Abstract: The present quasi-experimental research aimed to examine the differential effect of metacognitive strategy training and critical thinking awareness-raising on EFL learners’ reading comprehension of general reading (GR), cause and effect (CE), and argumentative (ARG) texts. The study set to investigate the extent to which raising Iranian EFL learners’ awareness of critical thinking skills and three sets of metacognitive reading strategies including global, problem-solving, and support may influence the three groups of participants’ reading comprehension. To this end, a purposeful sample of 54 intermediate male Iranian EFL learners attending three classes was recruited from a pool of 85 English learners and was randomly assigned as two experimental groups receiving metacognitive training (MCG) and critical thinking awareness-raising (CTG) and a control group (CG). The research data were gleaned using a researcher-made piloted 54-item reading comprehension test. The results of the paired sample t-test analyses demonstrated that both MCG and CTG made significant improvements in comprehending GR and ARG texts from the pre-test to the post-test and that both outperformed the CG in comprehending GR and ARG post-tests. With regard to CE comprehension, the only
significant difference was observed between the MCG and the CG. The findings offer a number of pedagogical implications.

**Subjects:** Language & Linguistics; Language Teaching & Learning; General Language

**Reference**

**Keywords:** argumentation; causal relationship; critical thinking; metacognitive strategy training; reading comprehension

1. Introduction

Reading comprehension has long been emphasized as an important skill in foreign language learning. The overriding role attributed to reading has been substantiated with respect to the potential practice activities it can provide for widening learners' repertoire of words and structures or the opportunities it offers for exposure to incessant input. The conventional mechanical views of reading comprehension as a passive receptive skill have been superseded by the cognitive and interactive perspective which envisage it as an active information processing skill in which readers link the written input to their perceptual and psycholinguistic background while filling the gaps and making inferences to make sense of what they are exposed to (Anastasiou & Griva, 2009). Regardless of the theoretical position taken, there is consensus among teachers and educators that academic and professional success entails a developed reading comprehension skill since attaining expertise in any field relies on the individuals' ability to digest a large body of written input that is mostly presented in English textbooks and journals (Zare, 2007).

An intrinsic property of reading comprehension is that it is not an acquired skill and entails instruction. Based on this conviction, teachers and researchers have long been seeking to cultivate the most effective instructional approach in teaching reading. Yet, the theoretical active/passive divide in conceptualization of reading is also evident in the way it is taught in practice. Owing to the still prevailing misconception of reading comprehension as a language learning activity, some teachers eschew the critical potential of reading comprehension in favor of lexical and grammatical development. Based on the common experience of English teachers, most of the difficulties that plethora of EFL learners, including Iranian learners, face in comprehending written texts seem to derive from this widespread illusion the product of which is a highly restricted skill that hardly enables the learners to read between the lines.

The proponents of recent communicative and critical stand, on the other hand, accentuate comprehension as an initial stage in critical thinking (CT) and emphasize the need to engage readers in critically analyzing, synthesizing and evaluating the quality of what they read (Jun, 2011). Theoretical support for this critical interpretation is offered by Bloom's hierarchical taxonomy for CT (1956) which starts with comprehension as the bottom layer and analysis, synthesis and evaluation as the higher levels of thinking. Research findings in applied linguistics highlight the compatibility of CT in teaching of reading comprehension and link EFL learners' problems in reading to exclusive attempt to improve learners' comprehension through lexical and grammatical knowledge with no parallel attempt to encourage the development of higher-order thinking skills (Pressley, 2002) and reasoning skills (Van Gelder, 2005). The burgeoning research in CT since the 1990s has unravelled the paramount importance of developing learners' comprehension along with both their CT skills and metacognitive strategies (MCSs).

The concomitant instruction of CT along with instruction in basic skills such as reading comprehension represent the infusion approach to CT that has been advocated by numerous experts like Bailin, Case, Coombs, and Daniels (1999). Educationalists view CT as a domain-specific potential capacity that entails both in-depth instruction in the subject matter and explicit instruction on general principles of CT. They justify the teachability of CT on grounds that learners can be trained to analyze arguments and claims via making inferences, inductive and deductive reasoning, analyzing and synthesizing and evaluating the input before arriving at decisions and solutions.
(Facione, 1990). Willingham (2007) delineated the CT awareness-raising activities that can naturally occur in a reading classroom including activating background knowledge, asking and answering questions, defining terms, identifying assumptions, interpreting and explaining meaning, verbal reasoning in relation to likelihood and uncertainty, predicting and seeing both sides of an issue. As such, CT skills may be drawn from the content to be learnt through the natural consequence of engaging with the subject matter (Ennis, 1989). It is argued that learners can thus function more efficiently by evaluating the validity of the information they receive, making more accurate decisions and learning how to learn and what to believe (Braun, 2004).

CT skills start with comprehension of the written input which may still pose serious problems for numerous EFL learners. One way out of this predicament, according to research findings (Oxford, 1990; Tavakoli, 2014), is raising learners’ awareness of metacognitive strategies (MCSs) that indicate the ways readers interact with written texts (Erfanpour, 2013) and are congruent with learner autonomy as the ultimate goal in learning-centered instruction. Operationalization of metacognitive awareness-raising by Mokhtari and Reichard (2002) in the form of Metacognitive Awareness of Reading Strategy Inventory (MARSI) allowed practitioners to measure the extent to which adult readers employ strategies to comprehend what they read. This framework can also be employed to train learners to promote their comprehension of the text, which is the initial stage of CT, through strategic reading. Hence, metacognitive training can facilitate comprehension whereas CT awareness-raising can boost critical analysis and evaluation of the input. The extent to which application of these two methodological alternatives may contribute to overall comprehension across various genres is still unexplored.

A glance through the related literature indicates that despite a plethora of research dealing with MCSs, CT and reading comprehension distinctly (Erfanpour, 2013; Fahim & Kamali, 2011; Ismail & Tawalbeh, 2015), literature is not so rich with respect to the extent to which metacognitive strategy training or CT-awareness raising may contribute to EFL learners’ reading comprehension of various textual genres particularly general, argumentative, and cause of effect texts. Therefore, the current inquiry set out to explore the influence of these two methodological options, as the independent variables, on Iranian EFL learners’ comprehension of general, cause and effect and argumentative texts. It was assumed that exploring the effectiveness of these two instructional interventions across textual genres would not only provide insight on their effectiveness but also narrow down teachers’ choices by transparently delineating pedagogical options based on learners’ needs and teaching content. To serve the purpose, the following research questions were formulated:

(1) Does metacognitive strategy training have any significant differential impact on EFL learners’ reading comprehension of general, cause and effect and argumentative texts?
(2) Does CT awareness-raising have any significant differential impact on EFL learners’ reading comprehension of general, cause and effect and argumentative texts?
(3) Do metacognitive strategy training and CT awareness-raising have any significant differential impact on EFL learners’ reading comprehension of general, cause and effect and argumentative texts?
(4) Is there any significant difference in the three groups’ performance on the general, cause and effect, and argumentative reading comprehension post-test?

2. Theoretical context and literature review

2.1. MCSs, and reading comprehension
Knowledge of metacognition in reading incorporates one’s familiarity with the reason and the objective of reading (Eskey, 2005) as well as the way comprehension problems could be tackled. Metacognitive system learning appears to be basic if readers are to successfully control their methodology use while reading (Phakiti, 2003a). One of the principal meanings of metacognition
originates from Flavell (1976), who described it as one’s learning concerning one’s own subjective procedures and items or anything identified with them. Yet, there is no regular comprehension of the connection between student utilization of learning strategies and learning achievement, or whether and how system use is reflected in test outcomes (Saks & Leigen, 2018). Indeed, metacognition, as stated by Mokhtari and Reichard (2002), has been characterized as the mindfulness and observing procedures that comprise the information of the readers’ discernment about perusing and the restraint components they practice when monitoring and managing content perception.

Numerous studies have addressed the relationship between reading comprehension, metacognition, and CT. For instance, Phakiti (2003b) examined the relationship between 384 Thai learners’ cognitive and metacognitive strategy use and their reading test performance through the use of a cognitive and metacognitive questionnaire, retrospective interviews and an EFL achievement test. Research is also replete with studies addressing the impact of various metacognitive training programs on listening comprehension (Coskun, 2010), and reading comprehension (Hong-Nam & Leavel, 2011), EFL and ESL reading comprehension (Aghaie & Zhang, 2012; Estacio, 2013; Iwai, 2011; Jafari & Ketabi, 2012; Karbalaei, 2011; Seifoori, 2018). The findings suggest that explicit strategy training can improve the participants’ reading and listening comprehension as well as their autonomous reading behaviors (Aghaie & Zhang, 2012). Metacognitive training was also found effective in enhancing less proficient and low accomplishing students’ learning (Ismail & Tawalbeh, 2015). In another study, Riyadi, Hersulastuti, and Nugrahaningsih (2017) developed a theoretical model of reading comprehension based on MCSs and found underlining, note-taking, abridging, and idea mapping as significantly enhancing senior secondary school students’ comprehension. More recently, Shih and Huang (2018) underscored the number and variety of MCSs used by the students as major determinants of reading performance during reading testing situations.

2.2. CT and reading comprehension

Comprehension, as already stated, is only the first stage of CT that can provoke profound thinking procedures and culminate in reconfiguration of one’s conceptual system. That is why Beck (1999) rules out the viability of reading without reasoning. Yet, for such thought-provoking reading comprehension to take place, it is vital to raise learners’ awareness of CT skills which incorporate the cognitive abilities of thinking, making a deduction, analyzing the arguments, settling on choices and assessing the validity of the information. As such, reading comprehension might be envisaged as closely relevant to principles of CT, as suggested by Cohen (2004).

Research findings have substantiated the positive effectiveness of CT in boosting reading comprehension (Borjesteheh & Vaseghi, 2012; Gomez, 2010; Mendenhall & Johnson, 2010). Fahim and Kamali (2011) attributed learners’ ability to find unknown words in a reading comprehension text to their CT skills. In another study, Fahim and Sa’eepour (2011) explored the effect of training CT aptitudes on reading comprehension and found that CT aptitudes prompted students’ reading comprehension. CT skills were also found to be significantly and strongly correlated with Iranian EFL learners’ reading comprehension (GhorbanDordiNejad & Heydari, 2012) and university students’ self-efficacy (Dehghani, Jafarisani, Pakmehr, & Malekzadeh, 2011).

All the above-mentioned and many other empirical studies have explored reading comprehension either in relation to CT or MCSs while others have detected the influence of each of these variables on participants’ reading comprehension. The present study, however, is distinct from what has been undertaken so far for two reasons. First, it acknowledged the complementary nature of comprehension and CT, on the one hand, and the contributions that metacognitive training can make to promote comprehension, on the other. Thus, the study took a comparative stand and investigated the differential effects of each of these interventions on the participants’ reading comprehension.

Secondly, reading comprehension was operationalized as closely related to generic structure of the text since Iranian EFL learners seem to perform differently while reading various textual
genres. Iranian students seem to have fewer problems in deciphering meaning while reading general texts compared to cause and effect and argumentative texts. CT includes the constituent skills of analyzing arguments, making inferences, using inductive or deductive reasoning, evaluating and making decisions. By the same token, cause and effect and argumentative input seem to comprise embedded intentions, implied meanings and covert premises comprehension of which entails both a set of metacognitive strategies and CT skills. It is, nevertheless, doubtful whether comprehension problems with such texts have their roots in the learners’ unawareness of CR skills or underdeveloped metacognitive strategies.

According to Van Gelder (2005) and Willingham (2007), metacognition appears to be subsumed under CT because CT entails the ability to deploy the right strategies and skills at the right time and this ability is typically referred to as conditional or strategic knowledge which is part of metacognition. Similarly, Halpern (1998) conceive of metacognition as monitoring thinking and strategy use by asking questions like: What do I already know? What is my goal? How will I know when I get there? Am I making progress? Even though MCSs are considered as subcategories of CT, both consist of similar and non-similar subcategories. That is to say, MCSs focused in the present study tended to promote learners’ initial comprehension of the three types of texts while the CT skills selected aimed at enabling the participants to analyze, synthesize and evaluate the target texts. The rationale for taking this comparative approach was to add to the existing literature by detecting more precisely the extent to which each of these two methodological manipulations can maximize comprehension of general, argumentative and cause and effect texts.

3. Methodology

3.1. Participants
A purposeful sample of 54 intermediate male Iranian EFL learners attending three classes in an English Language Institute in Qazvin, Iran, were selected from a pool of 85 English learners based on their performance on a Preliminary English Test (PET) that was run to verify the groups’ homogeneity in reading comprehension. Those whose scores fell within two standard deviation above and below the mean were selected as the research sample. The participants were speakers of Persian and were learning English as a second language. The three groups, each including 18 participants, were randomly assigned as two experimental groups, receiving metacognitive training (MCG) and CT awareness-raising (CTG), and one control group (CG) that was instructed based on the conventional pre-view, view, post-view model of teaching reading with no reference to metacognitive strategies nor CT skills.

3.2. Instruments
To probe the research questions, we made use of a PET and a researcher-made reading comprehension test.

3.2.1. Preliminary English test (PET)
PET is a standardized proficiency test developed for intermediate learners. The original test comprises different subtests; Yet, in line with the focus of the study, we employed the reading comprehension subtest to check the homogeneity of the participants at the onset of the study. It comprised of five reading comprehension texts and 35 comprehension questions. The texts were followed by multiple-choice, matching items, true/false multiple-choice cloze items.

3.2.2. Reading comprehension test
The study was concerned with the participants’ comprehension of general, cause and effect and argumentative texts. To this end, we developed a reading comprehension test including three general, three argumentative and three cause and effect texts selected from sample TOEFL reading texts and each followed by six multiple-choice items. To answer the questions correctly, as is the norm with TOEFL, participants had to employ a wide range of strategies and CT skills to analyze and judge the information to obtain the total test score of 54. The test was piloted with a group
sharing the characteristics of the norm group for whom it had been constructed. The reliability coefficient was found to be .81 on KR21.

Further, the actual test was administered as the pre-test and the post-test under identical conditions with a change in the order of the reading texts, the items and the options. The time allotted to each of the tests was 90 minutes.

3.2.3. The MARSI
The MARSI, developed by Mokhtari and Reichard (2002), was employed as the basic framework for the metacognitive training program. It comprises three subcomponent strategy types. Global reading strategies (GRSs) with 13 items (1,3,4,7,10,14,17,19,22,23,25,26,29) that represent generalized or global reading strategies aimed at setting the stage for the reading act, for instance, setting a purpose for reading and previewing text content. Problem-solving reading strategies (PSSs) include 8 items (8,11,13,16,18,21,27,30) that address localized focused problem solving or repair strategies such as checking understanding which are employed when information processing becomes problematic. Finally, the support reading strategy (SRSs) subcomponent consists of 9 items (2, 5,6,9,12,15,20,24,28) that check the reader’s use of support mechanisms and tools like reference materials aimed at sustaining responsiveness to reading.

3.3. Procedures
Having selected the research sample including three groups of participants in three intact classes, the study began with the administration of the reading pre-test to check whether the participants were homogeneous in their comprehension of general, argumentative and cause and effect text types.

Next, the treatment in both the MCG and the CTG and the placebo in the CG started and continued for 36 sessions over a time span of two semesters, 18 sessions each. Each session lasted for 90 minutes during which the participants worked on two reading texts and were assigned a third text as homework. The texts were selected from authentic reading comprehension textbooks. The content included a proportionate number of general, cause and effect and argumentative texts. The groups were taught the same content through different procedures. Each semester, the first two sessions were devoted to introduction of the course and pre-testing the participants’ reading comprehension. The last session was also devoted to the post-tests. Thus, the treatment lasted for 30 sessions.

3.3.1. The MCG
The training program designed for the MCG was based on Metacognitive Awareness of Reading Strategies Inventory (MARI) which is a 30-item and 5-point Likert-type scale that rates adolescent and adult language learners’ perceived use of reading strategies. In the present study, however, it was employed as a pedagogical framework to present metacognitive strategies. The MCG received training based on the CALLA model (Chamot, Barnhardt, El-Dinary, & Robbins, 1999; Chamot & O’Malley, 1994). The model was employed through five basic steps including “preparation, presentation, practice, evaluation, and expansion” (Oxford, 1990).

During the preparation stage, which lasted for about five minutes, the instructor asked some general pre-reading questions related to the topic to activate the participants’ background knowledge. In the next 20 minutes, which was the presentation stage and would normally take approximately 20 minutes of the class time, two of MCSs were presented by asking the participants some general questions such as “what do you do if you do not understand the meaning of a word while reading?”; they were directed at the target strategies. Further, the operations to tackle those problems were explicitly and interactively presented followed by examples to clarify the concepts. The next thing to do was to consolidate the presented strategies through practice. Hence, a reading text was assigned to be read individually in approximately 15 minutes. To answer the comprehension questions following the text required application of the strategies they had been
taught. During the practice stage, the teacher was sitting at her desk not to disturb the participants’ concentration. Then, they were given a few minutes to check their responses in pairs before giving feedback to the class. The feedback phase would take approximately 10 minutes.

Having comprehended the assigned text, the participants were invited to evaluate their application of the strategies and the usefulness of each in enhancing comprehension in 10 minutes. Meanwhile, they were encouraged to compare their prior experiences of reading comprehension with what they had just done in class and to realize the difference strategic reading can make to comprehension. Further, the teacher would emphasize the necessity of expanding strategic reading to outside classroom situations by applying the same strategies while reading different texts and for a wide range of purposes. Each session culminated in a supplementary reading comprehension task that was either a cause and effect or an argumentative in nature. Their responses were reviewed in the class and the problems were resolved interactively. Finally, a third text was assigned as homework.

3.3.2. The CTG
Following the instructional method offered by Jun (2011) and insights from Paul et al., (1997), the instruction in the CTG aimed at helping learners to develop four mental abilities of interpreting, analyzing, evaluating and explaining written input. The focus of awareness-raising in this group was on major concepts of CT like detecting clues and interpreting content, analyzing the text to identify intended meaning and actual inferential relations among statements to draw reasonable conclusions, evaluating the validity of content by assessing the credibility of statements and finally presenting the results of personal reasoning in the form of a coherent and cogent explanation. These four CT skills were initially presented in the first session of each semester using PowerPoint presentation and examples to clarify each skill. The instructional sessions were focused on four-stage interpretation, analysis, evaluation and explanation of the course content, each lasting for 20 minutes.

For each instructional session, teaching of reading started with the first phase of the training which was analysis. The teacher introduced the reading comprehension topic asking the participants to discuss it and state what they expected to find in the text. Then, they were required to skim the text to see how it conformed to their expectations. The focus in this stage was on engaging the participants in getting an overall interpretation of the text. Participants interpretations were then heard without any feedback.

The second phase of teaching was focused on text analysis which was a level higher than interpretation. It involved identifying the meaning of unknown words based on the context clues, intended meaning and actual inferential relations among statements, questions or descriptions that aimed to express belief, judgements and reasons. The participants were taught how to find out the writer’s main purpose and point of view regarding the topic and the main questions reflected in the text.

Evaluating the logic of the passage was carried out during the third phase of teaching process when the participants read the text line by line and judge whether the writer could clearly state the main idea and achieve the goal of elaborating it accurately and adequately. Finally, they were required to explain their evaluation of the text in the form of an evaluative summary.

In the following 15 minutes of the class time, the teacher would assign a reading comprehension task followed by questions that required the participants to interpret, analyze, evaluate and explain the text as homework. The three texts represented general, cause and effect and argumentative texts ordered based on the course content and the difficulty level of the texts.

3.4. Data analysis
The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS, version 20). Having checked the normality of the data and the homogeneity of the three groups
via ANOVA analysis of the pre-test scores, the experimental groups’ pre-test and post-test scores were compared through paired-samples t-tests to answer research questions one and two. The third research question was answered using three independent samples t-tests to compare the participants’ post-test scores to compare the effectiveness of the two interventions. Finally, the three groups’ comprehension of general, argumentative and cause and effect texts were compared via one-way between groups ANOVA analysis.

4. Results and discussion

4.1. The pre-test scores
Prior to any statistical analyses, the Shapiro-Wilk (SW) test was run on the pre-test scores to check the normality assumption. The results are depicted in Table 1.

As shown in Table 1, the results of the SW, used for samples smaller than 2000, show that all the scores were normally distributed, \( p > .001 \). Further, the groups’ pre-test scores were compared via a One-Way ANOVA to ensure their initial homogeneity in reading comprehension. Table 2 presents the results.

A glance at Table 2 indicates that the observed differences in the groups’ scores did not reach significance level, \( p > .05 \), thus, confirming the initial homogeneity of the groups in reading comprehension.

4.2. The post-test scores
It was essential to check the normality of the post-test scores through another Shapiro Wilks test prior to analyzing the data to answer the research questions. The results are depicted in Table 3.

Based on the results in Table 3, all the score sets were normally distributed with regard to the SW test, \( p > .001 \).

4.3. The effect of MCG on GR, CER, and ARGR
The group’s descriptive statistics were calculated, as illustrated in Table 4, and revealed some differences.

The results depicted increases in the group’s scores from the pre-test to the post-test in GR (Pre-test \( M = 8.94 \) to Post-test \( M = 10.72 \)) and in CER (Pre-test \( M = 9.56 \) to Post-test \( M = 10.05 \)) and in ARGR from \( M = 8.83 \) to \( M = 10.50 \).

The first research question addressed the effect of MCG on the participants’ GR, CER, and ARGR. This question was answered through a paired samples t-test analysis of the data. Table 5 presents the results.

As displayed in Table 5, the magnitude of the differences in the group’s mean scores was significant for GR, \( t_{(34)} = -2.13, p = .04 \), two-tailed, and ARG, \( t_{(34)} = -3.22, p = .001 \), two-tail. However, the difference in CER scores did not reach significance level, \( t_{(34)} = -0.90, p = .38 \), two-tailed.

| Table 1. Tests of normality of the groups’ pre-test scores |
|-----------------------------------------------------------|
| **Shapiro-Wilk**                                          |
| **Statistic** | **df** | **Sig.** |
|----------------|--------|---------|
| GR             | 0.95   | 54      | 0.02   |
| CER            | 0.97   | 54      | 0.09   |
| ARGR           | 0.96   | 54      | 0.04   |
| Total R.       | 0.98   | 54      | 0.69   |
4.4. The effect of CT awareness-raising on GR, CER, and ARGR
To test the effect of CRAR on the participants’ GR, CER, and ARGR, as posed in the second research question, the descriptive statistics of the pre-test and post-test scores sets were calculated, as presented in Table 4, and the significance of the differences in the scores was tested via paired samples t-test, the results of which are revealed in Table 6.

As Table 6 indicates, the differences from the pre-test to the post-test were significant in GR scores, $t_{(34)} = −3.98, p = .001$, two-tailed, and ARGR scores, $t_{(34)} = 0.268, p = 0.02$, two-tailed; the magnitude of the differences in the means was large for GR (.53) and ARGR (.25) (Cohen 2004). The difference in the CER scores, yet, did not reach significance level, $t_{(34)} = −1.21, p = 0.24$, two-tailed.

4.5. The comparative effect of MCG and CTG on GR, CE, and ARG scores
The third research question delved into the comparative effect of the two independent variables on the participants’ reading comprehension of the three genres. To answer this research question, hence, the groups’ post-test general, cause and effect, and argumentative reading comprehension scores were analyzed through independent samples t-tests. Tables 7, 8, and 9 display the results of the independent samples t-tests respectively.

According to Table 7, there was no significant difference in the GR scores for the MCG ($M = 10.72, SD = 1.93$) and the CTG ($M = 10.22, SD = 1.51$), $t_{(34)} = .86, p = 0.39$, two-tailed; the magnitude of the differences in the means (mean difference = .57, 95% CI: −6.7 to 1.67) was small (eta squared = .02) (Cohen, 2004).
According to Table 8, there was no significant difference was observed in the CER scores of the MCG (M = 10.05, SD = 1.61) and the CTG (M = 9.00, SD = 1.87), t\((34)\) = 1.48, p = 0.08, two-tailed. The magnitude of the differences in the means (mean difference = 1.05, 95% CI:—1.40 to 2.25) was small (eta squared = .08) (Cohen, 2004).

According to Table 9, there was no significant difference between the ARG scores of the MCG (M = 10.50, SD = 2.00) and the CTG (M = 9.94, SD = 2.18), t\((34)\) = 0.79, p = 0.43, two-tailed; the magnitude of the differences in the means (mean difference = .55, 95% CI:—8.64 to 1.97) was small (eta squared = .019) (Cohen, 2004).

4.6. Comparing the three groups’ reading post-test scores
The last research question addressed the comparative effect of the three methodological interventions, MC training, CT awareness-raising and conventional teaching of the content, on the participants’ reading comprehension post-test scores to decide whether the observed enhancement in the two experimental groups could be attributed to the treatments or the course of instruction they underwent. To serve the purpose, three one-way between-groups ANOVA tests were run on the groups’ GR, CER, and ARGR, as measured by the reading comprehension post-test. The results are presented in Table 10.

As displayed in Table 10, there was a statistically significant difference at the p < .05 level for the three groups in GR scores: F\((2, 51)\) = 5.61, p = 0.006, CER scores: F\((2, 51)\) = 3.49, p = 0.038, and ARGR scores: F\((2, 51)\) = 6.14, p = 0.004. The effect size, calculated using eta squared, was 0.18, 0.12, and 0.19 for the GR, CE, and ARG reading, respectively, all regarded as medium (Cohen, 2004). To locate the difference more specifically, a Tukey HSD test was run, the results of which are presented in Table 11.

The Post-hoc comparison, as illustrated in Table 11, indicated that the MCG and the CTG significantly outperformed the CG in GR and ARGR. With respect to cause and effect texts, however, the MCG could significantly outperform the CG.

4.7. Discussion
The findings emerging from the present enquiry indicated that CT awareness-raising and MC training could boost the participants’ reading comprehension of general and argumentative texts and that CT failed to enhance their comprehension of texts expressing causal relationship. As far as the effect of metacognitive training is concerned, the outcomes of the current
Table 5. Paired samples t-test for the MCG’s pre-test/post-test scores

|       | Paired Differences |        |        | 95% Confidence Interval of the Difference |       |       |       |
|-------|--------------------|--------|--------|------------------------------------------|-------|-------|-------|
|       |                    | Mean   | SD     | Std. Error Mean                          | Lower | Upper | t     | df   | Sig. (2-tailed) |
| GR    | PRE-POST           | -1.77  | 3.54   | 0.83                                     | -3.53 | -0.02 | -2.13 | 17   | 0.04          |
| CER   | PRE-POST           | -0.50  | 2.35   | 0.56                                     | -1.67 | 0.67  | -0.90 | 17   | 0.38          |
| ARGR  | PRE-POST           | -1.66  | 2.19   | 0.52                                     | -2.75 | -0.57 | -3.22 | 17   | 0.00          |
|       | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | t   | df  | Sig. (2-tailed) |
|-------|------|----------------|-----------------|------------------------------------------|-----|-----|----------------|
|       |      |                |                 |                                          |     |     |                |
| GR    | −2.83| 3.01           | 0.710           | −4.33, −1.33                              | −3.98 | 17  | 0.001          |
| CER   | −1.05| 3.70           | 0.872           | −2.89, 0.785                              | −1.21 | 17  | 0.24           |
| ARGK  | −2.27| 3.59           | 0.847           | −4.06, −0.490                             | −2.69 | 17  | 0.02           |

Table 6. Paired samples t-test for the CTG’s pre-test/post-test scores
### Table 7. Independent-samples t-test for the MCG and CTG’s Post-test GR scores

| Levene’s Test for Equality of Variances | t-test for Equality of Means |
|----------------------------------------|-------------------------------|
| F                                      | Sig. | t    | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
| Equal variances assumed             | 1.67 | 0.20 | 0.86 | 34 | 0.39 | 0.500 | 0.57 | −0.677 | 1.67 |
| Equal variances not assumed | 0.86 | 32.17 | 0.39 | 500 | 0.57 | −0.679 | 1.67 |
Table 8. Independent-samples t-test for the MCG and CTG’s post-test CER scores

| Levene’s Test for Equality of Variances | Independent Samples Test | t-test for Equality of Means |
|----------------------------------------|--------------------------|-----------------------------|
| F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
|---|------|---|----|----------------|-----------------|-----------------------|------------------------------------------|
| POSTCER | Equal variances assumed | 0.009 | 0.92 | 1.78 | 34 | 0.08 | 1.055 | 0.59 | −0.14 | 2.25 |
| | Equal variances not assumed | | | 1.78 | 33.50 | 0.08 | 1.055 | 0.59 | −0.14 | 2.25 |
Table 9. Independent-samples t-test for the MCG and CTG ‘s Post-test ARGR scores

| Levene’s Test for Equality of Variances | t-test for Equality of Means |
|----------------------------------------|-----------------------------|
| F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
|---|---|---|---|----------------|-----------------|-----------------------|-------------------------------------------|
| POSTARGR | Equal variances assumed | 0.25 | 0.61 | 0.79 | 34 | 0.43 | 0.555 | 0.698 | -0.864 | 1.97 |
| | Equal variances not assumed | 0.79 | 33.76 | 0.43 | 0.555 | 0.698 | -0.865 | 1.97 |
investigation are in conformity with some previous inquiries (Aghaie & Zhang, 2012; Akkakoson & Setabol, 2009; Estacio, 2013; Ismail & Tawalbeh, 2015; Jafari & Ketabi, 2012; Karbalaei, 2011; Mehrpour, Sadighi, & Bagheri, 2012; Riyadi et al., 2017; Shih & Huang, 2018) that confirmed facilitative effects of MC training on EFL learners’ reading comprehension.

The findings are, nonetheless, incompatible with those of Mante (2009), Korotaeva (2012) and Mehrdad, Ahghar, and Ahghar (2012) who found no significant effect from metacognitive training on EFL learners’ reading comprehension, respectively. The findings also run counter to those reported by Pammu, Amir, and Maasum (2014) who found use of various MCSs ineffective in improving Indonesian EFL learners’ comprehension. The investigations about the instruction of metacognitive reading strategies are still at an exploratory stage and further empirical and theoretical inspections need to be carried out.

The contradictory research findings regarding the effect of MC training between this and previous studies might be explained from the perspective of Adaptive Control of Thought (ACT) Model (Anderson, 1983) with regard to the degree of proceduralization of the strategic knowledge achieved. ACT postulates a declarative/procedural continuum with various forms of knowledge at either poles and learning is defined as the Proceduralization of knowledge through practice. In other words, explicit learning typical of classroom contexts demands focal attention while processing information during the cognitive stage of skill development. It is subsequent meaningful practice that can trigger more neural associations and culminate in proceduralization of knowledge by releasing attentional load (Anderson, 1983). Strategy training, like any other kind of learning, is assumed to be governed by the same principles. Participants in the MCG seem to have succeeded in making the shift from cognitive to associative and autonomy stages in their strategic knowledge while reading general and argumentative texts in and outside the class.

The improvement of the MCG could also be explicaded in terms of input processing instruction (VanPatten, 1996) that acknowledges the difficulty of concurrently attending to different stimuli in the input and postulates that learners need to prioritize their attentional resources while receiving and processing input. This model puts forward a number of default processing strategies such as processing lexical and grammatical items. The instructional aim within IPI is to help learners overcome these default processing tendencies via explicit explanation of the target structures, explicit strategy training to enable learners to overcome the default processing strategy, and
Table 11. Between groups’ comparison Tukey HSD test

| Dependent Variable | (I) Groups | (J) Groups | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |
|--------------------|------------|------------|-----------------------|------------|------|------------------------|
|                    |            |            |                       |            |      | Lower Bound | Upper Bound |
| GR                 | MCG        | CG         | 2.11*                 | 0.65       | 0.006| 0.52        | 3.70        |
|                    | CTG        | MCG        | 0.50                  | 0.65       | 0.729| -1.08       | 2.08        |
| CTG                | MCG        | CG         | 1.61*                 | 0.65       | 0.046| 0.02        | 3.20        |
|                    | CTG        | MCG        | -0.50                 | 0.65       | 0.729| -2.08       | 1.08        |
| CER                | MCG        | CG         | 1.94*                 | 0.73       | 0.029| 0.16        | 3.72        |
|                    | CTG        | MCG        | 1.05                  | 0.73       | 0.331| -0.72       | 2.83        |
|                    | CTG        | MCG        | 1.05                  | 0.73       | 0.331| -2.83       | 0.72        |
| ARGGR              | MCG        | CG         | -2.50*                | 0.74       | 0.004| 0.69        | 4.30        |
|                    | CTG        | MCG        | 0.55                  | 0.74       | 0.740| -1.25       | 2.36        |
|                    | CTG        | MCG        | 1.94*                 | 0.74       | 0.032| 0.13        | 3.75        |
|                    | CTG        | MCG        | -0.55                 | 0.74       | 0.740| -2.36       | 1.25        |

* The mean difference is significant at the 0.05 level.
structured input activities. Although the participant in the MCG relied more heavily on the second
technique and received explicit strategy training in using three sets of metacognitive reading
strategies which seems to have helped them noticed the organizational and structural features
of all texts to overcome their default processing tendencies.

Moreover, the finding corroborates theoretical postulations and empirical evidence about the
effectiveness of metacognitive instruction in enhancing reading comprehension. It is specifically
documented in the literature that metacognitive training facilitates processing and storing of
information (Vandergrift & Tafaghodtari, 2010), helps readers to manage cognitive processes
and difficulties while reading (Goh, 2008), and directs them to self-appraising and self-regulating
of their learning (Wenden, 1998). In this way, learners understand the active nature of reading
process and the need for particular effort from their part (Goh, 2008) to use certain strategies to
enhance their understanding.

As for the CTG, the findings substantiate the effectiveness of CT awareness-raising in enhancing EFL
learners’ analytic, evaluative and explanatory skills which, according to Fahim and Kamali (2011) can
develop the competency to reason. The methodology used in presenting and practicing CT skills in the
current study followed the same explicit/implicit and declarative/procedural route as the metacog-
nitive reading strategies. Hence, the findings might be explained with regard to the proceduralization
of CT skills (Anderson, 1983). Application of these CT skills, as suggested by Gomez (2010), involves
reflecting on the legitimacy of what learners read in light of their earlier information. The improve-
ment in the CTAR group could also be corroborated with regard to the consolidation of CT awareness-
raising with the reading comprehension course since, as posited by Silva (2008), knowledge and
thinking have to be taught simultaneously and CT provides a vehicle for teaching reading compre-
hension skills. The outcomes of the current investigation are in accordance with those of Abrami et al.
(2008), Fahim and Saeeepour (2011) and Barjesteh and Vaseghi. (2012) who found CT training
effective in enhancing EFL learners’ reading comprehension skill.

Further, the findings revealed no significant difference between MCG and CTG in comprehension
of the three reading genres. A few studies, however, found MC and CT unrelated (e.g. Kamid, 2013)
and a few experts (McPeck, 1990) argue that CT and metacognition are distinct constructs. In
contrast with those findings, the results from the present research lend support to the similarity of
metacognitive and critical thinking skills and accentuate the possibility of developing reading comprehension skills through both types of training. This finding is consistent with previous studies (Anderson, 2002; Choy & Cheah, 2009; Daud & Hafsar, 2015; Kaur, 2017; Ku & Ho, 2010; Kuhn & Dean, 2004; Magno, 2010; Mall-Amiri & Ahmadi, 2014; Nemat-Tabrizi & Erfani, 2014).

Surprisingly, neither of the instructional interventions could promote the participants’ compre-
henision of causality from the pre-test to the post-test viably because of the complexity and
diversity of distinctive structural and organizational features expressing causality, the partici-
pants’ inadequate processing mechanisms to differentiate those features and lack of pedago-
gical focus on such features in the program. In fact, what characterizes cause and effect
structure, according to McCrudden et al., (2007) is a number of distinctive characteristics that
render it one of the most difficult organizational patterns to comprehend. At the simplest level,
cause and effect structure presents a single cause linked to a single effect. Yet, the top-level
arrangement of causes and effects may vary widely and thus pose a challenge in detecting and
comprehending the causal relationship partly due to the limits of short-term memory. The
highest levels of incomprehensibility are associated with texts in which the causal consequent
is not directly connected to its antecedent. As Linderholm et al. (2000) suggested, such texts
oblige the reader to infer the cause, or retrieve information from personal background knowl-
edge, each of which may expectedly hamper comprehension of less-skilled readers who are not
proficient enough to predict cause and effect relationships. In fact, these features were beyond
the reach of the interventions and remained untouched from the pre-test to the post-test. The
only significant improvement was observed in the MCG in contrast to the CG. The superiority of
the MCG over the CG can indicate the difference metacognitive strategy use can make to overcome their default processing tendencies. MC training seems to be a more promising alternative to conventional methods of teaching reading.

5. Conclusion
The current study suffered from a few limitations and delimitations including the sample size and purposeful sampling procedure, disregard of learner variables like age, gender and intellectual propensities as well as restricting the study to reading comprehension and constraining data collection instruments to a single test. Due to these restrictions and the contradictory results reported by other researchers (Mante, 2009 & Korotaeva, 2012), it may be premature to postulate a definite causal association between MC and CT training and reading comprehension. More studies have to be conducted with larger samples of male and female EFL learners at varying levels of proficiency, age and representing various individual characteristics before arriving at more definite conclusions.

Nevertheless, the findings underscore the necessity of realigning the conventional methods of teaching reading by incorporating methodological procedures that provoke metacognitive reading strategies or higher order thinking operations of analysis, synthesis and evaluative explanation. This basic requirement is justifiable with respect to the growing demand for reading comprehension skills to deal with incessant flow of intricate and conflicting information targeting the general public. They need to be trained how to. MC training and CT awareness-raising, as suggested by the findings, can help individuals to process the information adequately and precisely enough to arrive at sound and right judgements.

Secondly, the findings underscore the EFL learners’ need for expanding their organizational competence regarding various writing genres and particularly the cause and effect organizational signals in learning English as a foreign language. The findings unraveled the multifaceted nature of teaching reading and the multiplicity of the factors like textual genre that need to be taken into account to promote EFL learners’ comprehension. This need might be satisfied at a small-scale by individual teachers who select to broaden and deepen their repertoire of strategy-based instruction and CT skills and incorporate MCSs and CT skills into their teaching (Vandergrift, 1999) in order to develop their students’ strategic competence and thinking skills. EFL teachers are, thus, invited to reconsider the way they teach reading and see how they may accommodate learner development through strategic and CT investment. Alternatively, the demand might be met at a large-scale through teacher education and bottom-up curriculum development by obtaining insights from practicing teachers and teacher educators regarding comprehension problems students face, and thereby, designing teacher training course focused on strategic reading and the role of CT skills to develop the teachers’ strategic teaching skills as a first step in promoting reading comprehension at a national scale. In addition, teacher educators should familiarize student teachers with theoretical issues and empirical findings regarding MCSs and CT in pre-service courses. Last, but not least, individual EFL learners are recommended to take the lead in their own learning by expanding their strategic competence and CT skills through self-development.

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