

Data-Driven Learning Tasks and Involvement Load Hypothesis

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Abstract

Despite the increasing research on the benefits of using corpora in language teaching and learning, Data-Driven Learning (henceforth, DDL) research has been criticized for its lack of contribution to second language theories. This paper intends to address this gap by examining the assumptions of Involvement Load Hypothesis (ILH) using two DDL tasks with different cognitive loads. Learners were assigned to one of two conditions: reading only or translation. Based on ILH, translation is more effective than reading in learning vocabulary, as it induces more cognitive involvement (Laufer & Hulstijn, 2001). The two groups received a pretest to ensure their unfamiliarity with six target words. Each group underwent one instructional session under one of the two conditions. After the session, students took three immediate post tests on the six target items: active recall of form, passive recall of meaning, and production. Contrary to the expectations of ILH, the results of the immediate post tests showed no statistically significant difference in the mean of vocabulary knowledge between the two groups. In addition, in the delayed test, the reading-only group showed statistically higher scores in the active recall of form than their translation peers. The findings highlight some important theoretical and pedagogical implications for using DDL tasks, particularly for EFL vocabulary learning.

Keywords: corpora, foreign language acquisition, ILH, vocabulary, cognitive load, DDL

1. Introduction

Vocabulary knowledge is generally endorsed as the backbone of education and language learning (Durrant, Brenchley & McCallum, 2021), yet it is still one of the main obstacles learners encounter in their foreign language learning experience (Daller & Phelan, 2013; Douglas, 2010; Morris & Cobb, 2004; Pennebaker, Chung, Frazee, Lavergne, & Beaver, 2014). A considerable number of studies have explored various practical methodologies and tools to help learners enlarge their vocabulary knowledge. The availability of various types of digital corpora and the advances in corpus linguistic tools have contributed to increasing interest in using corpus-based tools or DDL in the instruction of second language (L2) lexical items (Boulton, 2012; Boulton & Cobb, 2017; Boulton & Pérez-Paredes, 2014; Chambers, 2007; Cobb & Boulton, 2015; Lee et al., 2019; Mizumoto & Chujo, 2015; Vyatkina & Boulton, 2017). The use of corpus linguistic tools in L2 instruction or learning is referred to as DDL (Gilquin and Granger, 2010, p. 359). Several meta-analyses of DDL studies pointed to generally positive results for using corpora in language learning (Cobb & Boulton 2015; Boulton & Cobb 2017; Mizumoto & Chujo 2015). The authentic language that concordance lines provide and the multiple contextual examples from which learners are prompted to discover how target items are used promoted researchers to utilize corpora in facilitating learners' acquisition of new words, collocations, and syntactic patterns. The design and cognitive processes that DDL-based activities stimulate conform with the principles of second language acquisition (SLA) theories (see Flowerdew, 2015). By singling out the taught items through multiple sentential examples in which the target forms are in different font, concordance lines provide salient input that promotes noticing or conscious attention to linguistic forms, a prerequisite for language learning, as postulated by the Noticing Hypothesis (Schmidt 2001). Noticing means observing the target form and rehearsing it in short-term memory (Schmidt 2001). Also, encouraging learners to take an active role in their learning through inferencing, discovery, analysis, and synthesis processes of knowledge aligns with the principles of discovery learning/constructivism theory to language learning (Flowerdew, 2015).

Besides building upon SLA principles of noticing and discovery learning, the use of DDL tasks is posited to conform with cognitive processing theories, mainly ILH. The cognitive processes involved in concordance analysis – “predicting, observing, noticing, thinking, reasoning, analyzing, interpreting, reflecting, exploring, making inferences (inductively or deductively), focusing, guessing, comparing, differentiating, theorizing, hypothesizing, and verifying” (O’Sullivan, 2007, p. 277) – increase learners’ cognitive involvement with the target language, which, according to Laufer and Hulstijn’s (2001) ILH or task-induced involvement hypothesis, enhances the chance of learning and retention.

Despite the plethora DDL studies, the approach has been criticized for its lack of contribution to second language acquisition theories. Cognitive load processing theories, primarily ILH, have been frequently cited in DDL literature to support its use; nevertheless, no study, to the best of the author’s knowledge, has attempted to assess ILH within DDL task design. According to ILH, tasks with higher involvement load (i.e., greater mental effort) can lead to better vocabulary retention. The involvement load of a task is measured by summing the scores of three components: need, search, and evaluation. Tasks inducing involvement can, hence, be similar or different

depending on the presence and the strength of these elements in each task (a detailed discussion of ILH is provided in the literature review).

ILH has been tested by various researchers using tasks with presumably different involvement loads. Results from research that has assessed the hypothesis either directly or indirectly (e.g., Kim, 2008; Kolaiti & Raikou, 2017; Laufer, 2003; Laufer & Girasi, 2008) revealed that, overall, tasks that require higher cognitive involvement can lead to a better retention of vocabulary. Nevertheless, one pedagogical limitation of ILH studies is that most tasks were based on learning vocabulary through passage-context designs. According to Nation (1991), full retention of vocabulary items requires five to 16 encounters with the new vocabulary items in different occasions. Needless to say that when it comes to reading passages, only a certain number of vocabulary items can be taught, and it is pedagogically difficult to find passages that cover the range and frequency of vocabulary items needed for retention of new vocabulary items. DDL lines not only provide sufficient context for learning the form and meaning but also sufficient opportunities for detecting and cognitively processing the target forms in multiple contexts. Hence, DDL lines can be used as an effective alternative to reading passages in investigating how DDL tasks of different involvement load impact vocabulary retention.

Flowerdew (2015), McEnery, Brezina, Gablasova, and Banerjee (2019), Pérez-Paredes (2019), Papp (2007) and O’Keeffe (2020) are among the few voices calling for increased contributions of corpus research to L2 language learning theories. O’Keeffe (2020) made his stance clear, stating that “few of the many worthwhile DDL studies over the years have engaged with SLA theory and indeed few SLA studies have sought out DDL as a means of exploring their hypotheses”(p. 259). He further calls for more DDL experimental research to enrich the ongoing SLA debates and to offer “cutting edge insights” into the cognitive process involved in language learning, particularly in relation to implicit and explicit learning.

Investigating how DDL tasks of presumably different cognitive loads can impact vocabulary retention can help teachers select theoretically more effective tasks for their students and, thereby, enhance the integration of DDL into classroom practices, an issue that DDL research has been criticized for by many researchers (Boulton & Tyne, 2013; Paredes, 2019; Romer, 2006). Paredes (2019) contested that “the potential role of DDL in usage-based accounts of language learning, while promising, remains largely unexplored”(p.17). One reason for this lack of integration is that with DDL researchers’ use of various tasks and different types of corpora, some of which are generally signaled to be more appropriate for advanced level learners, teachers might feel reluctant and confused about which DDL activities and corpora are more appropriate particularly for lower level EFL learners. Another barrier for integrating DDL into the classroom is that not all classes have the luxury of having well-equipped computer labs and, even with their availability, the number and the capacity of the labs, accompanied by technical issues with using online platforms and the lack of IT support, can affect teachers’ reluctance to adopt DDL (Wood, 2011).

Considering the need for further research that sheds light on how DDL tasks of presumably different cognitive loads contribute to language acquisition of vocabulary and in response to the increasing calls for more contributions to SLA theories and need to demonstrate to EFL teachers the potential of different DDL tasks, the current study attempts to identify whether DDL tasks with theoretically different cognitive loads will lead to better retention of the L2 vocabulary knowledge in different dimensions. The study also addresses the call for more research on EFL-lower proficiency levels and provides recommendations for utilizing paper based-DDL exercises (Boulton, 2010) especially with EFL learners of lower-level language proficiency who have no or little experience with corpus-based tools. This path of research will not only help support or otherwise refine the assumptions of the Involvement Load Hypothesis, a prominent theory in SLA, but also helps teachers to design and use theoretically sound DDL tasks. Accordingly, the following questions will be tackled by the current paper:

1. Will DDL tasks of presumably higher, compared to lower, involvement load (translation vs. reading only) lead to better immediate vocabulary knowledge in terms of passive recall of meaning, active recall of meaning, and productive vocabulary?
2. Will DDL tasks of presumably higher, compared to lower, involvement load (backward translation vs. reading only) lead to better delayed vocabulary knowledge in terms of passive recall of meaning, active recall of meaning, and productive vocabulary?

Vocabulary knowledge is operationalized in this paper in terms of active form recall (i.e., students’ ability to provide the correct L2 equivalent form for L1 translation of the target words) and the ability to provide the meaning of a target form (passive recall of meaning) as well as the ability to use the target words in syntactically and semantically correct sentences. In the following sections, a discussion of the underpinnings of the ILH and how DDL research can confirm its assumption will be offered. This is followed by a review of previous DDL research on vocabulary and the methodology. The final section presents the results and implications of the present research for EFL teaching of vocabulary and provides suggestions for future research.

2. Literature Review

2.1 Involvement Load Hypothesis and Vocabulary Learning

Laufer and Hulstijn (2001), drawing on Craik and Lockhart’s (1972) Depth of Processing Hypothesis and Schmidt’s work on attention (1990, 2001), developed the ILH to distinguish tasks based on their induced depth of processing. The cognitive assumptions underlying the ILH are proposed to be in line with cognitive approaches to task-based teaching (Robinson, 2005; Skehan, 1996; Swain, 1998; VanPatten, 2002), which contend that the cognitively demanding tasks are important for language learning and retention of linguistic forms. With a primary focus on vocabulary learning, Laufer and Hulstijn (2001) proposed that the cognitive complexity of a task, or the

involvement load, is contingent upon three factors --search, need and evaluation -- with the sum of the three constituting the load of involvement. Any of the three components can be present or absent in a task. If a component is absent, its score will be zero.

Search refers to the cognitive process of finding out the meaning of unknown L2 words or the linguistic form corresponding to a particular concept or meaning (e.g., trying to find the L2 translation of an L1 word). Search has two levels: absence and presence. It is absent (zero points) if the task does not require a search for the meaning (e.g., when the meaning is already provided). It is present and receives 1 point if the task requires looking up the meaning or the form of a word or a concept; this can take place by consulting a teacher or a dictionary or trying to guess the meaning. The *need*, or the motivation, has three levels: a) zero if the task completion does not require knowing the meaning of the unknown word(s), b) moderate (1 point) if the need to know the meaning is imposed by the task, and c) strong (2 points) if the need is self-generated. *Evaluation* is a “kind of selective decision about the appropriate word to be used in a particular context” (Laufer & Hulstijn, 2001, p.15). Accordingly, evaluation involves a comparison between different lexical forms to decide upon the appropriate one in a particular context. Evaluation also contains three levels: a) zero when the task requires no evaluation of word(s) or meaning to be used, b) moderate (1 point) when identifying the differences in meaning between words in a given context (e.g., identifying which word[s] fit[s] in the provided context as in fill-in tasks from a list of words) (Laufer & Hulstijn, 2001), and c) strong (2 points) when learners need to evaluate how a word would fit in a new, original context (e.g., when using words for writing original sentences or a composition), and c)

ILH has been assessed in numerous studies. The findings from most this research revealed that tasks that require higher involvement load were more effective in learning vocabulary (e.g., Eckerth & Tavakoli, 2012; Folse, 2006; Hulstijn & Laufer, 2001; Keating, 2008; Kim, 2008; Kolaiti & Raikou, 2017; Laufer, 2003; Laufer and Girasi, 2008). However, some of the studies’ findings were not completely consistent with the predictions of ILH (e.g., Bao, 2015; Folse, 2006; Keating, 2008; Rott, 2012; Zou, 2017). For example, in line with ILH predictions, Bao (2015) found that writing and translation tasks (high involvement load) resulted in higher productive vocabulary knowledge than the definition task in which learners are asked to match words with their meaning (low involvement load). However, contrary to the ILH predictions, the definition task group outperformed those in translation and combining tasks (reordering words into their correct structure) in receptive vocabulary knowledge. Similarly, Keating’s experiment (2008), in alignment with ILH expectations, revealed that learners with tasks of a higher involvement load (reading plus filling in the blanks and sentence writing) received significantly higher scores than the reading only (reading with comprehension questions) on immediate vocabulary tests. However, in a delayed test, only the reading plus fill-in-the-blank group had statistically higher scores than those in the reading only condition.

The inaccurate predictions can be attributed to different factors including a) the differing effect that each of the ILH components (need, search, evaluation) exert on vocabulary learning, b) factors of frequency effect, and c) test format. This conclusion was supported by a meta-analysis of 42 empirical studies conducted by Yanagisawa and Webb (2021) to examine the predictive ability of ILH. They found that ILH is a statistically significant predictor of vocabulary learning and that frequent exposure and test format can moderate the learning gains. The meta-analysis also revealed that the level of provoked involvement had a stronger effect than the time spent on a task.

Despite being frequently cited to support the premise of DDL use, the assumptions of ILH have not been tested by DDL research; this is important from both theoretical and pedagogical perspectives. From theoretical perspectives, examining how the frequency of exposure in DDL tasks can moderate the effects of ILH provides further insights on the accuracy of ILH predictions in vocabulary learning, particularly within DDL contexts. From a pedagogical perspective, the results can help educators and ESL teachers evaluate the efficiency of different DDL tasks, some of which are more time-consuming than others, based on theoretical grounding. The next section further reviews the current trends and sheds additional light on the gaps in DDL research that this paper intends to address.

2.2 Findings and Limitations of Empirical Research on DDL Vocabulary Instruction

Studies on the effects of using DDL for vocabulary learning can be generally grouped into two major strands. The first strand has utilized parallel corpora (i.e., one in the source language and the other in the target language) (Frankenberg-Garcia, 2004; Lixun, 2001; Xu & Kaweck, 2005). The second focused on either comparing different types of instructional tools (e.g., online corpora) to common search engines or online dictionaries (Chan and Liou, 2005; Chang, 2014; Cowan et al., 2014; Frankenberg-Garcia, 2014). Overall, these studies pointed to positive effects of using DDL in learning vocabulary and to its superiority, in many cases, to traditional instruction. Similar conclusions were revealed by Mizumoto and Chujo’s (2015) and Lee, Warschauer, and Lee’s (2019) meta-analyses and by Paredes’ (2019) systematic review of DDL research.

DDL tasks were also found to influence vocabulary knowledge dimensions differently and to have stronger effects on long-term retention. The meta-analysis conducted by Lee, Warschauer, and Lee (2019) investigated the overall effect of corpus use on L2 vocabulary learning, revealing “a medium-sized effect on L2 vocabulary learning, with the greatest benefits for promoting in-depth knowledge to learners who have at least intermediate L2 proficiency” (p. 25). In their study, in-depth knowledge is operationalized as the ability to provide referencing meaning (e.g., synonyms). In addition, the study found that corpus use has positive medium-sized effects on long-term vocabulary retention and that the DDL benefits are greater when the concordance lines are “purposefully selected”(p.25) by teachers.

A critical examination of DDL research, however, points to some practical and theoretical limitations. From practical perspectives, the majority of the previous studies used corpora that were intended for general language analysis use and not for ESL language learning purposes. The difficulty that learners may experience in decoding concordance lines in general reference corpora, such as COCA or BNC, contributed to the reported negative attitudes toward using DDL tasks. Smith (2011) indicated that seven of the 19 studies reviewed

included some sort of negative attitudes. Similarly, in Geluso and Yamaguchi (2014), students voiced difficulty in interpreting the cutoff concordance lines from the COCA corpus. In addition, various tasks have been used in DDL research, yet no attempt was made to investigate whether different DDL tasks would have the same impact on different aspects of vocabulary knowledge. The lack of attention and resolutions to the problems and concerns cited by both teachers and learners contribute to the lack of DDL integration in ESL classrooms. In his review of more than 700 DDL research papers, Paredes (2019) contested that “the potential role of DDL in usage-based accounts of language learning, while promising, remains largely unexplored”(p.17). From a theoretical perspective, there seems to be a lack of contribution from DDL research to second language acquisition theories. In fact, while DDL tasks are presented as aligning with cognitive load theories, namely ILH, through stimulating cognitive processing, thereby increasing the retention rate of vocabulary, no known study has attempted to test this assumption with DDL tasks. A major focus of previous research on vocabulary was on comparing online corpora with other sources of word knowledge, such as word list or online dictionaries, but little if any attention was given to investigating whether tasks of higher involvement load, as proposed by ILH, can actually lead to better learning and retention of vocabulary items. This line of research is important for validating the assumption of ILH, and it also provides instructors with theoretically based guidelines for selecting appropriate DDL tasks for vocabulary teaching purposes.

3. Methodology

3.1 Instruments and Treatment

Students were first provided with a pretest of single words (see Appendix A) to ensure that none of the target words were known to them. The test included the target items and some distractors, some of which were already known to students, and students were required to demonstrate their knowledge of the words by providing definitions/explanations in English or their L1 (Arabic). Two intact reading classes were assigned to either a reading-only or a translation group. Both groups received a paper -based printout of the same concordance lines that were retrieved from SKELL corpus. SKELL is a free corpus designed for ESL/EFL students. In the reading-only group, learners were asked to read the sentences(see Appendix B), with three concordance lines for each target word, and then choose the right meaning or synonyms for the underlined target words from among four options. The teacher provided feedback to students when needed. The translation group used the same concordance lines, but was asked to translate the sentences from their L2 to their L1. The answers were discussed then in the class and the students’ written answers were collected. All students in the translation group were then provided with the L1 translation of the same examples and were asked to give their L2 equivalents orally. The discussion took nearly 40 minutes for the reading task and 60 minutes for translation. The reading and translation tasks carry different cognitive loads based on ILH. The reading task was assumed to have less of a cognitive load. Students need to complete the task assigned by their teachers (need =1), search for the meaning by guessing from context (search =1), and evaluate different words to choose the appropriate one (evaluation=1). Hence, the total involvement load of the reading task was three points. Similarly, the translation task was assigned by their teachers (need =1), with students searching for meaning either by guessing or using a dictionary (search=1). However, the evaluation was strong (evaluation =2), as students needed to orally translate from their L1 to the L2. When translating from the L1 to the L2, students had to evaluate different syntactic and lexical options to come up with the appropriate translation (Laufer & Girsai, 2008). The involvement load for the translation task was, therefore, as follows: need (1), search (1), evaluation (2) = 4. The post test was administered twice: one immediately after the treatment and the other a week later. Three immediate tests were administered in the following order: active form recall, passive recall of meaning, and the production of form and meaning of six target words. The same tests were presented in the same order a week later. In the active recall of form, students were asked to provide the L2 form for the L1 translation of the target words. In the passive recall of meaning, they were asked to provide the meaning of the target words in Arabic or English. In the production part, they needed to write complete sentences using the target words. The treatment was conducted during the regular class time (an 80-minute session). The translation group took approximately 50 minutes to complete the task, whereas the reading-only group took 35 minutes to finalize the required tasks. The immediate and delayed tests each took approximately 20 minutes to accomplish.

Each answer in the active and passive form tests was scored dichotomously (i.e., if it was correct, it received one point, and if incorrect, it received zero). As for the productive task, the answer received 1 point if it was both semantically and syntactically correct. It received .5 points if it was semantically and syntactically correct, but contained minor errors in spelling that did not prevent comprehension.

3.2 Participants

Two intact reading classes at a public university in Saudi Arabia participated in the study. The participants had a similar demographic background, and they were of similar age (18-22). They were all freshmen English majors accepted into the English four-year program after they passed an English preparatory semester. The two classes were assigned randomly to either a reading-only or translation condition. The translation group contained 15 students while the reading-only group included 20 students, after excluding students who either missed the immediate or delayed tests. The translation group was taught by the researcher, while the reading-only group was taught by another colleague.

4. Results and Discussion

Descriptive statistics of means and standard deviation of both immediate and delayed tests will first be presented followed by the results of inferential statistics. As shown in Tables 1 and 2, both groups showed enhanced performance on the passive recall test, with an average score ranging from 4.23 to 5.15 out of the maximum possible score of 6. Table 1 shows that the reading-only group scores were higher on

both immediate active and passive recall tests. However, the reading-only group scores were lower than their translation peers in the production vocabulary test.

The scores of both groups showed no considerable decline or change on the delayed test. Similar to their results in the immediate tests, the reading-only group scored higher in active and passive recall, but lower than the translation group in the productive task. To examine whether the mean differences between groups were of statistical significance, six one-way ANOVA tests were conducted: three tests with the three immediate vocabulary tests and three with the delayed tests.

Table 1. Scores of the Immediate Vocabulary Test

Group	Active Recall Max=6	Passive Recall Max=6	Production Max=6
Translation N=15	2.33 (1.4)	4.23 (1.25)	2.30 (1.7)
Reading N=19	3.13 (1.9)	5.15(1.4)	1.6 (1.4)

Table 2. Scores of the Delayed Vocabulary Test

Condition	Active Recall Max=6	Passive Recall Max=6	Production Max=6
Translation N=15	1.63 (1.4)	4.8 (1.5)	2.53 (1.9)
Reading N=20	3.13 (1.6)	4.48 (1.7)	1.93 (1.6)

Although the reading-only group scored higher on active and passive recall tests and lower on the productive task, the differences in the means between the two groups were not statistically significant ($P > .05$ for the immediate tests, as shown from the F values in Table 3).

However, in the delayed test, the difference, as shown in Table 3, was statistically significant in active recall test, but not in the passive and productive tests.

Table 2. Results of ANOVA Test for Immediate and Delayed Vocabulary Tests

Vocabulary Test	Active	Passive	Production
Immediate	1.91 (df=1)	3.68 (df=1)	1.97 (df=1)
Delayed	7.12*** (df=1)	.35 (df=1)	.32 (df=1)

*** $p < .05$

The current study was conducted to examine whether DDL tasks of higher involvement load are more effective in improving vocabulary retention. Based on ILH, translation tasks, particularly from the L1 to the L2, require more cognitive processing and stronger evaluation of the appropriateness of word choice, hence, were expected to have a stronger effect on vocabulary retention than the reading-only task. However, the reading-only group showed better performance in active and recall tasks in both immediate and delayed tests, although the results were only statistically significant in the delayed active recall test. The findings of the current study, therefore, do not support the assumptions of ILH, at least in the DDL context, and conclude that DDL tasks with similar exposure frequency have similar effects on vocabulary retention regardless of their ILH load. In fact, the reading-only group scoring statistically higher in active recall tasks suggests that the higher cognitive load needed for translating sentences from the L2 to the L1 and then back translating to the L2 may detract attention to the target words' forms.

The findings are in contrast with that of Laufer and Girsai (2008), wherein the translation group performed significantly better than the reading and control groups in passive and active recall tasks. One possible reason for such a contrast is the impact of frequency. While students in both the translation and reading-only groups in the current study were exposed to three sentential examples of the target words, students in Laufer and Girsai's (2008) study had one encounter with the new words. The findings, thus, support Yanagisawa and Webb's (2021) conclusion that the frequency of exposure compensates for the additional elaboration or cognitive processing suggested by ILH for better learning.

The study findings are also in line with Laufer and Girsai (2008) and Lee, Warschauer, and Lee (2019) in that active recall of meaning is easier to acquire than the other dimensions of vocabulary knowledge. In addition, having lower scores in production tasks compared to recall of form and meaning is in line with the expected phases of vocabulary development where the ability of producing words in a new context comes at a later stage. It is also worth noting that the relative stability of vocabulary scores from the immediate to the delayed posttest conforms to Lee, Warschauer, and Lee's (2019) conclusion that DDL tasks have long-term influence on vocabulary retention.

5. Conclusion and Pedagogical Implications

The goal of the current study was to investigate ILH assumptions with DDL tasks. The results indicate that frequency can be a moderator factor with DDL tasks of different induced engagement levels. When involving several corpora-based examples of the target items, reading alone tasks which are assumed to demand less cognitive processing, resulted, contrary to ILH predictions, in a statistically higher vocabulary retention in the delayed active recall test. The reading only group showed also higher means in the immediate active and recall

tests, though the mean difference between the two groups falls short from being statistically significant.

One of the important pedagogical implications of the current findings is that preselected concordance lines with at least three frequency exposures can lead to better vocabulary retention in terms of form and meaning recall and production, regardless of the task type (reading or translating). Another implication is that in selecting the appropriate vocabulary task, teachers need to prioritize their goals of teaching vocabulary (e.g., whether the focus is on receptive or productive knowledge). Reading tasks tend to be pedagogically at least as effective as translation tasks in enhancing vocabulary knowledge, particularly in form and meaning recall dimensions, yet they are less time-consuming. However, when the focus is the production aspect of vocabulary knowledge, as in writing courses, it seems that translation tasks, especially those focusing on translation from the L1 to the L2, are relatively more effective, although the difference in means reaches no statistical significance.

6. Limitations and Suggestions for Future Research

The current research is not without limitations. The sample was convenient and relatively small, hence, replication studies on larger samples in different ESL contexts can further support the current findings. In addition, the current study followed a between-subjects design; it will be more insightful to consider both within- and between-subjects designs to further confirm the current findings. Another consideration for future research is to examine the impact of the number of frequency exposures within the same or different tasks on different dimensions of vocabulary retention. Full retention of new lexical items, according to Nation (2001), requires between five and 16 exposures in different contexts. To further confirm this threshold, future research may consider DDL tasks with, for example, three, five, and 10 concordance lines. This line of research will further shed light on the most theoretically appropriate number of concordance lines for vocabulary knowledge and, thereby helping teachers and students save time and efforts in sifting through tens of concordance lines. Also, the current paper utilized two types of translation (L2-L1/L1-L2), a task that takes relatively considerable amounts of time compared to a one-directional translation approach. Hence, it would be interesting to assess whether adopting one type of translation is more effective than the other and whether the use of written translation from L1 to L2 can have a similar impact as the oral one. The current research used a corpus designed for ESL learners. It would be informative to examine whether using general reference corpora, as opposed to a learner corpus, would yield the same results. Finally, examination of learners' attitudes and thinking processes when conducting the two DDL tasks was not sought in the current paper. Accordingly, future research is invited to capture and analyze learners' perceptions and cognitive processes in DDL tasks of different involvement loads.

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Appendix A

Write the meaning of the following in Arabic or English

1.	Reflect	
2.	Major (V)	
3.	Inform	
4.	determine	
5.	Remain	
6.	Include	
7.	isolate	
8.	Escalate	
9.	Exploit	
10.	Terminate	
11.	refrain	
12.	Nurture	
13.	Evoke	
14.	inhibit	
15.	render	
16.	Constrict	
17.	Pledge	
18.	Fluctuate	
19.	conform	
20.	Augment	
21.	Abstain	
22.	Contend	
23.	Comprise	
24.	Infuriate	
25.	Sabotage	
26.	Explicate	
27.	Deviate	
28.	Attain	
29.	abandon	
30.	Distort	
31.	Accumulate	
32.	Undergo	

Appendix B

Part One: **Active Recall of Form:** Write the words that correspond to the provided definition . The first two letters are provided. Use the words that were discussed in the class.

- 1. Es..... means to increase or make things worse (تصاعد او ترايد) :
- 2. Ex..... means to make use of or take advantage of something. يستغل.
- 3. Te..... means to end something. يوقف او ينهي.
- 4. Nu..... Means to take care or develop something يعزز او يرعى
- 5. Re..... means to avoid or stop doing some thing. يمتنع
- 6. Ev..... means to cause some thing to happen . يثير او يستحضر .

Part Two: **Passive Recall of meaning:** Write the meaning of the following in Arabic or in English .

Escalate	
Exploit	
Terminate	
refrain	
Nurture	
Evoke	

Part Three: **Production:** Write the following words in complete sentences

Escalate	
Exploit	
Terminate	
refrain	
Nurture	
Evoke	

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