Self-regulated Learning, Metacognitive Awareness, and Argumentative writing: A Structural Equation Modeling Approach

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Abstract

The current study examined the relationships among self-regulated learning, metacognitive awareness, and EFL learners' performance in argumentative writing. We collected data through two questionnaires (i.e., *Motivated Strategies for Learning Questionnaire (MSLQ); Metacognitive Awareness Inventory (MAI)),* and an argumentative writing task administered to 250 Iranian graduate students of TEFL in eleven universities across Iran. Using LISREL version 8.8, we ran structural equation modeling (SEM) to analyze the hypothesized relationships. The results revealed that although the SEM enjoyed a good fit on the hypothesized relationships among self-regulated learning, metacognitive awareness, and argumentative writing, the significant influence of metacognitive awareness and self-regulated learning on students' argumentative writing performance could not be postulated. Finally, the pedagogical implications for writing instruction and research are discussed.

Keywords: Self-regulation; Metacognitive awareness; Argumentative writing; Structural Equation Modeling (SEM); EFL graduate learners

1. Introduction

One of the essential purposes of education is to equip learners with self-regulated strategies, which can help them manage their learning effectively and actively by orchestrating self-regulated learning strategies into their own learning (Zimmerman, 2001). This self-regulatory capacity has been widely documented as one of the most important predictors of "student success in L2 learning in academic settings" (Teng & Zhang, 2016, p. 674). As Dörnyei (2005) asserts, self-regulation comprises "a multidimensional construct, including cognitive, metacognitive, motivational, behavioral, and environmental processes that learners can apply to enhance academic achievement" (p. 10).

Parallel to self-regulatory strategies, another influential factor in learning achievement is metacognition which is defined as "a type of knowledge that enhances learners' awareness of their own learning process and helps them control those processes" (Sato & Loewen, 2019, p. 13). It is further defined as, "thinking about thinking" (Georghiades, 2004), "thinking about learning" (Jackson, 2004), "learning about learning" (Case, Gunstone, & Lewis, 2001), "knowing about learning" (Meyer, 2004), and "knowledge about knowledge" (Yore & Treagust, 2006). However, as Veenman, van Hout-Wolters, and Afflerbach (2006) rightly assert, even though there is a consistent "acknowledgment of the importance of metacognition, inconsistency marks the conceptualization of the construct" (p. 4). As a result of its elusiveness, the field of language learning and teaching deploys the notion of metacognition in "a variety of ways and with different superordinate and subordinate categories (e.g., self-efficacy, learning strategies, self-regulation, to name a few) depending on researcher's background and research interests" (Hauks, 2018, p. 12).

As Sato and Loewen (2019) argue, strong metacognitive awareness can enhance self-regulated learning strategies whereby "learners plan, self-monitor, and evaluate their learning processes" (p. 13). Likewise, metacognitive awareness might help learners understand themselves and the tasks they engage in (e.g., an argumentative task), and eventually help learners gain higher achievement and better learning outcomes (Azevedo & Witherspoon, 2009; Shraw, 2009).

Metacognition further plays a contributory role in guiding problem-solving processes (e.g., Hoffman & Spatariu, 2008; Metallidou, 2009) and is a critical player in the arena of writers' cognitive processes. According to Resnick (1987), the act of writing, like other higher-order complex problem-solving cognitive tasks, requires "processes to keep track of one's own understanding, to initiate review or rehearsal activities when needed, and to deliberately organize one's attention and other resources in order to learn something" (p. 17). That is, L2 writers tend to move between cognitive processes for planning, translating, and reviewing text and account for metacognitive processes of monitoring, and regulating cognition.

More specifically, most of us engage in metacognitive processes when confronted with effortful and challenging cognitive tasks such as argumentative writing, which in turn demands more cognitive load than other genres such as narration and expository text types (Abdollahzadeh, Amini Farsani, & Beikmohammadi, 2017). Argumentative writers are expected

to express their ideology in academically appropriate ways and engage in several cognitive processes which are paramount "with a predominance of emotive diction, metaphoric expression, and subtle uses of modality" (Hatim & Mason, 1990, p. 191). In other words, various propositions related to the subject of enquiry are put forward, and an argument for or against them is constructed (Toulmin, 2003).

Research has revealed that learners use both metacognitive awareness strategies and regulate their strategy use when encountered with cognitively demanding activities such as argumentative writing. On the one hand, to explain the nature of academic performance and success, demonstrating the association between self-regulatory and metacognitive strategies is needed. Further, both metacognitive and self-regulated learning strategies tend to contribute to learners' writing performance, particularly in an argumentative genre which is cognitively demanding. For example, at the metacognitive awareness level (i.e., the level of thinking about thinking), L2 arguers might be aware of a claim (i.e., taking positions) they are making based on existing beliefs or new information or might provide sound reasons for a given claim by stimulating metacognitive awareness repertoire (Kuhn, 2005). Consequently, given the contributory role of the metacognitive awareness in learning outcome (see Sato & Loewen, 2019), exploring argumentative writing behaviour of L2 writers and attending their metacognitive awareness seems warranted.

Consequently, the current study rests on the assumption that examining self-regulated learning (SRL) and its relationship with metacognitive awareness might furnish researchers and practitioners with a more comprehensive profile of the L2 writers' learning and agency. Despite the abundance of research on metacognition and its association with other constructs such as reading (Mokhtari & Reichard, 2002), decision making (Puncochar & Fox, 2004), ethical choices (Krettenauer & Eichler, 2006), problem solving (Berardi-Coletta et al., 1995), and critical thinking (Sharma & Hannafin, 2004), there has been a dearth of research on metacognitive awareness activities and self-regulated learning strategies which may guide L2 writers' composing processes in an EFL context which has been characterized as a complex, situational, and multi-aspectual one (Anani Sarab & Amini Farsani, 2014; Zhang, 2013).Therefore, this makes it possible to explore the relationship between the two constructs in an under-researched EFL context.

It is also argued that L2 writing, particularly argumentative writing, is a process that can be examined from a multidimensional perspective embracing "an understanding of how learners set goals; attempt to monitor, regulate, and control their cognition, motivation, and behaviour in the learning process" (Teng & Zhang, 2016; p. 677; see also Abdollahzadeh et al., 2017). Given the importance associated with the cognitive process of problem-solving and the shortage of research in EFL academic writing in this regard (e.g., Negretti, 2012), it is assumed that research on this uncharted issue would broaden our understanding of the development of metacognitive awareness and self-regulated learning in EFL contexts.

1.1 The Present Study

The traditional product approach is still dominant in teaching writing to L2 learners in Iranian universities and colleges. Moreover, given that little has been invested in teaching and learning argumentative writing in these EFL settings, more attention needs to be paid to teaching and learning argumentative writing skill given the surge of EFL learners applying for graduate studies in English-medium universities (Abdollahzadeh et al., 2017). Likewise, as Hirvela (2017) rightly puts it, "The capacity to write effective argumentative essays is also an important marker of L2 writing ability" (p. 1).

The present study examines the relationships between self-regulated learning, metacognitive awareness, and learners' performance in argumentative writing through structural equation modeling in an EFL context. This study is mainly rooted in theories of self-regulation, metacognition, and the act of writing. As a general framework for self-regulated learning, we used social cognitive theory (Pintrich, 1991, 2000). According to Pintrich (2000), self-regulatiory strategies can help learners interact with and make effective use of their environment, thus positively affecting learning outcomes. Concerning metacognitive awareness, we adopted Brown's (1987) metacognitive awareness model which is cited as the most widely acknowledged theoretical model of metacognition (Shraw, 2009). This metacognition model typically includes (a) *knowledge of cognition* (i.e., how much learners are aware of their thinking and learning); and (b) *regulation of cognition* (i.e., how learners use this metacognitive awareness to regulate their own thinking and learning).

Concerning L2 writing, this study is grounded in the socio-cognitive view of writing. From the late 1990s, writing researchers have examined the social and metacognitive factors that

shape writing to better understand how writers acquire the cognitive and metacognitive knowledge and skills that allow them to undergo a composing process (Graham, 2007). A socio-cognitive lens views the writer constructing meaning through acts of interpretation, negotiation, and reflection (Flower, 1994).

To this end, Iranian graduate students, for whom argumentative writing is found to be a significant challenging genre (Birjandi & Malmir, 2009), were examined in the study. This research might boost our understanding of individual differences in the act of writing and help create more favorable writing environments in an accountable setting like Iran (Amini Farsani & Babaii, in press). Thus, the following research questions are posed:

RQ1: What types of self-regulated learning strategies EFL writers mainly employ?

RQ2: What types of metacognitive awareness strategies EFL writes mainly use?

RQ3: To what extent do self-regulated learning strategies and metacognitive awareness strategies mediate EFL learners' performance in argumentative writing?

2. Literature Review

2.1 Self-regulation, Metacognition, and Language Performance

In breakthrough research, Raphael, Kirschner, and Englert (1989) attempted to enhance learners' writing performance by fostering their metacognition. Group questionnaires and individual interviews were used to evaluate students' declarative, procedural, and conditional knowledge, before, during, and following participation in four writing programs, each lasting approximately five months. Communicative context and text structure instruction exerted a positive influence on metacognitive knowledge which subsequently had a significant positive effect on learners' writing performance. Moreover, Englert, Raphael, Anderson, Anthony, and Stevens (1991), in a comprehensive training program, employed metacognitive strategies to develop self-regulatory writing process, and figure out the appropriateness of the particular text structures. The findings revealed that poor writers benefited from both kinds of instructions and were able to extrapolate improvements in writing to tasks involving similar text structures. Likewise, poor writers gained greater metacognitive knowledge about writing and were better able to talk about writing, planning, and revising even months after completing the training. The overall message

highlighted the crucial role self-regulated scaffolding might play in fostering writing achievement.

Similarly, Devine, Railey, and Boshoff (1993) examined the relationship between metacognition and writing through the lens of cognitive models in both L1 and L2 writing. A potential link was found between both students' writing performance and their metacognitive awareness. They argued that "metacognitive variables play an even more important role than linguistic competence especially noteworthy in second language writing" (p. 116). Furthermore, Kasper (1997) examined whether the three variables of metacognitive knowledge (i.e., person, task, and strategy) in ESL/EFL writing performance affected learners' performance equally at different levels of English language proficiency, and how metacognitive knowledge would evolve when students improved in their language study. The findings highlighted the positive role of metacognition in students' writing performance in the EFL setting. All in all, based on the above studies, the overall message underscores the essential role of metacognition in fostering learners' writing performance in L2 settings.

Tomlinson and McTighe (2006) argued that "the most effective learners are metacognitive ones who are mindful of how they learn, set personal goals, regularly self-assess as well as adjust their performance, and use productive strategies to assist their learning" (p. 79). They further assert that if students have the opportunity to reflect on their learning by knowing their strengths and weaknesses, how they learn, and how to set goals, they will take more control over their own learning. As a result, a teacher who allows students to think about their learning and express their thoughts through writing is thus helping to increase their metacognition.

Lu (2006) examined the relationship between metacognitive strategies and English writing performance. Using a questionnaire along with students' argumentative essays, he found that the frequency of metacognitive strategies among 128 participants in writing is at the level of 'somewhat' or 'often'. The differences between successful writers and unsuccessful writers concerning the applications of metacognitive strategies were of statistical significance. Two metacognitive strategies (advanced planning and selective attention) were found to be dominant factors affecting the participants' English writing. Drawing on the theories of metacognition and self-regulated learning, Negretti (2012) proposed a new approach to examining students' academic writing. The findings revealed a significant association between task perception and

students' metacognitive awareness and their conceptualizations of how to adapt writing strategies to specific rhetorical situations.

The above-mentioned studies signify that exploring metacognitive awareness strategy in L2 writing might provide research consumers with a new and more comprehensive understanding of and implications for L2 writing instruction (Negretti & Kuteeva, 2011). Likewise, the above studies mainly focused on investigating the role of metacognitive awareness in learners' writing performance through statistical techniques such as correlational analyses (which are subject to analytical limitations), the employment of metacognitive strategies by both successful and unsuccessful writers, L1 and L2 student writers' writing performance and their metacognitive awareness, and self-regulated scaffolding in learners' writing performance. As the literature suggests, self-regulated learning and metacognitive awareness, two major elements of learners' writing performance, are assumed to develop learners' competence and promote their performance in a given writing task (Graham & Harris, 2000). Therefore, advanced writers are expected to have a deep understanding of the conventions of different genres (e.g., narrative and argumentative genres). In a specific writing task such as writing an argumentative essay which demands more cognitive load than other genres (Hatim & Mason, 1990), these advanced learners need to have both metacognitive awareness and a regulating mechanism for its use. Accordingly, the present study tries to explore this relationship among self-regulated learning, metacognitive variables, and learners' argumentative writing performance in the EFL context.

3. Method

3.1 Participants

250 Iranian MA students in TEFL from a spread of 11 state universities across the country were recruited for the study. From among the initial participants, 80 participants returned the questionnaires without the writing task, and 24 did not do any of the instruments. As a result, 146 MA students completed all the instruments and thus constituted our final study participants (see Table 1).

INSERT TABLE 1 HERE

Their age ranged from 22 to 43, with 55 males (38%) and 91 females (62%). They had all achieved a BA degree in English language and literature or English translation and had passed

the Iranian national matriculation examination for entering university. Their formal writing experience is limited to two compulsory undergraduate courses in writing: '*Principles of Writing*' and '*Essay Writing*', and an '*Academic Writing*' module during their two-year graduate program leading to Master's degree in TEFL. Through these courses, they learn how to write paragraphs, text types (e.g., narration, description, and argumentation), essays, research proposals, and academic articles. Participants had all passed their course '*Academic Writing*' module; hence, they were all expected to be familiar with a variety of genres, and with argumentative writing (Abdollahzadeh et al., 2017). The participating students and their instructors were all informed about the purpose of the study and consented to do the tasks.

3.2 Instruments

We employed *Motivated Strategies for Learning Questionnaire* (Pintrich, 1991) and *Metacognitive Awareness Inventory (MAI)* (Schraw & Dennison, 1994). The *MSLQ*— a 5-point Likert type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*)—elicited essential data on the level of writers' engagement in the process of self-regulated learning. The first part of the questionnaire provided information about the purpose of the questionnaire and elicited background information on the participants' age, gender, major, and their university; The second part consisted of 47 items divided into three categories; *cognitive, metacognitive, and resource-management*. Cognitive and metacognitive strategies comprised (a) rehearsal, (b) elaboration, (c) organization, (d) critical thinking, and (e) metacognitive self-regulation. Resource-management strategies measured (a) time and study environment, (b) peer-learning, (c) help-seeking, and effort regulation (see Table 2).

INSERT TABLE 2 ABOUT HERE

An exploratory factor analysis through varimax rotation was run to probe the underlying constructs of the MSLQ questionnaire. Both principal components analysis and principal axis factoring yielded a one-factor solution which accounted for 70.83 percent of the total variance (see Table 3). Further, a confirmatory factor analysis was conducted in order to examine the validity of the questionnaire's factor model.

INSERT TABLE 3 ABOUT HERE

As illustrated in Figure 1, the Chi-square and RMSEA indices were zero, and the *P*-value was 1, confirming a one-factor solution for the three components of self-regulated learning.

INSERT FIGURE 1 ABOUT HERE

Metacognitive Awareness Inventory (MAI) included 52 items, among which 17 measured *knowledge of cognition* and 35 items measured *regulation of cognition* (see Table 4). Knowledge of cognition comprises declarative knowledge (i.e., knowing about things); procedural knowledge (i.e., how to do things); and conditional knowledge (i.e., knowing the "why" and "when" aspects of cognition). Regulation of cognition was classified into 5 components: planning (i.e., goal setting prior to learning); information management (i.e., skills used to process information); monitoring (i.e., assessment of learning); debugging (i.e., strategies used to correct comprehension); and evaluation (i.e., analysis of performance).

INSERT TABLE 4 ABOUT HERE

As shown in Table 5, both principal component analysis and principal axis factoring yielded a one-factor solution which accounted for 57.48 percent of the total variance.

INSERT TABLE 5 ABOUT HERE

A confirmatory factor analysis was further run. As depicted in Figure 2, '*Knowledge of Cognition*' and '*Regulation of Cognition*' load on a higher underlying factor labeled as *Metacognitive Awareness Strategy* (MCAS).

INSERT FIGURE 2 ABOUT HERE

Also, the participants were asked to write an argumentative essay on a contentious topic in English. We referred to the online database "Opposing Viewpoint Resource Center"—a helpful source of controversial issues published by Thomson Higher Education (http://gale.cengage.com/Opposing Viewpoints)—to select an argumentative topic. We chose 11 subjects which seemed appropriate for the study. Fourteen writing instructors were asked to rate the 11 topics on a 5-point Likert scale questionnaire, ranging from 1 (the least interesting) to 5

(the most interesting). The topic '*Iran poses a serious threat to the United States vs. Iran does not pose a serious threat to the United States'* was finally selected as the topic of the argumentative writing task. In spite of its appropriacy, the chosen topic might be emotionally charged for the participants. To minimize this bias, "the wording of the topic was reversed for half of the respondents" (Abdollahzadeh et al., 2017, p. 648). The writing task required learners to develop sound arguments supporting their perspectives and taking their positions apparent on the issue. This was followed by the essay prompt and three blank pages attached.

3.3 Procedure

Initially, an informed consent letter was given to the instructors and students to participate in the study. The instructors were given a task script explaining how the questionnaires and the writing task should be administered. The respondents were reassured that their participation was voluntary, their responses would be treated confidentially, and they could withdraw at any stage of the study. The allotted time for developing the argumentative essay was 50 minutes which was decided based on piloting the topic with some participants similar to the eligible group. They were further requested to create a balanced argument based on their background knowledge and personal experience on the selected topic. They were briefed on avoiding sketchy arguments and were thus required to attend to opposing views on the issue and come up with their clear points of view. A uniform procedure for data collection was followed across all universities.

To assess the overall quality of the argumentative papers, the essays were graded holistically by two raters, following the criteria developed by McCann (1989), and Nussabaum and Kardash (2005) as to 'the overall argument effectiveness in terms of the presence or absence of the possible opposing views', 'the overall structure', and 'the overall language use'. These criteria served as general indicators of a compelling argument. The inter-rater reliability of the scores was found to be 0.88. To ensure the validity of the recruited holistic rubric, the two raters, utilizing the holistic scoring rubric, scored 20 writers' argumentative papers randomly selected from the pool of data. They were asked to use the rubric and to mark the essays. Then, the raters discussed the aspects of the rubric which might have caused some confusion and fuzziness. The inter-rater reliability using coefficient alpha was 0.78 before the discussion meeting. In the next phase, according to the raters' feedback, we revised the rubric to assure that descriptions and instructions were recognizable and each part of the rubric was represented in writers'

argumentative papers. Finally, the raters, using the revised rubric, scored independently another 25 randomly selected arguers' papers, and the inter-rater reliability of the scores was found to be 0.88.

After they completed the writing task, they were requested to complete the two questionnaires. Each of the questionnaires required 15 minutes to complete based on a pilot study with a small group of participants similar to the target group. For the respondents to better understand the questionnaires, we translated the questionnaires into learners' native language (i.e., Persian). The pilot study was initially conducted to "fine-tune" the instruments' intelligibility, appropriacy, and item classification before the last administration. Both the *MSLQ* and *MAI* enjoyed a high degree of internal consistency (0.84 and 0.81, respectively). Also, according to Table 3 and Table 4, the results revealed that both questionnaires were valid.

3.4 Data Analysis

To evaluate the relationships between the variables of the study, structural equation modeling (SEM) was used as the primary statistical technique due to its advantages over other multivariate procedures such as regression analysis, canonical correlational analysis, and path analysis (Phakiti, 2018). The analyses were done through LISREL software (Version 8.8; 2006). LISREL produces some goodness-of-fit indices based on which one can support or reject the model. Two of the most cited criteria, chi-square and root mean square of error approximation (RMSEA), produced as parts of the diagram output. These two indices are labeled as indices of bad fit because the higher the values of these indices, the less fitness the model enjoys. RMSEA values below 0.10 are taken as 'good' and below 0.05 as 'very good' (Phakiti, 2018). In order to interpret the RMSEA, it is advisable to consult the 95 percent confidence interval and the probability for close fit indices. Four other fit indices should be reported for any model: normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), and goodness of fit index (GFI). These indices need to be higher than 0.90 in a good model (Phakiti, 2018).

4. Results

4.1 Descriptive Statistics on Self-regulated Learning, Metacognitive Awareness, and Argumentative Writing Task

According to Table 6, the participants used different types of self-regulated strategies. However, resource management strategies were the most frequently used; metacognitive strategies were the least prevalent strategies. The higher frequency of use of resource management strategies (RMS) shows that EFL graduate learners mostly utilized these writing strategies to control other resources along with their cognition. Furthermore, RMS help the writers manage their time, study environment, use of peer-learning and help-seeking while doing the argumentative task.

INSERT TABLE 6 ABOUT HERE

A similar analysis was done to examine the Metacognitive Awareness Strategy (hereafter, MAS) use (Table 7).

INSERT TABLE 7 ABOUT HERE

The results indicated that EFL respondents used all the metacognitive awareness subcomponents. From among the eight subcomponents, they used *'debugging strategy'* as the most frequent strategy; and *'evaluating strategy'* as the least frequent one. These findings suggest that EFL respondents preferred more to use strategies which help them overcome their task performance challenges. Given the fact that debugging strategies can be recruited to correct comprehension and performance errors (Shraw, 2009), learners can change strategies when they fail to understand a task. However, the participants preferred less to use evaluation strategies for analyzing their performance after a learning session. Furthermore, descriptive statistics of argumentative essays evaluated by two raters are given in Table 8.

INSERT TABLE 8 ABOUT HERE

4.2 The Final Model

The SPSS extracted two factors for the eight subcomponents of the metacognitive awareness inventory, three components of self-regulation learning, and the two holistic argumentative writing scores (i.e., two raters). As shown in Table 9, this two-factor solution accounted for 60% of the total variance.

INSERT TABLE 9 ABOUT HERE

As displayed in Table 10, the components of MAS and self-regulated learning (SRL) load on the first factor and the argumentative writing performance (AW) load on the second factor.

INSERT TABLE 10 ABOUT HERE

Besides the exploratory factor analysis results which confirmed the interrelatedness of self-regulation and metacognitive awareness, the CFA results, however, stressed the discriminant validity of the components of self-regulation strategies (i.e., three strategies) and metacognitive awareness (i.e., eight strategies). Evidence of discriminant validity was reasonable for the scales. According to the inter-correlations of the 11 strategies, the coefficients ranged from r=0.26 between metacognitive strategy and declarative knowledge to r=0.64 between cognitive and resource management strategies. As shown in Table 11, all 11 factors were significantly correlated with each other (p<.01). Although these 11 strategies of self-regulation and metacognitive awareness were co-varied, they almost had distinct constructs. For example, the cognitive dimension was almost strongly correlated with metacognitive awareness strategies. To a lesser degree, as for the metacognitive dimension, the results revealed that this aspect almost had a small-to-moderate correlation with metacognitive awareness. This lower correlation signified the fact that items on metacognitive dimension were distinct from the other sub-scales. As for the resource-management strategies, virtually all the metacognitive awareness dimensions had a moderate relationship with this dimension. Consequently, a moderate to small correlation, according to Table 11, provides some evidence of discriminant validity for these scales.

INSERT TABLE 11 ABOUT HERE

Likewise, to further reassure the distinctiveness of the self-regulation and metacognitive awareness scales, we submitted the items of both questionnaires to Mokken scale analysis, which is a non-parametric item response theory model (Meijer & Baneke, 2004; Molenaar & Sijtsma, 2000). The overall purpose of this analysis was to confirm unidimensionality of the scales (i.e., self-regulation and metacognitive awareness) and ascertain discriminant validity of the questionnaires. The results revealed discriminant validity between self-regulation and metacognitive awareness (see Table 12). We adhered to Mokken's (1971) benchmark for interpreting the scalability of the components, i.e., H < 0.30: no scale; .30 < H < .40: weak scale; .40 < H < .50: medium scale; .50 < H: strong scale. The results revealed that all the sub-scales of

self-regulation were reported as strong; almost all the components of metacognitive awareness were medium.

<center>INSERT TABLE 12 ABOUT HERE</center>

Figure 3 illustrates the model hypothesized in this study. The model comprises three latent variables: the *Metacognitive Awareness Inventory* (MCAS) with eight indicators, the *Self-Regulated Learning Strategy* (SRI) with three indicators, and *Argumentative Writing* (WR) with two indicators (i.e., two raters).

<center>INSERT FIGURE 3 ABOUT HERE</center>

The chi-square value of 103.17 is significant (P=0.008<0.05). That is, its ratio and degree of freedom (103.17/62=1.66) indicate that the present model enjoys a good fit.

<center>INSERT FIGURE 4 ABOUT HERE</center>

The RMSEA of 0.06 also indicated a good fit. Based on the 90 percent confidence interval for RMSEA (i.e., 0.044; 0.090), one can be 90% confident that the true RMSEA value in the population would fall within the bounds of 0.044 (good fit) and 0.09 (acceptable fit), representing a reasonable degree of precision. On the other hand, the *P*-Value for Test of Close Fit (RMSEA<0.05)=0.11) is higher than 0.05. Overall, the results indicated that the model including the *Metacognitive Awareness Inventory*, *Self-Regulated Learning*, and *Argumentative Writing* enjoys a good fit. This signifies the fact that the global fit of the model was sufficient for demonstrating the interrelationship between metacognitive strategies, self-regulated strategies, and argumentative writing. Likewise, the SEM results have statistically supported these interrelationships between the variables. According to Kline (2011), it is appropriate to focus on more than one fit index in order to assess the data model fit; therefore, we reported four other fit indices, i.e., normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), and goodness of fit index (GFI) were found to be 0.95, 0.97, 0.98, and 0.90, respectively for the present model. Consequently, it can be concluded that the model presented in Figure 4 provides an adequate representation of our data.

Given that the hypothesized model enjoyed acceptable model-data fit indices, it is advisable to assess the relationships between the variables. In doing so, we examined the individual paths. As can be seen in Figure 5, all of the components of metacognitive awareness

<center>14</center>

inventory and self-regulated learning significantly load on their respective latent variables. Although a significant relationship (shown by double-headed arrows) between metacognitive awareness inventory and self-regulated learning (t=18.65) was found, the paths connecting the metacognitive awareness inventory (t=-.47) and self-regulated learning (t=.05) to argumentative writing were non-significant.

INSERT FIGURE 5 ABOUT HERE

This finding is not surprising given the slight ratio of the sample size per parameter (i.e., N:q): the required sample-to-parameter ratio should be exceeded 10:1 (Kline, 2011). Although minimally acceptable, the ratio in the overall measurement model was almost 3:1, which might lead to estimation error and affect some subscales of the model. Prospectively, future studies need to re-examine the overall measurement model with at least 450 respondents (see Phakiti, 2018).

5. Discussion

Hypotheses from social cognitive theory (Pintrich, 2000), metacognitive awareness theory (Brown, 1987), and social cognitive theory of writing (Graham, 2007) provide the present study with a multi-theory framework. The purpose of this study was to illuminate the hypothesized relationships among self-regulated learning, metacognitive awareness, and argumentative writing in order to come up with a model through SEM. Descriptive statistics of self-regulated learning strategies showed that Iranian advanced EFL learners used resource management and cognitive strategies most frequently, and metacognitive strategies least frequently in L2 writing. This finding is in contrast with findings by Abdollahzadeh (2010) with Iranian undergraduate EFL learners, highlighting the use of metacognitive strategies as the most frequently used ones. It is noteworthy, however, that the above studies dealt with writing strategies in general rather than special genres such as argumentative writing skill.

On the other hand, Garcia and Pintrich (1996) believed that resource management strategies include student regulatory strategies for controlling other resources besides their cognition. These strategies manage the learners' time, study environment, use of peer learning, and help-seeking. Through using these resources, the EFL writers might provide themselves with more tools to efficiently finish the argumentative writing task, resorting to both external

resources (e.g., dictionary use, peers, and teachers) and internal resources (e.g., self–reflection) to accomplish the task. Regarding the low use of metacognitive strategies, one can infer that the EFL graduates employed little planning devices to set their goals in advance, applied tiny monitoring strategies to improve their writing, and might have been unable to change their metacognitive writing strategies if they faced difficulties during their act of writing. Consequently, they resorted to their peers and teachers, hence employed resource management strategies more frequently.

Good writers are assumed to be more actively and metacognitively involved in the writing process (Flower & Hayes, 1986). The EFL writers showed to be cognitively aware of the mental representation and content knowledge of the argumentative task as a challenging writing genre; less so with the discourse knowledge (argumentative writing) due to their potential lack of understanding of what a persuasive argument is generally like.

The respondents employed all different types of metacognitive awareness strategies; however, the extent of utilizing each strategy type was different. From among the eight subcomponents, they used the *'debugging strategy'* as the most frequently used strategy under the regulation of the cognition process. This finding is consistent with Brown's (1987) study that highlighted the frequent use of metacognitive strategies. It implies that these learners concentrate on these executive processes more than its counterpart (i.e., conditional knowledge, procedural knowledge, declarative knowledge, etc.). However, they utilized evaluating strategy less frequently, demonstrating that the participants preferred more to use strategies which help them improve their task performance or comprehension errors. It also reflects EFL graduate learners' awareness of their own writing deficiencies. Moreover, both knowledge of cognition and regulation of cognition were employed which might be interpreted as the thinking processes and the actions taken to adjust their cognitive strategies when engaging in developing arguments (Paris & Winograd, 1990).

Based on the final SEM model, the non-significant influence of metacognitive awareness strategies and self-regulated learning on students' argumentative writing performance might not be surprising, though the hypothesized model embracing metacognitive awareness, self-regulated learning, and argumentative writing was confirmed. The possible explanations for this non-significant influence can be sought in the context of Iranian universities. That is, teaching English writing at the graduate level may not fundamentally enhance a free-writing culture

among the students (Abdollahzadeh, 2010), which is in part due to the emphasis put on the product view of writing. However, as the results showed, these learners can yet reach greater academic achievements due to their high use of self-regulation strategies.

The current findings on the profile of metacognition, self-regulation, and argumentative writing among EFL graduate learners might corroborate the dominance of the product-oriented teaching and learning culture in an Iranian EFL context in which narrative and expository modes of writing are highly promoted in this context (e.g., Abdollahzadeh, 2010; Anani Sarab & Amini Farsani, 2014; Birjandi & Malmir, 2009). Accordingly, as the mainstream mode of writing instruction is product-based and less inclusive of a more argumentative and dialogic learning culture, less space would be left for developing other approaches in writing in which cognition and metacognition play a role (Abdollahzadeh et al., 2017). Moreover, various cultural values, ideologies, and assumptions may influence how people think, and how they express themselves both orally and in written texts (Kaplan, 1998). Consequently, when EFL writers produce argumentative essays—a generic Cinderella—in English, they would still be influenced by their own culture, values, and ideology and thus inclined to write in 'unsystematic' ways. Unfortunately, such unsystematic style of writing is often viewed as a rhetorical weakness on the part of these writers by English speaking readers (Mauranen, 1993).

In sum, the structural model (see Figure 3) represents the relationship between the constructs (i.e., metacognitive awareness, self-regulated learning, and argumentative writing) in a foreign language context. Although the model is supported, metacognitive awareness and self-regulated learning indices do not have any direct influence on the learners' argumentative writing performance. The relationship between metacognitive awareness and self-regulated learning indices suggests that individuals with high metacognitive awareness strategies such as declarative knowledge, procedural knowledge, monitoring, and evaluation, would also demonstrate high tendency to use resource management, cognitive, and metacognitive strategies.

However, the fact that these two constructs do not cumulatively affect the learners' argumentative writing performance in this context may imply that the extent to which metacognitive awareness strategies and self-regulated learning strategies are used in a specific context is determined by the learning and cultural context in which language use occurs. That is, though important for learners' writing performance in a given context, these EFL writers might not have been well equipped with metacognitive awareness and self-regulated learning strategies

during their performance in argumentative writing. Nevertheless, further qualitative research needs to examine in-depth explanations as to why there is a non-significant influence of metacognitive awareness inventory and self-regulated learning on students' argumentative writing (apart from measurement limitations).

6. Conclusion

Examining what self-regulated learning strategies and metacognitive awareness components second language writers employ can provide insight into what writers think they are doing or should be doing and thus increase their understanding of the specifics of this process (Silva, 1993). Such an investigation can also help develop a predictive model of the construct of writing which can be useful for pedagogical, research, and curricular planning and assessment purposes (Grabe, 2001).

This study probed the unique relationships between self-regulated learning, metacognitive awareness, and argumentative writing, which had often been under-researched in the literature. It provides an understanding of the important factors influencing EFL graduates' composing process in general and argumentative writing in particular. Writing instructors should consider such factors as metacognitive awareness, self-regulated learning, critical thinking, rhetorical awareness, culture, values, and ideologies. Given that metacognition and self-regulated learning played a vital role in students' academic achievement, the self-regulated and metacognitively aware learners need to develop greater awareness of the argumentative writing task and task performance (Zimmerman, 2000).

There has been a growth in more theoretically-driven research as opposed to using crude correlational analysis (Ellis, 2008). This theoretically-driven study using a more sophisticated technique (SEM) showed that argumentative writing skill is a mentally- and experientially-based phenomenon. We infer that the interrelationships between metacognitive awareness strategies and self-regulated learning and argumentative writing performance are moderated by the sociocultural context of teaching and learning. Therefore, data coming from diverse contexts can provide a more comprehensive picture of this relationship.

Other methods such as think-aloud and interviews, along with surveys, are recommended to provide in-depth insight into the learners' argumentative writing behaviour. Nevertheless, we believe that the systematic and rigorous analyses of the data through SEM along with the survey

results provide an adequate ground for the reliability of the findings (see Phakiti, 2018). Given that the learners' performance on the writing task did not associate much with their reported metacognitive and self-regulated learning strategies, it is highly likely that a number of factors intervene in this relationship. Thus, it is recommended to examine these factors both quantitatively and qualitatively. Investigating these potential intervening factors can enrich our understanding of academic strategies involved in academic success and provide guidelines for writing task design. Further research with a large sample size can focus on the relationship between self-regulated learning and metacognitive awareness in other language skills in various EFL and ESL contexts to allow us to make cross-cultural comparisons.

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Table 1. Distribution of the Study Participants

Sex	N	Percent
Male	55	37.7
Female	91	62.3
Total	146	100.0

Table 2. MSLQ Items Related to Each Strategy Type

Strategy Type	Items
Cognitive	1, 2, 7, 8, 9, 10, 11, 15, 16, 18, 22, 27, 30, 31, 37, 38, 45
Metacognitive	5, 13, 23, 25, 28, 29, 33, 36, 42, 44
Resource-management	3, 4, 6, 12, 14, 17, 19, 20, 21, 24, 26, 32, 34, 35, 39, 40, 41, 43, 46, 47

Table 3. Self-regulated Learning Components

	Component 1
Cognitive	.880
Resource Management	.846
Metacognitive	.797
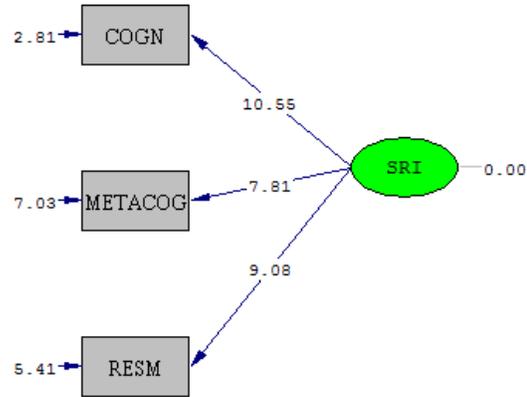
Chi-Square=0.00, df=0, P-value=1.00000, RMSEA=0.000

Figure 1. Confirmatory Factor Analysis of Self-Regulated Learning Components

Table 4. MAI Questionnaire Items Related to Each Strategy Type

Metacognitive Strategies	Items
Declarative Knowledge	5, 10, 12, 16, 17, 20, 32, 46
Procedural Knowledge	3, 14, 27, 33
Conditional Knowledge	15, 18, 26, 29, 35
Planning	4, 6, 8, 22, 23, 42, 45
Information Management	9, 13, 30, 31, 37, 39, 41, 43, 47, 78
Monitoring	1, 2, 11, 21, 28, 34, 49
Debugging	25, 40, 44, 51, 52
Evaluation	7, 19, 24, 36, 38, 50

Table 5. Metacognitive awareness components

	Component
	1
Monitoring	.802
Conditional Knowledge	.801
Procedural Knowledge	.774
Evaluation	.769
Planning	.756

Declarative Knowledge	.747
Information Management	.725
Debugging	.684
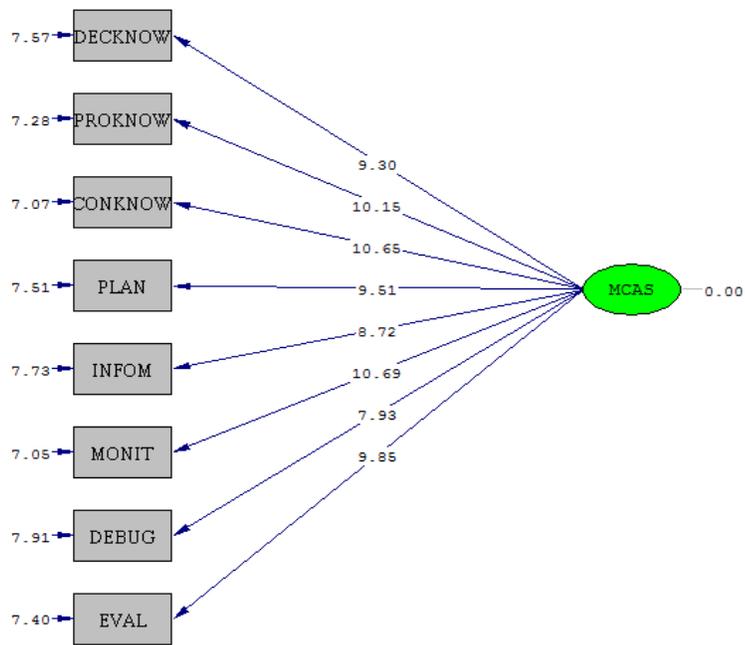
Chi-Square=51.25, df=20, P-value=0.00015, RMSEA=0.104

Figure 2. One Factor Model of Metacognitive Awareness

Table 6. Descriptive Statistics of the Self-Regulated Learning Components

	N	Minimum	Maximum	Mean	Std. Deviation
Resource-management strategy	146	36	59	49.20	3.999
Cognitive strategy	146	19	45	35.46	4.727

| Metacognitive strategy | 146 | 16 | 45 | 33.72 | 4.278 |

Table 7. Descriptive Statistics of the Metacognitive Awareness Inventory Sub-components

MAI Subcomponents	N	Minimum	Maximum	Mean	SD
Debugging Strategy	146	18	50	39.07	5.519
Declarative Knowledge	146	28	50	39.02	4.644
Conditional Knowledge	146	18	50	38.40	5.160
Information Management	146	17	49	38.02	5.703
Procedural Knowledge	146	20	50	38.02	5.558
Planning Strategy	146	19	49	36.15	5.492
Monitoring Strategy	146	17	47	35.90	5.003
Evaluating Strategy	146	23	50	35.80	5.139

Table 8. Descriptive statistics of argumentative writing by two raters

	N	Minimum	Maximum	Mean	Std. Deviation
HOLISTICR1	146	5	25	14.93	5.317
HOLISTICR2	146	5	25	15.27	5.310

Table 9. Total Variance Explained by the Components of Metacognitive Awareness, Self-Regulated Learning, and Argumentative Writing

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.920	45.537	45.537	5.920	45.537	45.537	5.897	45.361	45.361
2	1.889	14.532	60.069	1.889	14.532	60.069	1.912	14.708	60.069
3	.978	7.523	67.592						
4	.754	5.802	73.393						
5	.592	4.551	77.944						
6	.559	4.303	82.247						
7	.485	3.730	85.977						
8	.466	3.586	89.562						
9	.371	2.852	92.414						
10	.324	2.491	94.905						
11	.302	2.320	97.225						
12	.250	1.920	99.145						

13	.111	.855	100.000

Table 10. Factor Loadings for the Components of MAS, SRL, and AW

	Component	
	1	2
Monitoring	.781	
Evaluation	.761	
Cognitive	.753	
Conditional knowledge	.749	
Planning	.743	
Procedural Knowledge	.732	
Declarative Knowledge	.730	
Information Management	.729	
Metacognitive	.704	
Debugging	.693	
Resource Management	.671	
HOLISTICR2		.963
HOLISTICR1		.959

Table 11. Inter-relationships for Components of Self-regulation and Metacognitive Awareness

Dimensions	CO	ME	RM	DE	PR	CO	PL	IN	MO	DE	EV
Cognitive	1	.55**	.64**	.50**	.40**	.40**	.47**	.55**	.47**	.49**	.53**
Metacognitive	.55**	1	.50**	.28**	.30**	.35**	.40**	.27**	.30**	.26**	.29**
Resource management	.64**	.50**	1	.44**	.33**	.34**	.44**	.43**	.42**	.51**	.44**

Note. DE=Declarative; PR=Procedural; CO=Conditional; PL=Planning; IN=Information; MO=Monitoring; DE=Debugging; EV=Evaluation; CO=Cognitive; ME=Metacognitive; RM=Resource Management

Table 12. Overview of Mokken Scale Analysis

| Scale	Number of items	H	alpha
Cognitive	17	.62	.75
Metacognitive	10	.51	.49
Resource management	20	.67	.67
Declarative knowledge	8	.51	.70
Procedural knowledge	4	.39	.52
Conditional knowledge	5	.42	.60
Planning	7	.44	.66
Information	10	.41	.65
Monitoring	7	.40	.59
Debugging	5	.47	.63
Evaluation	6	.43	.53
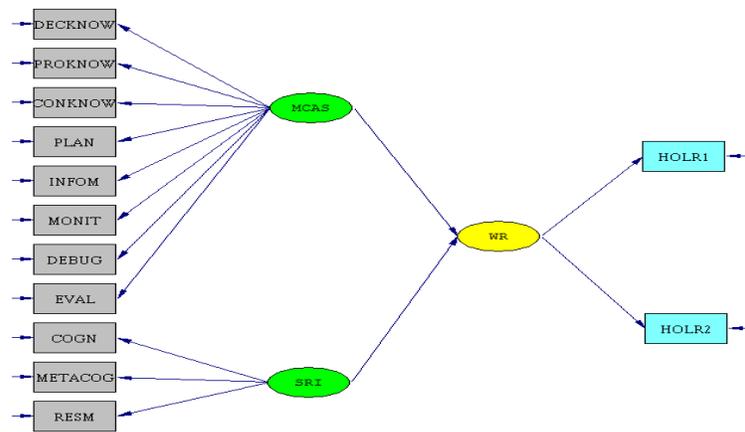
Figure 3. Hypothesized Relationship among MAS, SRL, and WE
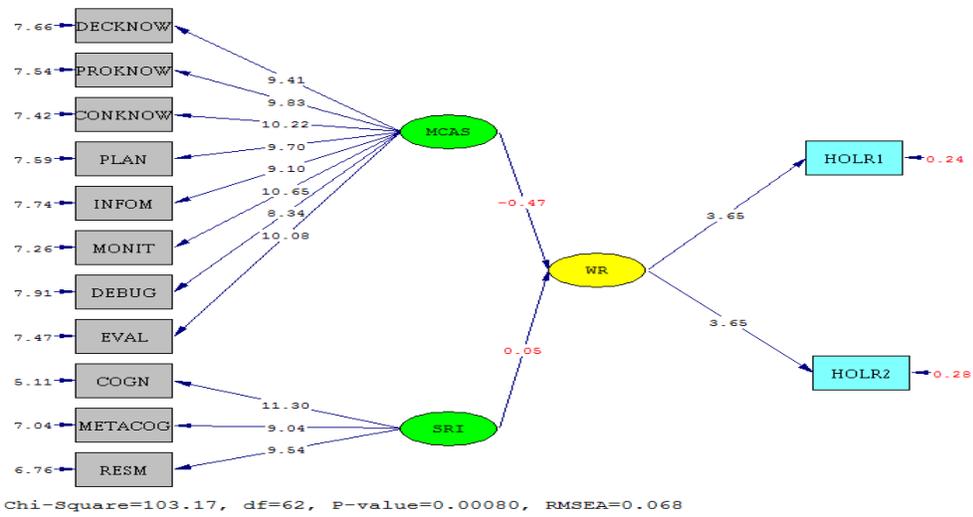
Figure 4.Measurement Model Hypothesized Relationships among MAS, SRL, and WE
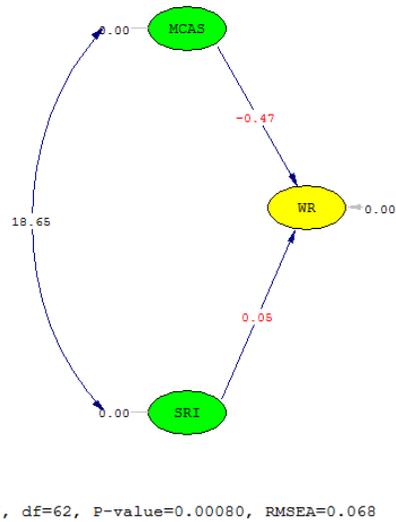
Figure 5. Structural Equation Model Exploring the Relationships among Metacognitive Awareness, Self-regulated Learning, and Argumentative Writing Task in a Foreign Context