

**REPEATED RETRIEVAL AND PRODUCTIVE LEXICAL
DEVELOPMENT: THE EFFECTS OF RETRIEVAL FREQUENCY
AMONG IRANIAN EFL LEARNERS**

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Abstract: Developing productive lexical competence requires learners to retrieve and use previously encountered vocabulary, yet the role of repeated retrieval frequency in this process remains insufficiently understood. This study investigated the effect of repeated retrieval opportunities on productive lexical competence among Iranian EFL learners. A quasi-experimental pretest–posttest design was employed with 384 intermediate-level EFL learners. Participants completed repeated productive vocabulary retrieval activities at different retrieval-frequency levels, and productive lexical knowledge was assessed using the Productive Vocabulary Levels Test (PVLТ). Data were analyzed using repeated-measures analysis of variance and pairwise comparisons of estimated marginal means. The results revealed a significant effect of retrieval frequency on productive lexical performance. Pairwise comparisons showed significant differences between all retrieval-frequency levels except the 6- and 8-retrieval conditions, with higher retrieval frequencies generally associated with better productive vocabulary performance. However, the difference between the third and fourth retrievals was not statistically significant. The findings suggest that repeated retrieval can contribute substantially to the development of productive lexical competence, although the benefits of additional retrieval opportunities may not increase uniformly at every stage. These results highlight the importance of incorporating repeated productive retrieval into vocabulary instruction while suggesting that the optimal frequency of retrieval may depend on the point at which additional practice produces meaningful gains.

Keywords: Productive lexical competence, productive vocabulary, retrieval frequency, repeated retrieval, vocabulary learning, PVLТ, EFL learners.

INTRODUCTION

Lexical competence is a fundamental component of second language (L2) proficiency because vocabulary knowledge provides the basis for understanding and producing language. Although grammatical knowledge organized linguistic expression, insufficient lexical knowledge can substantially restrict learners' ability to comprehend information, express ideas, and participate effectively in communication. As Wilkins (1972, pp. 111–112) famously observed, “without grammar very little can be conveyed, without vocabulary nothing can be conveyed.” Within lexical competence, an important distinction is made between receptive and productive knowledge. Receptive lexical competence involves recognizing and understanding lexical items in oral or written contexts, whereas productive lexical competence involves retrieving and generating lexical items for language production (Henriksen, 1999). While receptive knowledge enables learners to comprehend what they encounter, productive knowledge allows them to actively retrieve and use lexical items in speaking and writing. Consequently, developing productive lexical competence is particularly important for learners who need to use English effectively in academic and communicative contexts.

However, receptive lexical knowledge does not automatically become productive lexical knowledge. Learners may recognize and understand a considerable number of lexical items while experiencing difficulty retrieving those items when they need to produce language. This discrepancy between receptive and productive lexical competence has been widely recognized in vocabulary research and represents an important challenge for L2 learners (Henriksen, 1999; Laufer & Nation, 1999; Webb, 2005). In particular, learners may possess knowledge of a word's meaning without being able to retrieve its written or spoken form when required for production. In this respect, vocabulary instruction that primarily exposes learners to lexical items or asks them to recognize their meanings may provide insufficient opportunities for the development of productive knowledge. Consequently,

instructional activities that require learners to actively retrieve previously encountered lexical items may play an important role in facilitating the transition from receptive knowledge to productive lexical competence.

One mechanism that may support this transition is retrieval. Retrieval involves actively recalling previously encountered information rather than merely being exposed to it again. In vocabulary learning, repeated retrieval provides learners with opportunities to access lexical representations and strengthen the ability to recall them when needed. Such retrieval is particularly relevant to productive lexical development because productive knowledge requires learners to retrieve lexical forms rather than simply recognize them. Webb (2005) demonstrated the importance of productive involvement in vocabulary learning, while subsequent research has emphasized the role of retrieval and active engagement in strengthening lexical knowledge (Laufer & Hulstijn, 2001; Nation, 2013; Webb & Nation, 2017). From this perspective, the development of productive lexical competence can be viewed as a process in which initially receptive lexical knowledge is repeatedly accessed through retrieval attempts, thereby providing opportunities for learners to strengthen their access to lexical forms. Repeated retrieval may therefore contribute to the movement from knowing what a lexical item means to being able to recall and produce its form.

Nevertheless, recognizing the potential value of retrieval does not fully address an important instructional question: how many retrieval opportunities are needed to support productive lexical development? Repetition is a central component of vocabulary learning, but repeated encounters are not necessarily equivalent to repeated retrieval. When learners retrieve the same lexical items on multiple occasions, each retrieval opportunity provides another occasion to access and reinforce the relevant lexical knowledge. The frequency with which such retrieval opportunities are provided may therefore influence subsequent productive recall. Although previous research has demonstrated the importance of repeated retrieval for L2 vocabulary learning, comparatively less attention has been devoted to examining how different retrieval frequencies affect the subsequent development of productive lexical competence, particularly when retrieval is embedded in productive vocabulary tasks (Nakata, 2017). Investigating retrieval frequency is particularly important because it can provide empirical evidence about whether additional retrieval opportunities are associated with further gains in productive vocabulary knowledge after an appropriate retention interval.

The nature of the activity through which retrieval occurs may also be relevant to this process. Productive vocabulary learning can be supported through tasks that require learners to retrieve lexical items under different contextual and processing demands. The present study therefore considers three productive lexical tasks: open-cloze, sentence translation, and sentence writing. Open-cloze tasks require learners to retrieve an appropriate lexical item per contextual and linguistic cues. Sentence translation requires learners to retrieve and select lexical items while processing meaning across languages, whereas sentence writing requires learners to independently generate lexical items within a meaningful sentence. Although these tasks differ in their processing demands, they share the essential feature of requiring active retrieval and productive engagement with target lexical items. In the present investigation, therefore, the tasks are considered as contexts through which repeated retrieval opportunities can be provided rather than as the primary basis for determining which task is superior.

Despite the substantial body of research on receptive and productive vocabulary knowledge, relatively limited empirical attention has been devoted to the instructional processes through which receptive lexical competence develops into productive competence through repeated retrieval. Existing research proves the importance of productive engagement, retrieval, and repetition in vocabulary learning (Nakata, 2017; Webb & Nation, 2017); however, fewer studies have systematically examined whether different retrieval frequencies produce different levels of subsequent productive lexical performance. This gap is particularly relevant in EFL contexts such as Iran, where English language education is shaped by institutional and curricular conditions that may influence opportunities for productive language use (Rassouli & Osam, 2019). Recent research with Iranian EFL learners has continued to examine receptive and productive dimensions of vocabulary knowledge, highlighting the relevance of this distinction in the Iranian context (Khalavi & Zeraatpishe, 2023; Mohammadi et al., 2024). Identifying how repeated retrieval can be incorporated into productive vocabulary instruction may therefore provide both theoretical and pedagogical insight into the development of lexical competence in this context.

Accordingly, the present study examined whether different retrieval frequencies influenced the development of productive lexical competence among Iranian pre-university learners with an intermediate level of English.

Specifically, the study investigated productive lexical performance following two, four, six, and eight retrieval opportunities involving open-cloze, sentence translation, and sentence writing tasks. Productive lexical competence was assessed through the Productive Vocabulary Levels Test (PVLТ) (Laufer & Nation, 1999), following the identification of target lexical items that were known receptively but had not yet been established as productive knowledge. The following research question guides the study: Does retrieval frequency significantly affect productive lexical competence among Iranian intermediate EFL learners?

LITERATURE REVIEW

Receptive and Productive Lexical Competence

Lexical competence encompasses several dimensions of knowing a word, including its form, meaning, and use (Nation, 2001). Within this multidimensional construct, receptive and productive lexical competence represent two related but distinguishable aspects of lexical knowledge. Receptive lexical competence concerns the ability to recognize a lexical item and understand the meaning it conveys when encountered in listening or reading. Productive lexical competence, in contrast, involves the ability to retrieve and generate the appropriate lexical form when expressing a particular meaning. Henriksen (1999) characterizes receptive knowledge as sufficient recognition of a lexical item for comprehension, whereas productive knowledge requires the learner to actively produce the item. Thus, the two dimensions are related but do not necessarily develop at the same rate.

The distinction between receptive and productive knowledge is particularly relevant to vocabulary breadth. Learners can develop a relatively large receptive vocabulary without being able to retrieve an equivalent number of lexical items for productive use. This asymmetry has important implications for vocabulary instruction because recognition of a lexical item does not necessarily indicate that the item is available for spontaneous production. Webb (2005), for example, demonstrated that productive learning activities can contribute to vocabulary development beyond simple recognition, highlighting the importance of engaging learners in processes that require them to generate lexical forms. Similarly, research on vocabulary learning has increasingly emphasized the importance of activities that move learners beyond receptive processing toward active retrieval and use (Laufer & Hulstijn, 2001; Nation, 2013; Webb & Nation, 2017).

The present study focuses specifically on the form–meaning dimension of Nation’s (2001) taxonomy. From a receptive perspective, learners need to recognize that a particular lexical form signals a particular meaning; from a productive perspective, they need to retrieve the appropriate lexical form when they intend to express that meaning. The distinction is therefore directly relevant to the transition investigated in the present study: learners initially possessed receptive knowledge of the target lexical items but had not yet developed productive access to their forms. The New Vocabulary Levels Test (NVLТ) was used to establish receptive lexical knowledge, whereas the Productive Vocabulary Levels Test (PVLТ) was used to assess productive lexical recall. The target items were consequently selected to represent vocabulary that learners understood receptively but had not yet acquired for productive use, providing an appropriate basis for examining how instructional retrieval opportunities can support this transition.

Retrieval and Productive Vocabulary Development

One important mechanism through which receptive lexical knowledge may become productive is retrieval. Unlike passive exposure, retrieval requires learners to actively access information from memory. In vocabulary learning, this distinction is important because productive lexical competence fundamentally depends on the ability to retrieve a lexical form when it is needed to express a particular meaning. Accordingly, vocabulary activities that require learners to supply rather than merely recognize target lexical items may provide particularly relevant opportunities for strengthening productive lexical access.

The importance of active retrieval is reflected in research distinguishing recognition-based learning from recall-based learning. Laufer and Goldstein (2004), for example, distinguish among different levels of lexical access and emphasize the greater retrieval demands associated with active recall. In the present study, the three productive lexical tasks were similarly designed to require learners to supply target lexical items rather than simply identify them. Open-cloze tasks required learners to retrieve lexical items from contextual cues, sentence translation required retrieval of the appropriate English lexical item from an L1-based prompt, and sentence writing required

learners to independently generate sentences containing the target items. The three tasks therefore shared an essential feature: learners had to actively retrieve the target lexicon.

Retrieval may be particularly important when the instructional goal is to strengthen the connection between lexical meaning and lexical form. If learners have already established receptive knowledge of a word's meaning, requiring them to repeatedly retrieve its form creates opportunities to access that lexical representation from memory. Successful retrieval can consequently strengthen accessibility and increase the likelihood that the lexical item can subsequently be recalled when needed for production. From this perspective, productive vocabulary development can be conceptualized as a progression from receptive form–meaning recognition to increasingly accessible productive form retrieval. The repeated retrieval of target lexical items is therefore not merely additional practice; it constitutes an opportunity for learners to repeatedly activate and reinforce the lexical knowledge that underlies productive use.

This perspective is consistent with vocabulary learning approaches that emphasize meaningful involvement, active processing, and retrieval rather than exposure alone (Laufer & Hulstijn, 2001; Nation, 2013). Productive tasks can create different degrees and forms of retrieval demand. Open-cloze tasks provide contextual cues that constrain lexical selection, translation tasks require learners to establish a lexical connection between L1 meaning and L2 form, and sentence writing requires more independent generation of the target item in a self-produced context. The present study therefore treats these activities as different contexts for productive retrieval rather than simply as alternative methods of presenting vocabulary. The common feature across the conditions was that learners repeatedly attempted to retrieve the same target lexical items for productive purposes.

The role of retrieval becomes particularly important when considering retention. A lexical item that can be produced immediately following instruction may not remain accessible after a period without further retrieval. Repeated retrieval provides additional opportunities for learners to access the item after earlier learning episodes, potentially strengthening its availability for later recall. The present study therefore incorporated delayed assessment rather than relying exclusively on immediate performance. The target lexical items were repeatedly retrieved during the intervention and subsequently assessed after a 14-day interval following the final retrieval session, allowing productive lexical performance to be examined after immediate task effects had diminished.

Repetition Frequency and Repeated Retrieval

Although retrieval is increasingly recognized as an important mechanism in vocabulary learning, retrieval is not a single, uniform event. Learners may be given one opportunity to retrieve a lexical item or may encounter multiple opportunities distributed across subsequent learning sessions. Consequently, an important question concerns whether the frequency of retrieval opportunities influences the extent to which receptive lexical knowledge develops into productive lexical competence. Repetition has long been recognized as an important condition for vocabulary learning because repeated encounters and opportunities to process lexical items can contribute to retention and strengthening of lexical knowledge (Nation, 2013; Webb & Nation, 2017). However, repeated exposure and repeated retrieval are not identical. Repeated exposure allows learners to encounter a lexical item again, whereas repeated retrieval requires them to actively reconstruct or supply it from memory.

This distinction is particularly important for productive vocabulary learning. If the instructional objective is to develop the ability to produce a lexical item, repeatedly asking learners to retrieve that item may be more directly aligned with the desired outcome than repeatedly presenting the item for recognition. Each retrieval opportunity can provide another occasion for learners to access the lexical form associated with an already established meaning. The present study consequently operationalized repetition in terms of retrieval opportunities, rather than simply counting exposures to the target lexical items.

The spacing of retrieval opportunities may also matter. Retrieval that is separated across learning sessions provides learners with repeated opportunities to access lexical knowledge after some degree of forgetting has occurred. Such spacing can make retrieval more effortful than immediate repetition and may therefore provide a stronger learning experience. Research on spacing and retrieval has consequently emphasized the importance of considering not only whether vocabulary is repeated but also how repeated learning opportunities are distributed (Nation, 2013; Teng & Xu, 2022). In the present study, retrieval-frequency conditions were implemented through systematically scheduled opportunities, with the final productive vocabulary assessment administered 14 days after the final

retrieval session in each condition. This design was intended to maintain a constant retention interval while varying the number of retrieval opportunities.

The question of how many retrieval opportunities are sufficient or beneficial remains less clearly established than the broader finding that repetition and retrieval support vocabulary learning. Different numbers of retrieval opportunities may produce different levels of productive lexical development, but the relationship need not necessarily be linear. Additional retrieval opportunities could produce further gains, produce diminishing returns, or influence the developmental trajectory differently depending on the nature of the retrieval task. These possibilities make retrieval frequency an important variable for empirical investigation rather than treating repetition simply as a present-or-absent instructional feature.

This issue is especially relevant when retrieval occurs through productive lexical tasks that impose different degrees and types of support. Open-cloze tasks provide contextual information that can guide retrieval, translation tasks provide an L1 meaning-based prompt, and sentence writing provides comparatively less external scaffolding and requires independent lexical generation. The present study addresses this possibility by applying the same retrieval-frequency schedules across the three productive lexical tasks. Each task condition included 2-, 4-, 6-, and 8-retrieval schedules, while the lexical content remained identical across conditions.

Despite the substantial literature establishing the importance of repetition, retrieval, and productive engagement in vocabulary learning, comparatively less is known about whether increasing the number of retrieval opportunities produces systematically different levels of productive lexical performance. This limitation is important because evidence concerning the general value of retrieval does not by itself indicate how retrieval should be distributed or how many opportunities should be provided in instructional practice. The present study therefore extends research on productive vocabulary development by examining four systematically varied retrieval frequencies—two, four, six, and eight opportunities—and their relationship with subsequent productive lexical performance. By maintaining the same target lexical items and retention interval across conditions, the study was designed to examine the contribution of retrieval frequency across three forms of productive lexical activity.

Taken together, the literature suggests a theoretically coherent pathway from receptive lexical knowledge to productive lexical competence: learners first establish form–meaning knowledge, then engage in active retrieval, and repeated retrieval provides further opportunities to strengthen access to lexical forms. However, the extent to which retrieval frequency shapes this transition remains insufficiently understood. This gap provides the rationale for the present investigation of whether different numbers of repeated retrieval opportunities influence productive lexical competence across open-cloze, sentence translation, and sentence writing tasks.

Theoretical and Conceptual Framework

The present study is theoretically grounded in Nation's (2001) framework of lexical competence, particularly the relationship between lexical form and meaning. Within this framework, knowing a lexical item involves knowledge of its form, meaning, and use. The present investigation focuses specifically on the form–meaning dimension and examines the transition from receptive knowledge of lexical meaning to productive recall of lexical form. Thus, the study does not attempt to examine the full range of lexical knowledge but concentrates on the extent to which learners can move from recognizing and understanding target lexical items to actively retrieving their forms.

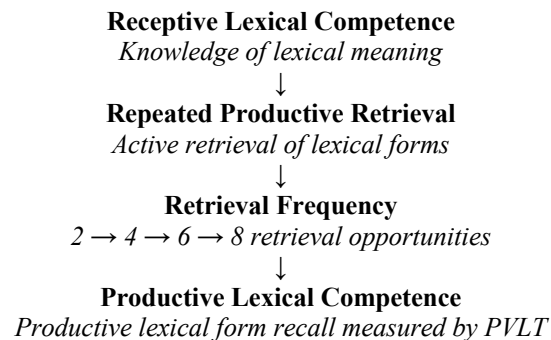
This transition is conceptualized as being supported by repeated productive retrieval. Learners in the present study were first identified as having receptive knowledge of the target lexical items but insufficient productive knowledge of their forms. The instructional tasks then required learners to actively retrieve these items in productive contexts. Repeated retrieval **provides** successive opportunities to access the lexical form associated with an already established lexical meaning, thereby potentially strengthening productive lexical access. Productive lexical competence was subsequently assessed through the Productive Vocabulary Levels Test (PVLTL) (Laufer & Nation, 1999).

Within this framework, retrieval frequency constitutes the principal variable of interest. Rather than treating repetition as a simple presence-or-absence condition, the present study operationalized repeated retrieval through four levels of retrieval frequency: 2, 4, 6, and 8 retrieval opportunities. The same target lexical items were

repeatedly retrieved through the instructional tasks, and productive lexical performance was assessed following a controlled retention interval. This design makes it possible to examine whether increasing the number of retrieval opportunities is associated with differences in subsequent productive lexical competence.

The framework also recognizes that retrieval does not occur independently of the activity that elicits. Three productive lexical tasks—open-cloze, sentence translation, and sentence writing—provided the contexts in which learners repeatedly retrieved the target lexical items. Although the primary focus of the present study is retrieval frequency, the task factor is retained in the conceptual model because the task conditions provided the contexts in which the different retrieval-frequency schedules were implemented. Thus, task type functions as a contextual factor through which repeated retrieval was implemented rather than as the primary focus of comparison.

Accordingly, the conceptual relationship examined in the present study can be represented as follows:



The retrieval process is implemented through three productive lexical task conditions:

Repeated Productive Retrieval

- **Open-Cloze**
- **Sentence Translation**
- **Sentence Writing**

The framework therefore proposes that repeated opportunities to retrieve previously known lexical items may facilitate the development of productive lexical form knowledge. The present study specifically examines whether differences in retrieval frequency are associated with differences in subsequent productive lexical performance, with open-cloze, sentence translation, and sentence writing serving as the instructional contexts through which retrieval was implemented. Gender is not included in this framework because it is outside the scope of the present investigation.

METHODOLOGY

Participants

The participants were 384 Iranian pre-university EFL learners, aged 17 to 22, enrolled in intermediate-level English courses at two language academies in Tehran, Iran. The participants were screened for English proficiency using the Oxford Placement Test (OPT) (Allan, 2004), and only learners who met the B1 (Intermediate) proficiency level were included in the study. The final sample consisted of 192 female and 192 male learners.

Following proficiency screening, participants were assigned to one of three productive lexical task conditions—open-cloze, sentence translation, and sentence writing—and experienced four retrieval-frequency conditions involving 2, 4, 6, and 8 retrieval opportunities. The same target lexical items were used across the retrieval-frequency conditions.

Target Vocabulary

The target vocabulary consisted of 20 lexical items selected through a two-stage screening procedure using the New Vocabulary Levels Test (NVLT) and the Productive Vocabulary Levels Test (PVL). This procedure

[6]

identified lexical items that participants knew receptively but had not yet acquired productively, thereby establishing an appropriate starting point for examining the transition from receptive to productive lexical competence.

First, participants completed the NVLT to establish their receptive lexical knowledge. Items that participants correctly identified on the NVLT were considered to represent established form–meaning recognition. They subsequently completed the PVLТ, and items that they failed to produce were classified as productively unknown. A common set of 20 lexical items that met these criteria was then selected for use throughout the intervention.

To ensure balanced representation of lexical categories, the 20 target items comprised five nouns, five verbs, five adjectives, and five adverbs. The same target items were used across all three productive lexical tasks and all four retrieval-frequency conditions. Thus, the lexical content remained constant across conditions, while the number of retrieval opportunities and the task through which retrieval occurred varied.

Instruments

New Vocabulary Levels Test. The New Vocabulary Levels Test (NVLT) (McLean & Kramer, 2015) was used to establish participants' receptive lexical knowledge. The test assessed whether learners could recognize the meanings of lexical items through a multiple-choice format. Its results were used in conjunction with the subsequent productive assessment to identify the target vocabulary for the intervention.

Productive Vocabulary Levels Test. The Productive Vocabulary Levels Test (PVLТ) (Laufer & Nation, 1999) was used to assess productive lexical breadth through form recall. Participants were provided with the initial letters of the target lexical items and were required to complete the lexical forms. The PVLТ was administered before the intervention to identify lexical items that were not yet productively known and was subsequently used as the delayed measure of productive lexical competence.

For the delayed assessment, responses were scored dichotomously, with one point awarded for a correct lexical retrieval and zero for an incorrect or blank response. Minor grammatical or orthographic deviations that did not obscure the target lexical item were accepted.

Productive Retrieval Tasks. Three productive lexical tasks were used to provide contexts for repeated retrieval of the target vocabulary: open-cloze, sentence translation, and sentence writing. All three tasks required learners to actively supply the target lexical items rather than merely recognize them. The tasks were designed around the same 20 target items, with materials developed by the researcher in collaboration with a native English-speaking instructor. Sentences were adapted from the Oxford Advanced Learner's Dictionary (2022) and the Cambridge Advanced Learner's Dictionary (2022).

Open-Cloze. In the open-cloze task, learners completed short texts containing gaps by retrieving the appropriate target lexical items from contextual and linguistic cues. Each task contained nine gaps, including one example item. The task therefore provided contextual support while requiring active lexical recall.

Sentence Translation. In the sentence translation task, learners translated sentences from Persian into English and were required to retrieve and produce the appropriate target lexical items. The task therefore required learners to establish a meaning–form connection across the two languages while producing the target English vocabulary.

Sentence Writing. In the sentence writing task, learners independently constructed original English sentences using the target lexical items. The task provided less external lexical support and required learners to generate the target forms in meaningful contexts.

The three tasks served as different contexts for repeated productive retrieval rather than as the primary object of comparison in the present article. The same target vocabulary was therefore repeatedly retrieved through each task across the assigned retrieval-frequency conditions.

Retrieval-Frequency Conditions. Retrieval frequency was operationalized as the number of opportunities learners received to retrieve the same 20 target lexical items. Four retrieval-frequency conditions were implemented: 2, 4, 6, and 8 retrieval opportunities. The same schedules were applied separately within each of the three productive task groups.

Table 1

Retrieval-Frequency Conditions, Retrieval Schedules, and Delayed PVLТ Assessment

Retrieval condition	Retrieval opportunities	Retrieval schedule	Delayed PVLТ
1	2	Weeks 1 and 3	Week 6
2	4	Weeks 2, 4, 6, and 8	Week 11
3	6	Weeks 9, 11, 13, 15, 17, and 19	Week 22
4	8	Weeks 9, 11, 13, 15, 17, 19, 21, and 23	Week 26

The staggered schedules implemented different numbers of retrieval opportunities while maintaining a constant 14-day interval between the final retrieval session and the delayed productive vocabulary assessment. Thus, the different calendar weeks did not constitute different experimental time points. Rather, calendar time served as an administrative mechanism for implementing the retrieval-frequency conditions. The critical comparison concerned the number of retrieval opportunities, with the same two-week retention interval maintained across conditions.

This design was particularly important for isolating retrieval frequency from time-based forgetting. For example, participants in the 2-retrieval condition completed their final retrieval in Week 3 and were assessed in Week 6, whereas participants in the 8-retrieval condition completed their final retrieval in Week 23 and were assessed in Week 26. In both cases, the delayed PVLТ followed the final retrieval opportunity by 14 days.

Research Procedure

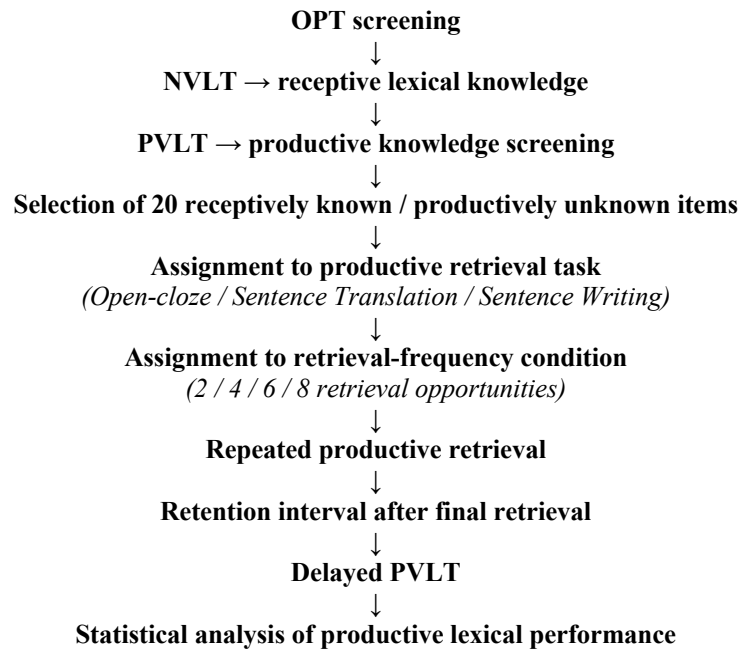
Data collection proceeded through a series of standardized stages. First, the Oxford Placement Test was administered to the 384 participants to verify intermediate (B1) English proficiency. Second, participants completed the NVLT followed by the PVLТ as preliminary assessments of receptive and productive lexical knowledge. The results of these assessments were used to identify the 20 target lexical items that were receptively known but not yet productively known.

Third, participants were assigned to one of the three productive lexical task conditions: open-cloze, sentence translation, or sentence writing. Within each task condition, participants were assigned to one of the four retrieval-frequency conditions: 2, 4, 6, or 8 retrieval opportunities.

Fourth, participants repeatedly retrieved the same 20 target lexical items through their assigned task according to the prescribed retrieval schedule. Following each task session, standardized corrective feedback was provided on the target lexical items to ensure consistent treatment across conditions.

Finally, a delayed PVLТ was administered following the final retrieval opportunity in each retrieval-frequency condition. The delayed assessment measured participants' subsequent productive lexical competence after the retention interval.

The overall procedure can be summarized as:



Data Analysis

The quantitative data were analyzed using IBM SPSS Statistics. Because the present article focuses specifically on the effect of retrieval frequency on productive lexical competence, the statistical analyses were restricted to procedures directly relevant to the research question. Descriptive statistics were first calculated to characterize productive lexical performance across the four retrieval-frequency conditions. Preliminary assumption checks were then conducted before the inferential analyses.

Preliminary Analysis

The assumptions relevant to the repeated-measures analysis were examined prior to the main analysis. Normality was assessed for the PVLT scores across the retrieval-frequency conditions. The Kolmogorov–Smirnov results reported in the thesis indicated no significant departures from normality, supporting parametric analysis usage.

Mauchly’s Test of Sphericity was also conducted to determine whether the sphericity assumption was satisfied for the within-subjects factor of retrieval frequency. The assumption was violated; therefore, Greenhouse–Geisser corrected values were used when interpreting the within-subjects effect.

Main Analysis: Effect of Retrieval Frequency

A one-way repeated-measures analysis of variance (ANOVA) was conducted to determine whether productive lexical competence differed across the four retrieval-frequency conditions: 2, 4, 6, and 8 retrieval opportunities. Productive lexical competence was operationalized through scores on the delayed Productive Vocabulary Levels Test (PVLT), administered following the standardized 14-day retention interval after the final retrieval opportunity in each condition.

Because Mauchly’s test indicated a violation of the sphericity assumption, the Greenhouse–Geisser correction was applied. The effect of retrieval frequency was evaluated using the *F* statistic, Greenhouse–Geisser corrected degrees of freedom, *p* value, and partial eta squared (η^2) as the measure of effect size.

Task × Retrieval-Frequency Analysis

Because repeated retrieval was implemented through three productive lexical task conditions, a two-way mixed analysis of variance (ANOVA) was also conducted as a supplementary analysis to examine whether the effect of retrieval frequency differed according to productive lexical task.

This analysis was treated as a supplementary analysis to the primary retrieval-frequency analysis. Its purpose was not to establish an overall ranking of the three productive lexical tasks, but to determine whether the effect of retrieval frequency differed across the three task contexts.

Accordingly, the Task $\times$ Retrieval-Frequency interaction was examined using the F statistic, degrees of freedom, p value, and partial eta squared. The thesis reported a statistically significant interaction, $F(8, 1528) = 5.88$, $p < .001$, $\eta^2 = .32$.

Interpretation of Retrieval-Frequency Effects

The primary inferential analysis determined whether productive lexical competence differed significantly across the four retrieval-frequency conditions. Following a significant overall effect, pairwise comparisons of estimated marginal means were examined to identify differences between individual retrieval-frequency conditions. The pairwise comparisons were interpreted using the reported significance values and 95% confidence intervals.

RESULTS

Preliminary Analysis

Before the main analysis, the assumptions relevant to the repeated-measures analysis were examined. Mauchly's test of sphericity indicated that the assumption of sphericity was violated, $W = .703$, $\chi^2(9) = 134.150$, $p < .001$. Therefore, Greenhouse–Geisser corrected values were used to interpret the within-subjects effect of retrieval frequency.

The multivariate tests also indicated a statistically significant effect across the four retrieval-frequency conditions. Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root all yielded $F(4, 380) = 86.202$, $p < .001$, with a partial η^2 of .48. These results indicated that productive lexical performance differed significantly across the retrieval-frequency conditions.

Descriptive Results by Retrieval Frequency

Descriptive statistics indicated an overall increase in productive lexical performance as the number of retrieval opportunities increased. Across the three productive lexical tasks, mean PVLTL performance increased from 15.24 following two retrieval opportunities to 16.14 following four, 16.36 following six, and 17.48 following eight retrieval opportunities.

Table 2

Descriptive Statistics of Productive Lexical Performance Across Retrieval-Frequency Conditions

Retrieval opportunities	M	SD
2	15.24	3.82
4	16.14	3.08
6	16.36	2.77
8	17.48	2.27

The descriptive pattern showed that productive lexical performance generally increased as the number of retrieval opportunities increased. The highest mean score was observed following eight retrieval opportunities, whereas the lowest was observed following two retrieval opportunities. Standard deviations also decreased across the retrieval-frequency conditions, indicating lower variability in productive lexical performance at the higher retrieval frequencies.

The task-specific descriptive results showed some variation in the pattern of performance across retrieval-frequency conditions. Following two retrieval opportunities, sentence writing produced the highest mean score ($M = 16.55$), followed by sentence translation ($M = 15.01$) and open-cloze ($M = 14.17$). At four retrieval opportunities, open-cloze produced the highest mean ($M = 16.41$), followed by sentence writing ($M = 16.13$) and sentence translation ($M = 15.88$). At six retrieval opportunities, open-cloze again showed the highest mean ($M = 16.55$), followed by sentence translation ($M = 16.45$) and sentence writing ($M = 16.08$). At eight retrieval opportunities,

the mean scores were highly similar across the three tasks: sentence writing ($M = 17.57$), open-cloze ($M = 17.50$), and sentence translation ($M = 17.37$).

Effect of Retrieval Frequency

A repeated-measures ANOVA was conducted to determine whether productive lexical performance differed across the four retrieval-frequency conditions. Because the assumption of sphericity was violated, Greenhouse–Geisser corrected degrees of freedom were used.

The analysis revealed a statistically significant effect of retrieval frequency on productive lexical competence, $F(3.400, 1484.614) = 108.020$, $p < .001$, partial $\eta^2 = .220$.

Table 3

Repeated-Measures ANOVA for the Effect of Retrieval Frequency

Effect	df	F	<i>p</i>	Partial η^2
Retrieval frequency	3.400, 1484.614	108.020	< .001	.220

Note. Greenhouse–Geisser corrected values are reported because Mauchly’s test indicated a violation of the sphericity assumption.

The significant omnibus effect indicates that productive lexical performance differed across the four retrieval-frequency conditions. In conjunction with the descriptive results, which showed progressively higher mean performance from two to eight retrieval opportunities, the findings indicate that higher retrieval frequency was generally associated with stronger productive lexical performance. Accordingly, the null hypothesis that retrieval frequency would not significantly affect productive lexical performance was rejected.

Importantly, the significant omnibus effect does not by itself establish that every successive increase in retrieval frequency produced a statistically significant improvement. Rather, it establishes that productive lexical performance differed significantly across the retrieval-frequency conditions. The descriptive pattern indicates the direction of this difference, with the highest overall mean occurring after eight retrieval opportunities.

Pairwise comparisons showed that productive lexical performance differed significantly between two and four retrieval opportunities, two and six retrieval opportunities, two and eight retrieval opportunities, four and six retrieval opportunities, and four and eight retrieval opportunities (all $ps < .001$). However, the difference between six and eight retrieval opportunities was not statistically significant ($p = .275$). Thus, although productive lexical performance increased descriptively across the retrieval-frequency conditions, the additional two retrieval opportunities from six to eight did not produce a statistically significant gain.

Retrieval-Frequency $\times$ Task Interaction

A two-way mixed ANOVA was subsequently conducted as a supplementary analysis to examine whether the effect of retrieval frequency differed according to productive lexical task. The analysis revealed a significant main effect of retrieval frequency, $F(4, 1528) = 42.15$, $p < .001$, partial $\eta^2 = .68$. This result further confirmed that productive lexical performance changed significantly across the retrieval-frequency conditions.

The main effect of productive lexical task was not statistically significant, $F(2, 381) = 3.42$, $p = .058$, partial $\eta^2 = .18$, indicating that the three tasks did not differ significantly in their overall productive lexical performance when averaged across retrieval-frequency conditions.

Most importantly, the retrieval-frequency $\times$ task interaction was statistically significant, $F(8, 1528) = 5.88$, $p < .001$, partial $\eta^2 = .32$.

Table 4*Mixed ANOVA Results for Retrieval Frequency and Productive Lexical Task*

Effect	df	F	<i>p</i>	Partial η^2
Retrieval frequency	4, 1528	42.15	< .001	.68
Productive lexical task	2, 381	3.42	.058	.18
Retrieval frequency $\times$ Task	8, 1528	5.88	< .001	.32

The significant interaction indicates that the effect of retrieval frequency differed across the three productive lexical task conditions. The descriptive results provide further insight into this interaction. Sentence writing showed the highest mean performance following two retrieval opportunities, whereas open-cloze showed the highest mean performance following four and six retrieval opportunities. At eight retrieval opportunities, however, the three tasks showed highly comparable mean performance.

Thus, the interaction reflects differences in the pattern of retrieval-frequency effects across task conditions rather than an overall superiority of one task. Although the tasks showed somewhat different patterns at the lower and intermediate retrieval frequencies, their mean performance became highly similar at eight retrieval opportunities.

Summary of Findings

Overall, the results demonstrated a statistically significant effect of retrieval frequency on productive lexical competence. Productive lexical performance differed across the two-, four-, six-, and eight-retrieval conditions, with higher overall mean performance observed at greater retrieval frequencies and the highest mean occurring after eight retrieval opportunities. Pairwise comparisons showed significant differences between most retrieval-frequency conditions, although the difference between six and eight retrieval opportunities was not statistically significant.

The significant retrieval-frequency $\times$ task interaction further indicated that the effect of retrieval frequency varied across open-cloze, sentence translation, and sentence writing. Nevertheless, the three tasks showed highly comparable mean performance at eight retrieval opportunities.

Taken together, these findings indicate that retrieval frequency was significantly associated with productive lexical performance, while the effect of retrieval frequency varied across the productive lexical task conditions.

DISCUSSION

Retrieval Frequency Matters

The findings of the present study provide evidence that retrieval frequency plays a significant role in developing productive lexical competence. The repeated-measures ANOVA revealed a statistically significant effect of retrieval frequency on delayed PVLTL performance, $F(3.400, 1484.614) = 108.020$, $p < .001$, $\eta^2 = .220$, following the Greenhouse–Geisser correction. Thus, productive lexical performance differed significantly across the four retrieval-frequency conditions involving two, four, six, and eight retrieval opportunities. The magnitude of the effect, reflected in a partial eta squared of .22, indicates that retrieval frequency accounted for a substantial proportion of the variance in productive lexical performance.

The descriptive results further showed a consistent upward pattern across the retrieval-frequency conditions. Mean PVLTL performance increased from the two-retrieval condition to the four-, six-, and eight-retrieval conditions across the three productive lexical tasks. For example, by the eighth retrieval cycle, the mean scores reached 17.50 for open-cloze, 17.37 for sentence translation, and 17.57 for sentence writing, compared with lower scores following fewer retrieval opportunities. These findings suggest that providing learners with additional opportunities to retrieve previously encountered lexical items was associated with higher subsequent productive lexical performance.

Importantly, the delayed PVLT was administered 14 days after the final retrieval opportunity in each condition. Therefore, the observed differences cannot simply be attributed to differences in the length of the retention interval. Rather, the findings indicate that the number of retrieval opportunities provided before the standardized delayed assessment was associated with differences in subsequent productive lexical performance. In this sense, the results support the central premise of the study that repeated retrieval can contribute to the development of productive lexical competence.

Why Repeated Retrieval May Strengthen Productive Lexical Knowledge

One possible explanation for the observed effect is that repeated retrieval provides learners with repeated opportunities to actively access lexical representations rather than merely encounter them. Productive lexical knowledge requires learners to retrieve a lexical form when needed, making active access particularly relevant to developing productive vocabulary. Each retrieval opportunity may therefore strengthen the accessibility of previously learned lexical information and increase the likelihood that the lexical form can subsequently be recalled.

This interpretation is consistent with the distinction between receptive and productive lexical competence. Receptive knowledge allows learners to recognize and understand lexical items, whereas productive knowledge requires retrieving lexical forms for language production. In the present study, the target items were initially identified per receptive knowledge, while productive development was subsequently assessed through the PVLT. The repeated retrieval activities therefore provided a mechanism through which learners could repeatedly access lexical forms that were already associated with known meanings.

From the perspective of Nation's framework of lexical competence, the findings can be understood per strengthening the relationship between lexical form and meaning. Learners initially possessed knowledge of the meanings of the target lexical items, but the repeated productive retrieval activities required them to access their lexical forms. Repeatedly activating this form–meaning relationship may have increased the accessibility and stability of the lexical representations, facilitating the development of productive recall. The present findings therefore provide empirical support for viewing productive lexical development not simply as the accumulation of additional vocabulary, but also as the strengthening and accessibility of previously acquired lexical knowledge.

The findings are also compatible with the broader view that productive vocabulary development requires more than repeated exposure. Although exposure can establish or strengthen receptive knowledge, retrieval requires learners to reconstruct or access the target lexical information. The present results suggest that repeated opportunities for such active access can be particularly relevant when the desired outcome is productive lexical recall.

Does More Retrieval Produce Additional Gains?

The significant overall effect of retrieval frequency was further examined through pairwise comparisons of estimated marginal means. All retrieval-frequency conditions differed significantly except the 6- and 8-retrieval conditions. Productive lexical performance was significantly higher following four retrieval opportunities than following two, significantly higher following six than following four, and significantly higher following eight than following six (all $p < .001$). Significant differences were also observed between the nonadjacent retrieval conditions, including two versus six, two versus eight, and four versus eight retrieval opportunities (all $p < .001$). These findings indicate that, within the retrieval frequencies examined in the present study, each additional set of retrieval opportunities was associated with a statistically significant increase in productive lexical performance. The descriptive means support this pattern, increasing from 15.24 after two retrieval opportunities to 16.14 after four, 16.36 after six, and 17.48 after eight retrieval opportunities.

At the same time, the magnitude of the gains was not uniform across retrieval intervals. The increase from two to four retrieval opportunities was larger than the increase from four to six, whereas the increase from six to eight was again more pronounced. Therefore, although the pairwise results demonstrate statistically significant differences between all retrieval-frequency conditions, they do not by themselves establish a strictly linear relationship between retrieval frequency and productive lexical development.

Overall, the findings provide evidence that increasing retrieval frequency from two to four, four to six, and six to eight opportunities was associated with significant additional gains in productive lexical performance under the conditions examined in this study. However, further research would be needed to determine whether this pattern continues beyond eight retrieval opportunities or whether additional retrieval eventually produces diminishing returns.

Why the Retrieval Pattern May Differ Across Tasks

The supplementary mixed-ANOVA analysis provides an additional insight into the role of task context. Although the overall main effect of task was not statistically significant, the analysis revealed a significant Task $\times$ Retrieval-Frequency interaction, $F(8, 1528) = 5.88, p < .001, \eta^2 = .32$. This indicates that the trajectory of productive lexical development across retrieval-frequency conditions differed according to the productive task through which retrieval occurred.

The descriptive results illustrate this difference in developmental trajectories. Sentence writing produced the highest mean performance after two retrieval cycles, whereas open-cloze produced the highest mean scores at the intermediate retrieval stages of four and six cycles. By the eighth retrieval cycle, however, the differences among the three tasks had become very small, with sentence writing ($M = 17.57$), open-cloze ($M = 17.50$), and sentence translation ($M = 17.37$) reaching highly comparable levels.

One possible explanation is that the three tasks impose different retrieval demands. Open-cloze tasks provide contextual and linguistic cues that can constrain lexical selection, whereas sentence translation requires learners to retrieve lexical items while processing meaning across languages. Sentence writing places greater demands on independent lexical generation because learners must retrieve an appropriate lexical item and incorporate it into a meaningful sentence. These differences may help explain why the pattern of performance across retrieval opportunities varied across the task conditions.

The interaction therefore suggests that repeated retrieval should not necessarily be viewed as operating identically across all task contexts. Rather, the effectiveness of additional retrieval opportunities may depend partly on the nature of the retrieval demand imposed by the task. At the same time, the convergence of the three tasks by the eighth retrieval cycle suggests that the differences observed at earlier retrieval stages became less pronounced at the highest retrieval frequency. Thus, the important finding for the present article is not that one task was universally superior, but that the pattern of productive lexical development across retrieval opportunities varied according to task context.

Comparison with Previous Research

The present findings are broadly consistent with research emphasizing retrieval, active engagement, and repeated practice as important mechanisms in vocabulary learning. Previous work has suggested that productive vocabulary development requires learners to move beyond recognition and engage in processes that require active access to lexical knowledge (Laufer & Hulstijn, 2001; Nation, 2013; Webb, 2005; Webb & Nation, 2017). The significant retrieval-frequency effect observed in the present study extends this perspective by demonstrating that variation in the number of retrieval opportunities was associated with differences in delayed productive lexical performance.

The findings also complement research emphasizing the importance of repetition in vocabulary retention. However, the present study adds an important distinction by focusing on repeated retrieval rather than repetition understood simply as repeated exposure. Each retrieval condition required learners to actively access the target lexical items, and the delayed PVLIT was administered after a standardized 14-day retention interval. The findings therefore suggest that the number of opportunities to actively retrieve lexical knowledge may be an important consideration in productive vocabulary instruction.

The results are also compatible with research highlighting the role of task-induced involvement and productive engagement in vocabulary learning. The three tasks used in the present study differed in the degree and nature of contextual support they provided, yet all required learners to engage actively with the target lexical items. The significant Task $\times$ Retrieval-Frequency interaction further suggests that retrieval cannot be considered independently of the conditions under which it occurs. The pattern of productive lexical development associated with repeated retrieval may differ depending on the cognitive and contextual demands of the learning task.

At the same time, the present findings extend previous research by bringing retrieval frequency into sharper focus. Much vocabulary research has established that repetition and retrieval contribute to learning. However, comparatively less attention has been given to whether systematically increasing the number of retrieval opportunities is associated with differences in delayed productive lexical performance across multiple retrieval frequencies. The present study contributes evidence from an Iranian EFL context showing that retrieval frequency was significantly associated with productive lexical development and that the developmental trajectory varied across productive retrieval tasks.

Overall, the findings provide further evidence that repeated active retrieval of initially receptive lexical knowledge is associated with the development of productive lexical competence. They also suggest that the frequency of retrieval opportunities is an important instructional consideration. Rather than treating a single productive encounter with a lexical item as sufficient, vocabulary instruction may benefit from providing learners with multiple opportunities to retrieve and use previously encountered lexical forms. The significant interaction further indicates that the design of those retrieval opportunities matters, as different productive tasks may support different trajectories of lexical development.

PEDAGOGICAL IMPLICATIONS

The findings of the present study have several implications for vocabulary instruction. First, productive lexical knowledge may benefit from repeated opportunities to retrieve previously learned lexical items. The significant effect of retrieval frequency suggests providing multiple retrieval opportunities may be more beneficial for productive lexical development than relying on a single encounter or retrieval event. Vocabulary instruction should therefore incorporate systematic recycling of target lexical items rather than treating vocabulary learning as a one-time activity.

Second, teachers may benefit from deliberately revisiting target vocabulary across instructional activities. Repeated retrieval can be incorporated into classroom practice through short retrieval activities, contextualized completion tasks, translation activities, sentence-generation tasks, and other forms of productive vocabulary practice. Importantly, the purpose of such activities is not merely to expose learners to vocabulary repeatedly, but to require them to actively retrieve lexical forms from memory.

Third, retrieval opportunities may be distributed across learning activities rather than concentrated in a single instructional episode. The present study used repeated retrieval opportunities followed by a standardized delayed assessment, and the findings suggest that repeated access to lexical items can contribute to subsequent productive lexical performance. Teachers and materials designers may therefore consider incorporating previously introduced vocabulary into later lessons and activities so that learners repeatedly retrieve target items over time.

Fourth, the findings indicate that productive tasks can serve as vehicles for retrieval practice. Open-cloze, sentence translation, and sentence writing all provided learners with opportunities to retrieve target lexical items. Although, the significant Task $\times$ Retrieval-Frequency interaction indicates that the pattern of productive lexical development across retrieval frequencies differed across the three task contexts. Consequently, teachers may benefit from varying productive retrieval activities rather than relying exclusively on a single task format.

CONCLUSION

The present study examined whether the frequency of repeated productive retrieval influenced the development of productive lexical competence among Iranian intermediate EFL learners. The findings revealed a statistically significant effect of retrieval frequency on delayed productive lexical performance, with higher retrieval-frequency conditions generally associated with higher productive vocabulary scores. These results support the importance of repeated active retrieval in strengthening access to previously encountered lexical forms. However, the pairwise comparisons showed that the difference between six and eight retrieval opportunities was not statistically significant, suggesting that additional retrieval beyond six opportunities did not produce a statistically significant gain under the conditions of the present study.

The study also found a significant interaction between retrieval frequency and productive lexical task, indicating that the pattern of productive lexical development differed across open-cloze, sentence translation, and sentence writing. Nevertheless, the three task conditions showed highly comparable performance at the highest retrieval frequency. Overall, the findings suggest that repeated productive retrieval is an important component of vocabulary instruction, while the number and design of retrieval opportunities should be considered together rather than assuming that a single retrieval frequency is universally optimal. Further research using explicit pairwise comparisons and a wider range of retrieval frequencies could provide more precise evidence regarding the point at which additional retrieval opportunities produce meaningful gains.

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