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Research Article

The Effectiveness of Three Vocabulary Learning Tasks from the Perspective of Technique Feature Analysis

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Abstract: This study investigated the effectiveness of vocabulary learning tasks based on the Technique Feature Analysis framework. The framework provides criteria for evaluating the effectiveness of vocabulary learning tasks. The study investigated the correlation between the predictability of the framework and the task's effect on vocabulary learning and retention. The study employed an experimental design in which participants were assigned to three different vocabulary tasks involving 15 target words. The tasks were designed to vary in the presence of the vocabulary learning criteria outlined in the Technique Feature Analysis. Learners' knowledge of word forms and word meanings was assessed immediately and one week later. The results provided mixed support for the Technique Feature Analysis framework. While no significant differences were found in immediate form-meaning recognition, and delayed form recognition, the framework was predictive of learners' delayed meaning recognition performance.

Keywords: technique feature analysis; L2 vocabulary acquisition; task type; vocabulary learning; teaching techniques

1. Introduction

Vocabulary knowledge is an indispensable part of language learning and a prerequisite for language proficiency (Lin & Morrison, 2010; Schmitt, 2010). Research literature indicates a strong association between vocabulary knowledge and overall communicative competence (Koizumi & In'nami, 2013). Vocabulary appears to be a crucial component of reading ability, with lexical knowledge serving as a key determinant of reading comprehension (Cain & Oakhill, 2011). Furthermore, vocabulary knowledge has been linked to the quality of written expression (Lee, 2003; Coxhead, 2012). However, the specific processes and mechanisms involved in vocabulary learning continue to be a topic of debate and investigation.

The depth of processing framework, proposed by Craik and Lockhart (1972), is a fundamental concept underlying much of the research on incidental vocabulary learning. This framework posits that the strength and durability of memory traces are positively correlated with the depth to which a stimulus is analyzed and processed. In other words, the more elaborate and in-depth the processing of information, the more persistent and robust the resulting memory traces will be. The depth of processing hypothesis suggests that the retention of information is determined by the depth to which it is processed, rather than the duration of its presence in short-term memory. Elaboration is therefore considered a key factor in promoting the learning and retention of vocabulary.

However, a key challenge with the depth of processing hypothesis has been the lack of clear, operationalizable definitions for evaluating and classifying tasks in terms of their depth of processing and subsequent effectiveness. To address this, three theoretical frameworks have been proposed: the Involvement Load Hypothesis (hereafter ILH; Hulstijn & Laufer, 2001), Type of Processing – Resource Allocation (TOPRA) model (Barcroft, 2002) and Technique Feature Analysis (hereafter TFA; Nation & Webb, 2011). These frameworks aim to provide a more systematic way to conceptualize and measure the depth of processing involved in different vocabulary learning activities. While there are several studies confirming the predictive power of the ILH and TOPRA model (Keating, 2008; Kida & Barcroft, 2018) and research have been comparing the predictability between the ILH and TFA framework,

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research on three vocabulary tasks possessing three different TFA scoring remain scarce. Therefore, this research aim is to examine the predictions made by the TFA regarding the effectiveness of vocabulary learning tasks

1.1. Technique Feature Analysis

The TFA outlines five categories that dictate word learning efficiency, including motivation, noticing, retrieval, generation and retention. Each component is subdivided into 18 features in the form of questions and the effectiveness of a task is based on how well it scores. Scores are added or deduced (assigned to 0) in accordance with whether a feature is present or absent, and a task can get a maximum score of 18 (Figure 1).

Criteria	Scores	
Motivation		
Is there a clear vocabulary learning goal?	0	1
Does the activity motivate learning?	0	1
Do the learners select the words?	0	1
Noticing		
Does the activity focus attention on the target words?	0	1
Does the activity raise awareness of new vocabulary learning?	0	1
Does the activity involve negotiation?	0	1
Retrieval		
Does the activity involve retrieval of the words?	0	1
Is it productive retrieval?	0	1
Is it recall?	0	1
Are there multiple retrievals of each word?	0	1
Is there spacing between retrievals?	0	1
Generation		
Does the activity involve generative use?	0	1
Is it productive?	0	1
Is there a marked change that involves the use of other words?	0	1
Retention		
Does the activity ensure successful linking of form and meaning?	0	1
Does the activity involve instantiation?	0	1
Does the activity involve imaging?	0	1
Does the activity avoid interference?	0	1
Maximum score		18

Figure 1. Technique analysis hypothesis.
Source: Nation & Webb, 2011.

Motivation feature concerns the learning goal and a task with a clear goal facilitates learning as it arouses interest in learners. In addition, a task can be motivative when it is challenging, raises awareness of successful learning and brings pleasure to the learners. In Noticing, it is stated that word learning occurs when learners are aware of the unknown words and also the need to learn that words in an activity. Retrieval refers to the process of accessing stored information or recalling previously encountered information. Generative use of wordsx is related to meeting or produce the words in new context. Retention is examined whether the activity involves the form-meaning link of new words, instantiation, imaging and avoidance of interference (Nation & Webb, 2011).

The research aimed to investigate the effectiveness of three vocabulary tasks based on the Task Feature Analysis (TFA) framework on the learning and retention of 15 target words.

This study investigates the following questions:

1. To what extent do the three vocabulary tasks used in this research contribute to vocabulary learning?
2. To what extent do three vocabulary tasks contribute to vocabulary form and meaning recognition in the immediate post-test and delayed post-test?

2. Materials and Methods

2.1. Design

The study was adopted within-group design, Vocabulary Treatment (three vocabulary-oriented tasks) and Time (immediately and one week after the experiment).

The studies adopted an intentional learning design in which participants were informed about the vocabulary tests after they performed the treatments. The target words in the texts were replaced by pseudowords that resemble English words phonetically and orthographically. The 15 pseudowords were selected from a series of studies by Webb (2007a,

2007b, 2008a, 2008b) for reasons of reliability. Their forms and meanings are as follows: bandet (bank), masco (peep), dangy (daisy), denet (rabbit), hodet (hole), ictay (pressure), denent (slums), copac (terrible), gishom (shocking), ancon (inhabitant), faddam (urbanisation), nasin (friendship), shoten (sibling), intay (interaction), pathen (parents).

2.2. Participants

The participants in this research were 38 Vietnamese students (30 females, 8 males, age from 20 to 28). All the participants achieved an IELTS score of 5.5 and above. They are recruited following convenient sampling process. As the representativeness of the sample and its size is crucial to a robust research conclusion, random sampling is used because it minimizes the effect of subjectivity; hence, the subjects would be more representative and similar to the population than non-random samples (Dörnyei, 2007).

2.3. Procedure

All participants were asked to read the texts and perform the tasks in the allotted time of 30 minutes (10 minutes for each task). After each assigned task, the participants were tested immediately to measure their learning of target words. A delayed post-test was conducted a week later to evaluate their vocabulary retention.

2.4. Vocabulary tasks

As the study aims to compare the effectiveness of word-focused activities, the tasks must obtain different TFA scores, lead to intentional vocabulary learning and must all have new word learning feature. Each task involves one passage containing five new words and the TFA scores were 4, 5, and 7 respectively (Table 1). Each target word appeared once in the passages.

Table 1. Scoring of vocabulary tasks.

Criteria	Task 1	Task 2	Task 3
Motivation			
Is there a clear vocabulary learning goal?	1	1	1
Does the activity motivate learning?	1	1	1
Do the learners select the words?	0	0	0
Noticing			
Does the activity focus attention on the target words?	1	1	1
Does the activity raise awareness of new vocabulary learning?	1	1	1
Does the activity involve negotiation?	0	0	0
Retrieval			
Does the activity involve retrieval of the words?	1	0	0
Is it productive retrieval?	0	0	0
Is it recall?	0	0	0
Are there multiple retrievals of each word?	0	0	0
Is there spacing between retrievals?	0	0	0
Generation			
Does the activity involve generative use?	0	0	0
Is it productive?	0	0	0
Is there a marked change that involves the use of other words?	0	0	0
Retention			
Does the activity ensure successful linking of form and meaning?	1	0	0
Does the activity involve instantiation?	0	0	0

Does the activity involve imaging?	1	0	0
Does the activity avoid interference?	1	1	0
Total score	7	5	4

The reading passages include an extract from Alice's Adventures in Wonderland and two reading texts about Urbanization and Family taken from Vocabulary for IELTS (Cullen, 2008). Considerations were made on the running words of the text as vocabulary knowledge is widely acknowledged to have a primary effect on reading performance and several studies have shown their strong correlation (Laufer, 1997; Hu & Nation, 2000). Three reading texts were selected and graded in order to ensure that the texts are comprehensible to the participants. Consonant with the fact that the subjects must know at least 3,000 word families, 95% of the texts should include this high-frequency vocabulary level. The researcher excluded all target words in three texts and conducted a lexical frequency profile analysis via Vocabprofilers on Tom Cobb's Website (http://lextutor.ca/vp/). Results show that the original texts did not meet the required coverage therefore, the texts were adapted to meet the 95% coverage within the 3,000 word-family level by paraphrasing and replacing less frequency words with high frequency words.

Task 1: Read and write with target words

The participants read an extract from Alice's Adventure in Wonderland and performed two tasks: filling in the blanks and matching the target words with pictures depicting their meanings. Pictures were taken from the animated Alice in Wonderland to preserve contextual consistency.

Task 2: Read plus fill in

Task 2 involves a reading text with blanks replacing the target words. The target words were glossed under the passage. Participants selected the suitable words and filled in the blanks.

Task 3: Read and select word meaning

The participants read a full text. The target words and their definitions were provided disorderly in a separate table. Based on the context of the reading passage, they had to match the target words with the equivalent definitions. The target words are ictay (pressure), nasin (friendship), shoten (sibling), intay (interaction), pathen (parents).

2.5. Tests

The research adopts two tests: immediate tests and delayed tests measuring recognition of form and meaning in multiple-choice formats. The form recognition tests preceded the meaning recognition tests to prevent the subjects from familiarising themselves with the word form. As the immediate tests and post-tests were identical, the test questions were rearranged to prevent any memorisation.

The first test measured receptive knowledge of form; the participants had to circle the correctly spelled target words, which appeared with three distracters. The distracters were created to resemble the target words both phonetically and orthographically.

Immediate recognition of form test

Circle the correct word form

1.

a. gishom
b. geshom
c. gishum
d. geshum

The second test measured receptive knowledge of meaning; the participants had to circle the correct meaning of target words.

Immediate recognition of meaning test

Circle the correct word meaning

1. gishom

a. changing
b. rising
c. falling
d. shocking

2.6. Data Analysis

This study adopts the analysis of variance (ANOVA) to determine any differences between the mean scores of each task. Concerning the number of groups in the study, the ANOVA is a feasible option as it is a method used to compare the mean of two or more groups. In the within-group designs, each subject is exposed to three learning tasks. For this study, one-way ANOVA tests were conducted to compare the TFA scores and learning outcomes (form recognition, meaning recognition, delayed meaning recognition) across the three task conditions (Task 1, Task 2, Task 3).

The vocabulary tests were scored dichotomously in which every correct and incorrect answer was assigned a 1 or 0 point respectively. The test scores were analysed using repeated measure with test scores as a within-subject variable.

Wilk's Lambda was used to determine statistical significance ($p<.05$) as recommended by Pallant (2010). Effect size is also assessed to measure the degree of association between the three sets of scores. The effect size is evaluated following guidelines proposed by Cohen (1988, see Pallant 2010). For repeated measure ANOVA, Cohen (1988) suggested that $\eta p2$ (Partial eta squared) = 0.01 be considered a small effect size, 0.06 represents a moderate effect size and 0.138 a large effect size. This means that if the effect size is no greater than 0.01, the difference is trivial even though there is statistical significance.

3. Results

This study adopts the analysis of variance (ANOVA) to determine any differences between the mean scores of each task.

The immediate and post-tests were scored dichotomously in which every correct and incorrect answer was assigned a 1 or 0 point respectively. The test scores were analysed using repeated measure with test scores as a within-subject variable.

The results will be presented and discussed in terms of the remaining research questions:

3.1. To what extent do the three vocabulary tasks used in this research contribute to vocabulary learning?

A one-way repeated measure ANOVA was conducted to compare scores on the immediate tests and delayed post-tests. The means and standard deviation are presented in Table 2.

Table 2. Descriptive statistics of task scores.

Condition	N	TFA scores	Form recognition				Meaning recognition			
			Immediate		Delayed		Immediate		Delayed	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
Task 1	38	8	4.55	.60	3.21	.96	4.58	.79	4.16	1.05
Task 2	38	6	4.71	.56	3.55	1.06	4.61	.49	3.47	1.03
Task 3	38	4	4.39	.95	3.47	1.18	4.26	1.18	2.74	1.55

The results showed that the participants learned a substantial number of words. Mean scores of the immediate tests remained above 4 out of 5 points scale and there was not a big gap between immediate form and meaning recognition test scores. Task 2 yielded the highest average scores in the Immediate form, Immediate meaning and Form recognition delayed tests with the mean scores of 4.71, 4.61 and 3.55 respectively. Task 3 ranked third and only had the second highest scores on the form recognition delayed test.

Table 2 compares the means of delayed and immediate tests. The participants scored higher on the immediate than on the delayed tests. Task 2 has the highest scores of form retention, followed by Task 3 and Task 1. The retention of word meaning scores the highest in Task 1 and the least in Task 3.

3.2. To what extent do three vocabulary tasks contribute differently to vocabulary form and meaning recognition in the immediate post-test and delayed post-test?

Post hoc test using the Bonferroni correction was generated to determine the degree of significant difference between each task. Data from Table 3 revealed that participants retained more words from Task 1 (mean= 4.16; SD = 1.05) compared to Task 2 (mean= 3.47; SD = 1.03; p=.001) and Task 3 (mean= 2.74; SD = 1.55; p<.001). Task 3 was significantly less effective than Task 2 (p= .0.007), indicating that Task 3 resulted in the least retention of word meaning.

Table 3. Pairwise comparisons between delayed meaning tests

(I) Delayed meaning test	(J) Delayed meaning test	Mean Difference (I-J)	Sig.
1	2	.684*	.001
	3	1.421*	.000
2	1	-.684*	.001
	3	.737*	.007
3	1	-1.421*	.000
	2	-.737*	.007

The scoring of TFA does not align with the descriptive statistic for immediate recognition tests. Task 2 has lower TFA scores than Task 1; however, its mean scores were the highest. Meanwhile, the subjects scored the lowest in Task 3. Therefore, the TFA does not consistently predict which task is more effective than one another in terms of immediate meaning and form recognition. Results from immediate tests yielded no significant difference among the tasks.

Similar findings can be found in the case of delayed form recognition knowledge in which no statistical significance was found between the tasks. However, the difference lies in the analysis of delayed tests results which indicated the TFA scores correlate with the retention of word meaning as participants fared best in Task 1, scored lower in Task 2 and lowest in Task 3. Therefore, the research found that the framework only predicts the retention of vocabulary meaning.

Findings revealed that learning effect only differs in delayed meaning recognition tests while results from other tests have no significant difference among the tasks. This section can be divided into multiple sub-sections to ensure that the results are presented in the best possible format. We strongly recommend using tables, and figures, in this part of the article.

4. Discussion

The research aimed to compare the effect of three vocabulary tasks on learning and retention of 15 target words from the perspective of TFA framework. Considering all target words were unknown to the participants, three tasks led to new word learning.

The hypothesis was that the TFA scores would correlate with task effectiveness, with learners expected to perform best on Task 1 and poorest on Task 3. However, the analysis found no significant differences in the scores of immediate form and meaning recognition knowledge across the tasks. This lack of distinction may be attributed to the fact that all tasks were designed using the TFA framework, thus incorporating features that facilitate vocabulary learning, such as Motivation, Noticing, Retrieval, Generation, and Retention. Additionally, the similarity between the task formats and the recognition-based test format may have minimized performance differences, as participants had already engaged with the target words' meaning in the previous tasks.

The study found a significant difference in learners' performance on the delayed meaning recognition test, providing evidence for the effectiveness of the TFA framework in vocabulary retention. Several explanations can be offered, referring to the level of processing involved in the tasks. In Task 1, learners had to select the correct word form and infer the word meaning from the text, which aligns with concerns raised by researchers about the limitations of learning from contextual guessing. The context may not provide sufficient information for correct meaning inference, potentially leading learners to acquire the wrong meaning. However, these studies inspected inferring-from-context method under a reading only condition (i.e. no subsequent vocabulary exercises). Hulstijn (1992) and Koren (1999) concluded treatments that encouraged lexical inferencing led to higher level of retention than

glossing, which can be seen in the results of post-tests. Initially, it can be assumed that fill-in-the-blank exercises in Task 1 is a passive use of vocabulary as the subjects only searched word form and filled in the blanks. However, Folse (2006) argued that this exercise involves various thinking processes: learners can try out different words in a slot, probably "by translating many of the words or perhaps by remembering tidbits about some of the words" (p.287). In his opinion, this is indeed deep processing of the word which facilitates retention. Another possible reason can be found in the second sub-task – matching pictures and vocabulary. Studies have showed that words that are strongly associated with images are more likely to be remembered (Underwood, 1989) and recognised (Yanguas, 2009). This has been referred to as the picture superiority effect which assumes that pictures are more elaborative and elaboration is a facilitator to vocabulary learning. In a study by Carpenter and Olson (2012), vocabulary learning from picture-word pairing was more effective than words translated in native language.

The increased number of word encounters in Task 1 may have contributed to better meaning retention. Learners had to read the text (first meeting), fill in the blanks (second meeting), and match pictures (third meeting). The two sub-tasks also strengthened the connection between lexical form and meaning. The fill-in-the-blank task required word form retrieval and semantic decision-making, while the picture matching task involved retrieving word meaning for the given forms. Previous re-search has found that two retrievals within a single vocabulary task led to better word retention. As emphasized in the literature, multiple retrievals and encounter opportunities are strong facilitators of vocabulary acquisition.

5. Conclusions

The study aimed to investigate whether the TFA framework can predict the effect of vocabulary tasks on the learning and retention among Vietnamese learners. Results showed that there was no difference between a task's effect on the learning of a word's meaning and word form with the retention of word form while learning effect differs in delayed meaning recognition

Findings from the studies suggest that the design of vocabulary exercises can be based on the TFA framework. The researcher recommends using the framework regularly as there are some components (i.e. motivation, spacing retrievals, marked change in generative use) that require insights from the teachers in the long term. It can be suggested to combine exercises for better learning effect. Getting learners to perform the two tasks simultaneously is more likely to result in their better learning and retaining more words.

For more cumulative effect and more differences in the learning gains, future research could have larger sample sizes, provide longer time for post-tests and use more tasks with similar and different TFA features which is then followed by tests of productive word knowledge (i.e., form, meaning, grammatical function).

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