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Research Paper

The Effect of Integrating Metacognitive Strategies with Task Complexity in Learning English Verb Tenses by Iranian EFL Learners

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Abstract

This research aims to explore how the cognitive demands of tasks affect the acquisition of English verb tenses and their association with grammatical metacognitive awareness among language learners. The study addresses two key questions: 1) Differential impacts of tasks varying in cognitive load on the acquisition of verb tenses, 2) The predictive role of learners' metacognitive strategies in task conditions. Employing a quasi-experimental design, the study involved 120 first-semester Bachelor of Arts students from Azad University South Branch in Tehran, Iran. Participants were assigned to four groups exposed to different task conditions: reading, reading with textual enhancement, cloze exercises, and reading with writing tasks. Instruments included Grammar Judgment and Editing Tests, Pawlak's (2018) Grammar Learning Metacognitive Strategies Inventory, and the Oxford Placement Test. The analysis involved the learners' performances on the Grammar Judgment and Editing Test, which were compared from the pretest to the posttest. One-way ANOVA was utilized. Additionally, comparisons among different task conditions in the posttest revealed which tasks resulted in higher learner performance. Results indicated significant improvements in tense structure proficiency associated with higher involvement tasks. This study

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bridges gaps in understanding optimal task designs for language learning and underscores the importance of metacognitive strategies in the Iranian EFL context.

Keywords: Cognitive Tasks, English Verb tenses, Language Grammar Learning, Metacognitive Strategies, Task Involvement Load

Mastering complex second language grammatical systems, such as English verb tenses, poses significant challenges for learners, especially in English as a foreign language (EFL) context. An important aspect of effective language acquisition is the nature of the cognitive tasks presented to learners, which can vary in complexity and level of involvement. Task involvement load, a concept derived from cognitive load theory, relates to the level of cognitive effort a task requires of the learner and its apparent relevance to the language learning goal. As such, varying task involvement can significantly influence the learning experience, potentially affecting the speed and efficiency with which learners acquire complex grammatical structures.

In addition to task complexity, metacognitive strategies, that is, the methods learners use to plan, monitor, and evaluate their understanding and performance, are essential in shaping language acquisition outcomes. Research suggests that metacognitive awareness can improve learners' ability to manage complex tasks and is likely to lead to better grammatical understanding. However, although the current literature emphasizes the importance of metacognitive strategies in learning, much remains to be done to understand how these strategies interact with different task demands, particularly in the context of English verb tenses.

Although several studies have examined cognitive load theory and its implications for language learning (Sweller, 2023; Rahmani et al., 2018), very few have focused specifically on the interaction between task complexity and metacognitive strategies in the context of English verb tenses. Furthermore, certain studies have underscored the significance of metacognitive strategies in language acquisition (Bouknify, 2023; Flavell, 1979). However, there is still a need to comprehensively understand how these strategies facilitate the interaction between task conditions and the outcomes of grammatical learning. This study aims to fill this gap by exploring how different levels of task involvement affect the acquisition of English verb tenses in Iranian EFL learners. The main research questions guiding this investigation are: 1) Do tasks with varying

involvement loads have different effects on the acquisition of English verb tenses? 2) Do learners' metacognitive strategies predict the effects of task conditions on learning verb tenses? By addressing these questions, the study hopes to contribute to a deeper understanding of the factors that improve language learning performance.

Review of Literature

Research on language acquisition encompasses a variety of theories and models that attempt to elucidate how learners engage with and acquire new linguistic structures. Among these, cognitive task load and metacognition represent two major areas of research that provide valuable insights into the cognitive processes involved in language learning. This literature review aims to examine current research on these concepts individually, focusing on their relevance to grammar acquisition and their implications for effective language teaching. By exploring the literature on cognitive task load, metacognition, and their relationship to the development of L2 skills and metacognitive knowledge, the review seeks to provide a comprehensive understanding of these constructs and their role in the language learning process.

Cognitive Load and Task Involvement in L2 Learning

The Involvement Load Hypothesis (ILH), proposed by Hulstijn and Laufer (2001), is based on research on second language (L2) acquisition, particularly vocabulary learning. ILH posits that the cognitive load imposed by specific learning tasks has a significant impact on vocabulary acquisition, suggesting that tasks requiring higher levels of cognitive involvement will facilitate deeper processing and better retention of linguistic elements. The hypothesis is guided by three essential components: *need*, which indicates the necessity of learning a word; *search*, which represents the effort to search for the meaning of the word; and *evaluation*, which involves evaluating the meaning or usage of the word. The model suggests that higher levels of involvement in these three areas will improve vocabulary retention.

Recent advances by Phadungsilp and Supasiraprapa (2023) have extended the implications of ILH to L2 grammar, arguing that task-induced involvement, relative to learners' proficiency levels, plays an important role in the mastery of grammatical

structures. Furthermore, the motivational and cognitive components of involvement, need, search, and evaluation serve as essential predictors of the acquisition and retention of linguistic structures (Liu & Nesbit, 2023).

In addition to ILH, the Task Cognitive Load Hypothesis developed by Sweller (1994) is inspired by cognitive psychology and emphasizes that the cognitive demands of tasks significantly affect learners' involvement and understanding of language concepts. According to this hypothesis, the concept of cognitive load encompasses the mental effort deployed in working memory during learning tasks and is divided into three types: intrinsic load (the complexity of the content), extrinsic load (the way the information is presented), and relevant load (the processes that facilitate learning). Effective management of cognitive load is essential to optimize learning outcomes; excessive cognitive demands can hinder the learning process.

Empirical studies in English examining the relationship between task involvement and vocabulary acquisition present a complex landscape marked by mixed results. For example, Aotani and Takahashi (2023) provide inconsistent support for ILH on vocabulary knowledge, while Alanazi (2023) finds no significant differences in reading and translation tasks despite variations in cognitive load. However, several studies have confirmed the effectiveness of high-involvement tasks on vocabulary acquisition. Ghorbani and Rahmandoost (2012) found that tasks with higher levels of involvement facilitate vocabulary learning, and Keyvanfar and Badragi (2011) noted that Iranian EFL students excelled in reading tests when they engaged in high-involvement tasks. The positive effects of role-playing tasks have also been supported by recent research in various contexts (Teng & Xu, 2022; Chen et al., 2022).

Despite these assertions, challenges remain. Li (2014) points out that highly involved tasks do not always produce better learning outcomes, highlighting the complex interplay between task design and individual learner differences. Studies by Hazrat (2015), Pourakbari and Biria (2015), and Amini and Maftoon (2017) further support the effectiveness of highly involved tasks in vocabulary acquisition. Additionally, Rahmani et al. (2018) have demonstrated the positive effects of these tasks on vocabulary retention. However, Aotani and Takahashi (2022) note that the manipulation of assessment and demand aspects may have a negligible impact on learners' vocabulary awareness,

signaling the need for further exploration within a broader theoretical framework of language and cognitive task load. Thus, while the interaction between task involvement and cognitive load highlights the importance of involvement in the development of L2 skills, the complexity revealed by empirical studies underscores the need for additional research. Such investigation aims to disentangle the contribution of ILH and cognitive task load to the acquisition and retention of L2 vocabulary and grammar. This would pave the way for the development of effective language learning strategies that are appropriate for diverse contexts and learner profiles. Thus, the involvement hypothesis and the cognitive task load hypothesis both offer valuable insights into the learning process, focusing on the level of involvement and cognitive processing required during language acquisition.

Metacognition in L2 Learning

Metacognition plays an essential role in second language (L2) learning, especially in grammar acquisition, as it involves an individual's awareness and regulation of the cognitive processes involved in learning. Metacognitive knowledge, as described by Flavell (1979), involves understanding one's cognitive functions, such as recognizing gaps in knowledge, setting learning goals, and activating existing knowledge to facilitate language learning (Sato, 2022). This knowledge can be divided into three types: declarative knowledge, which involves understanding one's strengths and weaknesses; procedural knowledge, which involves knowing which strategies to apply in different learning activities; and conditional knowledge, which focuses on effectively planning and managing one's learning strategies (Faerch & Kasper, 1987).

The development of metacognitive knowledge in L2 learners is influenced by both internal factors, such as personality traits, and external factors, including task demands (Saffari, 2019). Teachers play an important role in enhancing students' metacognitive awareness by modeling effective strategies and encouraging them to reflect on their own learning processes (Hasibuddin, 2022). Research shows that metacognitive strategies significantly improve learners' performance in language acquisition, especially in mastering grammar (Purpura, 2004). This is particularly relevant in the English as a Foreign Language (EFL) context, where implementing metacognitive strategies leads to

greater learner autonomy, better comprehension and memory, and better problem-solving skills (Wongdaeng & Higgins, 2022; Berenji, 2021).

Furthermore, metacognitive awareness is not only necessary for successful grammar learning; it also facilitates the transfer of skills across different learning situations (Stebner et al., 2022). Structured educational programs, known as "training interventions," can be effective in improving cognitive and metacognitive skills (Stebner et al., 2022). Combined training, which integrates cognitive strategies with metacognitive skills, further promotes the transfer of these abilities to new tasks (Scharff et al., 2017).In support of this integration, Nunan (1996) emphasized the need to integrate language learning strategies into educational contexts to promote greater involvement and understanding.

While acknowledging the importance of metacognition, Cohen (2003) noted the relative lack of research on grammar learning strategies, highlighting a gap that needs to be further explored. Recent studies, such as those conducted by Teng and Xu (2022), highlight the effectiveness of metacognitive adaptations in improving both academic performance and grammar learning outcomes. However, further research is needed to identify effective strategies for integrating metacognition into grammar teaching.

To effectively implement metacognitive strategies in the classroom, teachers are encouraged to provide explicit instruction, promote reflective practice, create a supportive learning environment, and foster opportunities for student collaboration. By equipping learners with metacognitive awareness, teachers can significantly improve successful language acquisition and empower them to take charge of their educational journey (Shih & Huang, 2020).

Metacognitive L2 Learning Strategies Inventories

Metacognitive strategy inventories are instruments designed to assess an individual's awareness and regulation of cognitive processes during learning. These inventories play an important role in education, especially in language learning, because they help educators and researchers understand how learners think about their learning processes, monitor their understanding, and adjust their strategies accordingly. The metacognitive strategy consists of two main components: metacognitive knowledge (awareness of one's

own cognitive processes) and metacognitive regulation (the ability to manage these processes through planning, monitoring, and evaluating one's understanding and performance).

For example, Oxford's Strategy Inventory for Language Learning (SILL), developed in 1990, is one of the leading tools for classifying the strategies used by learners to acquire a new language, highlighting cognitive and metacognitive strategies. Similarly, the Metacognitive Awareness Inventory (MAI) by Schraw and Dennison, created in 1994, is a widely recognized tool designed to measure metacognitive awareness in various domains. Using a verbal report method, the MAI provides access to many aspects of thinking that may not be directly observable, providing insight into how individuals perceive their thought processes.

In terms of grammar learning, this inventory is specifically designed to focus on the unique strategies learners use when acquiring grammatical structures and rules. The Grammar Learning Strategy Inventory (GLSI), created by Pawlak in 2009, builds on previous models of language learning strategies proposed by other researchers, such as Oxford et al.and Cohen and Dörnyei, to better classify and assess grammar-specific learning strategies. Pavlak further refined this inventory in 2018, validating it to ensure that it accurately measures the different metacognitive strategies specific to grammar learning, recognizing the unique cognitive demands that grammar acquisition may place.

In addition to these specific inventories, other scales exist to measure metacognition more generally. For example, the Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich and colleagues in 1993, assesses both motivational and metacognitive behaviors, helping to understand how these two domains influence learning outcomes. The Metacognitive Thinking Skills Scale (Tuncer & Kaysi, 2013) and the Metacognition Assessment Interview Protocol (Semerari et al., 2012) are additional tools that have emerged to provide additional information about metacognitive abilities. These inventories are essential for educators because they help identify learners' strengths and weaknesses in their metacognitive cognition and strategies, thereby helping to improve teaching methods and learner outcomes in the context of general language learning and grammar acquisition.

Method

Research Design

Employing a quasi-experimental design, the research included pretests and posttests with both receptive and productive components to assess participants' knowledge of verb tenses. Subjects were randomly distributed across four groups operating under different task conditions, reflecting various levels of cognitive involvement. Pre- and posttest scores on grammar knowledge were then examined to compare across these conditions. A one-way independent ANOVA was used to ascertain whether differences could be established among the four groups based on their performance. Additionally, this research investigated the correlation between different types of tasks and learners' applying metacognitive strategies for verb tenses in their learning process. Regression analysis was conducted to determine whether learners' metacognitive strategies predict the effects of task conditions on learning verb tenses.

Participants

The study involved 120 first-semester Bachelor of Arts students, aged 18 to 24, enrolled at the Islamic Azad University, Tehran South Branch. All participants were native speakers of Farsi and were classified as non-English majors. The sample consisted of 120 randomly selected male and female freshmen from an initial pool of 285 students. To form a more homogeneous group of learners, participants were assessed using the Oxford Placement Test (OPT), which indicated that the majority of learners achieved proficiency levels between A2 and B1.1, according to the Common European Framework of Reference for Languages (CEFR).

This classification indicates that these learners have a basic understanding of verb tenses and can engage in simple conversations. The classification of participants into four distinct groups of 30 students was based on their pretest scores, which evaluated their reading proficiency and response to various instructional strategies. Group A engaged in reading only, Group B participated in reading with textual enhancement, Group C completed reading with cloze exercises, and Group D was involved in reading and writing activities. To ensure a valid analysis, participants whose pretest scores deviated more than 20% from the mean or who did not complete the treatment were excluded from the study.

Consequently, a final sample of 120 students was utilized for analysis, ensuring the homogeneity of the groups for the purposes of the study.

Instruments

Four tasks with varying levels of cognitive load were selected to engage participants in learning verb tenses. To assess receptive and productive knowledge, a pretest and posttest were administered, comprising a 20-item Grammar Judgment Test (GJT) and a 20-item Editing Test. These tests, standardized measures from the IELTS and TOEFL, evaluated the participants' grammar proficiency. Additionally, the Grammar Learning Metacognitive Strategies Inventory (Pawlak, 2018) was applied to evaluate participants' metacognitive knowledge, and the Oxford Placement Test (OPT) ensured participant homogeneity. Learners at the elementary A2 and pre-intermediate B.1.1 level, specifically those with scores ranging from 21 to 50, were selected as the main participants for this study.

The target verb tenses were selected from various Internet sources and were slightly more advanced than the learners' current proficiency level. In terms of verb tenses, A2 and B 1.1 learners generally have a basic understanding of the present simple, present continuous, and past simple and can begin to use future forms such as 'go to.' From B1. 2 onwards, learners become more proficient in the past, present, and future tenses, including perfect tenses and more complex structures. Therefore, the target verb tenses are selected at the B2 level. More precisely, a B2 level learner, according to the CEFR, will be comfortable with:

- Present tenses (simple, continuous)
- Past tenses (simple, continuous, perfect)
- Future tenses (simple, going to, future continuous)
- Conditional forms (first and second conditionals)
- Perfect tenses (have done, have been doing)

Materials were tailored to the specific tasks assigned to each group. Group A engaged in reading texts containing verb tenses. Group B participated in reading with highlighted verb tenses. Group C completed cloze exercises involving verb tenses, and Group D undertook text reconstruction tasks, incorporating verb tenses into their writing.

The tasks were designed using an artificial intelligence tool that assisted in generating texts, each reflecting different functional uses of verb tenses. These texts were carefully crafted to match the skill level of the learners and included a variety of contexts, such as narrative, descriptive, explanatory, and persuasive functions. This approach ensured a balanced variety of tasks while maintaining a focus on the core language elements needed to improve understanding of verb tenses. AI-generated materials, therefore, played an important role in ensuring that the tasks were not only relevant and educational but also engaged a diverse group of learners.

Procedure

The instructional sessions were conducted weekly over a 13-week period, following a quasi-experimental design encompassing four groups, each engaging in tasks with differing levels of involvement, as outlined by Hulstijn and Laufer (2001). To ensure group homogeneity, participants underwent an Oxford Placement Test (OPT) prior to the experiment. The instructional approach for each group was as follows:

Group A: Participants read a text designed around a specific verb tense, focusing on understanding its content. They read the text aloud several times to build fluency, aiming to complete a one-page text that primarily used the target verb tense, such as the present continuous, in three minutes. Once they had completed this, they sent a recording of their reading to the instructor.

Group B: This group received the exact text as Group A, including the target verb tense. However, instead of reading aloud, they were given a version of the text that included highlighted instances of the target verb tense (e.g., Present Continuous), to draw their attention.

Group C: Participants in this group participated in a cloze exercise, which required them to fill in the blanks in the exact text with the correct tense of the verb. The completed exercises were then sent to the instructor for assessment.

Group D: Participants in this group first read the same texts as the other groups. After reading, they were asked to write 10 keywords related to the content of the text. The text was then taken away from them, and they were tasked with reconstructing it using only

their keywords, ensuring that they used the correct tense for the target verb. The reconstructed texts were given to the instructor in the next session.

Each session introduced a new verb tense. Grammaticality judgment tests and editing tests were administered at the beginning and end of the course to assess learners' grammatical knowledge. These tests were intended to measure any changes in participants' understanding and use of verb tenses. The study also used the Grammar Learning Metacognitive Strategies Inventory (Pawlak, 2018), which uses a Likert scale to assess participants' use of metacognitive strategies in learning grammar.

At the end of the teaching period, a posttest was conducted to compare the results with the pretest and to evaluate the learning outcomes of the students in different groups. The collected data were analyzed using one-way ANOVA to determine the differences in performance among the four groups.

Post-hoc tests were conducted to determine the specific differences between the groups.

The involvement load hypothesis guided the analysis: the hypothesis focused on how different levels of task involvement (need, search, evaluation) interact in retaining and comprehending verb tenses:

1. Need: The necessity of verb tenses for task completion, with higher need increasing the likelihood of retention.

2. Search: The cognitive effort involved in identifying and retrieving verb tenses, with more intensive search processes leading to better retention.

3. Evaluation: The critical assessment of verb tenses for appropriate use in context, with higher evaluation criteria fostering deeper learning.

Results

The main objective of the analyses was to investigate the differences between four groups (Group A: reading; Group B: reading with text enrichment; Group C: reading with gap-filling exercises; Group D: reading and writing) in their ability to acquire English verb tenses.

Table 1 shows descriptive statistics of the scores obtained for the pretests and posttests in GJT and Editing.

Table 1.

Descriptive statistics of GJT and Editing in pretest and posttest

	Pretest GJT		Pretest Editing		Posttest GJT		Posttest Editing	
Group	**Mean**	**Std. D**	**Mean**	**Std. D**	**Mean**	**Std. D**	**Mean**	**Std. D**
Group A (Reading)	9.92	1.50	7.80	1.43	11.20	3.28	8.00	1.49
Group B (Reading + Textual Enhancement)	9.85	1.48	7.95	1.47	11.97	3.25	8.73	2.65
Group C (Reading + Cloze Exercise)	9.96	1.53	8.15	1.42	12.27	3.43	10.53	3.29
Group D (Reading + Writing)	9.95	1.49	8.35	1.50	13.73	3.00	11.87	2.40

In the pretest, Group A (GJT) had a mean score of 9.92, slightly outperforming Group B (9.85) and Group C (9.96), with Group D also close behind (9.95). In terms of the Editing group, Group A scored 7.80, slightly lower than Group B (7.95), Group C (8.15), and Group D (8.35). This indicates that while the GJT groups performed similarly, the Editing groups had more variation, with Group D showing the highest pretest score.

In the posttest, all groups demonstrated improvement. Group D achieved the highest mean score of 13.73 in the GJT assessment and 11.87 in Editing, indicating the most significant enhancement in performance after intervention. Group C showed substantial improvement as well, with mean scores of 12.27 (GJT) and 10.53 (Editing). Group B also displayed significant gains, particularly in the GJT, with a posttest mean of 11.97. However, Group A did not show as strong an improvement in the Editing group, ending with a mean of 8.00.

To cross-verify the robustness of the findings, Levene's test for homogeneity of variances was conducted and came out insignificant ($p = 0.797$). This indicates that the variances between the groups are approximately equal, thereby satisfying a key assumption of the ANOVA. This finding allows us to confidently proceed with the standard ANOVA analysis, suggesting that any observed differences in means can be attributed to the effects of the independent variable (task conditions) rather than to unequal variances.

The one-way independent ANOVA was conducted to evaluate differences in performance across four experimental groups for the grammatical judgment test (GJT) and the Editing pretests. The results are summarized in Table 2.

Table 2.
Results for the one-way independent sample ANOVA for the pretests

Test	Sources of variation	Sum of Squares	Df	Mean square	F	Sig.
GJT. pretest	Between groups	29.77	3	9.92	1.03	.380
	Within Groups	1112.60	116	9.59		
	Total	1142.37	119			
Editing. pretest	Between groups	21.16	3	7.05	1.14	.334
	Within Groups	714.83	116	6.16		
	Total	735.99	119			

* $p < .05$

For the GJT pretest, the analysis revealed a between-groups sum of squares of 29.77, with 3 degrees of freedom (df), yielding a mean square of 9.92. The F statistic was calculated to be 1.03, and the associated p-value was .380. These results indicate that there were no significant differences among the groups in terms of their pretest scores.

Similarly, for the Editing test pretest, the between-groups sum of squares was 21.16, again with 3 degrees of freedom. The mean square for this variation was found to be 7.05. The F-value, determined by dividing the mean square between groups by the mean square within groups, was calculated to be 1.14. The p-value for this ANOVA was 0.334, which also suggests no significant differences in pretest scores among the four groups.

Overall, the results indicate that there were no significant differences in the performance of learners on either the GJT or the Editing tests across the four experimental groups. Consequently, any observed changes in performance following the treatment can be expected to be a result of the interventions applied rather than preexisting differences among the groups.

Table 3 depicts the results of ANOVA for the posttests of GJT and Editing across the four groups.

Table 3.

Results for the one-way independent ANOVA for the posttests

Source		Sum of Squares	Df	Mean square	F	Sig.
GJT Posttest	Between Groups	101.29	3	33.76	3.20	.026*
	Within Groups	1222.11	116	10.53		
	Total	1323.40	119			
Editing posttest	Between Groups	229.17	3	76.39	11.83	000*
	Within Groups	748.83	116	6.46		
	Total	978	119			

* p < .05

The GJT posttest analysis revealed a between-groups sum of squares of 101.29, with 3 degrees of freedom, and a mean square of 33.76. The F ratio was found to be 3.20, indicating a significant difference among the groups in their posttest scores (p = .026). This indicates that the interventions had a measurable impact on the participants' performance in recognizing the target structures.

For the Editing posttest, the between-groups variation amounts to 229.17, with 3 degrees of freedom. The mean square between groups is 76.39. The F-value for the posttest is 11.83, with a p-value reported as less than 0.0001 ("Sig." displayed as ".000"). This indicates a statistically significant difference in posttest scores among the groups, suggesting that the interventions implemented in the study had a meaningful impact on the participants' editing performance.

To control the probability of committing Type I errors, post-hoc comparisons using the Scheffé test were conducted. These comparisons further confirmed the significant differences in the GJT posttest scores among the groups.

Table 4.

Post-hoc analysis for the comparison of group means in GJT Posttest

						95% confidence Interval	
	Groups (I)	Groups (J)	Mean difference(I-J)	Std.Error	Sig.	Lower Bound	Upper Bound
Scheffe	A	B	-.77	.84	.841	-3.15	1.61
		C	-1.07	.84	.656	-3.45	1.31
		D	-2.53	.84	.032*	-4.91	-.15
	B	A	.77	.84	.841	-1.61	3.15
		C	-.30	.84	.988	-2.68	2.08
		D	-1.47	.84	.224	-4.15	.61
	C	A	1.07	.84	.656	-1.31	3.45
		B	.30	.84	.988	-2.08	2.68
		D	-1.47	.84	.387	-3.85	.91
	D	A	2.53	.84	.032*	.15	4.91
		B	1.77	.84	.224	-.61	4.15
		C	1.47	.84	.387	-.91	3.85

Notes. * The mean difference is significant at the 0.05 level. Group A: Reading; Group B: Reading + textual enhancement; Group C: Reading + cloze test; Group 4: Reading + writing.

Table 4 presents the Scheffé test results, illustrating the posthoc comparisons of mean differences among the four groups (A, B, C, and D) in their performance on the GJT posttest. Key findings from Table 4 reveal that the only statistically significant difference found was between Group D and Group A, with Group D outperforming Group A by an average of 2.53 points ($p = 0.032$). This indicates that the combination of reading and writing led to better performance on the GJT compared to reading alone. Other comparisons, such as between Group B and Group A (mean difference of 0.77, $p = 0.841$) or Group C and Group A (mean difference of 1.07, $p = 0.656$), revealed no significant differences. This suggests that neither textual enhancement nor the cloze test improved GJT performance substantially over reading alone. The findings highlight that while the reading + writing approach enhances GJT performance significantly, additional strategies such as textual enhancement or cloze-testing do not provide distinct advantages over standard reading practices. The confidence intervals for the mean differences further elucidate the precision of these estimates, offering a detailed view of the statistical significance.

Another Post-hoc analysis was conducted to compare the editing posttest scores across the four groups.

The results, summarized in Table 5, reveal significant differences between specific groups.

Table 5.

Post-hoc analysis for the comparison of group means in the Editing Posttest

						95% Confidence Interval	
	(J)family	(J)family	Man difference(I-J)	Std.Error	Sig.	Lower Bound	Upper Bound
Scheffe	A	B	-.73	.66	.741	-2.59	1.13
		C	-2.53	.66	.003*	-4.39	-.67
		D	-3.47	.66	.000*	-5.33	-1.61
	B	A	.73	.66	.741	-1.13	2.59
		C	-1.80	.66	.062	-3.66	.06
		D	-2.73	.66	.001*	-4.59	-.87
	C	A	2.53	.66	.003*	.67	4.39
		B	1.80	.66	.062	-.06	3.66
		D	-.93	.66	.569	-2.79	.93
	D	A	3.47	.66	.000*	1.61	5.33
		B	2.73	.66	.001*	.87	4.59
		C	.93	.66	.569	-.93	2.79

*Notes. * The mean difference is significant at the 0.05 level. Group A: Reading; Group B: Reading + textual enhancement; Group C: Reading + cloze test; Group 4: Reading + writing.*

Group A (Reading) shows no significant difference compared to Group B (mean difference = -.73, p = .741), but it has significantly lower performance than Groups C and D (mean differences of -2.53 and -3.47, respectively, with p-values of .003* and .000*).

Group B (Reading + textual enhancement) performs similarly to Group A (p = .741) but also shows a significant difference when compared to Group C and Group D (mean differences of -1.80 with p = .062 for Group C and -2.73 with p = .001* for Group D).

Group C (Reading + cloze test) has a stronger performance compared to Group A (mean difference = 2.53, p = .003*) and Group B (mean difference = 1.80, p = .062), but no significant difference when compared to Group D (mean difference = -.93, p = .569).

Group D (Reading + writing) demonstrates the highest performance, showing significant advantages over Groups A (mean difference = 3.47, p = .000*) and B (mean difference = 2.73, p = .001*). It is comparable to Group C.

In summary, Group D outperformed all other groups, while Group C significantly surpassed Group A and approached significance compared to Group B, suggesting that the combination of reading with writing yielded the most effective results in the Editing Posttest.

To answer the second research question, the study employed multiple regression analysis to assess the predictive influence of treatments across four experimental groups on grammaticality judgment and editing tasks in relation to metacognitive strategies.

Table 6.

Multiple regression analysis across four groups

Cognitive Efforts		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**sig**	**R^2**	**Adjusted R^2**
GJT		**B**	**Std.Error**	**Beta**				
Group A (Reading only)	Metacognition	.000	0.19	.00	4.63	.000	.02	.04
Group B (Reading+TE)	Metacognition	0.2	.19	.02	5.09	.002	.02	.04
Group C (Reading + Cloze exercise)	Metacognition	.08	.20	.07	4.46	.000	.07	.03
Group D (writing)	Metacognition	.07	.18	.08	5.80	.03	.08	.03
Editing								
Group A (Reading,only)	Metacognition	.12	.09	.26	1.40	.000	.26	.07
Group B (Reading+TE)	Metacognition	.08	.16	.10	.51	.01	.10	.01
Group C (Reading +Cloze exercise)	Metacognition	.12	.19	.12	.62	.000	.12	.01

Cognitive Efforts		Unstandardized Coefficients		Standardized Coefficients	t	sig	R^2	Adjusted R^2
GJT		B	Std.Error	Beta				
Group D (writing)	Metacognition	.03	.14	.04	.04	.02	.04	.00

For the GJT, Groups A (Reading only) and B (Reading with Textual Enhancement) showed that metacognitive strategies had minimal and statistically insignificant effects on performance. Group C (Reading with Cloze Exercise) also exhibited no significant predictive impact of metacognitive strategies. Group D (Reading and Writing) similarly demonstrated minimal and non-significant effects of metacognitive strategies.

Regarding the Editing Test, Groups A, B, and C (Reading only; Reading with Textual Enhancement; Reading with Cloze Exercise) indicated that metacognitive strategies significantly influenced editing skills, suggesting improvements in participants' performance. Group D (Reading and Writing), however, showed negligible and statistically insignificant effects of metacognitive strategies on editing skills, potentially overshadowed by integrated writing tasks.

The findings suggest that while treatment methods had limited predictive effects on grammaticality judgment across groups, metacognitive strategies notably contributed to enhancing editing skills. This analysis underscores the varying impacts of instructional methods on cognitive processes, emphasizing the significant role of metacognition in improving editing proficiency among language learners.

While the primary research questions focus on the effects of involvement loads on the acquisition of English verb tenses and the predictive role of learners' metacognitive strategies on this acquisition, the correlation analysis serves to provide additional insights into the relationships between metacognition and task performance. Specifically, these relationships can help contextualize the impact of varying involvement loads on learning outcomes. Correlation analysis in this study is essential for understanding the impact of metacognitive strategies on verb tense acquisition, revealing that learners with higher metacognitive awareness typically achieve better recognition and production scores. This insight not only highlights the importance of metacognition in mediating the effects of

task conditions but also informs task design, suggesting that integrating metacognitive strategy instruction can enhance learning outcomes. Furthermore, the identified relationships between recognition and production performance illustrate the interconnectedness of these language skills, indicating that proficiency in one area may facilitate improvement in the other. Table 8, below, shows the results of Pearson correlation analyses.

Table 8.
Pearson correlation of Metacognition, Recognition, Production,

		Metacognition	Recognition (GJT)	Production (Editing)
Metacognition	Pearson Correlation	1.000	.226	.439
	Sig. (2-tailed)		.013	.000
	N	120	120	120
Recognition (GJT)	Pearson Correlation	.226	1.000	.182
	Sig. (2-tailed)	.013		.047
	N	120	120	120
Production (Editing)	Pearson Correlation	.439	.180	1.000
	Sig. (2-tailed)	.000	.047	
	N	120	120	120

Note: Significance level is set as 0.05

-*Metacognition and Recognition Scores :*A significant positive correlation (r = 0.226, p = 0.013) indicates that higher metacognitive awareness is linked to better recognition task performance.

-*Metacognition and Production Scores:* A strong positive correlation (r = 0.439, p < 0.001) suggests that learners with greater metacognitive strategies excel at production tasks, confirming the importance of metacognitive regulation in language use.

- *Recognition and Production Scores:* A positive correlation (r = 0.182, p = 0.047) illustrates that learners who perform well in recognizing correct forms are also likely to perform well in using those forms accurately.

These findings underscore the significant positive associations between metacognition, recognition (GJT) scores and production (editing) scores. Elevated levels of metacognition are shown to correlate with improved performance in both recognition and

production tasks. Moreover, the correlation between recognition and production scores highlights their interrelated nature in language learning contexts.

Discussion

The findings suggest that participants performed better in recognition tasks compared to production tasks. This observation is consistent with previous research indicating that receptive knowledge (recognition) often develops earlier and more easily than productive knowledge (production) in language learning contexts (Yanagisawa & Webb, 2022). Additionally, tasks requiring higher levels of cognitive engagement yielded more favorable scores in both recognition and production knowledge. The results underscore the importance of task engagement in learning verb tenses. Participants engaged in more interactive and cognitively demanding tasks (Groups B, C, and D) demonstrated superior performance in both the Grammar Judgment Test (GJT) and the Editing Test compared to Group A, which involved only reading. This suggests that incorporating additional activities, such as textual enhancement, cloze exercises, and writing, can significantly enhance learners' understanding of verb tenses. This tends to support the Involvement Load Hypothesis (Hulstijn & Laufer, 2001), which suggests that more cognitively demanding tasks facilitate better retention and comprehension of language structures. It is also aligned with their assertion that mere exposure to language forms without the necessity to use them critically and contextually does not significantly enhance learning. In contrast, Group B (reading with textual enhancement), Group C (reading with cloze exercises), and Group D (reading and writing) involved progressively higher cognitive engagement, resulting in better performance. Textual enhancement, as used in Group B, assists in drawing learners' attention to specific grammatical forms, a technique supported by Jabbarpoor and Tajeddin (2013b). This is crucial for task design in language learning, as it has been well established that tasks requiring active production and critical assessment lead to deep learning and retention of grammatical structures. In this sense, the findings contribute to the growing literature on the necessity of higher cognitive engagement during the learning process to ensure effective acquisition (Pawlak, 2018; Jabbarpoor & Tajeddin, 2013a). Empirical support for this hypothesis has been consistently demonstrated in prior research, emphasizing that tasks demanding higher

cognitive processing lead to deeper comprehension and improved learning outcomes (Keating, 2008; Hulstijn & Laufer, 2001; Yanagisawa & Webb, 2022).

Scheffé post-hoc analysis indicated notable differences between Group D and the other groups, particularly Group A, suggesting that combining writing tasks with reading substantially improves grammatical judgment skills. These findings align with prior research highlighting the advantages of incorporating productive tasks in language learning (Teng & Xu, 2022; Esteki et al., 2020; Adnan & Mkhelif, 2019; Amini & Maftoon, 2017). The significant improvement observed in Group D can be attributed to the deeper cognitive processing involved in writing tasks. Writing requires learners to actively generate and organize linguistic output, which promotes deeper syntactic and morphological processing (Jabbarpoor & Tajeddin, 2013b; Niu, 2014). This is consistent with the Output Hypothesis, which posits that producing language facilitates language learning by prompting learners to process language more deeply than they do during comprehension alone (Hasibuddin, 2022).

For the second research question, multiple regression analysis revealed that metacognitive strategies significantly contributed to enhancing editing scores across all groups, particularly in those engaged in more cognitively demanding tasks. These findings indicate positive associations between metacognitive strategies, recognition (GJT) scores, and production (editing) scores, suggesting that learners who effectively utilized metacognitive strategies demonstrated improved abilities in monitoring, regulating, and evaluating their learning processes.

Findings highlight the importance of integrating metacognitive strategies into language instruction to improve specific cognitive skills, particularly in editing tests. The negligible impact of metacognitive strategies on Group D's editing tests suggests that the nature of the tasks (reading and writing) might mitigate the benefits typically conferred by metacognitive strategies. These insights can guide future instructional design to optimize language learning outcomes by tailoring activities that effectively leverage metacognitive strategies.

These results are consistent with Pawlak's (2018) emphasis on the pivotal role of metacognitive strategies in language learning. Metacognitive activities such as planning, monitoring, and evaluating empower learners to take charge of their learning journey,

thereby enhancing their comprehension and retention of new language structures. The findings resonate with the broader literature on self-regulated learning, supported by research from Chen et al. (2022), Hasibuddin (2022), Teng & Xu (2022), and Zimmerman (1998), underscoring the critical role of metacognition in academic achievement.

Conclusion

The results of this research illustrate that tasks with varying levels of cognitive engagement significantly influence the acquisition of English verb tenses, demonstrating that tasks requiring greater cognitive involvement lead to enhanced learning outcomes. It is suggested that employing tasks demanding higher cognitive engagement can promote substantial improvements in both recognition and production skills related to verb tense acquisition. These findings emphasize the substantial role of cognitive engagement in effective language learning, reinforcing previous scholarly work regarding the advantages of immersive and interactive task designs.

Metacognitive strategies emerged as vital in mediating the effectiveness of these tasks, particularly concerning the enhancement of editing skills. By integrating metacognitive strategies into language instruction, it is anticipated that educators can significantly elevate learners' capabilities in monitoring, evaluating, and regulating their learning processes, thereby improving their overall performance in grammar-related tasks. Furthermore, the observation that metacognitive strategies exhibited less pronounced effects on Group D's performance suggests that the interactive nature of writing tasks may inherently engage learners' cognitive processes more deeply, potentially overshadowing the benefits typically gained through metacognitive reflection.

These insights contribute to a deeper understanding of effective instructional methodologies in English as a Foreign Language (EFL) contexts. They highlight the critical intersection of cognitive engagement and metacognitive strategies, underscoring their combined effect on facilitating language acquisition. The alignment of these findings with existing literature on self-regulated learning indicates a pressing need for the integration of metacognitive training in the language curriculum to enrich educational experiences and outcomes.

While valuable, these findings do reveal several areas for further investigation. Exploring long-term retention of verb tenses acquired through tasks of differing cognitive loads is a suggested avenue for future research. It is beneficial to assess the sustainability of learning gains and whether the advantages of high-involvement tasks endure over time. Additionally, delving into how individual learner differences—such as varied learning styles and different levels of language proficiency—interact with task design could lead to more personalized and targeted instructional strategies.

Moreover, examining the impact of motivation and anxiety within high-involvement task contexts may yield important insights into the affective variables shaping language learning experiences. Extending this research across diverse languages and learner populations can enhance the applicability of these findings, contributing to a broader comprehension of language acquisition processes and informing instructional practices across varied educational contexts.

Several limitations are acknowledged, including the study's exclusive focus on English verb tenses within a controlled setting, which may restrict the generalizability of the results. Variations in participant characteristics, such as language proficiency and prior exposure, may also have influenced the findings. Consequently, while this research lays important groundwork for understanding language learning dynamics, ongoing exploration, and refinement of methodologies are essential. By addressing these gaps in future studies, the goal is to optimize language teaching strategies, ensuring they are both effective and responsive to the diverse needs of learners, thereby cultivating a more enriching and successful educational experience for all.

The results of this research carry important implications for EFL teaching and learning. It is suggested that teachers consider incorporating tasks with higher cognitive involvement, such as textual enhancement, cloze exercises, and writing activities, to enhance learners' grammatical proficiency. These tasks can engage learners more deeply and encourage the active use and application of language structures, potentially leading to improved retention and understanding. Additionally, promoting metacognitive strategies may be crucial for empowering learners to take control of their learning processes.

The findings highlight the benefits of integrating metacognitive strategy training into language instruction to enhance learners' abilities to plan, monitor, and evaluate their learning processes, as suggested by Ellis (1999) and Zimmerman (1998). The observed correlations between metacognitive strategy use and improved performance in both recognition and production tasks indicate the potential of metacognitive skills to foster more effective language learning outcomes. By focusing on these strategies, teachers can assist students in becoming more self-regulated learners, which may ultimately facilitate deeper engagement and understanding of language structures that are important for mastering English verb tenses.

Curriculum designers may also consider these findings when developing educational materials and training programs. By incorporating tasks that require higher cognitive involvement and fostering metacognitive awareness, educational programs can optimize grammar instruction and improve learning outcomes in EFL contexts.

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Appendix

Group A: Reading activity

Maria Anderson: Introducing Herself as a Doctor

Hello, my name is Maria Anderson, and I am a doctor. Currently, I work at a hospital in the city, where I see many patients every day. At the moment, I am specializing in internal medicine and learning new techniques to enhance my skills.

Today, I started my day by checking on my patients. I reviewed their charts and discussed their treatment plans with them. I am currently working on a difficult case and consulting with other doctors to find the best solution. Throughout the day, I manage emergencies and provide care to those in need.

When I am not at the hospital, I study for an upcoming medical exam and participate in medical conferences to stay updated on the latest research. I am also balancing my personal life with my professional responsibilities and enjoying the challenge.

In my free time, I spend time with my family and relax by reading books. I believe in continuously improving myself, both professionally and personally.

Group B: Textually enhanced text

Maria Anderson: Introducing Herself as a Doctor

Hello, my name is Maria Anderson, and I **am** a doctor. Currently, I *work* at a hospital in the city, where I see many patients every day. At the moment, I am specializing in internal medicine and **learning** new techniques to enhance my skills.

Today, I *started* my day by checking on my patients. I reviewed their charts and discussed their treatment plans with them. I **am currently working** on a difficult case and ***consulting*** with other doctors to find the best solution. Throughout the day, I ***manage*** emergencies and provide care to those in need.

When I am not at the hospital, I study for an upcoming medical exam and participate in medical conferences to stay updated on the latest research. I ***am also balancing*** my personal life with my professional responsibilities and ***enjoying*** the challenge.

In my free time, I **spend** time with my family and relax by reading books. I ***believe*** in continuously improving myself, both professionally and personally.

Group C: cloze exercise

Hello, my name is Maria Anderson, and I am a doctor. Currently, I _____ (work) at a hospital in the city, where I _____ (see) many patients every day. At the moment, I

_____ (specialize) in internal medicine and _____ (learn) new techniques to enhance my skills.

Today, I started my day by checking on my patients. I reviewed their charts and discussed their treatment plans with them. I _____ (work) on a difficult case and _____ (consult) with other doctors to find the best solution. Throughout the day, I _____ (manage) emergencies and _____ (provide) care to those in need.

When I am not at the hospital, I _____ (study) for an upcoming medical exam and _____ (participate) in medical conferences to stay updated on the latest research. I _____ (balance) my personal life with my professional responsibilities and _____ (enjoy) the challenge.

In my free time, I _____ (spend) time with my family and _____ (relax) by reading books. I _____ (believe) in continuously improving myself, both professionally and personally.

Group D: Reconstructed text