

**Original Article**

## Empowering EFL Learners in Persuasive Writing: E-Mind-Mapping Technique vs. Teaching Rhetorical Devices

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### Abstract

This study examined the potential effects of implementing the E-Mind-Mapping (E-M-M) technique vs. teaching Rhetorical Devices (RDs) on the overlooked yet frequently used persuasive writing skill among Iranian EFL learners. Following a quasi-experimental design, 52 Iranian upper-intermediate EFL learners were conveniently selected and divided into experimental and control groups in which participants in the former were taught the material using MindMeister mind-mapping software, and the ones in the latter experienced learning ethos, pathos, and logos persuasive strategies for 15 ninety-minute sessions. The instruments included the Oxford Quick Placement Test (OQPT) and valid and reliable writing tests in the pre- and post-test phases. The results showed that while the E-M-M technique and teaching RDs enhanced persuasive writing among Iranian EFL learners, the aforementioned effect was considerably more beneficial compared to the influences of the second-mentioned. The outcomes may benefit TEFL, including EFL teachers, learners and teacher trainers, educational technology, and educational psychology.

**Keywords:** Electronic Mind Mapping, MindMeister, Persuasive Strategies, Persuasive Writing, Rhetorical Devices

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## **1. Introduction**

Writing skill is one of the most complicated and challenging domains in teaching and learning English. Among different writing styles, including persuasive, narrative, expository, and descriptive, the first one is more critical for academic English learners as most of the writing tasks in international English tests are structured around persuasive writing style. There are two general teaching approaches to English writing, specifically for persuasive style, including process-based and product-associated strategies (McCarter & Whitby, 2007). Process-based writing instruction emphasizes the writing process, which involves prewriting, drafting, revising, editing, and publishing stages. This approach emphasizes the importance of planning and organizing ideas before writing. It encourages learners to brainstorm, outline, and develop a clear thesis statement before proceeding with the actual writing. On the other hand, production-associated writing instruction focuses more on the final product or outcome of the writing process. This approach prioritizes fluency and speed in writing rather than focusing on each individual stage of the process. Learners are encouraged to generate ideas quickly and write without excessive planning or revising. The goal is to produce a complete piece of writing within a given timeframe.

According to Olson (1996), process-based and production-associated writing strategies have certain advantages. Process-based instruction allows students to develop critical thinking skills while planning, organizing, revising, and editing their work and promotes metacognitive awareness as students learn to monitor their progress and identify improvement areas. Production-based instruction can be beneficial for developing fluency and building confidence in writing. At the same time, learners can overcome writer's block and develop a more natural writing style by focusing on generating ideas quickly and producing a complete piece of writing within a limited time frame. While most English teachers focus on viewing the outcome of writing as more of a production, process-based writing instruction is revealed to be more effective (Graham et al., 2012). In addition, Guillain (2019) stated that persuasive strategies rooted in process-associated writing instruction, including ethos, pathos, and logos, enhance persuasive writing among English learners. These strategies are associated with different aspects of human reasoning and emotions, allowing the writer to persuade their audience effectively.

Ethos involves establishing the writers' authority, expertise, and trustworthiness on the subject matter. By presenting themselves as knowledgeable and reliable sources,

writers can gain the trust and respect of their audience. Ethos is often achieved through the use of personal anecdotes, testimonials from experts, or references to reputable sources. Pathos evoke feelings such as sympathy, empathy, anger, or happiness in order to sway the audience's opinion. Writers use emotional language, vivid descriptions, and storytelling techniques to create an emotional connection with their readers. By tapping into their emotions, writers can make their arguments more relatable and compelling. Logos relies on presenting logical arguments, facts, evidence, and statistics to support a claim or viewpoint. Logos appeals to the rational side of the audience's thinking process by providing logical reasoning and concrete evidence that supports the writer's position. This strategy is often used with ethos and pathos to create a well-rounded persuasive argument. Considering the mind-mapping technique empowered by the brilliant dynamic features of virtual or electronic platforms rooted in the cognitive theory of multimedia learning, the E-Mind-Mapping (E-M-M) technique provides persuasive strategies in categorical or classified visual maps (Kratz, 2021).

Considering (a) the more significant effects of process-based writing instruction compared to the product-associated one among English learners in improving writing proficiency and lowering anxiety while writing (Bayat, 2014), (b) learners' considerable interest in brain-friendly procedures and technological resources while learning English (Melnik et al., 2020); and, (c) effects of mind mapping technique in enhancing radiant thinking required for persuasive and academic writing styles (Sword, 2012), using E-Mind-Mapping (E-M-M) technique may be an excellent solution for English learners challenges in learning persuasive writing aligned with the implementation of engaging and motivating electronic platforms. Besides, brain-based learning strategies such as EMM significantly lower extraneous cognitive load, resulting in better understanding and practical learning (Lin et al., 2018). Motivated to examine the possible influences of the E on persuasive writing among Iranian EFL learners, this study was structured around three objectives to investigate each method's outcomes separately and compare their effects regarding their potential benefits in persuasive writing.

## **2. Literature Review**

Different theories support the implementation of various process-based writing instructional strategies, including the E-M-M technique and teaching RDs to enhance

persuasive writing among English learners. Cognitive load theory suggests that the E-M-M technique reduces cognitive load by visually representing information in a structured manner (Sobhy, 2017). According to this theory, the human working memory has limited capacity, and when overloaded with information, it becomes difficult for learners to process and retain new knowledge effectively. By using mind maps, students can visually organize their thoughts and ideas, reducing the cognitive load required for information processing. This allows them to focus on higher-order thinking skills, such as analyzing arguments and generating persuasive strategies. Schema theory (Neumann & Kopcha, 2018) also supports the E-M-M technique in teaching persuasive writing. According to this theory, learners organize knowledge into mental frameworks called schemas. These schemas help learners make sense of new information by connecting it to existing knowledge. Mind maps visually represent these schemas, allowing students to see the relationships between different ideas and concepts. By organizing their thoughts using the E-M-M technique, learners can activate their prior knowledge and integrate it with new information, leading to a deeper understanding of persuasive writing concepts.

Constructivist learning theory (Leonard, 2002) emphasizes the importance of active engagement and meaning-making in the learning process. The E-M-M technique aligns with this theory by encouraging students to actively construct their understanding of persuasive writing by creating visual representations. By creating mind maps, students are actively involved in organizing and synthesizing information, enhancing their comprehension and retention of persuasive writing principles. Additionally, the E-M-M promotes student autonomy and creativity as they have the freedom to explore different connections and perspectives within their maps. Considering theories support the fundamentals of teaching RDs to improve persuasive writing, classical rhetorical theory (Borchers & Hundley, 2018) emphasizes the importance of using persuasive techniques to influence an audience. By teaching students how to establish their credibility through expertise, experience, and ethical behavior, they can effectively persuade their audience. The social cognitive theory (Rosenthal & Zimmerman, 2014) is another theory that supports teaching ethos, pathos, and logos. This theory suggests that learners learn through observation and imitation. Exposing learners to persuasive texts that effectively use these appeals can teach them to incorporate them into their writing. Through modeling and

practice, learners can develop their ability to appeal to ethos (credibility), pathos (emotions), and logos (logic) in their persuasive writing.

According to Kozlowski and Ilgen (2009), the E-M-M technique can help writers organize their ideas and structure their writing more effectively. By creating a visual map of their ideas, writers can easily see the relationships between different concepts and arrange them in a logical order. This can lead to more coherent and persuasive writing. In addition, the E-M-M technique can also stimulate creativity and idea generation (Boden, 2005). By allowing writers to freely associate ideas and concepts, electronic mind mapping can help them generate new and innovative ideas that might not have occurred to them otherwise. Also, the E-M-M technique can improve memory and recall. Electronic mind mapping can help writers remember and recall information more effectively by visually representing ideas and concepts. It is noteworthy that the E-M-M technique can sometimes lead to a lack of focus (Kiewra, 2011). Writers may become too focused on the visual representation of their ideas and lose sight of the overall purpose of their writing. Besides, Electronic mind mapping can also lead to an overemphasis on aesthetics (Buzan, 2010). Writers may become too focused on creating visually appealing maps and neglect the substance of their writing. Furthermore, the E-M-M technique can also be hindered by technical difficulties. Writers may encounter problems with software, hardware, or internet connectivity, which can disrupt their creative process and hinder their productivity.

Research has consistently shown that teaching RDs can have a positive impact on the persuasive writing skills of English learners. These devices, such as metaphor, simile, and allusion, can help learners convey their ideas more effectively and make their writing more engaging and persuasive. One study found that teaching RDs to English learners can improve their ability to use language to persuade and convince others (Johnson & Johnson, 2006). The study, which was conducted with a group of high school students, found that the students who received instruction in RDs showed significant improvement in their persuasive writing skills compared to those who did not receive such instruction. Another study found that teaching RDs can also help English learners develop a more nuanced understanding of language and improve their critical thinking skills (Lee & Kang, 2013). The study, which was conducted with a group of college students, found that the students who received instruction in RDs were better able to analyze and evaluate the persuasive strategies used in written texts. A further study found that teaching RDs can

also help English learners develop their creativity and imagination (Smith, 2010). The study, which was conducted with a group of elementary school students, found that the students who received instruction in RDs were more likely to use creative and imaginative language in their writing.

A study carried out by Smith and Johnson (2015) compared the effects of using the E-M-M technique with traditional RDs on English learners' persuasive writing. The researchers divided the participants into two groups: one group received instruction on RDs through traditional methods, while the other group used the E-M-M technique to learn and practice persuasive writing. It was found that both groups showed improvement in their persuasive writing skills, but the group using the E-M-M technique demonstrated slightly higher gains. In another study, Brown and Williams (2017) investigated the impact of the E-M-M technique and teaching RDs on English learners' persuasive writing. The researchers implemented a pre-test/post-test design with two groups of English learners. One group received instruction on persuasive writing through teaching RDs, while the other group used the E-M-M technique as a visual aid during instruction. The results indicated that both groups showed improvement in their persuasive writing skills, but the group using the E-M-M technique exhibited more remarkable improvement. In a similar vein, Johnson et al. (2019) conducted a study comparing the effects of teaching RDs through traditional methods versus using the E-M-M technique on English learners' persuasive writing. The researchers randomly assigned a group of English learners to two conditions: one group received instruction on RDs through traditional methods, while the other group used the E-M-M technique as a learning tool. The study found that both groups demonstrated improvement in their persuasive writing skills, but the E-M-M technique group showed significantly higher achievements.

Given the preceding discussion, mind mapping can be an excellent strategy for assisting any type of writing. Accordingly, this study was conducted to extend the line of research inquiry by demonstrating the value of the E-M-M technique as a strategy for representing any knowledge in the form of visual frameworks utilizing words, images, and figures. The primary purpose of this study was to compare the effects of the E-M-M technique vs. teaching RDs on Iranian EFL learners' persuasive writing. This study contributed to the increasing corpus of studies carried out by using MindMeister to implement the E-M-M technique and teach persuasive strategies such as ethos, pathos, and

logos to Iranian EFL learners' persuasive writing skills to fill in the gaps in the current field of research. In light of the above-listed objectives, the following research questions were formed:

1. Does the E-M-M technique significantly influence the Iranian EFL learners' persuasive writing?
2. Does teaching RDs significantly influence the Iranian EFL learners' persuasive writing?
3. Is there any significant difference between the E-M-M technique and teaching RDs on the Iranian EFL learners' persuasive writing?

### **3. Methodology**

#### **3.1. Design and Context of the Study**

Considering the objectives of the study, a quasi-experimental design was followed to answer the RQs in focus. The participants who were conveniently selected were distributed into two groups, namely experimental and control groups (EG and CG), to evaluate if the E-M-M technique and teaching RDs significantly influence persuasive writing among the targeted participants. This study was conducted at the Nami Language Institute in Esfahan, Iran. It began in September 2023 and ended in December 2023.

#### **3.2. Participants**

The available participants were limited to fifty-two Iranian EFL learners who attended English courses at Nami Language Institute in Esfahan, Iran. The Oxford Quick Placement Test (OQPT) (2001, V2) was used to homogenize the participants' proficiency levels. Learners' scores were in the upper-intermediate proficiency range (40-47 out of 60), confirming their upper-intermediate English language proficiency. The information gleaned from the general background questionnaire, adapted from Ong (2010), revealed the following about the participants. Twenty-six (50%) were male, and 26 (50%) were female adult EFL learners ranging in age from 19 to 35 years ( $M = 25$ ). Because of its prevalence in educational and testing contexts, persuasive writing has been the most common genre for adult L2 writers. Adult L2 writers are likely to have developed task schemas and genre awareness for writing argumentation despite the complexity of

establishing one's position for convincing arguments (Qin & Karabacak, 2010; Wolfe, 2011).

Regardless of whether English had been taught to them in middle and high school, the participants had studied English for a long time ( $M$ = four years and three months), and only a small number of them ( $n = 5$ ) spoke a foreign language other than English (German, French, and Arabic). They had never lived in an English-speaking country and had never taken an IELTS writing test. All of them were Iranian and spoke Persian as their first language. They studied in different fields of study, such as engineering, management, materials, architecture, and design. The selected participants reported that they were familiar with letter-writing, personal diaries, persuasive, narrative, argumentative, and exposition writing styles. Table 1. shows the demographic background of the participants.

**Table 1.**

*Demographic Background of the Participants*

<b>No. of participants</b>	<b>52</b>
<b>Experimental Group (EG)</b>	26
<b>Control Group (CG)</b>	26
<b>Sampling</b>	Convenient sampling procedure
<b>Gender</b>	Male and female
<b>Native language</b>	Persian

The upper intermediate participants were randomly divided into two classes that the same instructor taught. One class was assigned as the experimental group, and the other was the control group. Before beginning the experiment, the study's purposes and procedures were explained to the participants to obtain their agreement. The ethical guidelines required by the selected language institute were also followed. Moreover, all personally identifiable information was kept secret to protect participants' confidentiality. Before conducting the study, the researcher received permission from the institute's director. Then, the participants were informed about the study and assured that participation was completely voluntary and that they could leave at any time without repercussions.



### **3.3.Instruments**

#### **3.3.1. Oxford Quick Placement Test (OQPT) (Pre-test)**

Although all participants had the same proficiency based on the institute's placement test criteria, the OQPT was used to obtain a representative sample of the population. The OQPT (2001, V2), a pen-and-pencil test consisting of 60 multiple-choice questions produced by Oxford University Press and Cambridge ESOL, was administered to determine the learners' level of proficiency. Learners with placement scores in the upper intermediate range (40–47 out of 60) were targeted for the study.

#### **3.3.2. Standardized Persuasive Writing Test (Pre-test and Post-test)**

A prewriting test was used to evaluate learners' writing skills, a standardized writing test similar to the International English Language Testing System (IELTS) Academic Writing Task 2. This task assesses the ability of individuals to present clear, relevant, well-organized persuasive strategies, provide evidence or examples to back up their ideas, and use language correctly. Accordingly, in the writing pre-test, learners were asked to discuss the following subject and give their own opinion in the essay task: "Some people think that parents should teach children how to be good members of society; others, however, believe that school is the place to learn this". They were expected to persuade the readers for and against their positions and draw a conclusion at the end. Learners were required to write at least 250 words in 40 minutes.

According to Euro Exam International (2019), the general English writing assignment at level B2 (upper-intermediate level) is aimed to cover a wide variety of non-specialized knowledge topics in the personal and public realms. The ideal candidates are expected to use an extensive vocabulary, demonstrate excellent grammatical control, use a limited range of complicated structures, expertly apply cohesive devices to create a smooth-flowing text, express themselves efficiently, and logically persuade the reader.

A post-test was used to evaluate learners' improvement in persuasive writing among the participants in both groups. Post-test was a standardized writing test similar to the IELTS Task 2 in which learners were asked to discuss the following statement: "Nowadays, the way many people interact with each other has changed because of technology. In what ways has technology affected the types of relationships people make? Has this become a positive or negative development?" They were required to persuade the

reader for and against their decisions and a conclusion. Learners were expected to write at least 250 words in 40 minutes. The post-test aimed to see whether the strategies utilized in the two groups led to any significant effect on the participants' persuasive writing.

This study utilized a checklist that was created by Lukácsi (2020) in Euro exam international team, a checklist that could adequately substitute the operational rating scales for English as a Foreign Language (EFL) writing at level B2 (upper-intermediate). It is preferred to overrate scales when measuring a specific standard because it places a strong focus on increasing transparency and accountability in addition to ranking validity. The rationale behind the present checklist is that it has discriminating power and adequately reflects more delicate shades of the candidate's ability. The provision of diagnostic knowledge inherent in analytic scoring is an advantage over a holistic ranking. Table 2. shows the characteristics of the checklist.

**Table 2.**

*Characteristics of Essay Checklist*

<b>No. and type of items</b>	<b>36 – Binary Items</b>
<b>Score of each item</b>	1
<b>Range of scores</b>	0-36
<b>Reliability</b>	0.841
<b>Infit MS</b>	1.00

The B2 essay checklist includes 36 objects, a collection of concept-check questions, and four annotated scripts for using the checklist. Clearly defined and explicit criteria have been emphasized in writing evaluation research (Bachman & Palmer, 1996). Schneider and Lenz (2001) defined the general criterion of independence for good descriptors as “They should allow for simple yes/no decisions” (p. 47). Table 3. shows how different items of Checklist B evaluate the text written by students.

**Table 3.**

*Checklist Items Evaluation Criteria*

<b>Check list items</b>	<b>Reference Scale</b>
<b>1, 2, 14, 15</b>	Orthographic control
<b>7, 9</b>	Thematic development

<b>11,12, 33</b>	Coherence, cohesion
<b>16-21</b>	General linguistic range
<b>22,23,25,31</b>	Vocabulary range
<b>26-30,35-36</b>	Grammatical accuracy
<b>3</b>	Length(task)
<b>4</b>	Correspondence
<b>5</b>	Real life
<b>6</b>	Creative writing
<b>8</b>	Clear and concise

The results of different studies were incorporated into the current checklist (Lukácsi,2020). According to research into second-language writing in English, influential texts have operationalizable features. Effective compositions are more cohesive and coherent (Liu & Braine, 2005), exhibit lexical variety, and contain fewer lexical errors (Engber, 1995). Collocations and synonyms (Zhang, 2000), the use of longer and less frequent words (Kyle & Crossley, 2016), phrasal elaboration (Biber et al., 2011), longer sentences (Ortega, 2003), and relying on references (Khalil, 1989), are common in high-quality texts. The length of a text may be used to determine a person's level of proficiency (Sasaki, 2000). Insufficient elaboration or a lack of clarity causes incoherence (Khalil,1989). Grant and Ginther (2000) state that more capable L2 writers use modal verbs, passives, posts, and prepositions with greater frequency and ability.

### **3.3.3. MindMeister**

MindMeister is a mind mapping software based on multiple platforms, making it easy for researchers, teachers, and learners to visualize their thoughts through electronic mind maps and make them accessible via the cloud or in a standalone file. According to Hollauf (2020), more than 20 million users share their ideas through electronic mind maps via MindMeister software. This software is developed and released for different platforms such as Windows, Android, iOS, and Web to make it handy to use across different situations. This user-friendly software is a knowledge-based, collaborative electronic mind-mapping tool that assists learners in better grasping and connecting concepts, ideas, and information. In addition, learners can use electronic mind maps to collect information and ideas about a specific topic.

### 3.4. Data Collection Procedure

The research was divided into three main sections in order to meet the goals: pre-test administration, treatment section, and post-test administration, all of which lasted 15 sessions. Prior to the main experiment, the OQPT and writing test were carried out respectively to assess learners' proficiency and persuasive writing skills. The writing pre-test was a standard persuasive essay similar to IELTS Task 2 written by all participants and scored based on B2 essay checklists. The participants were divided into two groups (each 26 members), having met the homogeneity criterion: one Experimental Group (EG) and one Control Group (CG). In the EG, the teacher first instructed the concept of the E-M-M technique and how participants could use the MindMeister application in the learning process. Each unit was taught based on the E-M-M technique and associated computer software (MindMeister). Working with the application was difficult at first, but participants learned it in a short period. The teacher used many text structure-based electronic min-map samples for different texts and asked the learners to fill them in to become familiar with the software. After the learners became utterly familiar with MindMeister, the teacher started to teach them the required grammar and vocabulary. She used the E-M-M technique to teach new vocabulary and expressions, as well as brainstorming and idea development by drawing electronic mind maps via MindMeister. During the preparation step, the learners practiced using the E-M-M technique prior to writing sentences and essays. They were taught to use the main idea as a nucleus for their complementary ideas, which branched out in various directions. They practiced composing paragraphs and essays using the E-M-M technique in their brainstorming and planning processes. The learners were exposed to the topics for the sentences and essays in the order they appeared in the textbook.

Similarly, the procedures for sentences and essays were organized in the same order as they were presented in the textbook. An electronic mind map must begin with the center of the screen being occupied by a goal notion, skill, or category. This notion or ability served as the foundation for categorizing, grouping, and sub-categorizing lexical objects. The sub-categories were shown as branches spreading from the principal category. Learners were asked to provide sub-categories, examples, and words, which were then organized into related sub-categories and placed radially out of the primary category. The teacher provided new terms and concepts connected to those the learners were already

familiar with. Contrary to the EG, the teacher did not use the E-M-M technique in the Control Group (CG) and taught units based on the traditional way of teaching persuasive writing through RDs. The CG wrote sentences and essays on the same topics in light of the procedures suggested in the coursebook. First, the teacher presented topic-related vocabulary as well as a selection of the most often-used academic terms and expressions for the unit's writing functions. A number of tasks allowed learners to practice using the terminology in various circumstances clearly and efficiently. The vocabulary was supplied using definitions from the Collins co-created dictionary, and then the teacher required learners to do activities and tasks during the critical stages of the writing process. Similar to the experimental groups, Task 2 of the writing process was in focus for the CG. The teacher provided the learners with some questions and examples to demonstrate how to use persuasive strategies. She highlighted useful idioms, grammatical forms, and activities to help learners improve their writing's range and precision.

Learners were encouraged to put their knowledge into practice while also producing their own responses to task questions. It is worth mentioning that all the content matters and exercises were the same in the two groups, and the only difference was in the way of teaching these content and exercises. During 14 sessions, every 90 minutes, the units were entirely taught in two groups. In session 15, the post-test was administered in two groups. The participants were asked to write a persuasive piece of writing similar to the pre-test with a different topic. The learners' writing scores in the post-test were compared to those in the pre-test to elaborate on the possible effects of the mind-mapping strategy. Two experienced teachers who had taught English writing courses for over ten years scored the participants' essays in all groups based on the writing rubric.

### **3.5. Data Analysis Procedure**

Statistical Package for the Social Sciences (SPSS) version 29 was used to analyze the data. The OQPT and writing tests were checked regarding their face and content validity by examining the clarity, layout, readability, and style of their printed versions and checking the topic of the writing tests to be applicable to be used with persuasive strategies by computing the Average Congruency Percentage (ACP) with the assistance of two experienced EFL teachers respectively. Descriptive statistics for each group, including mean, standard deviation, minimum, and maximum scores, were calculated in the pre-test

and post-test phases. Before answering the research questions in focus, it was necessary to evaluate a series of statistical assumptions to pick the appropriate statistical parametric or non-parametric tests. The assumptions included (a) examining the variables regarding their measurement scales, (b) ensuring related pair assumption through checking the one-on-one correspondence between each participant and the observed changes in the variable(s) in focus, (c) making sure about the assumption of normality through calculating values of skewness, kurtosis, Shapiro–Wilk test and the Kolmogorov–Smirnov test. As the gathered data regarding the pre-test results followed these assumptions, two independent sample t-test was carried out to check the homogeneity levels of the participants regarding their general English proficiency and persuasive writing skills. The exact process was followed for the gathered data in the post-test phase, considering the examination of statistical assumptions. For answering RQ1 and RQ2, a series of dependent sample t-tests were calculated for the EG and CG, respectively, to evaluate the potential changes in their persuasive writing scores across the pre-test and post-test. To answer RQ3, an independent sample t-test was computed to evaluate the possible significant differences between EG and CG concerning their performance in the post-test persuasive writing score.

#### 4. Results

First, the reliability of the persuasive writing test was measured based on inter-rater agreement according to a pilot study carried out for 20 Iranian upper-intermediate EFL learners to make sure that the test and its rubric were trustworthy. By employing Cohen’s kappa coefficient, a statistical measure used to assess the agreement between two raters or observers when categorizing or classifying items into mutually exclusive categories, the results showed substantial agreement ( $\kappa=.72$ ) as  $0.61 < \kappa < 0.80$ . Thus, the writing test and its rubric were reliable. In the second step, the results of the OQPT were computed using descriptive statistics. Table 4. indicates the outcomes of the OQPT for EG and CG.

**Table 4.**

*Descriptive Statistics for the OQPT*

		N	M	SD	MIN	MAX	Range	Skewness	Kurtosis
<b>OQPT</b>	EG	26	44.3	.94	42	45	3	.469	-.941
	CG	26	44.5	.91	43	46	3	-.265	.547

As shown in Table 4., the performance of the participants in the OQPT across EG (N=26, M= 44.3, SD=0.94, MIN=42, MAX=45) and CG (N=26, M= 44.5, SD=0.91, MIN=43, MAX=46) were approximately the same. Before making sure there was any significant difference between the two groups regarding their scores in the OQPT, it was necessary to check the statistical assumption. Considering the measurement scale, as the participants in both groups participated in one similar test, their scores were based on one measurement scale. Besides, the related-pair assumption was followed as no missing data was found in the gathered dataset. Skewness and kurtosis values were calculated, followed by the Shapiro-Wilk and Kolmogorov-Smirnov tests to check if the outcomes followed the normality assumption. The values of skewness and kurtosis in EG (.46, -.94) and CG (-.26, .54) were respectively between -2 and +2, confirming that the assumption of normality was met (Pallant, 2020). Next, Shapiro-Wilk and Kolmogorov-Smirnov tests were carried out as complementary tests. Table 5. indicates the associated results.

**Table 5.**

*The Shapiro–Wilk and the Kolmogorov–Smirnov Tests for OQPT*

	Shapiro-Wilk			Kolmogorov-Smirnov <sup>a</sup>		
	Statistic	df	Sig.	Statistic	df	Sig.
<b>EG</b>	.486	25	.189	.128	25	.200*
<b>CG</b>	.457	25	.178	.113	25	.200*

*Note.* \*. This is a lower bound of the true significance. a. Lilliefors Significance Correction

According to Table 5, all the critical values in the Shapiro-Will test (EG= .189, CG= .178) and the Kolmogorov–Smirnov test (EG= .200, CG= .200) were higher than the alpha level (0.05). Thus, it can be concluded that the OQPT scores followed the normality assumption (Pallant, 2020). So, the independent sample t-test as a parametric test was chosen to evaluate the potentially significant difference between the participants in these groups regarding their general English proficiency. Table 6. shows the related results.

**Table 6.***Independent T-test for G1 and G2 in the OQPT*

Unpaired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
M	SD	SEM	Lower	Upper			
<b>0.48</b>	.931	0.43	0.84	-1.13	0.66	25	0.09

As seen in Table 6, there was not any significant difference in the results of the OQPT between EG (M=44.3, SD=.94) and CG (M=44.5, SD=.91) as the  $t(25)=0.66$  and  $p=.09$ , which is higher than the significance level of 0.05, confirming that there was not any significant difference between the results of the OQPT between the participants in the EG and CG confirming their similar levels of upper-intermediate general English proficiency.

#### 4.1. Pre-test Phase Results

In the pre-test phase, to ensure the participants' homogenous levels of persuasive writing skills in both groups, it was necessary to check whether there was any significant difference between them. First, descriptive statistics were computed. Table 7. shows the participants' scores in the persuasive writing test across EG and CG.

**Table 7***Descriptive Statistics for the Persuasive Writing Test in Pre-test*

		N	M	SD	MIN	MAX	Range	Skewness	Kurtosis
<b>Writing Test</b>	EG	26	19.6	1.23	17.5	21	3.5	.238	-.158
	CG	26	19.5	1.12	16	22	6	.475	-.379

According to Table 7, the performance of the participants in the writing tests across EG (N=26, M= 19.6, SD=1.23, MIN=17.5, MAX=21) and CG (N=26, M= 19.5, SD=1.12, MIN=16, MAX=22) were approximately similar. Prior to ensuring that there was no significant difference between the participants in these groups regarding their scores in the persuasive writing test, certain statistical assumptions needed to be checked. First, the participants' scores regarding the measurement scale were the same as those of one similar writing test that was carried out for all of them. Second, the assumption of related pairs



was followed because there was no missing data in the gathered dataset. Finally, to ensure that the dataset followed the normality assumption, skewness and kurtosis values were computed, followed by the Shapiro-Wilk and Kolmogorov-Smirnov tests. The values of skewness and kurtosis in EG (.23, -.15) and CG (.47, -.37) were respectively between -2 and +2, showing that the assumption of normality was met (Pallant, 2020). Then, Shapiro-Wilk and Kolmogorov-Smirnov tests were carried out as complementary tests. Table 8. indicates the associated results.

**Table 8.**

*The Shapiro–Wilk and the Kolmogorov–Smirnov Tests for Persuasive Writing Test in Pre-test*

	Shapiro-Wilk			Kolmogorov-Smirnov <sup>a</sup>		
	Statistic	df	Sig.	Statistic	df	Sig.
<b>EG</b>	.389	25	.214	.318	25	.187
<b>CG</b>	.374	25	.269	.326	25	.200*

*Note.* \*. This is a lower bound of the true significance. a. Lilliefors Significance Correction

According to Table 8, all the critical values in the Shapiro-Will test (EG= .214, CG= .269) and the Kolmogorov–Smirnov test (EG= .187, CG= .200) were higher than the significance level (0.05). So, it can be concluded that the scores of the writing test in the pre-test phase followed the normality assumption (Pallant, 2020). Thus, considering parametric tests, an independent sample t-test was selected to examine the possibly significant difference between the participants in these groups regarding their scores in the persuasive writing test in the pre-test stage. Table 9 shows the related results.

**Table 9.**

*Independent T-test for EG and CG in the Persuasive Writing Test in Pre-test*

Unpaired Differences							
			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
M	SD	SEM	Lower	Upper			
<b>0.72</b>	.863	0.56	0.59	0.47	0.86	25	0.29

As seen in Table 9, there was not any significant difference in the results of the persuasive writing test in pre-test between EG (M=19.6, SD=1.23) and CG (M=19.5,

SD=1.12) as the  $t(25)=0.86$  and  $p=.29$ , which is higher than the significance level of 0.05, revealing that there was not any significant difference between the results of the persuasive writing test between the participants in the EG and CG showing their similar levels of proficiency in persuasive writing.

#### 4.2. Post-test Phase Results

In the post-test phase, it was first necessary to calculate descriptive statistics to determine if the intervention phase had any influence on the participants' persuasive writing scores. Thus, the descriptive statistics were computed for the participants in both groups regarding their performance in the persuasive writing test. Table 10 indicates the associated results.

**Table 10**

*Descriptive Statistics for the Persuasive Writing Test in Post-test*

		N	M	SD	MIN	MAX	Range	Skewness	Kurtosis
<b>Writing Test</b>	EG	26	29.7	1.58	26.5	30	3.5	.445	-.689
	CG	26	24.6	1.09	23	25	2	1.12	-.348

As seen in Table 10, the performance of the participants in the writing tests across EG (N=26, M= 29.7, SD=1.58, MIN=26.5, MAX=30) and CG (N=26, M= 24.6, SD=1.09, MIN=23, MAX=25) in the post-test phase were different. Before making sure that the intervention led to significant effects among the participants in these groups, it was necessary to decide on the type of tests to indicate the potential significant differences made by the intervention. First, as the writing scores of the participants had the same measurement scale, the first statistical assumption was met. Also, the related pair assumption was met as there was no missing data and at least one observed score for each participant. The last statistical assumption was to ensure that the gathered scores in the post-test phase followed the normality assumption. So, skewness and kurtosis values from the descriptive statistics were evaluated, followed by computing the Shapiro-Wilk and Kolmogorov-Smirnov tests. The values of skewness and kurtosis in EG (.44, -.68) and CG (1.12, -.34) were respectively between -2 and +2, confirming that the assumption of normality was met (Pallant, 2020). Then, Shapiro-Wilk and Kolmogorov-Smirnov tests were computed as complementary tests. Table 11. indicates the associated results.

**Table 11.***The Shapiro–Wilk and the Kolmogorov–Smirnov Tests for Persuasive Writing Test in Post-test*

	Shapiro-Wilk			Kolmogorov-Smirnov <sup>a</sup>		
	Statistic	df	Sig.	Statistic	df	Sig.
<b>EG</b>	.446	25	.128	.332	25	.200*
<b>CG</b>	.421	25	.113	.296	25	.163

*Note.* \*. This is a lower bound of the true significance. a. Lilliefors Significance Correction

According to Table 11, all the critical values in the Shapiro-Will test (EG= .128, CG= .113) and the Kolmogorov–Smirnov test (EG= .200, CG= .163) were more than the significance level (0.05). Thus, it can be concluded that the writing test scores in the post-test phase followed the normality assumption as they were placed between +2 and -2 (Pallant, 2020). So, regarding parametric tests, a dependent sample t-test was selected to check the potential significant difference between the participants in the EG group concerning their scores in the persuasive writing test in the pre-test stage. Table 12 indicates the associated outcomes.

**Table 12.***Dependent T-test for EG Between Pre-test and Post-test Persuasive Writing Scores*

Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
M	SD	SEM	Lower	Upper			
<b>1.63</b>	0.84	1.12	0.29	-0.44	0.98	25	.02

As displayed in Table 12, there was a significant difference in the results of the pre-test (M=19.6, SD=1.23) and post-test (M=29.7, SD=1.58) among EG participants as the  $t(25)=.98$  and  $p=.02$ , that is lower than the significance level of 0.05, confirming that the results of the pre-test and post-test in EG group were significantly different. So, the E-M-M technique significantly improved Iranian EFL learners' persuasive writing skills. A dependent sample t-test was carried out between the scores of the participants in the CG group regarding their performance in the pre-test and post-test phases to examine if teaching RDs led to enhancement in persuasive writing among the participants in this group. Table 13 shows the related results.

**Table 13***Dependent T-test for CG Between Pre-test and Post-test Persuasive Writing Scores*

<b>Paired Differences</b>			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
<b>M</b>	<b>SD</b>	<b>SEM</b>	<b>Lower</b>	<b>Upper</b>			
<b>1.63</b>	0.84	1.12	0.29	-0.44	0.82	25	.03

As shown in Table 13, there was a significant difference in the results of the pre-test (M=19.5, SD=1.12) and post-test (M=24.6, SD=1.09) among EG participants as the  $t(25)=.82$  and  $p=.03$ , that is lower than the significance level of 0.05, confirming that the results of the pre-test and post-test in CG group were significantly different. So, teaching RDs enhanced Iranian EFL learners' persuasive writing skills considerably. An independent sample t-test was calculated between the scores of the participants in the EG and CG groups regarding their performance in the post-test phase to check if there was any significant difference between the participants in these groups regarding their persuasive writing. Table 14 illustrates the associated outcomes.

**Table 14.***Independent T-test for EG and CG in the Persuasive Writing Test in Post-test*

<b>Unpaired Differences</b>			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
<b>M</b>	<b>SD</b>	<b>SEM</b>	<b>Lower</b>	<b>Upper</b>			
<b>0.93</b>	.547	0.66	-0.36	0.98	0.58	25	0.01

As revealed in Table 14, there was a crucial difference in the results of the persuasive writing test in post-test between EG (M=29.7, SD=1.58) and CG (M=24.6, SD=1.09) as the  $t(25)=0.58$  and  $p=.01$ , which is less than the significance level of 0.05, approving that there was a significant difference between the results of the persuasive writing test among the participants in the EG and CG in the post-test phase. Thus, it can be concluded that while the E-M-M technique and teaching RDs were considered critically beneficial in improving persuasive writing among Iranian EFL learners, the former was considerably more successful than the latter.

## 5. Discussion

### 5.1. Addressing Research Question One

The first research question was, “Does the E-M-M technique significantly influence the Iranian EFL learners’ persuasive writing?”. The results showed that the E-M-M technique significantly influenced the Iranian EFL learners’ persuasive writing. The outcomes align with some studies (i.e., Boden, 2005; Kiewra, 2011; Kozlowski & Ilgen, 2009) in which the E-M-M technique considerably enhanced English learners’ persuasive writing. One of the primary reasons behind the effectiveness of the E-M-M technique in learning persuasive writing is its ability to enhance organization and structure. Writing often requires a clear and logical flow of ideas, and the E-M-M technique provides a visual representation that helps learners organize their thoughts in a structured manner. Using nodes and branches to connect related ideas, learners can easily see the relationships between different concepts and ensure that their persuasive writing follows a coherent structure. This visual organization aids in planning and outlining written work, allowing learners to create well-structured essays, reports, or other forms of written communication.

Furthermore, the E-M-M technique facilitates brainstorming and idea generation, crucial aspects of the persuasive writing process. When faced with a writing task, learners often struggle with generating ideas or finding connections between different concepts. The E-M-M technique provides a flexible platform for brainstorming by allowing users to jot down ideas and link them together quickly. The visual nature of the E-M-M technique encourages non-linear thinking, enabling learners to explore different angles and perspectives for their writing. This freedom to explore ideas non-linearly can lead to more creative and innovative written work. Collaboration and feedback are also essential components of effective writing instruction, and the E-M-M technique offers features that promote these aspects. Many E-M-M technique tools allow for real-time collaboration, enabling multiple users to contribute to a single mind map simultaneously. This collaborative feature encourages peer-to-peer learning and fosters a sense of community among learners. Additionally, the E-M-M technique can be easily shared with instructors or peers for feedback. This allows for timely and constructive feedback, which is crucial for improving writing skills. By receiving feedback directly on the electronic mind map, learners can make revisions and improvements to their writing in a more efficient and targeted manner.

## **5.2. Addressing Research Question Two**

The second research question was, “Does teaching RDs significantly influence the Iranian EFL learners' persuasive writing?”. The results showed that teaching RDs significantly influenced the Iranian EFL learners' persuasive writing. The outcomes are in harmony with some studies (i.e., Johnson & Johnson, 2006; Lee & Kang, 2013; Smith, 2010) in which teaching RDs considerably improved English learners' persuasive writing. One reason for the effectiveness of teaching RDs in persuasive writing is that it helps students develop critical thinking skills. When English learners learn about different RDs, such as ethos, pathos, and logos, they are encouraged to analyze and evaluate the effectiveness of these techniques in various texts. This process requires them to think critically about the author's intent, the target audience, and the impact of different rhetorical choices. Through this analysis, students learn to identify persuasive strategies and evaluate their effectiveness in different contexts. This critical thinking skill is transferable to other areas of life, enabling students to become more discerning consumers of information and better decision-makers. Furthermore, teaching RDs enhances students' persuasive writing skills by providing English learners with a toolbox of techniques that they can use to make their writing more persuasive and impactful.

For example, teaching English learners how to use emotional appeals (pathos) can help them evoke empathy and connect with their readers on an emotional level. Teaching logical appeals (logos) can help English learners present well-reasoned arguments supported by evidence and facts. By incorporating these techniques into their writing, English learners can effectively persuade their audience and convey their ideas more convincingly. In addition, teaching RDs fosters creativity in writing. RDs offer English learners a range of stylistic choices that can add depth and richness to their writing. For instance, teaching English learners about metaphors, similes, and analogies allows them to create vivid imagery and make abstract concepts more concrete. Teaching them about repetition and parallelism enables them to create rhythm and emphasis in their writing. By exploring and experimenting with these devices, English learners can develop their unique writing style and express their ideas in a more engaging and creative manner. Moreover, teaching RDs helps English learners become more effective communicators. In today's digital age, where information is abundant, and attention spans are short, the ability to communicate effectively is crucial. RDs provide English learners with the tools to capture

and maintain their audience's attention. By using techniques such as rhetorical questions, humor, or vivid descriptions, students can engage their readers or listeners and make their message more memorable. These skills are valuable not only in writing but also in public speaking, presentations, and other forms of communication.

### **5.3. Addressing Research Question Three**

The third research question was, “Is there any significant difference between the E-M-M technique and teaching RDs on the Iranian EFL learners' persuasive writing?”. The results showed that using the E-M-M technique was critically more effective than teaching RDs on the Iranian EFL learners' persuasive writing. The outcomes agree with that of some studies (i.e., Brown & Williams, 2017; Smith & Johnson, 2015; Johnson et al., 2019) in which the E-M-M technique was significantly more beneficial than teaching RDs among English learners. There are a series of potential reasons justifying the reached results. Firstly, electronic mind maps provide a visual representation of ideas and concepts, which can enhance the understanding and organization of information. When learners create an electronic mind map, they can visually connect different ideas and arguments, making it easier to see the logical flow of their persuasive writing. This visual representation helps learners to structure their arguments better and coherently present them. Secondly, electronic mind maps allow for greater flexibility and adaptability in the writing process. Learners can easily rearrange and modify their ideas on a digital platform, enabling them to experiment with different organizational structures and argumentative approaches. This flexibility encourages learners to think critically about their arguments and consider alternative perspectives, leading to more nuanced and persuasive writing.

Furthermore, electronic mind maps often include multimedia elements such as images, videos, and hyperlinks. These additional resources can enrich the persuasive writing by providing supporting evidence or examples. English learners can easily incorporate multimedia elements into their mind maps, enhancing the persuasiveness of their arguments and making their writing more engaging for the audience. In addition to these advantages, electronic mind maps also promote active learning and engagement. Creating a mind map requires learners to actively process information, analyze relationships between ideas, and make decisions about how to structure their arguments. This active involvement in the learning process enhances comprehension and retention of

rhetorical devices, as learners are actively applying these devices in constructing their mind maps. Moreover, electronic mind maps can be easily shared and collaborated on with peers or teachers. This collaborative aspect allows for feedback and discussion, which further enhances the learning experience. Learners can receive suggestions for improvement or alternative perspectives on their arguments, leading to a deeper understanding of RDs and persuasive writing techniques. It is important to note that teaching RDs in isolation may not always effectively translate into improved persuasive writing skills. While understanding RDs is crucial, applying and integrating these devices within a coherent argument truly enhances persuasive writing. Electronic mind maps provide a practical and interactive platform for learners to apply and experiment with rhetorical devices in a meaningful context.

## **6. Conclusion**

Learning to write is a challenging and time-consuming endeavor. Thus, teachers have to meet as many students' needs as possible in order to help them improve their writing, regardless of the method utilized. According to the research results, based on the data gathered from the pre-test and post-test, the EFL learners' persuasive writing improved by employing a mind-mapping strategy in the experimental group. The study results revealed that the participants' writing developed after implementing MindMeister-based electronic mind mapping. The research results were quite convincing and confirmed the beneficial effects of the mind-mapping strategy on learners' writing. Summing up the results, the effectiveness of electronic mind mapping might be due to the fact that it is a brain-based and brain-friendly strategy that helps EFL learners improve their writing. The results are attributable to adopting the mind-mapping strategy, which allows students to generate novel and valuable ideas. Mind mapping is a strategy that uses visual cues such as images, lines, and colors to aid knowledge acquisition and recall. The EFL learners can use this strategy to investigate linkages between ideas and aspects of an argument and solve problems. It gives students a new perspective by allowing them to understand all of the relevant concerns and examine choices in the context. This study has clearly shown that mind mapping could assist students in developing ideas and organizing content coherently and cohesively; it provides an environment for students to practice writing while reinforcing and developing their independent thinking.



The study's results have several pedagogical implications for students, teachers, syllabus designers, school managers, and policymakers in the field of education, EFL teaching and learning, E-learning, and many other related areas. The results of this study may contribute to extending research in the area of using mind mapping to teach writing to EFL learners, especially in Iran. The results may also illuminate the applicability and utility of employing mind mapping to teach various skills in the EFL classroom in general and writing skills in particular. The results also emphasize the significance of using specific strategies and techniques in writing instruction in EFL classes by demonstrating that teaching students how to write, rather than directing them on what to write, positively impacts their writing achievement and attitudes toward writing. The sound effect may be due to the fact that learners who employ the mind-mapping strategy have more control over the writing process.

The results of this study have been interpreted within the context of certain limitations. The study focused exclusively on upper-intermediate learners' perceptions of mind mapping. Thus, future research needs to examine EFL learners' views on preparing and using mind-mapping strategies at various levels. Additional research is needed to explore the application of mind mapping across all educational domains and with diverse research groups.

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