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Research Paper

Cognitive and Metacognitive Strategy Instruction and Their Impact on Iranian EFL Learners' Writing Cognitive Processes

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ABSTRACT

This study explores the efficacy of cognitive and metacognitive strategy instruction in enhancing the writing cognitive processes of Iranian English as a Foreign Language (EFL) learners. Utilizing various instructional approaches, including scaffolded metacognitive instruction and writing metacognitive strategies, the research investigates the effects on learners' metacognitive awareness and writing accuracy. Research on cognitive-oriented writing is a young but growing field. The current mixed methods study explored the extent to which brainstorming, focus on form (FonF), and metacognitive strategy instruction could affect cognitive processes (planning, translating, revising) of Iranian EFL learners. The participants were 150 BA learners in three intact classes majoring in English language translation at IAU, Islamshahr Branch. During 16 sessions, each group experienced brainstorming, metacognitive strategy instruction, or FonF activities as pre-task conditions. Writing pretest and posttest, and semi-structured interview were utilized to collect the data. The results obtained from one-way ANOVA revealed that pre-task conditions statistically impacted the cognitive processes of learners' writings. The findings suggest a positive correlation between strategic knowledge, metacognitive strategies, and improved writing skills among Iranian EFL learners. The study not only contributes to the understanding of the interplay between cognitive and metacognitive processes in language learning but also provides valuable insights for educators aiming to enhance writing proficiency in EFL settings.

Keywords: *Brainstorming; Cognitive processes; Focus on form; Metacognitive strategy; Writing ability*

INTRODUCTION

As language acquisition involves receptive and productive skills, understanding how cognitive and metacognitive strategy instruction impact the cognitive aspects of writing is crucial for effective language instruction. Several researchers have verified that writing skill, even in the mother tongue, is a complex cognitive activity Abdel Latif (2019); (Ellis, Li, et al., 2019; Robinson & Gilabert, 2007; Skehan, 2014). Metacognitive writing strategies, such as scaffolded awareness and the use of cognitive writing strategies, have been explored in the context of Iranian EFL learners. The goal is to enhance not only the surface-level writing skills but also the underlying cognitive processes involved in tense accuracy and overall writing proficiency (Bereiter & Scardamalia, 2013).

The term metacognitive strategy, rooted in information-processing theory and the notion of executive mechanism, refers to the strategy learners utilize to manage, monitor and evaluate their learning activities (Sabet et al., 2018). In other words, they use metacognitive strategies to control their cognition and learning process. Many researchers (Kuiken & Vedder, 2017; Meesong & Jaroongkhongdach, 2016; Robinson, 2011; Shahnazari, 2013; Yan et al., 2021; Zalbidea, 2017) who explored the definition and role of metacognitive strategies agree that their main purpose is to plan, structure, and assess individual learning.. For instance, Du et al. (2022) considers metacognitive strategies as advanced executive abilities, describing them as techniques encompassing reflection on the learning process, preparation for learning, and self-assessment following the completion of a learning task..

It is also one of the crucial communication skills that every language learner needs. Student writers seem to experience problems with writing because it is difficult for them to express their ideas clearly and coherently through logical arguments (Johnson, 2017; Kane, 2013). They do not have the necessary skills to cope with the writing courses that are a part of the university curriculum. Skehan (2014) considers writing an essential and powerful communicative tool for all learners in all disciplines. Therefore, during their academic years, learners should improve their writing skills to produce influential writing not only for their English courses but also for their future employment purposes (Aubrey et al., 2022; Darling-Hammond et al., 2020; Kaushik, 2023; Payant et al., 2019; Zhang & Crawford, 2022).

Although a diversity of approaches has been inspected and reported as successful, no single best approach or method exists for teaching writing in a constructive, motivating, and authentic manner (Khoram, 2019; Lasauskaite et al., 2023). Among all introduced approaches, task-based language teaching is an inclusive one that seeks to integrate all language skills within the process of learning and teaching. Thus, the growing interest in investigating the role of tasks in L2 acquisition and performance has increased the popularity of tasks in SLA research (Cheong et al., 2022; Peng et al., 2020; Tomazin et al., 2023; Xie & Zhu, 2023). One of the main interests in TBLT studies is the role of cognitive processes and attentional capacities required in L2 production tasks (Cheong et al., 2022; Kaushik, 2023; Kim et al., 2023; Lasauskaite et al., 2023; Mellati & Khademi, 2018; Peng et al., 2020; Tomazin et al., 2023; Xie & Zhu, 2023). Scaffolded metacognitive instruction such as brainstorming was found to effectively improve learners' metacognitive awareness, positively impacting their writing abilities. This highlights the importance of targeted instructional approaches in enhancing metacognitive processes related to writing (Amiryousefi, 2017).

Brainstorming encompasses the articulation of a problem or concept and generating anything pertinent to the subject, regardless of how minor a suggestion may seem. These concepts are documented and

assessed solely following the brainstorming process. (Hashempour et al., 2015; Maghsoudi & Haririan, 2013). It is a strategy that provides an appropriate atmosphere for learners to participate in a discussion freely (Wilson & Soblo, 2020; Yang & Kim, 2020). It provides an equal chance for everyone to engage in group conversations and discover innovative problem-solving approaches by consolidating all ideas presented during the same meeting. Amiryousefi (2017) assumed that brainstorming merges an easygoing, informal method for addressing problems with lateral thinking, motivating individuals to generate notions and concepts that may initially appear somewhat unconventional. In writing activities, brainstorming can assist learners in using their background knowledge and identifying what skills and information they possess and what they need to gain (Golparvar & Rashidi, 2021). Though the ideas generated at this stage may or may not be directly related to the topic, brainstorming is a valuable strategy for expanding learners' thoughts and ideas before starting the writing task (Kim et al., 2023).

Besides the impact of instructing metacognitive strategies on writing proficiency, Skehan (2009) contend that certain techniques concentrating on linguistic forms are essential to capture learners' attention during task execution. Kim (2013) also asserts that employing form-focused methods takes place in the pre-task phase, aiming to heighten learners' awareness of these forms both during planning and task performance. Nevertheless, there are conflicting opinions about incorporating form-focused activities in the pre-task stage. Knoch (2011) does not view grammar instruction as a viable pre-task choice, as he believes learners may not be sufficiently prepared for the predetermined structure at that stage. Instead, he suggests that a focus on grammar should be reactive, coming into play when learners encounter challenges with linguistic forms necessary for conveying meaning.

Alternatively, following the skill acquisition theory, Polio and Shea (2014) argue that learners should possess declarative knowledge, acquired through pre-task grammar instruction, further refined during subsequent task-specific performance, and eventually automated through repetitive practice. Ellis, Li, et al. (2019) term the method as task-supported, distinguishing it from the exclusively task-based method endorsed by other researchers. Critics of pre-task grammar instruction assert that explicit grammar teaching predisposes learners to focus on structures, transforming the task into a language practice (Kim et al., 2022). They argue that explicit instruction may jeopardize the primary principle of task-based teaching, which is meaning. On the contrary, advocates for pre-task grammar instruction maintain that learners require grammar knowledge for effective communication tasks, and educators prefer to impart grammar skills before assigning tasks to students (Lasauskaite et al., 2023; Swales & Feak, 2023; Zare et al., 2021).

Writing can be an interactional modality in the classroom without suffering from the pressure of face-to-face conversation. Therefore, it is quite possible to assume that a task-based approach can help teachers in improving the writing abilities of L2 learners. As Ellis, Li, et al. (2019) put it, creating a task- based lesson requires examining the phases or elements of a lesson centered around a task as its primary component. Various designs have been suggested for task-based lessons. (Chenoweth & Hayes, 2001; Hayes & Berninger, 2014; Housen et al., 2012; Ishikawa, 2018; Jagaiah et al., 2020; Johnson, 2017), all propose three main stages—pre-task, task execution, and post-task—that mirror the sequence of a lesson based on tasks.. Although the only obligatory phase of task-based teaching is the 'during task' phase, and the 'pre-task' or 'post-task' phases are non-obligatory, these latter phases can ensure the maximum

effectiveness of the task performance (Ellis, Skehan, et al., 2019). Therefore, the rationale for studying the impact of cognitive and metacognitive strategy instruction on Iranian EFL learners' writing cognitive processes lies in the imperative to enhance language learning methodologies. These strategies, encompassing both cognitive and metacognitive aspects, are fundamental in shaping receptive and productive language skills. The identified studies Hayes and Berninger (2014), Meesong and Jaroongkhongdach (2016), and Yan et al. (2021) collectively address the exploration of scaffolded metacognitive writing strategy impact. Zalbidea (2017) emphasizes the need to train learners to improve metacognition, contributing to heightened awareness. The studies investigate how cognitive and metacognitive writing strategies can positively affect the content and overall proficiency of Iranian EFL learners' writing (Baaijen & Galbraith, 2018).

In cognitive writing models, metacognition plays such an undeniable role that Kafipour et al. (2018) defined writing as applied metacognition. Swales and Feak (2023) described metacognition as an individual's understanding of their cognitive operations and outcomes. Likewise, Teng and Zhan (2023) considered the association between metacognitive awareness and self-regulated learning; According to their assertions, individuals who regulate their learning exhibit engagement in metacognitive, motivational, and behavioral aspects throughout their learning journey. They posit that actively metacognitive, self-regulated learners engage in planning, organizing, self-instruction, self-monitoring, and self-evaluation at different phases during the learning process. The assessment of task-based writing holds significant importance. Following the shift in language teaching and the introduction of think-aloud protocols, researchers shifted their emphasis from evaluating written outcomes to exploring the cognitive processes and mental resources employed in crafting written content. Consequently, a focus on the writer and cognitive processes gave rise to process-oriented approaches (Albus et al., 2021; Bannert, 2002; Chen, 2015; Greene & Azevedo, 2010; Lamb et al., 2019; Mellati et al., 2022; Sam et al., 2021).

In the meantime, Skehan (2014) argues that utilizing strategies that emphasize linguistic forms is essential to capture learners' focus on language structures while engaging in tasks. Kim (2013) also holds that Strategies that emphasize linguistic forms are applied before tasks to enhance learners' recognition of these forms both during planning and actual task execution. Nevertheless, there are conflicting opinions about incorporating form-focused exercises in the pre-task phase. Knoch (2011) does not consider teaching grammar before a task, as he thinks learners might not be ready for a predetermined structure at that stage. According to him, addressing grammar should occur responsively when learners encounter challenges with linguistic forms necessary for creating meaning. On the other hand, via the skill acquisition theory, Polio and Shea (2014) hold that to acquire the necessary declarative knowledge, students can undergo pre-task grammar instruction, followed by proceduralization during task performance, and eventual automation through repetitive practice. Those against pre-task grammar instruction argue that explicit grammar teaching may incline learners towards a specific structure, transforming the task into a language practice exercise (Kim et al., 2022), the proponents advocate for the idea that learners require an understanding of grammar to effectively carry out communicative tasks, and assert that educators generally favor imparting grammar knowledge before assigning tasks to students (Lasauskaite et al., 2023; Swales & Feak, 2023; Zare et al., 2021). Besides, as Skehan and Foster (2001) argue, focusing on meaning during task performance may distract learners' attention from linguistic codes. This is the reason why researchers in task-based language teaching have suggested

various methods to help learners focus on linguistic patterns within task-based instruction that emphasizes meaningful communication (Kuiken & Vedder, 2017). Focus on Form (FonF) encompasses a clearly defined psycholinguistic aspect. It is crucial to examine the impact of selective attention and cognitive comparison during language learning, as these processes unfold when learners engage with language in their working memories. The restricted capacity of working memory limits what learners can concentrate on during communication, thereby shaping their focus (Ellis, Skehan, et al., 2019).

As writing involves highly complex skills and writers need to attend both higher-level (e.g., planning and organizing) and lower-level skills (e.g., spelling, punctuation, word choice, etc.), it is usually challenging for L2 learners to perform writing tasks. The difficulty becomes more serious when the writers' language proficiency is low (Liang & Xie, 2023). This problem can be alleviated through brainstorming since it creates a stress-free environment and motivates learners who are usually reluctant to write; therefore, the non-threatening atmosphere can help them develop their writing skill (Payant et al., 2019). As Tomazin et al. (2023) assumed, good writers as those who can think well; it seems beneficial to create situations where students can have the chance to think about the topic before actually starting the composition. Brainstorming was popularized in 1953 by Osborn, who claimed that it could help learners enhance their creative output.

Brainstorming guides learners to new ways of thinking and is the automatic act of note-taking of ideas in getting ready to write (Xie & Zhu, 2023). Kuiken and Vedder (2017) studied the effects of two brainstorming strategy instructions on the performance of Iranian intermediate L2 writers. They found that brainstorming could improve EFL learners writing skills and could make them responsible for their better learning. Kim et al. (2023) investigated various planning conditions in the first language (L1) context and identified consistent connections between the processes of writing and key outcome measures, including the quality of the written text and the comprehension of emerging writers. Swales and Feak (2023) argue that a crucial area for future investigation involves examining the dynamics of these connections during second language (L2) writing. This is particularly relevant when delving into the intricacies of writing procedures using verbal protocols and eye-tracking (Yoon & Abdi Tabari, 2023).

Yan et al. (2021) differentiate between cognition and metacognition, asserting that cognitive abilities are required for task execution, whereas metacognition is crucial for comprehending the process of task performance.. Darling-Hammond et al. (2020) study on the relationship between cognition and metacognition showed that cognitive processes are usually unconscious and automatic and are necessary for manipulating or transforming tasks. However, metacognitive abilities involve deliberate mental processing and serve to exert managerial control in the execution of tasks. Metacognitive strategies can be described as the higher order executive skills Liang and Xie (2023) that include reflection on the learning journey, preparing for learning, and self-assessment upon the completion of the learning task (Sabet et al., 2018). Metacognitive strategies can be operationally defined as those strategies that the teacher instructs before the main task to boost learners' writing performance by gaining enough control over complex cognitive and social processes of text creation and regulating their cognitive processes, planning, translating, and reviewing (Yan et al., 2021).

While there is a systematic review on metacognitive reading strategies and their impact on reading comprehension, there's a noticeable gap in exploring the specific impact of these strategies on writing cognitive processes. Future research could delve into this connection. The existing studies primarily focus on the effectiveness of cognitive and metacognitive writing strategies on learners' writing content. However, there's a research gap in understanding how these strategies influence other aspects of writing cognitive processes, such as organization, coherence, and overall writing proficiency. While one study touches upon the impact of online self-assessing metacognitive strategies on Iranian EFL learners, there is room for further investigation into the effectiveness of such strategies in the context of writing cognitive processes. Although there is evidence indicating the positive effects of explicit instruction in cognitive and metacognitive strategies on reading comprehension and strategy use among Iranian students, a more in-depth exploration of the explicit instructional approaches specifically tailored for writing cognitive processes is warranted.

Previous research indicates that cognitive and metacognitive strategy use can enhance EFL learners' receptive language skills. Findings suggest that such interventions can favor learners in creating better content for their writing, indicating potential improvements in the quality of written work. Scaffolded metacognitive instruction is reported to effectively improve learners' metacognitive awareness, providing insights into how instruction methods influence cognitive processes. The study addresses a lack of research into the effects of cognitive and metacognitive writing strategies on Iranian EFL learners, contributing to the broader understanding of language learning strategies. Understanding the impact of these instructional strategies on cognitive processes is vital for developing effective language teaching methodologies, especially in the Iranian EFL context. The findings contribute to the broader discourse on language pedagogy, providing insights into optimizing cognitive and metacognitive strategies for improved writing skills among EFL learners.

The literature on the topic indicates a growing interest in investigating the effectiveness of cognitive and metacognitive strategies in enhancing the writing skills of Iranian English as a Foreign Language (EFL) learners. A study on the impact of cognitive and metacognitive strategy use on EFL learners' receptive language skills suggests a focus on receptive skills in language learning, highlighting the need for effective strategies (Lasauskaite et al., 2023). Another study explores metacognitive strategy-based writing practices and their effect on EFL learners' writing skills, emphasizing the role of metacognition in writing proficiency (Kim et al., 2022). The literature reveals a gap in research related to Iranian EFL learners, indicating a need for more studies investigating how cognitive and metacognitive writing strategies specifically affect this learner group. A study on the effects of cognitive and metacognitive strategy training on the willingness to communicate (WTC) of Iranian EFL learners suggests a connection between these strategies and learners' communication confidence (Amiryousefi, 2017). An exploration of the impact of implementing writing metacognitive strategies via flipped classrooms on Iranian EFL learners indicates a shift toward innovative instructional approaches (Golparvar & Rashidi, 2021). Results from a study on explicit instruction in cognitive and metacognitive reading strategies suggest improvements in reading comprehension and strategy use among Iranian students (Khezrlou, 2021). Cognitive and metacognitive strategies play a pivotal role in shaping the writing skills of Iranian English as a Foreign Language (EFL) learners. Numerous studies have explored the effects of these strategies on different aspects of writing, shedding light on their impact (Kafipour et al., 2018). A study

investigated the effectiveness of cognitive and metacognitive strategy use on EFL learners' receptive language skills, emphasizing the connection between strategy utilization and overall language proficiency (Khoram, 2019). Another experimental investigation focused on how cognitive and metacognitive writing strategies influence the content of Iranian intermediate EFL learners' writing. This study delved into the specific ways these strategies shape the quality and substance of written compositions (Zare et al., 2021).

The primary purpose of the study is to investigate the effectiveness of cognitive and metacognitive strategy instruction on the writing cognitive processes of Iranian English as a Foreign Language (EFL) learners. The study aims to understand how these instructional strategies influence various aspects of writing, including planning, translating, revising. Through a combination of experimental investigations and exploratory approaches, the researchers seek to identify the specific cognitive and metacognitive strategies that prove most beneficial for Iranian EFL learners in enhancing their writing skills. The study may involve interventions such as pre-task conditions (brainstorming, FonF, and metacognitive strategy instruction). The ultimate goal is to contribute insights into effective pedagogical approaches that can be employed to enhance the writing abilities of Iranian EFL learners. In this regard, the following quantitative and qualitative questions were proposed:

1. Do pre-task conditions (brainstorming, FonF, and metacognitive strategy instruction) change Iranian EFL learners' cognitive processes (planning, translating, and revising)?
2. How do Iranian EFL learners perceive the use of brainstorming activities (assets and drawbacks) regarding their writing abilities and cognitive processes (planning, translating, revising)?
3. How do Iranian EFL learners perceive the use of metacognitive strategies (assets and drawbacks) regarding their writing abilities and cognitive processes (planning, translating, revising)?
4. How do Iranian EFL learners perceive the use of FonF activities (assets and drawbacks) regarding their writing abilities and cognitive processes (planning, translating, revising)?

METHODOLOGY

The current study investigated the potential effects of three different types of pre-task conditions (metacognitive strategy instruction, brainstorming, and FonF) on Iranian EFL learners' cognitive processes. In this respect, concentrating on cognitive processes, the study focused on planning/proposing, translating, and evaluating/revising procedures. The investigators utilized a convergent mixed methods approach, simultaneously collecting both qualitative and quantitative data to address the research inquiries. Employing data triangulation, the researcher aimed to obtain supplementary information, diminish potential biases, and acquire in-depth insights into the subject of investigation. The incorporation of both qualitative and quantitative data enhances the potential for producing findings that are more precise and dependable.

Participants

The study participants were 150 university students majoring in English language translation in three intact classes at Islamic Azad University, Islamshahr Branch. They were male and female learners aged 18 to 28 in three intact writing classes, randomly assigned to three treatment conditions: experimental

group 1 (n=50; 50% male; 50% female) was the Brainstorming Group, experimental group 2 (n=50; 60% male; 40% female) the Metacognitive Strategy Instruction Group, and experimental group 3 (n= 50; 54% male; 46% female) FonF Group.

Instruments

The investigators utilized the subsequent tools for gathering the necessary information.

Homogeneity Test

To establish uniformity among participants, the researchers conducted the grammar and vocabulary portions of the Oxford Placement Test. The grammar segment comprises fifteen cloze and ten multiple-choice questions, while the vocabulary section includes twenty-five multiple-choice questions and ten cloze test items. For the study, the researchers identified advanced learners by selecting those whose scores ranged from 48 to 60.

Writing Tests

At the study's outset, the researcher conducted an initial writing assessment to evaluate the writing proficiency of the participants. In the pretest, participants were allotted 45 minutes to compose an essay expressing their opinion on whether school children should be assigned homework. To ensure standardized writing topics, the researchers employed IELTS prompts. Following the intervention, participants were given another 45 minutes to produce an essay on processed foods and ready-made meals as a post-test, adhering to a five-paragraph structure typical for argumentative essays. The selection of pre-test and post-test topics considered the students' interests. Pearson product-moment correlation was utilized to assess the similarity between the pretest and posttest. Two IELTS trainers, employing IELTS band scores, evaluated the writings. The inter-rater reliability, examined through the Pearson product-moment correlation coefficient, demonstrated a robust agreement between the raters (r=0.823).

Semi-Structured Interview

Interviews serve as a prevalent qualitative method for obtaining authentic insights into an individual's skills, opinions, beliefs, awareness, feelings, and demographic details. In this research, the investigator engaged in semi-structured interviews involving 15 volunteers, with five participants from each experimental group. During these sessions, participants responded to predetermined inquiries concerning class sessions, their perspectives on pre-task conditions, and the outcomes they obtained. Furthermore, they provided additional insights into how interventions impacted their overall writing abilities and specific cognitive processes.

Procedure

At the outset of the study, to ensure the homogeneity of the participants, all participants took the grammar and vocabulary sections of the Oxford Placement Test (OPT). Based on their performance, the OPT test results were used to ensure that we have homogeneous experimental groups. Participants were assigned to three experimental groups who received three different treatments. The sampling procedure was convenience sampling of student participants available for the study. The study included sixteen 90-

minute sessions which lasted four months. The first session was allocated to the writing pretest. The participants had 45 minutes to write an essay about '*Should school children be given homework (opinion)?'* as a pretest. The researchers used IELTS topics to ensure the level of writing topics. During sessions 2 and 3, the preliminaries of essay writing and the different parts of an essay (introduction paragraph, three body paragraphs, and conclusion paragraphs) were taught to the three classes. In the following sessions, each group experienced a specific type of pre-task: brainstorming, metacognitive strategy instruction, or FonF activities during about 12 weeks of conducting the study. For example, in the fourth session of all classes, the teacher worked on how to organize an agree/disagree essay. However, in the Brainstorming class, brainstorming strategies were practiced. In the FonF class, the teacher discussed the students' grammatical problems. The teacher introduced and exercised planning, monitoring, and reviewing strategies in the Metacognitive strategy class. Table 1 shows the activities done in different groups during the subsequent sessions. After the treatment, the participants were given another 45 minutes to complete an essay on *processed foods and ready-made meals* as a post-test. The essays had to be written in five paragraphs following the general format accepted for argumentative essays. The topics of the pre-test and post-test were selected based on the students' interests. Pearson product-moment was used to check the similarity of the pretest and posttest.

Table 1

The Procedure of the Study

Session	Shared Activity	Specific Activity		
		Brainstorming	**FonF**	**Metacognitive**
1	Pre-test writing administration			
2	General points about writing essay/ Introduction paragraph			
3	Body paragraphs/ Conclusion			
4	Agree-disagree essay	Rules of brainstorming (BS)/ group BS	Diagnosing the students' problems in grammar	General points on planning strategies
5	Agree-disagree essay	Whole class BS	Punctuation, fragment/run-on sentences	planning strategies
6	Agree-disagree essay	Whole class BS	Types of sentences	planning strategies
7	Cause-effect essay	individual BS (free writing)	coordinating conjunctions and compound sentences	planning strategies
8	Cause-effect essay	individual BS (free writing)	correlative conjunctions and conjunctive adverbs	monitoring strategies
9	Cause-effect essay	BS in Groups	subordinating conjunctions and adverb clauses	monitoring strategies

10	Compare-Contrast essay	BS in Groups	adverb clauses	monitoring strategies
11	Compare-Contrast essay	individual BS (Clustering)	Adjective clauses	monitoring strategies
12	Compare-Contrast essay	individual BS (Clustering)	Adjective clauses	Revising strategies
13	Problem-Solution essay	individual BS (free writing)	noun clauses	Revising strategies
14	Problem-Solution essay	BS in Groups	noun clauses	Revising strategies
15	Posttest writing administration			
16	Semi-structured interview			

In the 16th session, the researchers implemented semi-structured interviews with five volunteers from each experimental group (totally 15 volunteers). In the interview sessions, learners answered pre-determined questions regarding the class sessions, their ideas about the pre-task conditions, and what they gained. They gave extra explanations regarding the effects of interventions on their writing abilities in general and their cognitive processes in particular. Analyzing the learners' reports and interview aided the researchers in explaining the quantitative results qualitatively.

RESULTS AND DISCUSSION

To answer the first research question, the researchers conducted a MANOVA, which compared the groups in terms of their means of cognitive processes (planning, translating, and revising) of written production. The results are presented in the following tables.

Before conducting the MANOVA analysis, the researchers tested whether the data confirmed to the assumptions of the analysis. To test for multivariate normality as one of the main assumptions of the MANOVA, the researchers calculated the regression using SPSS (version 24). Based on the results of Mahalanobis distances, the researchers deleted one case for the rest of the analyses.

Table 2

Multivariate Tests of MANOVA

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Group	Pillai's Trace	.400	12.088	6.000	290.000	.000	.200
	Wilks' Lambda	.611	13.382	6.000	288.000	.000	.218
	Hotelling's Trace	.616	14.688	6.000	286.000	.000	.236
	Roy's Largest Root	.584	28.212	3.000	145.000	.000	.369

A one-way between-groups multivariate analysis of variance was performed to investigate the differences in cognitive processes (planning, translating, and revising) of Iranian EFL learners' written production. Three dependent variables were used: planning, translating, and revising scores. As Table 2 shows, there was a statistically significant difference between the planning, translating, and revising of Iranian EFL learners' written production in three groups, F (6, 288) = 13.382, P< = .000; Wilks' Lambda = .611; partial eta squared = .218. It means that pre-task conditions (brainstorming, FonF, and

metacognitive strategy instruction) have a statistically significant effect on the planning, translating, and revising of Iranian EFL learners' written production.

Table 3

Tests of Between-Subjects Effects of MANOVA

Source	Dependent Variable		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	dimension1	Planning	413.827	2	206.913	2.024	.136	.027
		Translating	795.699	2	397.850	2.632	.075	.035
		Revising	4231.431	2	2115.716	40.302	.000	.356
Error	dimension1	Planning	14926.925	146	102.239			
		Translating	22067.562	146	151.148			
		Revising	7664.421	146	52.496			
Total	dimension1	Planning	332652.000	149				
		Translating	376703.000	149				
		Revising	58318.000	149				

Upon analyzing the outcomes of individual dependent variables, Table 3 reveals a singular statistically significant distinction. This difference reached significance under the Bonferroni-adjusted alpha level of .017, specifically in the domain of revising, with F (2, 146) = 40.302, P< = .000, and a partial eta squared value of .356. Examination of the mean scores in Table 4 highlighted that students belonging to the metacognitive strategy group exhibited a higher mean compared to both the Brain and FOF groups.

Table 4

Estimated Marginal Means of MANOVA

Dependent	Variable	Group		Mean	Std. Error	95% Confidence Interval	
						Lower Bound	Upper Bound
dimension0	Planning	dimension1	Brain	44.490	1.444	41.635	47.345
			FOF	45.500	1.430	42.674	48.326
			Meta	48.420	1.430	45.594	51.246
	Translating	dimension1	Brain	45.449	1.756	41.978	48.920
			FOF	50.640	1.739	47.204	54.076
			Meta	50.040	1.739	46.604	53.476
	Revising	dimension1	Brain	15.755	1.035	13.709	17.801
			FOF	24.880	1.025	22.855	26.905
			Meta	12.280	1.025	10.255	14.305

Answering the qualitative questions, content analysis was employed to analyze the results of semi-structured interviews. Subsequently, for data analysis, the investigators adhered to a process involving open coding, category development, and data triangulation. Initially, the acquired data underwent meticulous labeling and categorization. Following this, the established categories underwent further subdivision into sub-categories. Ultimately, the identified categories and sub-categories were subject to discussion in the subsequent analysis.

After analyzing the data collected for the second research question regarding the learners' perceptions about the use of brainstorming activities before the main task, the researcher found the following themes:

Creativity: Fostering the creative capabilities of students stands as a primary goal in TEFL educational writing initiatives. The effectiveness of TEFL instructors in realizing this aim, thereby creating an atmosphere conducive to nurturing the creative potential of their students, hinges on various elements within the educational setting. The results of interviews have shown that the use of brainstorming activities influenced the learners' creativity in their writing.

One of the participants stated in the interview:

> *New ideas came to my mind. When you need to be creative, your brain can be your worst enemy because you may encounter a vague idea, or different thoughts will be confused in your mind, and you will not be able to think about them clearly. One of the benefits of brainstorming is that it can become an opportunity to get the jumbled ideas out of your head. Brainstorming requires an individual or team to think creatively and come up with solutions that lead to better ideas and suggestions.*

When a group of people comes together to discuss a topic or problem, creativity increases, each idea helps shape another idea, and people come up with new solutions from each other's ideas.

> *One reason why brainstorming works is that thoughts produce further thoughts through the force of association. The strategy of association is all the more remarkable when one is working in a gathering than when one is working alone. The fact that it leads to expanded creativity makes reinforcement another variable. In the thought age period of brainstorming, all ideas are compensated by being gotten and recorded.* (One of the participants stated in the interview)

New and innovative ideas: Brainstorming requires a team to think creatively and develop solutions that lead to better ideas and suggestions. Brainstorming caused many questions. This strategy gave the right to choose between ideas.

A participant mentioned in the interview:

> *This strategy accelerates the process of writing. Before using this strategy, it took me about an hour to think about different aspects of one subject. Learning this strategy helps me to shape my mind in a short period with the help of my classmates.*

Another participant stated in the interview:

> *By using this strategy, I can generate many new ideas that were impossible to create lonely. This strategy encourages me to relax and be enthusiastic about the process.*

Better teamwork and cooperation: Collaboration and cooperative effort involve the skill of working together harmoniously in varied teams, workgroups, and throughout the class to attain collective objectives and organizational milestones. This encompasses both the willingness and capability to comprehend and interact proficiently with fellow learners possessing diverse backgrounds and perspectives. When you brainstorm as a group, one person does not feel like they are carrying the entire

task's workload or develop a sense of ownership over the team. On the other hand, everyone in the brainstorming session learns how to work together.

A participant stated in the interview:

In the classrooms, my major problem was cooperating with my classmates. It was difficult to work cooperatively on a project. However, the brainstorming strategy helped me to obviate this problem. Now, I can cooperate with my peers cooperatively.

A participant stated in the interview:

Brainstorming encourages me to collaborate with my classmates. Collaboration is all about realizing my potential, bringing my ideas, my passion for my project. In other words, adequate collaboration can take my learning process to the next level.

Critical thinking: Critical thinking means taking a particular issue or situation and thinking about it in a logical way free from personal biases. Brainstorming allows team members to think critically to solve a specific problem or develop a creative idea. The more students use this technique, the better they will be at facing a problem and thinking critically about it.

One of the expressions of the participants is as follows:

Brainstorming helped us not to get away from the topic and to focus on the topic. The importance of the subjects was better defined. It helped textual coherence. I knew the starting and ending points of my writing. It increased the writing speed. We had more time to edit. We used to avoid irrelevant sentences. It did not affect the grammar.

Iranian EFL learners' perceptions of using metacognitive strategy activities (assets and drawbacks) on the development of their writing processes were as follows:

The results showed that a considerable number of students collaborated on a plan for organizing individual paragraphs and deliberated on time allocation for each section of their essays. Furthermore, a majority of them concurred on outlining, defining the purpose of their writing, and strategizing with online resources to efficiently utilize network materials. Additionally, over half of the students favored crafting language elements and gathering pertinent materials related to the topic. Upon analyzing the second metacognitive approach, "Revising," it was evident that a noteworthy percentage of EFL learners endeavored to contemplate correct grammar, proper punctuation, and sought assistance from online dictionaries. Moreover, the majority of participants made efforts to select suitable words and phrases, considered essay instructions and components, and actively monitored their writing. Subsequently, more than half of the students attempted to identify specific locations in their compositions, adjust their time schedules, and rectify errors.

A participant stated in the interview:

Although metacognitive strategies slow down the writing speed, they greatly help to write correctly. In the revise strategy, I could see my mistakes and fix them. I used to use it before, but now I use it more and I use it according to the principles. The accuracy of the text has increased. It has a positive effect on both the coherence and cohesion of the text. My understanding of different parts of an article has increased, and I start writing more carefully.

A participant stated in the interview:

> *My teacher presumably incorporated a course plan, composing a list, learning goals, or something almost identical to provide me with a feeling of how the course is organized. Utilize this as my guide for the course. For instance, for a composing course, ponder why my teacher could have doled out the writing in this specific request. How would they associate? What are the key topics that ought to be taken note? What earlier information do I have that could educate my perusing regarding this new material? I can do this at various focuses all through the semester as I gain extra information.*

The findings from the qualitative data gathered to address the fourth research question indicated that while a significant portion of participants had neutral or negative views regarding explicit grammar instruction, they maintained a positive outlook on FonF activities, particularly feedback related to the content and structure of their written assignments. The results emphasized the preference of students for direct correction over indirect correction. Additionally, many students expressed a keen interest in incorporating more self-correction and interactive elements into the revision process. This desire for self-correction suggests a possible drawback of one-way FonF techniques.

A participant stated in the interview:

> *I realized that I was using many grammars incorrectly. It had a great impact on my writing accuracy. The number of my compound and complex sentences increased drastically. I got acquainted with my grammar problems. I write longer texts. All my focus was on grammar. I was trying to focus on grammar mistakes and fix them. Grammar knowledge is more important than having ideas. Because when you have an idea and do not have the necessary knowledge of grammar, you cannot implement the idea.*

DISCUSSION

This study examined the effects of cognitive and metacognitive pre-task activities (brainstorming, FonF, and metacognitive strategy instruction) on the cognitive processes of Iranian EFL writers. They seem to experience problems with writing because it is difficult for them to express their ideas clearly and coherently through logical arguments (Li et al., 2016). They do not have the necessary skills to cope with the writing courses that are a part of the university curriculum. One of the main interests in TBLT studies is the role of cognitive processes and attentional capacities required in L2 production tasks (Negretti, 2012; Teng & Zhan, 2023).

Liang and Xie (2023) emphasize that, besides metacognitive strategy instruction influencing writing performance, the integration of form-focusing strategies is crucial for capturing learners' attention to linguistic forms while performing tasks. Similarly, Kim (2013) supports the use of form-focused methods in the initial task phase to elevate learners' understanding of these structures in both the planning and execution stages. Nevertheless, the inclusion of form-focused activities in the pre-task phase sparks controversy. Kuiken and Vedder (2017) oppose considering grammar instruction as a pre-task option, asserting that learners may not be developmentally prepared for the predetermined structure. According to them, a focus on grammar should be reactive, addressing difficulties with linguistic forms essential for meaning-making.

Meesong and Jaroongkhongdach (2016) contend that concentrating on meaning during task execution might divert learners' focus from linguistic codes. Consequently, researchers in the field of task-based language teaching have suggested various approaches to redirect learners' attention to linguistic codes within meaning-oriented tasks. For example, in studies on task planning, scholars have investigated factors like the duration of planning time and specific attributes of task planning, including guided planning incorporating grammatical instructions (Ishikawa, 2018; Jagaiah et al., 2020; Knoch, 2011; Yan et al., 2021). The results also demonstrated a statistically significant difference between the planning, translating, and revising of Iranian EFL learners' written production in three groups. In other words, pre-task conditions (brainstorming, FonF, and metacognitive strategy instruction) significantly impact the planning, translating, and revising of Iranian EFL learners' written production. When the results for the dependent variables were considered separately, the translating and revising processes reached statistical significance.

However, when the results of cognitive process analyses come into play, the story becomes twofold. The statistical analysis of the learners' written productions showed that the metacognitive group performed better in the revising process (as a cognitive process) in pre-task conditions. Robinson (2005) hypothesis seems to explain the cognitive processes of EFL learners reflected in their writings. Teachers cannot overlook the primary place of using pre-task activities in teaching writing since writing is a complex and multidimensional skill. As seen in this study, pre-task activities for writing and cognitive process components were acceptable and productive. The efficiency of tasks in writing instruction for Iranian EFL teachers is also emphasized in the current study, as applying TBLT insights utilizes applicable and modern instructional practices.

The current study also found clear support for the impact of pre-task conditions (brainstorming, FonF, and metacognitive strategy instruction) on the writing abilities of Iranian EFL learners. This result ties well with previous studies wherein Kim (2013), Payant et al. (2019), and Yoon and Abdi Tabari (2023) have revealed that task conditions (e.g., planning time, pre-task conditions, topic familiarity, etc.) can lead to improvement in task performance. Notable cognitive models of writing also view the properties of writing tasks as linked with the writing process and textual features of the writing.

Various research papers contribute to this topic, emphasizing the importance of metacognitive strategies in enhancing receptive language skills. Additionally, various research investigates how teaching cognitive and metacognitive strategies affects the readiness to communicate (WTC) among Iranian EFL students. The teaching methods cover both cognitive and metacognitive writing approaches, particularly emphasizing accurate tense usage in writing for EFL learners with lower proficiency. The impact of raising awareness through scaffolding and employing metacognitive writing strategies is also under scrutiny. Additionally, there is an examination of incorporating metacognitive writing strategies in flipped classrooms and its repercussions on EFL learners. The research attempts to bridge gaps in understanding how these strategies affect Iranian EFL learners.

CONCLUSION

The study investigated the extent to which different pre-task conditions (brainstorming, FonF, and metacognitive strategy instruction) affect the cognitive processes (planning, translating, revising). An

online investigation of cognitive processes followed by the retrospective interviews would be an example of triangulation of data, which could give rise to reliable results. The findings confirmed a statistically significant difference between the planning, translating, and revising of Iranian EFL learners' written production in three groups. In other words, cognitive and metacognitive pre-task conditions statistically affect the planning, translating, and revising of Iranian EFL learners' written production. When the results for the dependent variables were considered separately, translating and revising processes reached statistical significance. The results of qualitative data revealed that most learners believed that brainstorming activities encourage critical thinking, creativity, teamwork, and cooperative learning. They argued that metacognitive strategies helped them actively monitor their writing, and FonF activities encourage self- and peer feedback on the content and the organization of their written assignments.

The findings collectively emphasize the importance of incorporating both cognitive and metacognitive strategies in EFL writing instruction. While cognitive strategies enhance language proficiency, metacognitive strategies contribute to heightened awareness and self-regulation, ultimately improving the overall quality of writing cognitive processes among Iranian EFL learners. The studies on cognitive and metacognitive strategy instruction suggest profound implications for Iranian English as a Foreign Language (EFL) learners. These strategies positively affect receptive language skills, writing content, and overall writing performance. Additionally, scaffolded metacognitive instruction appears effective in enhancing learners' metacognitive awareness, leading to improved writing tasks.

Future studies in this area could investigate the sustainability and long-term impact of cognitive and metacognitive strategy instruction on the writing skills of Iranian EFL learners. This could involve follow-up assessments over an extended period; examine how individual differences among learners, such as cognitive styles, motivation, and prior language proficiency, may influence the effectiveness of strategy instruction. This could provide insights into personalized teaching approaches. Future studies could conduct comparative analyses with other language proficiency levels to understand if the impact of these strategies varies among beginners, intermediate, and advanced EFL learners. They could explore the integration of technology in delivering cognitive and metacognitive strategy instruction. Investigate the effectiveness of online platforms, educational apps, or virtual environments in enhancing writing cognitive processes. Finally, future studies could investigate the impact of training EFL instructors in incorporating cognitive and metacognitive strategies into their teaching methods. This could assess how teacher knowledge and implementation influence student outcomes.

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