Enhancing Reading Comprehension via Metacognitive Strategy Training: Gender and Discipline Variation

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Abstract

The aim of this quasi-experimental study was to investigate the impact of a metacognitive training program on university freshmen's reading comprehension skill in a three-credit General English (GE) Course. The participants included eight groups of freshmen, in four disciplines: Management, Psychology, Mechanical Engineering and Computer Engineering. They were randomly assigned as four experimental and four control groups, each including approximately 30 participants. The same materials were taught to all groups after their initial homogeneity in English was assessed via Analysis of Variance of the pre-test scores obtained from a Key English Test (KET). In the experimental groups, one whole session was devoted to explicitly teaching three sets of metacognitive strategies and five reading strategies: skimming, scanning, previewing, using context clues, and making inferences. These groups also received metacognitive awareness-raising while applying the strategies in each reading lesson for six sessions. The analyses of the research data revealed that metacognitive strategy training promoted the participants' learning when integrated with a reading-focused GE course regardless of their gender and a small effect from discipline. The findings have implications for teachers, materials developers, and teacher trainers.

Keywords: metacognitive strategy training, reading comprehension, gender, discipline

Introduction

The Current research findings in second language acquisition (SLA) research have brought to the foreground the central role of learner factors in language pedagogy claiming that adding a focus on the learner will augment language teaching methodology. The realization was conducive to a large body of investigations centered on individual differences and learner autonomy as major principles in progressive educational philosophy which, according to Littlewood (1996), conceives of language learner as a unique developing individual with intellectual and emotional needs capable of learning and thinking independently. The concept of 'individual differences', however, has been construed as rather loose encompassing certain central variables along with many potential ones (Dornyei, 2005). Among the core variables are personality, aptitude, and motivation as well as learning styles and language learning strategies which have, according to Dornyei (2005), been long regarded as key individual differences in language pedagogy. The centrality of these variables might be pertinent to the paramount role they play in both boosting the learning process and enhancing the ultimate outcome.

Learners are now assumed as potentially more adept individuals who have at their disposal a wide range of cognitive and metacognitive resources that facilitate their control over the complexity involved in the language itself, the learning process, and the language input (Larsen-Freeman & Cameron, 2008; Larsen-Freeman, 1997, Oxford, 1990a). The need for such capable learners who can govern their own learning is marked by the swing of the educational pendulum in favor of learner-centered and process-orientated pedagogy on the one hand and the need to cope with the complexity and dynamicity of the input and the learning process on the other.

Two fundamental learner resources are affective and cognitive factors. Affective factors reflect some reaction on the part of the learner to the learning environment more directly influenced by various aspects of teaching. The postulation of reflective teaching practice might be interpreted as a deliberate perseverance to raise and maintain teachers' awareness of the necessity of creating an agreeable atmosphere that is conducive to learner engagement.It is assumed that under stimulating and engaging circumstances,

cognitive resources are triggered and give rise to more learning-conducing participation.

Among cognitive learner resources are a number of diverse learner strategies which have been defined by Cohen (1998) as "learning processes which are consciously selected by tlearner" (p. 4) that facilitate the learning process. The validity of 'choice' as a distinctive feature of learning strategies, nevertheless, was called into question by Dornyei (2005) who rightly underscored its inadequacy in distinguishing strategies from non-strategic activities "because students tend to make several choices concerning their learning process that are not strategic … and do not necessarily involve appropriate and purposeful behavior to enhance the effectiveness of learning" (p. 165). Further, Riding and Rayner (1998) highlighted the significance of purposeful selection and effortful application of strategies and defined them in terms of 'appropriateness' as strategic activities that are purposefully selected and strenuously employed by the learners to promote the effectiveness of their learning experiences.

These purposefully selected and assiduously applied operations fall into three categories of cognitive or learning strategies (CSs) used to control the language input, communication strategies (COSs) employed to control the process of communication, and metacognitive strategies (MCSs) deployed to control and monitor the effectiveness of CSs and the entire learning process (Flavell, 1979; Livingstone, 1997; Oxford, 1990b). A myriad of studies have addressed learners' strategy knowledge and awareness (Chamot, 1987, as cited in Wenden& Rubin, 1987; Chamot, 1990; Flavell, 1979; O'Malley & Oxford, 1989, 1990a) and the application of strategies (Brown, 1987; Coskun, 2010; Cromley, 2005; Livingston, 1997). The findings suggest the effectiveness of a wide range of strategies in helping learners control numerous aspects of the learning and communication processes and thereby achieve their potential. It has also been postulated that these strategies are teachable and that the training programs addressing the strategies should be compatible with the learning objectives and tasks.

From a pedagogic perspective, metacognitive strategies seem to play a more central role because they can assist learners with adequate selection and application of all other strategies. The term "metacognition" has been defined as the process underlying the efficient use of strategies and the essence of

intelligent activity (Wenden, 1987), and as the higher order thinking required for active control of cognitive learning processes (Livingstone, 1997). Flavell (1979) makes a distinction between metacognitive knowledge and metacognitive experience. The former refers to the conscious knowledge about cognitive processes which can be employed to control such processes whereas the latter involves the actual use of MCSs to control cognitive activities. Knowledge about person, about task, and about strategy has been postulated as three major subcomponents of metacognitive knowledge which, according to Flavell (1979), is interactive in nature and like other knowledge forms needs to be retrieved from long-term memory intentionally or unintentionally. The degree of this activation can lead to metacognitive experience before, during, or after a cognitive activity particularly in contexts that call for highly careful information processing. Yet, regardless of the exact time they may occur, metacognitive experiences can greatly impact the achievement of cognitive goals and accomplishment of various tasks by aiding the learner to abandon or revise learning goals or even to establish new ones, to add to, delete from, or revise the metacognitive knowledge base, and to activate cognitive or metacognitive strategies.

Notwithstanding the constant dynamic interaction between cognitive and metacognitive strategies, the borderline between the two does not seem to blur. Flavell (1979) has explained the distinction in terms of the way the information is used. That is to say, cognitive strategies are supposed to be learning-directed and are deployed to assist a learner achieve a particular learning goal. Metacognitive strategies, on the other hand, are organizational and evaluative in nature and may be used before a task to ensure optimal performance, probably through focusing attention and planning, or after a task to evaluate whether the goals have been accomplished or not. Some cases of overlap have also been reported (Livingston, 1997) such as self-questioning which might be presumed as a cognitive strategy when used to obtain information from a reading text, or a metacognitive one when used to monitor one's comprehension of the text.

Despite the practical advantages of metacognitive strategies, most learners rely on a merely unconscious application of these strategies with no control over when and how they can be implemented. Hence, learner development programs have been postulated as the key to overcoming this impediment to

autonomous learning. Wenden (2002, p. 9) has unambiguously stated the goal of learner development as "the enhancement of the processing of learning required to complete discrete pedagogical tasks through acquiring task specific strategies". Such programs may reflect varying foci in different language courses based on the teaching objectives, teaching materials and tasks.

In a reading comprehension classroom, task specific strategies encompass various reading strategies, for example, guessing the meaning of the new words in a passage, reading and outlining the key ideas in a paragraph. Receiving training in task specific strategies would guide the learner through stages of contextualized awareness-raising to reflective, self-regulative, and autonomous strategy use. What is underscored at all these phases of training is the congruence of task-based and skill-based training to the proficiency level of the learners (Wenden, 1991; Ellis & Sinclair, 1989, Huang & Van Naerssen, 1987).

The investigation of major differences in strategy use started in the 1980s. Politzer and McGroarty (1985) used a behavioristic questionnaire to survey 37 university ESL students majoring in engineering science and social science and humanities. The findings, however, were based on a small sample of participants and will not be dealt with here.

Another study was carried out by Ofodu and Adedipe (2011) to assess 120 ESL secondary school students' awareness and application of MCSs in comprehending academic materials at Ekiti, Nigeria. The descriptive analysis of the data showed over 60% affirmation on each of the aspects of MCSs which suggested that secondary school students were aware of MCSs to a large extent. Pearson correlation of students' awareness and application of MCSs also revealed a significant relationship between the participants' awareness and application of MCSs.

Strategy awareness and application have also been investigated in relation to other learner variables such as gender (Green & Oxford, 1995; Oxford, 1993; Oxford &Nyikos, 1989; Phakiti, 2003; Politzer, 1983; Poole, 2005;Yang, 1994, cited in Oxford & Burry-Stock, 1995), and academic discipline (Hong-Nam &Leavell, 2011; Ofodu&Adedipe, 2011).

Gender has been proposed as one of the basic demographic variables which can play a significant role in affecting every aspect of second language learning success and other individual variables (Dornyei, 2005) including

strategy use. The literature on gender difference in reading comprehension, CS use in general and MCS use in particular is relatively scarce. Spurling and Llyin (1985) have found no gender differences in reading test performance among L2 learners, whereas Chavez (2001, cited in Phatiki, 2003) has reported a superior performance for females on a multiple-choice reading test. In other studies (Oxford &Nyikos, 1989; Oxford, Lavine, Felkins, Hollaway, &Saleh, 1996) females have been reported to use CSs more frequently than males. A significantly higher use of MCSs by females has also been reported by Green & Oxford (1995) and Sheorey (1999).

However, one of the investigations of gender differences in strategy use in L2 reading was carried out by Phakiti (2003) who examined gender differences in both CS and MCS use in an EFL reading comprehension test context. He addressed gender differences in L2 reading comprehension performance assessed by a multiple-choice reading comprehension test and in the use of CSs and MCSs. The study was carried out with 384 university students at a major university in the north of Thailand who were taking a required Basic English Course (Fundamental English 1) and took the university's final examination in English, immediately followed by a questionnaire on their strategy use.

One of the investigations of major differences in strategy use was conducted by Peacock (2001) who used Oxford's (1985) SILL and a 15-minute semi-structured interview with the three students in each discipline with the highest and lowest use of all SILL strategies that were associated with higher levels of proficiency to explore the strategy use of 1006 Hong Kong Chinese learners attending English for Academic Purposes (EAP) classes in 55 City universities. 51% of the participants were males and 49% of them were females with the age range of 18-39, and from eight different disciplines: Building and Construction, Business, Computer Studies, Engineering, English, Math, Primary Education, and Science. This study addressed the most frequently used categories of strategies (compensatory, cognitive, and metacognitive) and the relationship between strategy use and proficiency, gender, and major.

Descriptive statistics of the research data revealed that "among all students, the most frequently used strategies were the compensation category followed by cognitive and metacognitive, then social, memory, and affective

strategies" (Peacock & Ho, 2003, p. 183). Multivariate analysis of variance, on the other hand, indicated a number of disciplinary differences in strategy use, e.g. higher use of cognitive, metacognitive, and social strategies by students majoring in English and much lower use of MCSs by computer students. Although he did not report discipline differences for individual strategies, frequent use of cognitive and compensation strategies were verified. Physics students used significantly fewer CSs than students from the other two disciplines, and that Math students used significantly fewer MCSs.

Results also showed a statistically significant positive relationship between 27 individual strategies, mostly cognitive and metacognitive, and proficiency. Gender differences were also supported with females (493) reporting significantly higher use of all six strategy categories than males.

The use of reading strategies has also been substantiated by native speakers in their L1, EFL, and ESL learners (Feng&Mokhtari, 1998; Sheorey&Mokhtari, 2001). In an investigation of reading strategies of 20 Chinese proficient college students, Feng and Mokhtari (1998) reported a wide-ranging use of strategies while reading in English and Chinese. They also found that more strategies were used while reading difficult English texts.

The ESL learners' use of MCSs in reading was explored by Sheorey and Mokhtari (2001) who examined 105 American native speakers and ESL university students and found high level of various reading strategies awareness among all participants. In both groups, high-reading-ability participants showed comparable degrees of higher reported use of CSs and MCSs than lower-reading ability students in the counterpart groups. A major difference between ESL learners and native participants, however, was related to the significance they attributed to support reading strategies which were regarded as more important to ESL learners regardless of their reading proficiency.

In response to the scarcity of empirical investigation of the types of MC reading strategies used by EFL and ESL readers in reading English texts, Karbalaei (2010) compared MC reading strategies used by Iranian EFL and Indian ESL learners under a reading comprehension test condition. 93 Indian and 96 Iranian freshmen and sophomore college students majoring in English Translation and Literature participated in his study. The paired t-test analysis of the research data obtained from the MARSI questionnaire administered before and after a reading comprehension test indicated significant differences

between EFL and ESL learners' use of MCSs such and Support reading strategies, with Indian ESL learners showing a better use. With respect to CSs, however, both groups reported the same use of problem-solving strategies. Based on the findings, the importance of helping both ESL and EFL college readers develop their metacognitive awareness of reading strategies is underscored.

The need might seem more urgent for EFL college students who need to read a large body of academic reading texts in English which entails an adequate preparation from high school. Yet, most of them enter university unprepared for this demand (Dreyer &Nel, 2003) and, thus, fail to select effective and efficient strategies (Wood, Motz, & Willoughby, 1998). It has been suggested that teachers can play a part in enhancing students' awareness and application of various reading strategies (Pressley &Afflerbach, 1995). This intervention can take the form of implicit metacognitive training or metacognitive awareness raising activities that can be incorporated into any course depending on the course objectives.

The impact of strategy training has been explored on the complexity of task-based speech (Birjandi&Seifoori, 2009), various features of task-based oral performance (Seifoori, 2009), fluency of task-based speech (Seifoori&Vahidi, 2012), as well as on receptive skills, e.g. listening comprehension (Coskun, 2010) and reading comprehension (Hong-Nam &Leavell, 2011). In case of productive skills, the findings have attributed the effectiveness of metacognitive training in enhancing the complexity of output to learners' proficiency level and attitude (Birjandi&Seifoori, 2009). The accuracy and fluency of oral output, however, were found (Seifoori, 2009; Seifoori&Vahidi, 2010). As for receptive skills, reading and listening strategy training led to significant increase in use of MCSs and positively influenced the participants' reading and listening comprehension (Coskun, 2010; Hong-Nam &Leavell, 2011).

Hong-Nam and Leavell (2011) addressed the effect of explicit instruction in reading strategies on increasing readers' reported cognitive and metacognitive strategy use as well as the correlation between their strategy use and self-perception. The strategy instruction model utilized was based on best practice for strategy instruction (Nist&Holschuh, 2000, as cited in Hung-Nam

&Leavel, 2011,) which included establishing a purpose for learning the strategy, modeling of the strategy by the instruction using techniques like think aloud and talking aloud, guided practice with the help of the instructor, independent practice with instructor monitoring, reflection/feedback on strategy use, and finally multiple opportunities for strategy application. Paired samples t-test was run to show the differences in overall strategy use from the pre-test to the post-test the results of which indicated an increase in learners' overall use of reading strategies from the pre-test to the post-test. Although the increase reported by the participants was evident in all three areas, the increase was statistically significant only for MCSs.

In a different study focused on the impact of strategy training and the oral receptive skill, Coskun (2010) explored the effect of a five-week embedded metacognitive training program on listening performance of a group of preparatory school students. The t-test analysis of the listening post-test scores indicated that the metacognitive training program was effective in enhancing the participants' listening comprehension in the experimental group.

Despite various investigations of strategy use by EFL and ESL readers, no attempt has yet been made to train Iranian university students to use their cognitive and MCSs. Hence, the present study set out to bridge this gap and examine the impact of a metacognitive training program embedded in the GECs on Iranian college students' reading comprehension in different disciplines and to probe probable gender and discipline differences in their strategy use. The following research questions were formulated to serve the purpose:

1. Does metacognitive training improve EFL learners' reading comprehension?
2. Are there discipline variations in the impact of training on reading comprehension?
3. Are there gender variations in the impact of training on reading comprehension?

Method

Participants

A sample of 240 female and male college freshmen from five disciplines, Management, Psychology, Mechanical Engineering and Computer Engineering participated in this study. They were taking a three-credit GE course as a pre-requisite for a content-based two-credit English for Specific Purpose (ESP) Course. The sample was recruited from a population of approximately 1000

students who take the course each semester. The main objective in the GE course is to improve the participants' reading comprehension skill and to prepare them for the ESP courses and comprehending more technical texts based on the content they are studying. Since the participants were attending intact classes, random sampling was impossible. Yet, to overcome this limitation, the groups were randomly assigned as the experimental and the control groups. Furthermore, a proficiency pre-test was administered to ascertain initial homogeneity of the groups at the onset of the study.

Instrumentation

The research data in the present study were obtained via three major instruments: a general proficiency test administered as the pre-test, the Metacognitive section of Oxford's Strategy Inventory for Language Learning (SILL) (1985), and a syllabus-based final reading exam.

A modified version of the Key English Test (KET, 2005), which is a standardized first level Cambridge English exam for speakers of other languages (ESOL) at elementary level, was piloted and administered as the pre-test to all groups of participants.

The dependent variable in the present study was the participants' reading comprehension skill. To assess the extent of this development, the researcher, in corporation with the teacher, designed a syllabus-based final exam with a total score of 20. The test included three reading passages, a sum of 12, and some vocabulary and grammar questions, with a sum score of 8. The test was administered to all groups at the end of the study to measure both their growth in reading comprehension and vocabulary and grammar as subcomponents of reading.

Teaching Materials

The teaching materials used in this study was "Select Readings; Teacher-approved readings for today's students" (Lee, 2011). The course book contains 14 chapters focused on topics like sports in the world, healthy eater, dream homes, etc. The course book provides some guidelines for the teacher in the form of Series Overview where the overall organization of a typical chapter is explained followed by some teaching suggestions.

Procedure

The participants in the experimental groups received explicit instructions on how to use various reading strategies based on the supplementary strategies-based lessons at the end of the same course book (Lee, 2011, pp. 92-102). Together with the teacher, they learned what five different reading strategies were and why and how they could be applied. These strategies included skimming, scanning, previewing, using context clues, and making inferences. They also applied the strategy in question to complete an example task under the teachers' supervision.

The selected sequence for each session embodied an integrated reading-based metacognitive training which reinforced the explicit presentation of CSs during the reading sessions. The methodology used to implement the metacognitive training program centered on the three-group classification of metacognitive strategies: 1) centering your learning, 2) arranging and planning your learning, and 3) evaluating your learning (Oxford, 1990b).

"Centering your learning strategies" included overviewing and linking with already known material, as well as paying attention. These strategies were introduced and practiced before each phase of the reading. That is, theparticipants in the experimental groups were first reminded of the necessity of the strategy they were to apply. For example, the "Vocabulary Preview" section of the "Before You Read" was introduced as an activity which could link the new material to their previous knowledge and personalize the topic. The importance of paying attention while doing the activity was also notified.

"Arranging and planning your learning strategies", on the other hand, comprised setting goals and objectives, identifying the purpose, planning for a language task. The participants were engaged in these activities through questions posed by the teacher. They were directed to find out the purpose of the task/activity, e.g. skimming, scanning, etc., to set goals and objectives for themselves, and to carefully apply the strategies they had learned, and were required to plan their performance within the time limits.

The third metacognitive strategy was self-monitoring which was introduced before each activity. The learners were required to self-edit their performance while doing the task and to check their responses in pairs. Finally, while the

activities were checked in the class, they were required to find out their problems.

Research Design and Research Variables

This quasi-experimental research was undertaken to examine the impact of the independent research variable: MC training, on the dependent research variable: male and female non-English major freshmen's reading comprehension in GE.

Data Analysis

The proficiency pre-test scores were compared via Analysis of Variance to ascertain the initial homogeneity of the participants. Descriptive Statistics of the data obtained from the syllabus-based post-test were estimated and a two-way ANOVA was run on the data to compare the reading comprehension scores of the male and female participants in the control and experimental groups' across the four different Disciplines.

Results

The Key English Test

Cambridge Key English Test (KET), for speakers of other languages (ESOL) at elementary level, was piloted and administered as the pre-test to all groups of participants. Those participants whose scores ranged two standard deviations below and above the mean were selected to participate in the study. After Levene's Homogeneity Test confirmed the normality of the data (p= .050), the results of the proficiency test were submitted to a One-way ANOVA test, the results of which showed that the difference between the eight groups did not reach significance level, $F(7.232)=.529$, $p=.81$.

The Syllabus-Based Post-Test

The research questions addressed the differential impact of metacognitive strategy training on the participants' reading comprehension skill across discipline and gender. Table 1 presents the descriptive statistics of the male

and female participants' syllabus-based post test scores in the control and experimental groups.

Table 1
Descriptive Statistics of the Groups' Syllabus-Based Post-Test Scores

Groups	Gender	Discipline	Mean	Std. Deviation	N
Control	Male	Management	13.71	2.85	15
		Psychology	12.18	2.96	15
		Mechanics	14.36	2.63	15
		Computer	12.96	3.37	15
	Female	Management	12.96	2.37	15
		Psychology	14.18	2.18	15
		Mechanics	14.65	2.62	15
		Computer	12.90	2.75	15
	Total	Management	13.34	2.60	30
		Psychology	13.18	2.75	30
		Mechanics	14.50	2.58	30
		Computer	12.93	3.02	30
Experimental	Male	Management	14.70	2.43	15
		Psychology	14.83	2.25	15
		Mechanics	16.11	2.15	15
		Computer	16.08	2.90	15
	Female	Management	14.00	2.84	15
		Psychology	14.80	2.17	15
		Mechanics	15.30	2.58	15
		Computer	16.11	2.42	15
	Total	Management	14.35	2.62	30
		Psychology	14.81	2.17	30
		Mechanics	15.70	2.37	30
		Computer	16.10	2.63	30
Total	Male	Management	14.20	2.651	30
		Psychology	13.50	2.91	30
		Mechanics	15.24	2.52	30
		Computer	14.52	3.47	30
	Female	Management	13.48	2.63	30
		Psychology	14.49	2.16	30
		Mechanics	14.97	2.58	30
		Computer	14.50	3.028	30
	Total	Management	13.84	2.644	60
		Psychology	14.00	2.594	60

Mechanics	15.10	2.535	60
Computer	14.51	3.233	60
Total	14.36	2.793	240

As illustrated in Table 1, some differences were observed between and among the mean scores of the male and female participants from each Discipline. Hence, the researcher analyzed the data to test the significance of the apparent difference via a two-way ANOVA test. The Levene's test of Equality of Error Variances was first conducted to assess the normality of the data the results of which revealed no significant difference between the groups, p=.85.

The Impact of Metacognitive Training

The syllabus-based post-test scores were, further, submitted to a two-way ANOVA test to find out the impact of the metacognitive training on the experimental and control groups' reading comprehension. Table 2 presents the results of this analysis.

Table 2.
Two-way ANOVA Analysis of the Groups' Syllabus-Based Post-Test Scores

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	329.49[a]	15	21.96	3.205	.00	.177
Intercept	49543.16	1	49543.16	7.229E3	.00	.970
Groups	184.17	1	184.17	26.871	.00	.107
Gender	.002	1	.002	.000	.98	.000
Discipline	58.68	3	19.56	2.854	.03	.037
Groups* Gender	8.34	1	8.34	1.217	.27	.005
Groups* Discipline	43.10	3	14.36	2.096	.10	.027
Gender* Discipline	23.45	3	7.81	1.141	.33	.015
Groups* Gender* Discipline	11.74	3	3.91	.571	.63	.008
Error	1535.24	224	6.85			
Total	51407.90	240				
Corrected Total	1864.74	239				

a. R Squared = .177
(Adjusted R Squared = .122)

As indicated in Table 2, the effect of grouping was significant $F(1,224)$ = 26.87, p=.000. That is, the experimental groups majoring in Mechanical Engineering (M= 15.70) and Computer Engineering (M=16.10) outperformed the control counter-groups (M=14.50) and (M=12.93), respectively. The

Management participants in the experimental group (*M*=14.35) stood above the control group ((*M*= 13.34). The difference reached significance level between the experimental group (*M*= 14.81) and the control group (*M*=14.18) majoring in psychology as well. However, the effect size of (.10) for the group differences was small.

Metacognitive Training and Discipline

As for the effect of the participants' Discipline on the effectiveness of the metacognitive training they received and thereby on their reading comprehension, the ANOVA analysis of the post-test scores in Table 2 indicated significant difference among the mean scores of the participants from different Disciplines, $F(1,224)=2.85$, $p<.05$. To locate the difference between groups more specifically, I conducted the Tuckey post hoc test the results of which are presented in Table 3.

Table 3.
Tucky post-hoc test of discipline effects on the groups' syllabus-based post-test scores

(I) Discipline	(J) Discipline	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Management	Psychology	-.15	.477	.98	-1.39	1.08
	Mechanics	-1.26*	.477	.04	-2.49	-.02
	Computer	-.67	.477	.49	-1.90	.56
Psychology	Management	.15	.477	.98	-1.08	1.39
	Mechanics	-1.10	.477	.09	-2.34	.129
	Computer	-.51	.477	.70	-1.75	.72
Mechanics	Management	1.26*	.477	.04	.02	2.49
	Psychology	1.10	.477	.09	-.12	2.34
	Computer	.59	.477	.60	-.64	1.82
Computer	Management	.67	.477	.49	-.56	1.90
	Psychology	.51	.477	.70	-.72	1.75
	Mechanics	-.59	.477	.60	-1.82	.64

Based on observed means.
The error term is Mean Square(Error) = 6.854.

*. The mean difference is significant at the .05 level.

Based on the analysis in Table 3, the difference in the post test scores was significant only between the participants' majoring in Management (*M*=14.35) and Mechanical Engineering (*M*=16.10). That is to say,

Management participants benefited less from the metacognitive training than those studying Mechanical Engineering.

Metacognitive Training and Gender

The analysis, however, did not indicate any significant difference between male and female participants' scores $F(1,224) = .000$, $p>.05$. That is to say, both male and female participants in the experimental groups equally benefited from the metacognitive training which enhanced their reading comprehension skill. In addition, no significant interactive effect was found between the independent variables, grouping and Discipline.

Discussion

The present study examined the impact of metacognitive strategy training on Iranian EFL learners' reading comprehension across gender and discipline. The findings might be discussed in three distinct sections with reference to previous research findings.

Metacognitive Training and Reading Comprehension

The findings from the present study indicated the positive impact of metacognitive training on improving Iranian EFL learners' reading comprehension skill. They lend support to the findings of Ofodu and Adedipe (2011), Hong-Nam and Leavverll (2011) and Coskun (2010). Ofodu and Adedipe (2011) investigagted the use of MCSs in comprehending academic materials at Ekiti, Nigeria by 120 ESL secondary school students and the probable relationship between this awareness and the application of such strategies in reading comprehension. The analysis of the research data showed that secondary school students were aware of MCSs to a large extent. A significant relationship was also found between the participants' awareness and application of MCSs and the students' awareness and application of MCSs.

Hong-Nam and Leavell (2011) explored the effect of explicit strategy training on increasing cognitive and metacognitive strategy use and the correlation between the participants' strategy use and self-perception, as measured by Metacognitive Awareness of Reading Strategies Inventory (MARSI) (Mokhtari&Reichard's, 2002) at a large university in Texas. Paired samples t-test analysis indicated an increase in learners' overall use of reading

strategies from the pre-test to the post-test and the increase was statistically significant only for MCSs.

In a different study focused on the impact of strategy training on the oral receptive skill, Coskun (2010) explored the effect of a five-week embedded metacognitive training program on listening performance of a group of preparatory school students. The t-test analysis of the listening post-test scores indicated that the metacognitive training program was effective in enhancing the participants' listening comprehension in the experimental group.

Gender Variation in MetacognitiveTraining

The findings emerging from the present study provided no evidence supporting the relationship between the participants' gender and their use of strategies or their success in taking advantage of metacognitive training. The findings are compatible with those of Spurling and Llyin (1985) who found no gender differences in reading test performance among L2 learners. The findings, however, call into question the findings of Chavez (2001, cited in Phatiki, 2003), Sheorey (1999), and Phakiti (2003). Chavez (2001, cited in Phatiki, 2003) reported a superior performance for females on a multiple-choice reading test, as well as those of Green & Oxford (1995). In another study, Sheorey (1999) found a significantly higher use of MCSs by females. Likewise, Phakiti (2003) addressed gender differences in L2 reading comprehension performance assessed by a multiple-choice reading comprehension test and in the use of CSs and MCSs. The results of the Multivariate analysis of variance of the research data revealed that although males and females did not differ in their reading comprehension performance and their use of CSs, they showed significant differences in their use of MCSs.

Discipline Variation in Metacognitive Training

The results of the present study indicated Discipline differences in the final scores of the participants' in the experimental groups from different Disciplines, which supports the influence of Discipline on the final outcomes of the training program. The findings match those of Peacock (2001) who

used Oxford's (1985) SILL to explore the strategy use of 1006 Hong Kong Chinese learners attending English for Academic Purposes (EAP) classes in 55 City universities. Multivariate analysis of variance indicated higher use of cognitive, metacognitive, and social strategies by students majoring in English compared to computer students (Peacock & Ho, 2003). Although he did not report discipline differences for individual strategies, frequent use of cognitive and compensation strategies were verified. Physics students used significantly fewer CSs than students from the other two disciplines, and Math students used significantly fewer MCSs. Gender differences were also supported with females (493) reporting significantly higher use of all six strategy categories than males.

Conclusion

The study provides implications for practical spheres of language teaching methodology, teacher trainers and materials designers. Methodologically, the findings from this research highlight the significance of incorporating metacognitive training activities into everyday classroom language instruction. Such activities might be of high executive value on the ground that they introduce learners to task-specific strategies in various skills, e.g. reading comprehension, and, thereby, to learn how to employ the metacognitive awareness developed in the classroom to manage their general learning. The applicability of such a training program is more justifiable with regard to the scarcity of exposure in English as foreign language contexts (EFL), and specifically, for freshmen and sophomores who require to learn how to tackle various English technical texts to keep pace with the new findings in their fields, to write and present academic texts in English and to communicate with the world via English.

Of course, it should be borne in mind that qualified teachers are required to apply strategies-based instruction. The findings from this study, thus, accentuate the inevitability of a teacher training program the aim of which must be set as familiarizing the novice and practicing teachers, instructors with the basics of strategic investment and the principles of designing such activities.

Various courses at university level in Iran are largely based on course books. Thus, it would make a great difference if course book writers draw attention to various strategies-based activities and attempt to take into account the needs of Iranian learners who are used to explicit instruction. Research findings, as mentioned in Chapter II, have highlighted the positive role of explicit instruction in raising strategic awareness. Therefore, if some explicit strategies-oriented activities are added to the course books used, learners would definitely find them more needs-based and practically constructive. One major characteristic that language teachers should have is the ability to assess learners' needs and to endeavor to tailor their teaching based on those needs. Such learner-tailored instruction entails the ability to evaluate course books as well which requires formal training, which if offered, would enable the teachers to evaluate course books and make them more compatible with learners' needs. Designing such teacher training courses, hence, focused on the designing and application of strategies-based activities to complement the course books content would enable teachers to offer courses that are more effective in enhancing Iranian freshmen's reading comprehension skill.

In conclusion, the research reviewed in this article expands our understanding of Iranian Freshmen's need for strategic awareness which, as verified here, can promote male and female learners' reading comprehension skill when integrated with a reading-focused general English course regardless of their gender. The pedagogic response to the rise in demand for strategic investment can take the form of metacognitive training programs that can provide a fascinating opportunity for graduate and postgraduate EFL learners.

Researchers have yet to delve into more longitudinal studies investigating the effect of the similar metacognitive training programs on other language skills with larger samples of language learners using more effective process-oriented and qualitative measures to make fair evaluation of the programs.

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Biodata

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