of processing information, accordingly readers may lose their concentration during the course of reading and try to get back on track.

The least used individual reading strategy reported by medical participants was 'asking oneself questions before reading the text' which fell into low strategy usage level (M=2.30). Karbalaei (2010) has supported this finding with the similar results obtained from Iranian EFL learners who perceived the aforementioned individual reading strategy as falling into low usage level of awareness. The reason for this similarity might be attributed to the specified learning goals of English reading in Iranian curricula in which L2 readers have been instructed to read the English text in order to learn the linguistic details, hence neither they have any authentic purpose in what they are reading; nor seek for a certain message in the L2 text before reading. On the contrary, Mokhtari and Reichard (2004) reported a moderate to high level of awareness for the individual reading strategy of "asking oneself questions". The possible reason for this contradictory finding might be due to the fact that both native and non-native participants of the study conducted by Mokhtari and Reichard (2004) were international university students who were obliged to pass their courses in English; therefore, they had authentic purposes in reading English texts.

Regarding overall records of reading strategies, the medical participants demonstrated a moderate overall strategy use (Mean= 3.49). This finding is in contrast with the results obtained from Arabic medical students in Malcolm's study (2009) who indicated a high level awareness of overall reading strategies. One possible explanation for this contrast might lie in the different curricula experienced by Arabic and Iranian Medical students as it was depicted in the previous section.

6.2 Strategy use Preferences among ESP Computer- Engineering Students

Computer-engineering participants demonstrated a prevailing preference for the individual strategy of 're-reading for better understanding' (Mean= 4.07). This finding is in agreement with the result obtained from a group of non-native English Spanish chemistry and technical engineering students in the study conducted by Martinez (2008) in which participants reported the individual strategy of 're-reading for better understanding' as the most favored one. Whereas, Mohktari and Reichard (2004) found a moderate use of the aforementioned individual strategy among native English speaking US university students. Therefore, the high preference for the strategy of re-reading for better understanding might be attributable to the effect of culture on the choice of reading strategies in that biliterate readers may use particular reading strategies which are unique and useful to reading in a second or foreign language (Jimenez et al, 1995, 1996).

Also, computer engineering participants reported the least perceived use for the individual reading strategy of 'checking the accuracy of the predictions' (Mean= 2.20).

This finding is inconsistent with that of ESL students use of the aforementioned individual reading strategy in the study conducted by Sheorey and Mokhtari (2001). This is possibly because the ESL participants were advanced English language learners who scored a minimum of 500 at the TOEFL test, but the participants of the present study were at the intermediate level of language proficiency, therefore they were less skilled in top down reading strategies such as confirming the predictions.

Concerning the overall perceived reading strategies use, computer engineering participants demonstrated a moderate level of overall reading strategies. This finding is consistent with that of Moroccan students in Mokhtari and Reichard (2004) study. This comparative finding might be explained due to the fact that Moroccan students are literate in Arabic that uses the orthography similar to that of Persians. Therefore, to some extent, both Moroccan and Iranian students share the same L1 background which may influence the level of metacognitive awareness of reading strategies (Mokhtari & sheorey, 2001).

6.3 Strategy use Preferences among ESP Law Students

As for the most and the least used individual reading strategies, not unexpectedly law participants reported the use of the individual strategy of 'trying to stay focused on reading' as one of the most used strategies. This finding has been concluded in all of the previous studies (Sheorey & Mokhtari,2001; Mokhtari & Reichard, 2004; Martinez, 2008; Malcolm, 2009; Karbalaei, 2010).The reason might be explained with regard to this fact that reading comprehension has a multidimensional and interactive nature that requires a lot of cognitive effort (Alderson,2000). Also, law participants perceived the use of' underlining and circling information in the text' as the other most favored reading strategy. Possibly, this finding might be explained due to the fact that the students' belief and discipline knowledge affects the choice of reading strategies (Mokhtari & Sheorey, 2001). Because, the majority of humanities students read academic texts for the fact and believe that there is a truth in what they are reading, hence they underline or highlight information in the text in order to make salient the important facts in the text, accordingly it is probable that this L1 strategic reading behavior might be transferred to L2 reading tasks (Hardin, 2001; Birjandi, 2001).

Regarding the least used individual reading strategy, law participants reported a moderate use of checking the accuracy of predictions as the least favored reading strategy (M= 2.5). This finding is consistent with the reported frequency of the aforementioned individual reading strategy in the study conducted by Karbalei (2010) in which Iranian students majoring in the English teaching and literature demonstrated a moderate use of the reading strategy of 'confirming predictions' (M= 2.9). These similar findings might be attributable to the effect of academic learning approaches on the LLS use. Since humanities students read for facts in order to memorize the author's major messages and they rarely engage actively in the process of reading in order to predict the content of the text.

Concerning the overall level of metacognitive awareness of reading strategies, law participants demonstrated that they are moderate reading strategy users. Bearing in mind the fact that law participants did not have any explicit English reading strategy instruction, this medium use of strategies in ESP reading task may be associated with years of academic instruction and transfer of L1 reading ability to L2 reading tasks.

6.4 Investigating Significant Difference among Medical, Computer Engineering and Law Students Regarding the Mean Frequency of the Perceived Individual Reading Strategies on the One Hand and Their Overall Reports on the Other

The analysis of the related data indicated that there were a few significant differences in the perceived individual reading strategies across the three academic fields of medicine, computer engineering and law ($p<0.05$); therefore, the null hypothesis was rejected regarding individual reading strategies across the three majors.

The analysis of the result confirmed the second part of the null hypothesis of this study. It showed that although there were differences in the means of overall reported strategy use across the three majors; these differences in overall reading strategy use were not statistically significant. The reason might be due to the fact that students had almost the same reading task requirements across the three academic fields of study, as Flavell (1979) has suggested the knowledge about the demands of a task interacts with the learners' level of strategy knowledge and vice versa.

CONCLUSION

Based on the findings of the study, a number of conclusions could be drawn with respect to L2 reading strategic processes of each of the three intermediate ESP groups. It can be concluded that all of the ESP learners were intermediate reading strategy users who demonstrated a clear preference for problem solving strategies regardless their academic field of study. However, ESP learners indicated variations in their individual reading strategy preferences and weaknesses across the three academic fields of study. Also, it was concluded that the major was influential in the awareness of specific individual reading strategies.

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