# The Effect of Argument Mapping Instruction on L2 Writing Achievement across Writing Tasks and Writing Components: A Case of Iranian EFL Learners

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**Abstract:** Argument maps as schematic representations of arguments and their logical and evidential relationships are effective diagrams for instruction in education as well as in L2 development. However, their use for teaching L2 writing in EFL contexts has not been adequately studied. Therefore, this study investigated the effect of argument mapping instruction on Iranian EFL learners' writing achievement and writing components, including grammar, coherence, cohesion, and task accomplishment in expository and descriptive essays. The participants were 60 intermediate EFL learners at Fadak language institute in Tehran. The selected participants were randomly divided into two groups: an experimental and a control group, each including 30 participants. Materials, coursebooks, and the teacher were the same for the study groups. However, the participants in the experimental group received specific instruction about the use of argument maps before and during their writing. After 10 sessions of treatment, the learners in the two groups were asked to write a descriptive and an expository paragraph. The paragraphs were rated by two raters and the final score was the average of the scores given by the two raters. The results of the data analysis revealed that argument mapping strategies had significant improvement impact on expository and descriptive writing tasks and could improve participants' writing in terms of grammar, coherence, cohesion, and task achievement. However, argument mapping was not beneficial in improving the vocabulary of study participants' writing. Findings of the study suggest that EFL language instructors and learners can use argument maps for teaching descriptive and expository writing.

**Keywords:** Argument Mapping, Descriptive Writing, Expository Writing, Writing Achievement.

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## Introduction

Argument mapping is a tool for reasoning through creating diagrams that include boxes and arrows. Argument mapping diagrams are employed to facilitate the understanding of complex arguments and debates (Santiago, 2011; Truscott, 2009; van Gelder, 2013). According to van Gelder (2015), an argument map is made up of connected boxes and arrows. Boxes represent the propositions and arrows demonstrate relationships among the introduced propositions. He further asserted that argument maps are analogous to other mapping activities like mind mapping and concept mapping. The only substantial difference lies on "the logical, evidential or inferential relationships among propositions" (van Gelder, 2007, p. 1). According to Twardy (2004), "an argument map is a two-dimensional representation of argument structure. It is usually a box-and-arrows diagram which resembles a tree. The boxes are claims, which are arranged so that some are reasons for believing (or disbelieving) others. At one extreme is the final conclusion, supported (and opposed) by its reasons and objections. At the other extreme, are the unsupported claims you take as basic" (p. 6). Davies (2010) stated that "argument mapping allows students to display inferential connections between propositions and contentions, and to evaluate them in terms of validity of argument structure and the soundness of argument premises" (p. 276).

Argument mapping was claimed to be a very effective technique that fosters critical thinking abilities in various educational fields (e.g. Davies, 2008, 2009, 2010, 2012; Dwyer, Hogan, & Stewart, 2011; Easterday, Aleven, Scheines, & Carver, 2009; Kirschner, Buckingham-Shum & Carr, 2012; Ohl, 2008; Paas & Sweller, 2012; Rider & Thomason, 2008; Santiago, 2011; Utah & Waters, 2014; van Gelder, 2002, 2005, 2007, 2013; van Gelder, Bissett, & Cumming, 2004). Using argument maps was reported to help learners and users overcome cognitive difficulty (Dwyer, Hogan, & Stewart, 2010; Khansir, 2012) or decrease the cognitive load (Sweller, Ayres, & Kalyuga, 2011) of information in various arguments, debates, and inferences and therefore, they promote understanding and analysis.

On the other hand, second and foreign language writing development has always been absolutely necessary and required for L2 learners and teachers during the history of SLA (Weigle, 2014). However, developing an effective L2 writing competency is not an easy job; it is, as Loh and Krashen (2015) claimed, the most difficult and the last language skill to master. Many SLA researchers have argued for the cognitive, metacognitive, and linguistic difficulties of L2 writing (Harper, 2010; Hyland, 2003, 2015; Nunan, 2001; Smith, 2005; Widdowson, 2015). The difficulties relating to developing an effective writing ability comes

from different aspects including content knowledge, task complexity, syntactic complexity, accuracy, lexical complexity, organizational mechanisms such as cohesion and coherence, and fluency of ideas. These difficulties and challenges get even more multiplex and baffling when different writing tasks, i.e. descriptive, expository, and argumentative writing modes are taught (Hyland, 2013). As Weigle (2013) uttered, writing genres add to the inherent complexity involved in L2 writing because of their special lexicogrammar and organizational structure.

Argument maps are among the tasks which have been recently used for teaching L2 writing. Richards (2006), for instance, maintained that what helps L2 learners promote their writing ability is the introduction of the real world, communicative, and meaningful tasks such as argumentative mapping. Although, argument maps have been used to improve L2 learners' writing competencies, no comprehensive study has been done to examine the effect of argument maps on writing components for descriptive versus expository writing as the more frequent orientations (as asserted by Hyland, 2016) than the narrative and argumentative writing. Accordingly, the current study was designed and carried out to provide SLA researchers with deeper insight into the effects of using argument maps for promoting task achievement, coherence and cohesion, grammar, and vocabulary components across two frequent writing tasks of exposition and description.

## Literature Review

Argument mapping was employed for language teaching in general (e.g. Davies, 2009) and in L2 teaching in particular (Harrell, 2011; Rider & Thomason, 2008). A lot of research has been carried on the use of manual and computer-based argument mapping strategies for enhancing L2 learners' critical thinking which is considered as the foundation of many language skills and subskills (Chamot, 1995; Eftekhari, Sotoudehnama & Marandi, 2016; Harrell & Wetzel, 2015). Eftekhari, et. al (2016), for example, studied the effect of computer-aided argument mapping in developing critical thinking among EFL leaners and found that learners' general critical thinking and their inference and inductive reasoning sub-skills significantly improved.

Some investigations have supported the efficacy of using argument mapping techniques for L2 text comprehension (Botley & Hakim, 2014; Chiang, Fan, Liu, & Chen, 2015; Rider & Thomason, 2008), as well as post- reading activities (Harrell, 2011). Dwyer, Hogan, and Stewart (2010) examined the effect of prose-text versus argument maps on reading

comprehension and memory ability. Findings of their study contrasted other studies; they found that learners who used argument maps as pre and post reading tools did better than others who practiced residing through prose-text explanation on tests of memory; however, the reading comprehension of the two study groups did not differ in significant ways. Grogan (2014) scrutinized the use of argumentation and argument mapping strategies on both reading comprehension and argumentative writing. As for the use of argument mapping in L2 reading comprehension, she found no significant differences between the performance of the study participants who received the treatment and that if the other learners.

Zarei and Keysan (2016) studied the impact of different mapping strategies including argument maps, concept maps, and mind maps on L2 vocabulary understanding and use among Iranian female EFL learners. One of their study findings indicated that argument maps had improved participants' knowledge regarding the use and comprehension of English words. Kawaguchi's (2016) study findings also revealed that the application of argument maps could lead to Japanese ESL learners' vocabulary development in Australian context.

Some studies have focused on the use of argument mapping and argumentation on the acquisition of L2 grammatical points or syntactic structures (Lenzig, 2016; Kawaguchi, 2005, 2013, 2016). Kawaguchi (2005) proclaimed that the use of and familiarity with argument structure and argument mapping techniques could assist the acquisition of Japanese grammatical structures as an L2. In a recent study, Kawaguchi (2016) observed that question sentences and argument mapping were reliable and significant predictors of ESL learners' syntactic improvement.

Argument maps have also been used for teaching L2 writing, indicating their effective use. Grogan (2014), for example, reported the efficacy of hand-made argument maps and metacognitive knowledge about argumentation on the quality and quantity of argumentative essays written by L2 learners. Harrell and Wetzel (2015) proclaimed that using well-designed argument diagrams can both enhance L2 learners' critical thinking and writing performance among beginner language learners, stressing that argument maps trigger the prerequisite thinking processes which are involved in writing. Davies (2010) compared the effect of argument, concept, and mind maps on ESL learners' writing enhancement, claiming that argument maps were more effective than other two kinds of maps for teaching L2 writing.

Dwyer at. al, (2010) also strongly supported the efficacy of argument mapping for promoting EFL learners' literacy skills and held that argument maps aid L2 learners produce more coherent and cohesive essays. Gray (2012) stated that argument maps can trigger L2

learners' critical thinking and problem solving abilities and therefore strengthen their writing performance. He pointed out that argument mapping specifically enriches the writing process and makes the journey through the process to the final product an enjoyable and fruitful experience by alleviating the threatening atmosphere of traditional composition writing classes.

Pinkwart, et. al. (2009) reported that the use of argument maps foster L2 learners' argumentative writing. The effectiveness of using argument mapping for teaching other writing modes was also reported by some other studies (e.g. Cho & Jonassen, 2002; Ellis & Yuan, 2004; Kawaguchi, 2005; Ojima, 2006). Kawaguchi's (2005) study, for instance, revealed that use of argument maps could enhance the quality of narrative essays written by advanced L2 learners. Ellis and Yuan's (2004) study also argued for the positive effect of using manual argument maps for L2 learners' narrative writing improvement. They asserted that argument maps designed based on the chronological order strongly facilitated brainstorming, writing, and revising narrative essays for upper-intermediate L2 learners.

As Ojima's (2006) and Cho and Jonassen' (2002) studies indicated the use of argument mapping supports the thinking processes of L2 learners during the brainstorming or other prewriting procedures, hones their logical contemplation, activates their creativity, and guides them through different phases in the writing experience. These studies made it clear that argument maps not only trigger thinking for writing, but they also act as reliable guides during the writing and even for revisions after the first draft has been produced. Accordingly, argument maps are unique schematic devices during all writing phases from brainstorming to revising and even evaluating the quality and quantity of the final text.

As far as Iranian EFL context is concerned, a few studies can be reported on the use of argument maps for teaching writing skill (Abdollahzadeh & Fard Kashani, 2011; Ahangari & Behzady, 2012; Pishghadam & Ghanizadeh, 2006). Abdollahzadeh and Fard Kashani (2011) examined the impact of argument mapping on Iranian EFL learners' language achievement and their writing as well. They reported that argument maps enhanced both language performance and writing skills among Iranian L2 learners. Pishghadam and Ghanizadeh (2006) reported that the use of concept and argument maps as pre-writing tasks can enhance Iranian EFL learners' writing skills. Maftoon, Birjandi, and Pahlavani (2014) conducted a research on the effect of employing computer-aided argument mapping (CAAM) on the ELF writing development and found those learners who completed their writing assignments using computer, i.e. CAAM, outperformed those counterparts who carried out their writing tasks

manually through the use of pen and paper. In two subsequent studies, the effectiveness of CAAM on EFL learners' writing self-regulation (Pahlavani & Maftoon, 2015) and writing self-regulation (Maftoon, & Pahlavani, 2014) were reported.

However, these studies focused on the general writing achievement of EFL learners, and less research has been done on the use of manual or computer-based argument mapping on the improvement of L2 writing components and across specific writing tasks (writing modes). Therefore, the current research was designed and carried out to investigate this untouched knowledge gap in L2 writing literature.

## Purpose of the Study

The purpose of the present research was to investigate the effect of argument mapping on Iranian EFL learners' writing achievement. Considering the purpose and the statement of the problem mentioned above, the research questions of the study were presented as follows:

1. Does argument mapping have any statistically significant effect on Iranian EFL learners' writing achievement?

2. Does argument mapping show any significant effects across task types (descriptive and expository tasks)?

3. Does argument mapping show any significant effects on the four components of writing (task achievement, coherence-cohesion, grammar and vocabulary)?

## Method

### Participants

Study participants were 60 intermediate level female EFL learners with the age range of 16 to 20 in Fadak Language Institute, Tehran. These participants were selected from an initial sample of 90 intermediate learners according to their performance on a Preliminary English Test (PET). The selected participants were randomly assigned to two groups: an experimental group and a control group each with 30 learners. The participants had been studying English in the same language institute for at least 10 semesters.

### Instruments

Three instruments were used to gather the needed data for the purpose of the current study: a PET test, a writing pretest, and a writing posttest.

**Preliminary English Test (PET)**

To select a homogeneous sample of learner, the B2 (2016 version) of PET published by Cambridge Assessment English was used to assess the participants' English language proficiency. The test was comprised of two parts included reading and writing sections and the total score (i.e. 50) was calculated by adding scores from all test sections. It took 60 minutes for learners to answer the whole test. The writing section of PET was rated based on Second Language Writing Scoring Guide provided by Alderson and Tankó (2010). This is in line with European council framework which specifies language proficiency of the learners in terms of A1, A2, B1, B2, C1, and C2, and accordingly the scores given to the written documents could range from 1 to 6. As Alderson and Tankó (2010, p. 127) asserted "essays are scored based on a 6-band holistic scale in the Written English in PET, TOEFL, MELAB and any other compatible Test of Written English (TWE)". In order to ascertain the reliability of assessing the writing parts of PET, two raters took part in the assessing processes. The raters were PhD candidates of TEFL with rather the same characteristics in experience and education. The raters were also briefed about the research objectives. The results represented that the mean was 39.8 and the SD was 2.10. The reliability of the test 0.89.

**Writing Pretest**

The second instrument used in the pre-treatment phase was a writing pretest about '*Your Best Vacation Ever*' (chosen from among the standard topics of PET) which was given to the participants selected after the language proficiency test. This writing pretest topic was different from the main 2016 version which was used as the proficiency test. The writings of the learners were corrected by two raters based on the guidelines provided by ETS (2010). The validity of the prompts given to the learners in the writing section was checked with two experts who were PhD holders in TEFL teaching at Islamic Azad University and inter-rater reliability of the learners' written pieces was also calculated. The inter-rater reliability indicated a strong agreement [$r$ (58) = .69, p<.05] between the two raters who rated the students' writings on the pretest.

**Writing Posttest**

The writing posttest included two tasks of expository and descriptive writing. The writing topics were selected from among the topics normally appearing in the educational websites but were checked for their sociocultural and cognitive appropriateness by two experts before

they were given to the students. The topics for the descriptive and expository writings were *'the best friend'* and *'the causes of drug abuse'*, respectively, and the learners were required to write long paragraphs including around 200 words.

**Data Collection Procedure**

One of the researchers taught both groups. Both the control and the experimental groups used the same course book, materials, lexical items, and passages. Any vocabulary and grammatical issues discussed were explicitly taught to the learners and they received feedback from the teacher and were allowed to discuss the main points both inside and outside the classroom. In both groups, at first, the teacher created a situation in which specific words and grammatical points were used. In this phase, i.e. the presentation phase, the teacher helped learners do brain-storming and engaged them in the process of learning. Then, in the practice phase, the learners were directed towards discussing lexical items and grammatical points. It was done to clarify the training offered as much as possible. In the third phase, the production phase, the learners were encouraged towards developing their own writings.

The argumentative mapping techniques such as finding relationships, classifying the information, brainstorming, developing subsections, presenting supports, major and minor ideas were introduced to the learners in the experimental group and the learners were asked to take part in the practicing phases in order to get familiar with the concept of argumentative mapping, planning for writing, and thinking before writing. The learners were asked to do the following procedure in the prewriting phase: stating their thesis, writing an outline, writing the first draft, and revising and polishing. They were also led towards thinking about the following questions whenever they were supposed to write.

1. What is your purpose for writing about the intended topic?

2. How are you going to reach that purpose in your writing?

Then, the students were asked to start brainstorming and the flowing of ideas. In the brainstorming phase, the learners were asked to write all ideas, suggestions, examples, sentences, false starts, etc. as they could. They were also asked to jot down everything that came to their mind, including ideas they were not sure about their relevance to the writing topic. In the next step, the learners were asked to summarize their whole idea and retell it to someone else in three or four sentences. Then, they were asked to diagram their major points somehow and present their first draft. The learners were also asked to focus on

whatever they needed to write while writing and any moment they felt it as necessary. This way they tried to solve their grammatical, lexical and even developmental writing problems such as writing a supporting sentence or a secondary main idea. The teacher also provided them with feedback needed. The learners practiced mapping and planning in its various forms in different sessions with various topics, but they mainly focused on the strategy they had been exposed to.

The learners in the control group did not receive any specific training on the argumentative mapping strategies; however, they enjoyed the same materials to practice and they received feedback from the teacher. It was tried to keep the situation in both classes the same and the only focused difference was the presence of argumentative mapping strategies in the experimental group. Instead, they worked with other methods of learning writing in the second language. The learners in this group were given topics to write about and then the teacher corrected the papers and provided the learners with some comments. Meanwhile, there was no specific preplanning of argumentative mapping strategies presented in the classroom. The treatment period continued for 10 sessions, each lasting for 90 minutes in both groups. Finally, the posttest of writing was administered and both the control and experimental groups were asked to write an expository and a descriptive essay. The paragraphs written by the participants in the three groups were scored by two skillful raters following the guidelines provided by ETS (2010).

## Materials

The coursebook used in the classroom was the *Touch Stone 2* published by Cambridge University Press in 2005. The series has been developed for young adult EFL/ESL learners. It has been written based on the Cambridge International Corpus of North American English. Everyday conversations and the frequent text that indicate the authentic use of American English shape the content of the series. The Cambridge International Corpus (CIC) has been produced to provide learners of English with needed writing materials and to help them get familiar with real world use of English. Content of CIC has been developed from various bases containing newspapers, media, books, Websites, journals, radio and television programs, and recordings of real world talks. The series is accompanied with teacher's guide, CDs, DVDs, students' book, work book, website, and a specific self-study audio CD/CD-ROM.

## Design

The selection of the participants and the assignment of the participants into the study groups were done randomly. There were pre and posttests, the experimental group received treatment but the control did not. So the present research had all the characteristics of a true experimental design: pre-test post-test control group design (Mackey & Gass, 2005).

## Data Analysis

The data analysis of the present study enjoyed both descriptive and inferential statistics. Descriptive statistics were used to calculate the mean and standard deviation of the piloted PET, writing pretest, and the writing posttest. The reliability of these tests were calculated through using K-R 21 formula. To check the inter-rater reliability of the writing section of PET, writing pretest and posttest, Cronbach Alpha was used. An independent t-test was applied to compare the experimental and control groups' PET test scores to check if the two study groups had the same level of general language proficiency prior to the treatment or not. Another independent samples t-test was run to compare the experimental and control groups' scores on the writing pretest in order to examine whether the two groups enjoyed the same writing ability level prior to the treatment. A repeated-measures ANOVA was run to investigate the effect of argument mapping, types of tasks (descriptive and expository) and components of writing (task achievement, cohesion-coherence, grammar and vocabulary) on the performance of the subjects on the writing posttest. And finally, an independent t-test was run to compare the experimental and control groups' posttest of writing in order to see the effect of the treatments on the learners' performances in the writing posttest.

## Results

All the assumptions for using parametric tests of independent t-test and repeated measures ANOVA were checked for PET, writing pretest, and writing posttest through statistical tests and graphs using SPPS (version 22). The needed assumptions were also checked for sub-sections of these three instruments. Normality of distribution, homogeneity of variances, sampling adequacy, lack of Multicollinearity and other assumptions were all met and there were not any violations.

Inter-Rater Reliability indices were calculated for PET (r=.85), for pretest (r=.69) and posttest (r=.73) of writing using Pearson Product-Moment correlation. Inter-rater reliability coefficients between the two raters who rated the learners' writings on the pretest and

posttests of writing were also checked for different tasks and the two wettings. All the inter-rater reliability indices showed strong agreement (p < .05) between scores given by the two raters. The average scores calculated from the scores given by the two raters were fed into SPSS.

An independent samples t-test was employed to compare the experimental and control groups' scores on the PET test to demonstrate that the two groups indicated the same level of general language proficiency before the treatment. As displayed in Table 1, the experimental (M = 42.03, SD = 2.32) and control (M = 42.13, SD = 2.23) groups showed almost the same means on the PET test.

**Table 1.** *Descriptive Statistics for Stduy Groups' Scores on the PET*

| Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Experimental | 30 | 42.03 | 2.327 | .425 |
| Control | 30 | 42.13 | 2.209 | .403 |

Figure 1 shows a graphic representation for the scores of the experimental and the control groups on the PET:
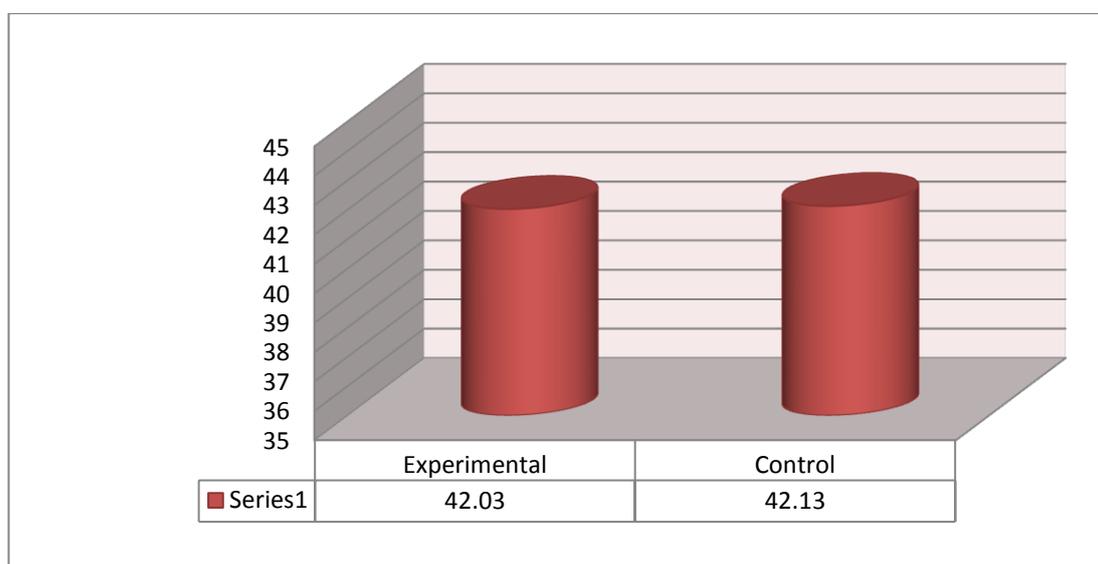


**Figure 1.** *Participants' scores on the PET in the experimental and control groups*

The results of the independent samples t-test [t (58) = .17, p>.05; R = .022] signified a weak effect size) (Table 2), indicating that there was not any significant difference between experimental and control groups' mean scores on the PET test.

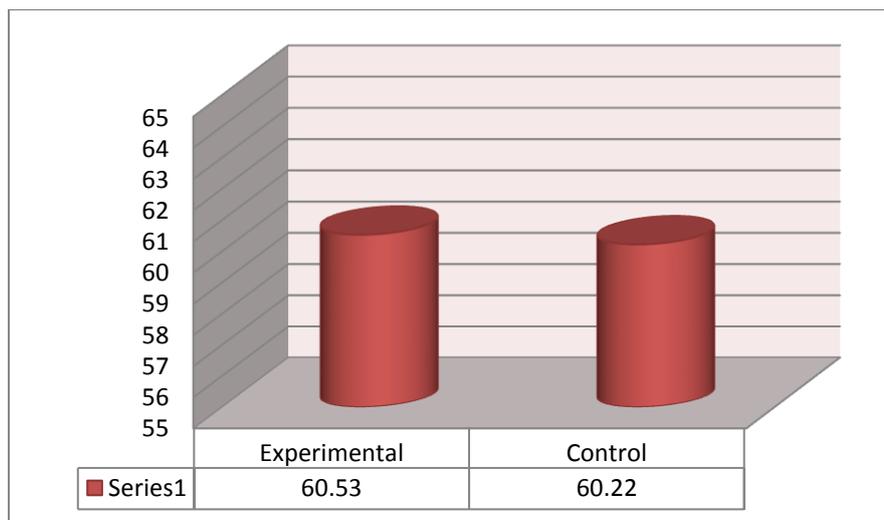**Table 2.** *Independent Samples t-test for Stduy Groups' Scores on the PET*

| | 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 | Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 95% Confidence Interval of the Difference | |
| Equal variances assumed | .046 | .832 | .171 | 58 | .865 | .100 | .586 | -1.072 | 1.272 |
| Equal variances not assumed | | | .171 | 57.844 | .865 | .100 | .586 | -1.072 | 1.272 |

An independent samples t-test was also utilized to compare the experimental and the control groups' scores on the writing pretest to examine if the two groups learners' writing ability was the same at the beginning of this research. As presented in Table 3, the experimental (M = 60.53, SD = 5.57) and control (M = 60.22, SD = 5.58) groups showed almost the same means on the writing pretest.

**Table 3.** *Descriptive Statistics for Stduy Groups' Scores on the Writing Pretest*

| Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Experimental | 30 | 60.53 | 5.575 | 1.018 |
| Control | 30 | 60.22 | 5.828 | 1.064 |

Figure 2 shows a graphic representation for the scores of the experimental and the control groups on the writing pretest:



**Figure 2.** *Stduy groups' scores on the writing pretest*

The results of the independent samples t-test [t (58) = .21, p>.05; R = .028, representing a weak effect size] in Table 4 indicated that there was not any significant difference between the experimental and the control groups' mean scores on the writing pretest. So, it was concluded that the two groups' writing skill was nearly similar before the treatment sessions began.

**Table 4.** *Independent Samples T-test for Stduy Groups' Scores on the Writing Pretest*

| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | | | | | | | 95% Confidence Interval of the Difference | |
| | F | Sig. | T | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| Equal variances assumed | .036 | .849 | .215 | 58 | .830 | .317 | 1.472 | -2.631 | 3.264 |
| Equal variances not assumed | | | .215 | 57.887 | .830 | .317 | 1.472 | -2.631 | 3.264 |

As displayed in Table 5, the experimental group (M = 16.19, SE = .08) after receiving the treatment, outperformed the control group (M = 14.28, SE = .08) on the posttest of writing.

**Table 5.** *Descriptive Statistics for Stduy Groups' Scores on the Writing Pretest*

| Group | Mean | Std. Error | 95% Confidence Interval | |
| | | | Lower Bound | Upper Bound |
|---|---|---|---|---|
| Experimental | 16.196 | .080 | 16.036 | 16.356 |
| Control | 14.283 | .080 | 14.123 | 14.444 |

A repeated-measures ANOVA was run to investigate the effect of argument mapping, types of tasks (descriptive and expository) and components of writing (task achievement, cohesion-coherence, grammar and vocabulary) on the performance of the subjects on the posttest of writing. The results [F (1, 58) 285.54, p<.05, Partial $\eta2$ = .83, representing a large effect size] indicated that there was a significant difference between the overall mean scores of the experimental and control groups on writing posttest. Thus, the answer to the first research question was that argument mapping had a statistically significant effect on the Iranian EFL learners' writing achievement.

**Table 6.** *Tests of Between-Subjects Effects for the Writing Postest*

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Intercept | 111477.552 | 1 | 111477.552 | 72522.668 | .000 | .999 |
| Group | 438.919 | 1 | 438.919 | 285.542 | .000 | .831 |
| Error | 89.154 | 58 | 1.537 | | | |

The second research question aimed at examining whether argument mapping had significantly different effects across task types (descriptive and expository tasks). As displayed in Table 7, learners' scores showed a slightly higher mean (M = 15.38, SE = .07) on the descriptive task than expository task (M = 15.09, SE = .05).

**Table 7.** *Descriptive Statistics for Study Gropus' Scores on the Tasks in the Writing Posttest*

| Tasks | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| Descriptive | 15.383 | .077 | 15.230 | 15.537 |
| Expository | 15.096 | .058 | 14.981 | 15.211 |

The results shown in Table 8 [F (1, 58) 14.71, p<.05, Partial $\eta^2$ = .20, representing a large effect size] indicated that there was a significant difference between the overall mean scores of the descriptive and expository tasks.

**Table 8.** *Multivariate Tests for for Study Gropus' Scores on the Tasks in the Writing Posttest*

| Effect | | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Tasks | Pillai's Trace | .202 | 14.712 | 1 | 58 | .000 | .202 |
| | Roy's Largest Root | .254 | 14.712 | 1 | 58 | .000 | .202 |
| Tasks * Group | Pillai's Trace | .865 | 372.068 | 1 | 58 | .000 | .865 |
| | Roy's Largest Root | 6.415 | 372.068 | 1 | 58 | .000 | .865 |
| Components | Pillai's Trace | .910 | 189.862 | 3 | 56 | .000 | .910 |
| | Roy's Largest Root | 10.171 | 189.862 | 3 | 56 | .000 | .910 |
| Components * Group | Pillai's Trace | .833 | 93.257 | 3 | 56 | .000 | .833 |
| | Roy's Largest Root | 4.996 | 93.257 | 3 | 56 | .000 | .833 |
| Tasks * Components | Pillai's Trace | .568 | 24.568 | 3 | 56 | .000 | .568 |
| | Roy's Largest Root | 1.316 | 24.568 | 3 | 56 | .000 | .568 |
| Tasks * Components * Group | Pillai's Trace | .445 | 14.956 | 3 | 56 | .000 | .445 |
| | Roy's Largest Root | .801 | 14.956 | 3 | 56 | .000 | .445 |

The third research question aimed at checking if argument mapping had significantly different effects across the components of writing (achievement, coherence and cohesion, grammar, vocabulary). Based on the results in Table 8 [F (3, 56) 189.86, p<.05, Partial $\eta^2$ = .91, it represented a large effect size], there was a significant difference between the overall mean scores of the four components of writing.

As seen in Table 9, participants obtained the highest mean score on the grammar (M = 16.72), followed by task achievement (M = 15.81), coherence-cohesion (M 15.53) and vocabulary (M= 12.89).

**Table 9.** *Descriptive Statistics for Components of Writing Posttet*

| Components | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| Task Achievement | 15.813 | .093 | 15.626 | 15.999 |
| Coherence-Cohesion | 15.533 | .117 | 15.299 | 15.768 |
| Grammar | 16.721 | .107 | 16.507 | 16.935 |
| Vocabulary | 12.892 | .106 | 12.679 | 13.104 |

Figure 3 shows a graphic representation for components of writing by groups on the writing pretest:
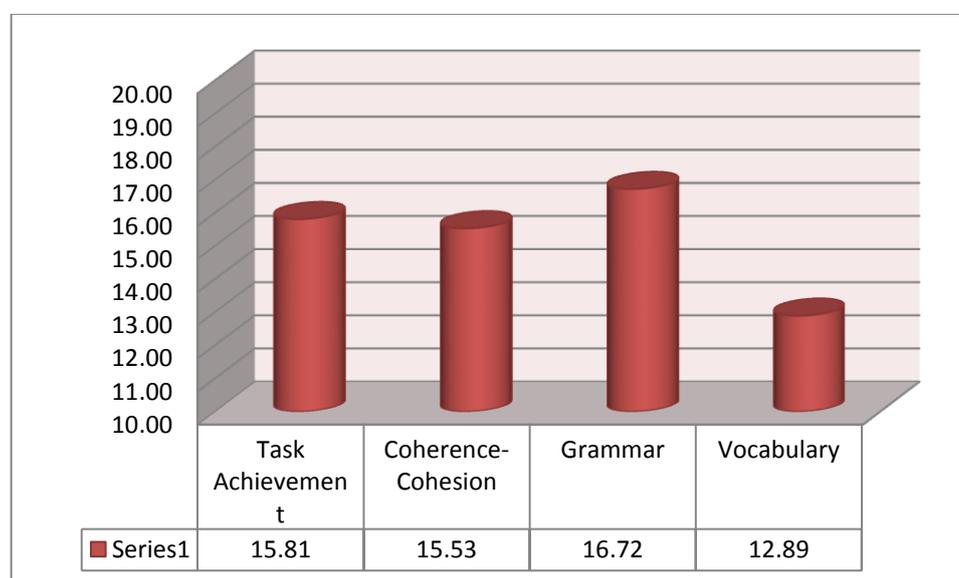


**Figure 3.** *Components of writing postest by groups*

Although the F-value of 189.86 indicated significant differences between the four components of writing, the post-hoc Scheffe's tests should be applied to compare the components two by two.

**Table 10.** *Post-Hoc Scheffe's Tests; for Components of Writing Postest by Stduy Groups*

| (I) Components | (J) Components | Mean Difference (I-J) | Std. Error | Sig.[b] |
|---|---|---|---|---|
| Task Achievement | Coherence-Cohesion | .279 | .130 | .214 |
| | Vocabulary | 2.921[*] | .155 | .000 |
| Coherence-Cohesion | Vocabulary | 2.642[*] | .143 | .000 |
| | Task Achievement | .908[*] | .109 | .000 |
| Grammar | Coherence-Cohesion | 1.188[*] | .164 | .000 |
| | Vocabulary | 3.829[*] | .171 | .000 |

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

According to the results obtained from the application of post-hoc tests (Table 10), there was a significant difference between the mean scores of the learners on the task achievement (M = 15.81) and vocabulary (12.89) (MD = 2.92, p<.05). A significant difference was also found between the mean scores of the learners on the coherence-cohesion (M = 15.53) and vocabulary (12.89) (MD = 2.64, p<.05). There was a significant difference between the mean scores of the learners on the grammar (M = 16.72) and vocabulary (12.89) (MD = 3.82, p<.05) components. In addition, a significant difference was observed between the mean scores of the learners on the grammar (M = 16.72) and coherence-cohesion (15.53) (MD = 1.18, p<.05). However, no significant difference was revealed between the mean scores of the grammar (M = 16.72) and task achievement (15.81) (MD = .90, p<.05) or between the mean scores of the coherence-cohesion (M = 15.53) and task achievement (15.81) (MD = .27, p<.05) components.

**Discussion**

The first findings of the present study revealed that argument mapping has a significant effect on the Iranian EFL learners' writing performance. The effectiveness of argument mapping treatments in the experimental groups can be accounted for by efficacious features attributed to argumentative mapping techniques such as locating relationships, sorting the information, brain storming, developing subclasses, giving supports, major and minor ideas that all are important dimensions of writing process. These features are reminiscent of the different steps required in the process of writing as claimed and advocated by many renowned L2 writing researchers (e.g. Flowerdew, 2017; Hyland, 2003, 2015). As asserted by Harrell (2012), argument mapping techniques provide a logical and incremental sketch to organize the ideas in a coherent and cohesive layout, facilitating both the comprehension and production of language. Argument mapping activates learners' background knowledge and facilitates the

effective application of this knowledge in the whole writing process. Furthermore, since argument mapping strategies involve high degree of critical thinking (Harrell, 2008), the learners experiencing argument mapping are expected to develop better writings in terms of complexity and content (Gray, 2012).

This first finding of the current investigation is in line with some previous research conducted in this domain (e.g. Abdollahzadeh & Fard Kashani, 2011; Botley & Hakim, 2014; Chiang, et al., 2015; Davies, 2009, 2010, Dwyer, et al., 2010; Gray, 2012; Harrell, 2008, 2011, 2012; Johnson, 2017; Kawaguchi, 2005; Kirschner, et al., 2012; Maftoon, et al., 2014; Pahlavani & Maftoon, 2015; Pinkwart, et al., 2009; Pishghadam & Ghanizadeh, 2006). Abdollahzadeh and Fard Kashani (2011), for example, studied the influence of argument mapping on performance in task-based learning and came to know that argument mapping strategies highly affect second language acquisition of the learners as well their writing. Ahangari and Behzady (2012) also argued that explicit instruction of computer-mediated concept maps showed a positive influence on the EFL writing skill in general. Talebinezhad and Mousapor Negari (2001) investigated the impact of explicit teaching of argument maps on the Iranian EFL learners' expository writing mode as well as their self-regulation during the writing process. The results of this research revealed that the use of mapping strategies (both concept and argument maps) promoted the study participants' self-regulation and expository writing remarkably.

Davies's (2010) study reported that among mind mapping, concept mapping, and argument mapping, this is argument mapping which results in the better writing development among the ESL learners. In an attempt to evaluate argument mapping as a learning tool, Dwyer, et al. (2010) found that argument mapping in the form of map reading was more positive than text reading when used for teaching reading comprehension and writing to the EFL learners. In a relatively recent study, Maftoon, et al., (2014) also proclaimed the positive impact of using computer-aided argument mapping (CAAM) on the enhancement of writing skill of Iranian learners of English. Pahlavani and Maftoon (2015) also found the positive impact of using argument mapping on the improvement of Iranian EFL learners' writing self-regulation. These show how significant the instruction of argument mapping is in the general course of second language acquisition and in second language writing growth specifically. Pinkwart, et al.'s (2009) the study also revealed that argument mapping instruction shows significantly influenced argument writing tasks. This finding correlates with that of Kawaguchi (2005), who also showed that strategic instruction of mapping and planning

affects the oral and written narratives of intermediate learners with low and high L2 proficiency, but this effect is higher in the more proficient learners.

The second finding was that argument mapping showed significantly different effects across task types, i.e. learners' performance on descriptive writing was better than that of the expository task. The only explanation for the difference is perhaps the familiarity of learners with the descriptive mode and its easier organization compared with the expository mode because no previous study or theory directly supports this finding. In addition, most learners were familiar with description as the simplest and easiest approach in L2 writing based on their experience from L1. As aforementioned, the majority of previous studies have examined the use of argument mapping techniques for teaching writing and its inherent components. As a result, the paucity of research about the impact of using these maps for teaching narrative, descriptive, expository, and argumentative paragraph and essay types as the four main writing modes as classified by Hyland (2003) discredits making robust claims and generalizations solely based on the findings of the current study. One of the rare references can be ascribed to Davies (2010) that has argued for the efficiency of using argument maps for enriching language leaners' description of events and phenomena in their writing tasks; however, he has not made any comparison among description and other writing functions.

The third substantial finding of this study highlighted that argument mapping shows significantly different effects across three components of writing (task achievement, coherence-cohesion, and grammar). It was found that learners showed the highest mean score on the grammar which was followed by task achievement, while coherence-cohesion factor was the third in ranking; however, vocabulary level of the learners has not been changed that much. Because of their sequentially logical and organized structures, argument maps facilitate task achievement through uninterrupted step-by-step support and scaffolding during the writing process from brainstorming ideas to the final draft (product of writing). Argument maps also provide coherence in writing as a result of their internally arranged structure including multiple interconnected and interrelated premises, concepts, and their relations. By providing coherent writing, argument maps also set the stage for rather linguistically cohesive organization utilizing both grammatical and lexical transitional devices. Arguments maps are also claimed to foster lexicogrammar of the writing draft (Davies, 2012; Ellis, 2009). Although the current study reported a less significant role for argument mapping on vocabulary development during descriptive and expository writing, theoretically it should also help learners activate the semantically related words and hence decide on better lexical choices.

Ellis and Yuan (2004) scrutinized the effects of argument mapping on fluency, complexity and accuracy in L2 narrative writing and reported that planning strategy helps L2 learners in "problem solving, picking up more complex structures, and well organized writing" (p. 82). Ellis (2009) also touched upon the differential impacts of types of argument mapping on the fluency, complexity, and accuracy in L2 oral production and mentioned that planning in the form of argument mapping highly and positively influences both accuracy and complexity factors, but complexity of the production is not that much influenced by planning tasks.

The third finding of the current study draws a parallel connection with findings of earlier investigations carried out by Cho and Jonassen (2002) on the effect of collaborative planning strategy, as a specific type of argument mapping in Korean writing classes, Ojima's (2006) case study on three Japanese ESL writers in Japan concerning the effect of argument mapping, and Lin, et al.'s (2004) research on the effect of computer-assisted argument maps as a pre-writing strategy for ESL intermediate learners. The results of these studies disclosed that argument mapping was effective in fostering L2 learners' writing organization, grammar, and coherence. The effect of argumenta mapping on L2 learners in the aforementioned studies was inconsequential compared with other writing components. Ahangari and Behzady's (2012) study also revealed that such trainings could improve the content, organization, vocabulary, and language use components except the mechanics of the learners' writing. Again the effect on vocabulary development was the least. Pishghadam and Ghanizadeh's (2006) research results showed that argument maps could enrich Iranian EFL learners' writing in two ways. First, argument maps assisted learners write more coherent, cohesive, and well-organized essays compared with those learners who did not receive such treatment during the pre-writing phase. Second, the quality and variety of lexicogrammar in their essays were also improved considerably.

## Conclusion and Implications

The present study was launched to scrutinize the role of argument mapping as both a pre-writing strategy and during writing strategy in EFL learners' writing ability. The main conclusions of the study are as follow. First, using argument mapping techniques could improve Iranian EFL learners' writing skill. Second, argument maps had different effects on different writing tasks (different writing modes), i.e. they enhanced participants' descriptive writing better than their expository writing. Third, familiarity with argument mapping

strategies could improve EFL learners' writing ability in terms of grammar, coherence, cohesion, and task achievement. However, the use of argument mapping was not beneficial in improving the vocabulary of Iranian foreign language learners in their L2 writing.

Findings of this study can have some pedagogical implications for teaching and learning English. Teachers, for example, can use argument mapping techniques such as finding relationships, classifying the information, brainstorming, designing subdivisions, offering major and minor supporting ideas, focusing on the specific grammatical topics and structures in their writing classes to help the learners acquire the skills to develop descriptive and expository essays. The teaching of cohesion and coherence devices and their actual lexico-grammatical forms can also be incorporated in EFL teachers' syllabi to promote descriptive and expository wetting among L2 learners.

Future studies might consider examining the residual effects of argument mapping instruction to explore whether and how long-term these effects actually could be. It is worth investigating whether providing learners at various proficiency levels with argument mapping strategies has the same effects on the learners' general grammatical, cohesion-coherence, and vocabulary knowledge and their ability in second language writing. A semi-longitudinal study of the argument mapping strategies in the Iranian EFL context on a specific group of learners can reveal if argument mapping strategies can affect learners' mentality or not. In addition, the present study employed descriptive and expository writing tasks; this study can be replicated for narrative and argumentative tasks as well. Further research is recommended to explore the role of argument mapping strategies in developing other language skills such as speaking, listening, and reading comprehension and their relationship together. The age and gender of students were not controlled in this research. Thus, age and gender factors could be taken into consideration in another study of the same type with a bigger sample to present more generalized results and findings.

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