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Do Linguistic Proficiency and Task Cognitive Complexity Affect Vocabulary Retention of ESL Learners?

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Abstract

Recently a few studies have examined the relationship between learner proficiency and vocabulary acquisition and retention (Kim, 2008; Tekmen & Daloglu, 2006). However, studies that have examined the effects of learner proficiency and task complexity on vocabulary development and retention are scanty. Hence, this study aimed to investigate whether proficiency levels of the sample and task complexity affected their performance and lexical retention while working on vocabulary tasks that made different degrees of cognitive demands. The Cognition Hypothesis of Robinson (2001) claims that increasing task cognitive demands along certain dimensions of the Triadic Componential Framework (TCF) will enhance the quality of L2 production. Drawing on the TCF, cognitive complexity was manipulated along +/- few elements and +/- single task variables to produce simple, complex, and + complex vocabulary tasks. Sample, comprising of 130 first-year undergraduate students, was divided into two groups – basic and intermediate levels of English language proficiency—based on their scores in a vocabulary test conducted earlier. The sample performed on the tasks and after two weeks participated in a delayed recall test. Results of the study indicated that linguistic proficiency affected the retention and recall of lexical items across the tasks. Learners with basic level of proficiency performed significantly better on + complex task than on simple and complex tasks but retained a greater number of words from the simple task than from the complex tasks. Participants with intermediate level of proficiency performed better on the complex and + complex tasks than on the simple task but retained a larger quantity of words from the simple and + complex tasks than from the complex task. These findings have several implications for the ESL learners of various proficiency levels in terms of gradation of tasks that would facilitate vocabulary development.

Keywords: Vocabulary acquisition, cognition hypothesis, task complexity, task types, learner proficiency.

1. Introduction

Researchers have recognized the importance of reading in the development of L2 competence, in addition to the role reading plays in enhancing vocabulary. Additionally, Hulstijn and Laufer (1996) identified better reading-based vocabulary tasks, arguing that these tasks entail more in-depth processing compared to other tasks.

However, according to Wu et al. (2012), researchers have provided a post hoc interpretation of the research findings without offering an operationalizable definition for deeper level of processing of better tasks. Bridging the gap Robinson's (2005) task complexity of TCF proposes a criterion for grading tasks. However, majority of research was on task complexity which has obscured the impact of learner proficiency, its connection with task complexity, and vocabulary task performance and retention. There are only a few studies that included learner proficiency along with task complexity and vocabulary task performance and retention, as proficiency is a variable that researchers generally control. Hence, the present study examined the impact of operationalizing task complexity and various levels of linguistic proficiency of ESL learners on reading-based vocabulary tasks performance.

2. Review of literature

The following sections of the article discuss research related to vocabulary learning through reading, task complexity, and learner proficiency.

Studies that attempted to understand how learners acquired vocabulary through reading and have recalled the same have shown mixed results. In their study, Hulstijn et al. (1996) found that the vocabulary retention of the students in three different conditions: provision of marginal glosses (MG), use of a dictionary (D), and a control group (C) that did not use either marginal glosses or dictionaries differed significantly. In these three conditions, 78 first-year Dutch students with advanced linguistic proficiency read a text and then responded to comprehension questions without referring to the text. The findings of the study demonstrated that the retention scores of MG group were slightly higher than those of the D group. The MG group surpassed the D group by two due to a greater degree of information processing in the reading of texts, whereas the success of the D group throughout the text was based on inference. In contrast to the MG group, the D group could remember meanings of words better when they looked them up in a dictionary.

However, researchers utilised post hoc analysis of the results to explain the result of greater performance, typically assuming that there is more depth of processing engaged in a better task. Also, as Laufer and Hulstijn (2001) pointed out, the mostly post hoc interpretation of the research findings lacks an operationalizable definition. In addition, their study does not provide any specific criteria for grading tasks in terms of the processing time required to work on a task. Therefore, it is difficult to decide while designing tasks which of them demands a higher level of cognitive processing. Nevertheless, sequencing tasks according to cognitive complexity is one of the crucial components of syllabus design. Robison's (2005, 2007) TCF proposes grading and sequencing of tasks based on their cognitive complexity which is discussed in the following section.

Task complexity is defined as "attentional, memory, reasoning, and other information processing demands imposed by the structure of the task on the language learner" (Robinson, 2001). Task complexity differs from task conditions and task difficulty. It is a cognitive component that includes attention and memory and the resources required to complete tasks. Further, within task complexity, a distinction is made between resource-directing dimensions (e.g., +/- few elements) that place cognitive or conceptual demands and resource-dispersing dimensions (e.g., +/- single task) that impose procedural or performative demands on learners. According to Robinson (2005), resource-directing dimensions direct learners' attention to specific L2 lexical items or syntactic structures, shifting their focus from pragmatic to syntactic code so that interlanguage analysis can reveal novel form-function mappings. However, resource-dispersing dimensions, according to Robinson (2011), aim at drawing learners'

attention to the numerous non-linguistic characteristics of a task and promote automaticity and control over the language resources in their interlanguage system. Robinson (2010) asserts that L2 development is contingent upon task complexity operationalization employing variables from both the resource-directing and resource-dispersing dimensions.

Nonetheless, while recent studies in TBLT (Nunan, 2004) have affirmed the importance of tasks in teaching, perspectives of ELT practitioners have differed on the effects of task complexity manipulation on task performance and word retention (Robinson, 2001; Skehan, 1998) as well as the influence of individual differences in proficiency, aptitude, motivation (Robinson, 2005) etc., (Awwad & Tavakoli, 2019). When Jackson and Suethanapornkul (2013) reviewed the literature on task complexity, they found two major limitations: "a lack of investigation into diverse factors of task complexity as well as a lack of uniformity in the operationalization of these variables" and "the connection between task complexity and learner-internal factors such as learner proficiency" (Awwad & Tavakoli, 2019). The next section of the article discussed the impact of learner proficiency on the performance of tasks.

Gaillard and Tremblay (2016) define proficiency as "the linguistic knowledge and skills that underlie L2 learners' successful comprehension and production of the target language" (Awwad & Tavakoli, 2019). Recent research in task complexity (Kormos & Trebits, 2011) has indicated that learner factors, such as language proficiency and working memory have a little impact on task performance when compared to the influence of task complexity. Ishikawa (2006) and Kim (2009) examined the interactional impact of L2 proficiency and task complexity on task performance.

Ishikawa (2006), for instance, investigated the impact of language proficiency and task complexity manipulated along +/- here-and-now versus there-and-then variables on second language written task performance. The study included 54 Japanese high school students who were divided into two groups—students with high and low language proficiency. They worked on a narrative writing task in which the presence or absence of a cartoon strip determined the task complexity. Findings of the study indicated that task complexity and L2 proficiency, which had a strong influence on target-like use of articles (TLU) articles, S-nodes per T-unit, and words per T-unit, were shown to be mostly independent of each other. However, a substantial impact of task complexity and learner proficiency interaction on type-token ratio (TTR) was identified, indicating that task complexity effects were detected exclusively in the low-proficiency group. This implies that task complexity impacts may vary according to proficiency levels.

In essence, while the TCF proposed by Robinson (2001) has piqued the interest of ELT practitioners, majority of research is on investigating the effects of task complexity. The influence of learner proficiency, on the other hand, is a largely ignored aspect with its relation to task complexity effects and task performance. In most cases, L2 proficiency is a variable that researchers seek to control in their studies. Ishikawa's (2006) research has demonstrated that task complexity manipulation has improved the performance in the writing task of learners with low-proficiency. However, research studies that explored vocabulary acquisition and retention at various levels of linguistic proficiency and cognitive task complexity are scanty. A few studies have examined the relation between learner proficiency and vocabulary acquisition without manipulating task complexity (e.g., Kim, 2008; Tekmen & Daloglu, 2006). Hence, given the paucity of research on the impacts of learner proficiency, this study investigated into the combined effects of ESL learners' basic and intermediate levels of linguistic proficiency and task complexity on the cognitively modified vocabulary tasks performance and word retention.

3 Method

The study adopted a mixed-methods approach, combining quantitative performance outcome assessments with the data gathered via a semi-structured questionnaire and focus-group interviews. The results of the study are highly accurate when the data is obtained, assessed, interpreted, and presented in numerical form.

The study aimed at investigating whether linguistic proficiency of learners influenced their performance and retention in cognitively manipulated vocabulary development tasks. Using the TCF proposed by Robinson (2001), cognitive complexity was operationalized along +/- few elements and +/- single task variables to create simple, complex, and + complex task types at different complexity levels. Thus, the following hypotheses were formulated:

1. Learners' linguistic proficiency and task complexity manipulations significantly affect their performance in vocabulary development tasks.
2. Learners with basic level of proficiency will better recall the target words from the simple task version than the complex task versions.
3. Learners with intermediate level of proficiency will retain a large number of words from the complex task versions than the simple task version.

The study attempted to investigate whether ESL learners' linguistic proficiency levels and task complexity affect vocabulary acquisition and retention of select target words. Levels of task complexity (simple, complex, and + complex) as well as the learner proficiency (basic and intermediate levels) are the independent variables under investigation in this study. The dependent variable is word recall measured by the degree of accuracy in terms of form, meaning, and use.

Learner proficiency being a Between-Subjects variable and task complexity being a Within-Subjects variable, participants were allocated to basic and intermediate proficiency groups. They worked on the simple, complex, and + complex tasks.

Table 1. Research design with learning proficiency and task complexity factors

Group	**Proficiency level**	**Three Readin Texts**	**Task complexity across Vocabulary Tasks (sim) (com) (+com)**	**No. of Exposures**	**Delayed recall test** (after 7 days)
G1	**basic**	Text 1 - Text 2 - Tex 3	Task 1 - Task 2 - Task 3	3	**(PO, PG, RG, RS, RA)**
G2	**intermediate**	Text 1 - Text 2 - Tex 3	Task 1 - Task 2 - Task 3	3	

The study included 130 non-native English speakers in their first-year of undergraduate course at a Degree College in Telangana State. Participants, aged between 18-20, were predominantly Telugu speakers and were from a semi-urban area of the State. English is taught as a second language in regional medium schools in Telangana beginning from class III. Thus, the participants had at least ten years of exposure to English.

For the study, a list of lexical items from the vocabulary development activities in the textbook prescribed for the first-year undergraduate level was prepared. Out of these words, a total of fifty-five words were selected for the diagnostic test which aimed at understanding words the participants were familiar with. Based on the responses of the sample, twenty-four target words were chosen from the four grammatical categories (verbs, nouns, adjectives, and adverbs). The updated Vocabulary Levels Test (VLT) designed by Webb and Sasao (2013) was

adapted to gauge the proficiency level of the sample.

3.1 Research Tools

The following tools were used to collect data:

a) Reading texts: Three expository reading texts were developed, each containing eight bold-faced target words inserted in the text. As opposed to narrative texts whose purpose is to narrate a story, expository texts convey factual information or explain something. Thus, expository texts are non-fictional, academic in nature, and more formal in style, while narrative texts are fictional.

b) Vocabulary tasks: Following each reading text, vocabulary tasks with varying levels of cognitive complexity were created: simple (Task 1), complex (Task 2), and + complex (Task 3).

Table 2. Task complexity operationalization along the TCF's variables

Cognitive complexity factors	**Task 1**	**Task 2**	**Task 3**
	Simple	**Complex**	**+ Complex**
+/- few elements variable of Resource-directing dimensions	+ few elements	+ few elements	- few elements
+/- single task variable of Resource-dispersing dimensions	+ single task	- single task	- single task

Task 1: Cognitive complexity is operationalized along + few elements and + single task variables to design a multiple-choice task. It is cognitively simple as it directs learners' attention to only a few linguistic elements and places minimal performative constraints on learners in terms of processing due to single task demand.

Task 2: A task containing definitions is made relatively complex by manipulating cognitive complexity along + few elements and - single task variables. In order to complete the task, learners must identify the target words from the reading text that correspond to the definitions and write them in the space provided. It entails learners' interaction with certain linguistic elements in the text to associate the word meaning and its contextual use with the suitable definitions. In addition, the complex task necessitates increased performative requirements from learners owing to several processing demands.

Task 3: In a + complex task, learners must determine the correct meaning of each target word before creating sentences with it. It is made relatively more complex by operationalizing cognitive complexity along - few elements and - single task variables. It imposes higher conceptual and performative demands on learners as they have to pay attention to several linguistic elements and dual tasks demands.

c) A delayed recall test: The research employed the Vocabulary Knowledge Test (VKT) of Webb (2007) which includes several such sub-tests as productive knowledge of orthographic form (PO), productive grammatical knowledge (PG), receptive grammatical knowledge (RG), receptive knowledge of syntax (RS), and receptive knowledge of association (RA) designed around the target vocabulary for the assessment of the productive and receptive

vocabulary knowledge of learners.

d) The updated version of the Vocabulary Levels Test (VLT): The VLT assesses students' understanding of word form-meaning relationships at four frequency levels (2000, 3000, 5000, and 10,000) and at an academic vocabulary level. In this study, however, the L2 linguistic proficiency of learners was measured using the improved VLT version of Webb and Sasao (2013), which covers the most frequently occurring 1000-word families that account for up to 80% of English.

e) Questionnaire: A questionnaire was administered to the participants to gauge their perceptions on the length of the reading texts, cognitive complexity of processing information provided in the text, familiarity with the topic of the text. The questionnaire also tried to elicit responses in terms of the text's ability to arouse the interest of the sample, time given to the sample to work on the tasks, instructions provided to complete the tasks, mental effort required to work on the tasks, and the degree of their involvement in the tasks.

f) Focus-group interviews: Interviews enable effective monitoring of the process flow as well as the ability to clarify any difficulties that arise during the process. Thus, focus-group interviews were conducted in order to elicit respondents' opinions about complexity levels of the texts they had read and the tasks they had worked on.

3.2 Procedure

Based on their performance in VLT, hundred and thirty participants were selected for the study who were then assigned to two groups—those with basic level of language proficiency and the ones with intermediate level. After having read a text in which the target words were embedded, the participants worked on the vocabulary tasks. No time limit was set for reading the text.

3.3 Data analysis

Since all participants worked on simple, complex and + complex tasks, their performance on tasks and their retention of words were assessed in terms of accuracy (percentage of error-free words in terms of form, meaning, and use). The hypotheses were tested by comparing the population means of two samples using 2x3 mixed-methods ANOVA to determine if the means of the population differed significantly. After coding the questionnaire and transcribing interviews, findings were compiled and analyzed to examine patterns of responses.

4. Results

Participants' responses on the questionnaire were used to determine how much of a strain the task variants imposed on cognitive processes involved in working on the tasks. Based on the patterns drawn from the questionnaire, it was noted that increased task complexity had a comparable impact on cognitive load, such that the complex version was seen to be challenging and time-consuming. Similarly, focus-group interviews revealed that participants with basic and intermediate levels of linguistic proficiency found complex task versions entailing a processing of a number of elements simultaneously to arrive at the answers and complete the task.

The effects of linguistic proficiency and cognitive load measures were analyzed using a 2x3 mixed-model ANOVA in SPSS. The main impact of proficiency and task complexity as well as their interaction effects on the vocabulary task scores were examined using an alpha level of .05.

Results of Hypothesis 1. Learners' linguistic proficiency and task complexity manipulations significantly affect their performance in vocabulary development tasks.

The findings of the ANOVA, shown in Table 3, highlight the main effect of Within-Subjects factor (task complexity) and the task complexity x proficiency interaction. The sig. column reveals that there is a high probability for both the main effect of the task complexity ($p < .001$) and interaction effect

of the task complexity x proficiency ($p < .001$), indicating a significant impact on vocabulary task performance.

Table 3. ANOVA results for the Within-Subjects effects on task performance

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Task complexity	Sphericity Assumed	844.492	2	422.246	144.441	.000	.530
	Greenhouse-Geisser	844.492	1.781	474.286	144.441	.000	.530
	Huynh-Feldt	844.492	1.818	464.506	144.441	.000	.530
	Lower-bound	844.492	1.000	844.492	144.441	.000	.530
Task complexity * proficiency	Sphericity Assumed	113.805	2	56.903	19.465	.000	.132
	Greenhouse-Geisser	113.805	1.781	63.915	19.465	.000	.132
	Huynh-Feldt	113.805	1.818	62.598	19.465	.000	.132
	Lower-bound	113.805	1.000	113.805	19.465	.000	.132
Error (Task complexity)	Sphericity Assumed	748.369	256	2.923			
	Greenhouse-Geisser	748.369	227.911	3.284			
	Huynh-Feldt	748.369	232.709	3.216			
	Lower-bound	748.369	128.000	5.847			

The ANOVA results for the Between-Subjects (proficiency) effects ($p = .036$) demonstrates that the main effect of proficiency on the vocabulary task performance is partially significant $F(1, 128) = 4.49$, $p = .036$.

Table 4. ANOVA results for the Between-Subjects variables

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	14148.208	1	14148.208	888.334	.000	.874
proficiency	71.510	1	71.510	4.490	.036	.034
Error	2038.615	128	15.927			

As the main effect of proficiency was statistically less significant ($p > .036$), the mean task scores for basic and intermediate proficiency groups were compared (table 5).

The mean scores of intermediate proficiency group (M = 6.45) found to be greater than that of basic proficiency group (M = 5.60) indicating a significant difference in task performance between the two groups.

Table 5. Marginal mean scores for the main effect of proficiency

Estimates				
Measure: MEASURE_1				
			95% Confidence Interval	
proficiency	Mean	Std. Error	Lower Bound	Upper Bound
basic	5.595	.286	5.029	6.160
inter	6.451	.286	5.886	7.017

Task complexity had a significant effect (table 6), F (2, 256) = 144.44, p < .001, and its impact on task scores varied considerably across Task 1 (M = 4.75), Task 2 (M = 5.24), and Task 3 (M = 8.09).

Table 6. Marginal mean scores for the main effect of task complexity

Estimates				
Measure: MEASURE_1				
Task complexity	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Task 1	4.746	.186	4.379	5.113
Task 2	5.238	.182	4.878	5.599
Task 3	8.085	.316	7.460	8.710

Further, the interaction effect of proficiency and task complexity was also observed (table 7), F (1, 256) = 19.465, P > .000. Thus, the task performance outcomes significantly varied between the groups of basic (Task 1, M = 4.15; Task 2, M = 4.25; Task 3, M = 8.38) and intermediate (Task 1, M = 5.34; Task 2, M = 6.23; Task 3, M = 7.78) levels of proficiency. Participants with basic proficiency level performed better on the + complex (M = 8.38; M = 7.78) than on the simple and complex tasks. Thus, the hypothesis 1 is confirmed regarding the combined effects of learner proficiency and task complexity on task performance.

Table 7. Interaction effect of proficiency and task complexity on task performance

proficiency * task complexity					
Measure: MEASURE_1					
proficiency	Task complexity	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
basic	Task 1	4.154	.262	3.635	4.673
	Task 2	4.246	.258	3.736	4.757
	Task 3	8.385	.447	7.501	9.269
inter	Task 1	5.338	.262	4.819	5.858
	Task 2	6.231	.258	5.720	6.741
	Task 3	7.785	.447	6.901	8.669

Results of hypothesis 2: Learners with basic level of proficiency will better recall the target words from the simple task version than the complex task versions.

Results of hypothesis 3: Learners with intermediate level of proficiency will retain a large number of words from the complex task versions than the simple task version.

With regard to hypotheses 1 and 2, the main effect of the Within-Subjects factor (task complexity) and the interaction effect of task complexity x proficiency on word retention are shown in Table 8. The results revealed that the likelihood of the main impact of complexity (p <.001) is substantial, but the interaction effect of complexity x proficiency (p = .319) is not.

Table 8. ANOVA results for the Within-Subjects effects on the target word retention

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Task complexity	Sphericity Assumed	185.185	2	92.592	71.207	.000	.357
	Greenhouse-Geisser	185.185	1.917	96.596	71.207	.000	.357
	Huynh-Feldt	185.185	1.961	94.443	71.207	.000	.357
	Lower-bound	185.185	1.000	185.185	71.207	.000	.357
Task complexity * proficiency	Sphericity Assumed	2.600	2	1.300	1.000	.369	.008
	Greenhouse-Geisser	2.600	1.917	1.356	1.000	.367	.008
	Huynh-Feldt	2.600	1.961	1.326	1.000	.368	.008
	Lower-bound	2.600	1.000	2.600	1.000	.319	.008
Error (task complexity)	Sphericity Assumed	332.882	256	1.300			
	Greenhouse-Geisser	332.882	245.390	1.357			
	Huynh-Feldt	332.882	250.983	1.326			
	Lower-bound	332.882	128.000	2.601			

Similarly, the main effect of proficiency on target word retention is significant F (1, 128) = 9.477, p = .003, according to the ANOVA results for the Between-Subjects (proficiency) effects (table 9). Since the sig. column value (p = .003) is smaller than.05, the main effect of proficiency on target word retention is significant.

Table 9. ANOVA results for the Between-Subjects effects on the target word retention.

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	14004.023	1	14004.023	4200.702	.000	.970
proficiency	31.592	1	31.592	9.477	.003	.069
Error	426.718	128	3.334			

The mean task scores for basic and intermediate proficiency groups were compared since the main effect of proficiency was statistically significant (p = .003) (table 10). The intermediate proficiency group's mean scores (M = 6.28) were higher than the basic proficiency group's (M = 5.71), indicating a substantial difference in target word retention between the two groups.

Table 10. Marginal mean scores for the main effect of proficiency on the target word retention

Estimates

Measure: MEASURE_1

proficiency	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
basic	5.708	.131	5.449	5.966
inter	6.277	.131	6.018	6.536

Task complexity displayed a significant main effect, F (2, 256) = 71.20, p < .001, with different effects on mean task scores for Task 1 (M = 6.92), Task 2 (M = 5.277), and Task 3 (M = 5.78) (table 11).

Table 11. Mean scores for the main effect of task complexity on the target word retention

Estimates

Measure: MEASURE_1

Task complexity		Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Task 1	Sub-tests	6.923	.124	6.678	7.169
Task 2	(PO, PG, RG, RS,	5.277	.107	5.066	5.488
Task 3	RA)	5.777	.137	5.505	6.049

Further, there was no interaction effect of proficiency and task complexity, F (2, 26) = 1.000, p = .319 on target word retention. The mean scores for the interaction effect on target word retention did not differ between the groups of basic (Task 1, M = 6.54; Task 2, M = 5.09; Task 3, M = 5.49) and intermediate (Task 1, M = 7.31; Task 2, M = 5.46; Task 3, M = 6.06) proficiency levels (table 12). However, the mean differences in target word retention scores from the subtests are listed for Tasks 1, 2, and 3 of the basic and intermediate levels of linguistic proficiency. Although, the sub-tests were designed to assess word retention accuracy in terms of specific word knowledge properties (form, meaning, and use), the primary purpose was to discover which task type resulted in greater word retention. While the simple task enabled participants with basic level of linguistic proficiency to retain a higher number of words than the complex and +complex tasks, thus confirming hypothesis 2, the third hypothesis is partially confirmed, as both simple and +complex tasks enhanced better target word retention in participants with intermediate level of proficiency than the complex task.

Table 12. Interaction effect of proficiency and task complexity on the target word retention

proficiency * task complexity

Measure: MEASURE_1

proficiency	task complexity		Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
basic	Task 1		6.538	.175	6.191	6.886
	Task 2	**Sub-tests**	5.092	.151	4.794	5.391
	Task 3	(PO, PG, RG, RS, RA)	5.492	.194	5.108	5.877
inter	Task 1		7.308	.175	6.961	7.655
	Task 2		5.462	.151	5.163	5.760
	Task 3		6.062	.194	5.677	6.446

5. Discussion

The aim of the study was to examine whether learner proficiency and task complexity manipulations affect cognitive load and result in the appropriate changes in vocabulary development.

The results of the study indicated a substantial main effect of task complexity ($p < .001$) as well as the interaction impact of task complexity and learner proficiency on vocabulary performance; but the main effect of learner proficiency was not significant ($p = .036$) on task performance. However, participants with a basic level of proficiency performed better on the + complex task version than the simple and complex task versions due to the interaction impact of task complexity and language proficiency. Participants with an intermediate level of proficiency, on the other hand, scored higher on complex task versions than on simple task version. Similarly, when the target word retention scores from the sub-tests were examined, it was found that both task complexity and learner proficiency had a substantial main effect on the results ($p < .001$); whereas their interaction did not impact word retention ($p = .319$). However, due to the main effect of task complexity and learner proficiency, learners with intermediate level of proficiency recalled more words from simple and + complex tasks than from the complex task.

Despite the fact that L2 proficiency had no significant effect on vocabulary task performance, the study found significant L2 proficiency and task complexity effects, with participants with intermediate levels of linguistic proficiency performing better on the tasks than those with basic levels of proficiency. However, the main effect of learner proficiency was substantial in terms of target word retention, with participants with intermediate levels of proficiency recalling the target words better than those with basic levels of linguistic proficiency. In terms of target word recall, however, no interaction effects of learner proficiency and task complexity were discovered. Participants with the basic level of proficiency retained a large number of words from the simple task, whereas those with an intermediate level of proficiency remembered a greater number of target words from both the simple and +complex tasks.

A possible explanation for the sample to have performed better on the complex task versions and retained targeted words can be explained in the views of Robinson (2005), who states "cognitively complex tasks encourage heightened attention to input (leading to more 'noticing' of form), and deeper processing (leading to longer-term retention) compared to simpler versions". Further, the current study, having garnered participants' self-ratings on the affective variable questionnaire, obtained reliable empirical support that increasing the number of elements and integrating dual task demands in a task had a significant effect on task performance due to increased cognitive demands that the structure of the task had placed on them. Besides, regardless of L2 proficiency levels, participants rated the complex task versions as being more difficult, stressful, and demanding more mental effort; and that it took a long time to complete. As regards the performance outcomes on the simple task versions, participants' self-ratings on the questionnaire revealed that the simple task was easy as they had to choose the most appropriate one from amongst the options provided. Thus, though the participants with the basic proficiency level performed better on the complex task versions initially, in the delayed recall test they could retain the target words better from the simple task.

6. Conclusion

The findings of the research on the impact of task complexity and learner proficiency demonstrated that increasing task complexity along +/- few elements and +/- single task variables would place greater cognitive demands on learners and lead to better vocabulary performance and the target word retention. As a result of the considerable interaction between task complexity and L2 proficiency, the impacts of task complexity appear to be greater on learners with high-proficiency level. Thus, this study confirms Robinson's (2001) Cognition Hypothesis in terms of vocabulary performance and lexical retention. This could imply that teachers can be encouraged to construct or adapt tasks to

assist students with low and high linguistic proficiencies to build confidence and improve task performance. Instructional designers can define a task's standard of performance as a way to gauge learners' progress based on their perceived success with the simple task version. However, the study has some limitations, such as the size of the sample, task complexity, and learner proficiency at two levels only. Hence, more task parameters could be manipulated in future studies in order to significantly enhance task complexity and include learners with advanced linguistic proficiency.

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