

A Study of the Effects of Time Lag between Learners' Errors and Teachers' Feedback on the Depth of Vocabulary Knowledge

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Abstract—The present study aims at studying the effect of immediate and delayed feedback on the depth of vocabulary knowledge. To this end, two classes were selected from Sokhansara institute of those who were studying at the intermediate level. But, to ensure homogeneity, an OPT was given based on which two groups were selected, one acting as the immediate feedback group (IFG) and the other as the delayed feedback group (DFG). In the next stage, a pretest which was adapted from Read's Word Association Test was given to assess the students' depth of vocabulary knowledge before treatment. After that, students in IFG received feedback over their lexical errors immediately in the presentation stages of the lessons, while in DFG, feedback was provided in the practice and production stages of the lessons. At the end of the semester, a parallel post test was given to assess the students' depth of vocabulary knowledge. As to the analysis of the results, a paired sample Students' T-Test was run on SPSS to compare the scores of participants in pretest and posttest within each group. An independent sample Students' T-Test was also run between the post test results to check the differences between two experimental groups. The findings of this research indicate that using delayed feedback has a positive impact on enhancing the depth of vocabulary knowledge of EFL students at intermediate level.

Index Terms—corrective feedback, dimensional approach to depth, immediate and delayed feedback, vocabulary knowledge dimensions, word association test

I. INTRODUCTION

Based on the previous research (Henriksen 1999; Nation 2001; Read 2000), it has been realized that word knowledge is a multidimensional construct with various types of knowledge components. As found in the literature, knowing a word goes beyond just knowing its different meanings in different contexts. A learner must know all kinds of associated knowledge of each word including knowledge related to its pronunciation, spelling, register, stylistic, and morphological features (Haastруп & Henriksen, 2000; Meara, 1996; Nation, 1990; Richards, 1976) as well as the knowledge of the word's syntactic and semantic relationships with other words in the language (i.e., its collocational meanings, antonymy, synonymy, and hyponymy) (Chappelle, 1994; Henriksen, 1999; Read, 2000). But, most commonly, researchers tend to view vocabulary knowledge as a dichotomy of breadth (how many words are known) and depth (how well is a word known) (Greidanus & Nienhuis, 2001; Read, 2000; Vermmer, 2001; Wolter, 2001)

As to teacher's feedback in language classroom, unfortunately, explicit teaching of vocabulary has been almost neglected and research conducted so far have been mostly in writing and speaking areas (e.g., Qian, 1999, 2002; Li, 2003). In Iran, for example, only little research has been done on the role of corrective feedback in vocabulary learning (e.g. Mollakhan, Rasouli & Karballaei, 2013, Keyanfar, & Azimi F, 2009). Mollakhan et al.'s (2013) study, also, was about using prompts and recasts as two kinds of oral corrective feedback for enhancing the learners' ability to detect and correct errors in their own speech when they are learning new vocabularies.

So, it can be said that, in the area of vocabulary teaching and learning, feedback is mostly provided on pronunciation errors, but teachers don't usually pay attention to the depth of vocabulary. What gives significance to the present study, therefore, is that it mainly focuses on feedback procedure in vocabulary development, in this case, enhancement of depth of vocabulary knowledge. Another factor which has been manipulated in this study is the time lag between learners' lexical errors and teacher's feedback, in a way that both immediate and delayed feedback conditions can be studied.

The following three research questions are addressed:

1. What is the effect of teacher's immediate feedback on EFL learners' depth of vocabulary knowledge?
2. What is the effect of teacher's delayed feedback on EFL learners' depth of vocabulary knowledge?
3. Is there any difference between EFL Learners' depth of vocabulary knowledge in immediate and delayed feedback conditions.

By considering the related questions mentioned above, the following hypotheses were raised:

1. Teacher's immediate feedback does not have any significant effect on EFL learners' depth of vocabulary knowledge.
2. Teacher's delayed feedback does not have any significant effect on EFL learners' depth of vocabulary knowledge.
3. There is no difference between EFL learners' depth of vocabulary knowledge in immediate and delayed feedback conditions.

II. LITERATURE REVIEW

A. Vocabulary Knowledge Dimensions

Because of the complexity of the construct of word knowledge, it is difficult to reach a consensus on what is involved in it and how to measure it. Nation (1990) proposed that word knowledge has eight different aspects: (1) the spoken form of a word, (2) the written form of the word, (3) the grammatical behavior of the word, (4) the collocation behavior of the word, (5) the word frequency, (6) the style and register of the word, (7) the conceptual meaning of the word, and (8) the associations the word has with other related words (cited, e.g., by: Schmitt, 1998).

Chappelle (1998) also, argues that in defining the vocabulary as a trait, one should include four dimensions: (1) vocabulary size; (2) knowledge of word characteristics; (3) lexicon organization; and (4) process of lexical access (cited by, e. g., Razmjoo, Sahragard, & Sadri, 2009). From another point of view, Henriksen (1999) includes three dimensions of precision, depth, and receptive/productive knowledge in his definition of lexical competence (see, e.g., Mehrpour, Razmjoo, & Kian, 2011). Furthermore, Qian (2002) in his recent framework, proposes the following four intrinsically connected dimensions of vocabulary knowledge:

(1) *vocabulary size, which refers to the number of words of which a learner has at least some superficial knowledge of meaning;* (2) *depth of vocabulary knowledge, which includes all lexical characteristics, such as phonemic, graphemic, morphemic, syntactic, semantic, collocational, and phraseological properties, as well as frequency and register;* (3) *lexical organization, which refers to the storage, connection, and representation of words in the mental lexicon of a learner;* and (4) *automaticity of receptive-productive knowledge, which refers to all the fundamental processes to access the word knowledge for both receptive and productive purposes, including phonological and orthographic encoding and decoding, access to structural and semantic features from the mental lexicon, lexical-semantic integration and representation, and morphological parsing and composing.* (cited by: Mehrpour, Razmjoo, & Kian, 2011; Shen, 2008).

For the purpose of the present study, only depth component of the vocabulary knowledge has been further explained below.

Depth of Vocabulary Knowledge (DVK)

With all the controversies existing as to the nature of vocabulary knowledge, a common trend has been observed among a group of researchers (e.g., Read, 2000; Qian, 2002; and Vermeer, 2001) who believe that vocabulary knowledge consists of two dimensions of breadth and depth. Breadth of vocabulary knowledge indicates a person's vocabulary size or the number of words one approximately knows (e.g., Nassaji, 2004; Qian, 2002; Zareva, 2005). Depth of vocabulary knowledge (DVK), on the other hand, implies the quality of a person's knowledge of a word – "how well someone knows a specific word or set of words" (Mehrpour, Razmjoo, & Kian, 2011). The only complexity which seems to exist is that few vocabulary tests attempt to address this DVK. The only widely known test format that does make such an attempt is the Word Associates Test (WAT) (Read, 1993, 1998), which, in addition to testing synonyms, attempts to incorporate collocational knowledge of the tested words.

Word Association Test

vocabulary size is usually a measurable construct and can be gauged by different techniques, for example, by classroom quizzes or more established assessment instruments, as mentioned by Schmitt et al. (2011), for example, the Peabody Picture Vocabulary Test (Dunn & Dunn, 2007, cited by Schmitt et al., 2011) for L1 children and the Vocabulary Levels Test (Schmitt, Schmitt, & Clapham, 2001) for L2 learners. The measurement of vocabulary depth, however, is more problematic (Schmitt et al., 2011). According to Read (2000), depth can be measured based on developmental and dimensional approaches. In the former, a scale of, usually 5 points, ranging from no knowledge to full mastery, is used for charting the level of mastery of lexical item. One of the best known scales of vocabulary knowledge is the Vocabulary Knowledge Scale, proposed by Paribakht and Wesche, (1997), although it has, also, some serious drawbacks (see Read, 2000 and Schmitt, 2010, for detailed discussions).

The dimensional approach, on the other hand, describes the depth in terms of different components of word knowledge. This approach which has been taken from Richards (1976) sets out a number of competencies necessary for mastery of a word (see: Shen, 2008). One of comprehensive measures which somewhat tap these competencies, is word association acknowledged by researchers like Schmitt and Meara (1997) and Read (2001).

A common format for Word Association Test has been provided in www.lex tutor.ca. There are two boxes with eight probable associates for each stimulus word. The four words in the left box may help to explain the meaning of the given word, while the four words in the right box are items that may collocate with the given word in a phrase or a sentence. Test takers are asked to select four words from the two boxes that they think are relevant to the stimulus word according to the criteria mentioned above.

B. Teacher's Feedback

Long (1996), in his general views to feedback, states that language learners have access to two types of input: positive evidence and negative evidence. Positive evidence is models provided for the learners of what is grammatical and acceptable in the TL; negative evidence is direct or indirect information given to the learners about what is unacceptable. In this case, teacher may explicitly explain a grammatical point or correct an error overtly, or act incidentally in his/her error correction and use some implicit techniques such as confirmation check (p. 413).

Immediate and Delayed Feedback

There are several control issues related to the timing interval between learners error and teachers feedback. For example, Metcalfe, Kornell, & Finn (2009) showed that:

"delayed feedback was better than immediate feedback (and both were better than no feedback) when time interval to test was not controlled, but there was no difference between the delayed and immediate feedback conditions when timing to the test was controlled".

According to the study by Metcalfe (2009), in testing situation, if immediate feedback is given to the test takers' answers in the form of automatic scoring or rating, such a test shows exactly where the learners' weaknesses are and helps in eliminating those weaknesses. And this should be done without any delay; because, according to Metcalfe, if a teacher cannot answer a student's question until 48 hours, something we have in common testing methods, he is considered as inefficient" (p. 417).

As to immediate feedback, Zahorik (1987), for example, stated that when students are informed about the wrong or right of their test performances, they can change their studying style and, consequently, reach a better achievement level. Furthermore, according to Zahorik, feedback should be given without any delay because it informs the students about the quality of their performance they show during learning. If the performance is not right, the immediate feedback helps the learners to modify it and stops the same incorrect behavior to occur again. On the other hand, if the behaviors are correct, immediate feedback can encourage students to follow the same route in their future performances. In addition, feedback shows the learners how they are progressing towards their objectives (Eggen & Kauchak, 2004).

Another factor which affects the usefulness of immediate or delayed feedback is the level of task difficulty. According to Clariana (1999), in difficult tasks, immediate feedback is useful, but in easy tasks, it's better to delay the feedback (cited by Samuels & Wu, 2003). There are some other researchers who emphasize that immediate feedback which is presented combined with the information about the student's responses enhances learning and recall (Epstein et al., 2002; Epstein & Lazarus, 2002; see, also: Ciampa, 2012). The effectiveness of tutoring is also due to the immediate feedback it provides to the learner.

But, there are some who believe in the contrary (Butler, Karpicke, & Roediger, 2007). This group believes that test performance improves a great deal after delayed feedback.

III. METHODOLOGY

The purpose of the study is to find out the difference between the effects of teachers' immediate and delayed feedback (IF & DF) on EFL learners' depth of vocabulary knowledge. A quasi-experimental study was conducted in a pretest-posttest design with the types of teachers' feedback (immediate, delay) as the independent variable and learners' vocabulary knowledge dimension, in this case, depth of the vocabulary knowledge, as the dependent variable.

A. Participants

The number of 96 students with intermediate level of proficiency constituted the population of the present study. These participants were studying at the intermediate level determined by the institute (Sokhansara). Among these students, 24 persons were fourteen, 33 persons were fifteen and 39 persons were sixteen years old. All the students were female. For ensuring the homogeneity of the groups, however, an OPT was held and the participants whose scores were reported to be between one standard deviation above the mean and one standard deviation below the mean were selected. They were counted as 75. Among these selected participants 30 were grouped in the immediate feedback classroom and 45 in the delayed feedback classroom. The teacher's method of teaching and the condition of the two classes were approximately the same. The only difference between the two classes was the feedback method used by the teacher (explained in the following sections). The data was collected during the regularly scheduled class periods.

B. Data Collection Procedure

Before conducting the study, the researcher first talked with the administrators of the institution about the study and got the required permissions. The researcher explained the teacher about the goal of the study. The data collection procedure started from the beginning of the term. Feedback was given at different stages during normal classroom procedure.

At first, at the beginning of the study, an OPT was given to homogenize the students in terms of their language proficiency. This test included 40 multiple-choice vocabulary, grammar, and reading comprehension items. The reliability of this test was .71. Based on the results of this test, two intermediate level groups were selected as the sample of the study. Then, the researcher took a diagnostic test to determine which vocabulary items the students did not know before the treatment. This test which was devised by the researcher according to the test procedure description

provided in Ellis et al. (1994), contained a list of 28 vocabulary items. These items were chosen from the Four Corners and Active Skills for Reading: INTRO and some from the outside sources as irrelevant items. The participants were asked to underline the items they didn't know. After that, the unknown items (i.e., those that were underlined) were identified and the percentage of the students not knowing the items was calculated. Those items that are underlined by most of the students were chosen to be included in the pretest.

After the diagnostic test, a pretest and a post test which were an adopted form of Read's Word Association Test (1993) were used by researchers to measure the participant's depth of vocabulary knowledge before and after the treatment. These tests, which were in a multiple choice format, were parallel versions of the same test that consisted of 57 items. These items were chosen from the main words of the Four corners and Active Skills for Reading: INTRO. The associates in these tests were selected from (www.wordassociations.net). For example "friend" was chosen and some relevant words that are related to it were selected from this site, like: helper, college, people and enemy. On the other hand, some irrelevant words were, also, selected. The students should choose only the relevant words. According to Cronbach's alpha, reliability coefficients of pretest and post test were 87% and 93% respectively.

Then the classroom teaching procedure started which followed the traditional approach of Presentation, Practice, Produce (PPP). One class received teachers' immediate feedback and another class received delayed feedback. In the immediate feedback group (IFG), the feedback was given in the presentation phase, while for the delayed feedback group (DFG), the feedback was postponed until the practice phase.

After twenty four treatment sessions, a post-test which was a parallel version of the pre-test was administered. The time interval between pre-test and post-test was four weeks. The results of the pretest and posttest were compared to check the possible improvements in learners' performance resulting from the feedback procedures.

C. Data Analysis

Testing the First Hypothesis

The first hypothesis was "Teacher's immediate feedback does not have any significant effect on EFL learners' depth of vocabulary knowledge."

To evaluate the effectiveness of immediate feedback on EFL learners' depth of vocabulary knowledge, a Students' t-test was used on IFG's pretest-post test results. This statistical test is used for testing hypotheses when the mean of a small sample is drawn from a normally distributed population (see: Britannica.com). The mean, standard deviation, minimum and maximum scores for IFG have been reported as follows:

TABLE 1.
DESCRIPTIVE STATISTICS OF ASSESSMENT SCORES FOR DEPTH OF VOCABULARY KNOWLEDGE IN IFG

Scale	Step	Average	Standard deviation	Minimum	Maximum
Immediate feedback	pre test	87.62	16.17	43	91
	post test	80.105	47.23	58	125

According to Table 4.1, the mean scores of pre-test and post-test in IFG respectively are 87/62 and 80/105. The minimum and maximum scores among the pre-test scores are 43 and 91 and the minimum and maximum scores among post test score are 58 and 125.

Mean, standard deviation, t value and significance level of the test are given in Table 2. The scores obtained by the students in this group were computed to compare the pre-test with the post-test.

TABLE 2.
STUDENT'S T TEST WITHIN IFG TO DETERMINE THE EFFECTIVENESS OF IMMEDIATE FEEDBACK

scale	Pre test		Post test		t	df	Sig.
	Mean	Sd.	Mean	Sd.			
Iranian EFL Learners' Depth of Vocabulary Knowledge	62.87	17.16	105.80	23.47	-5/65	44	0/01

The above table shows clearly a significant difference between the IFG's pre-test and post-test ($p < 0/05$). More precisely, the analysis revealed that the experimental group achieved a mean score of 62/87 in the pre-test; whereas for the post-test, the mean score increased to 105/80.

This result indicates that teachers' immediate feedback had a significant effect on EFL learners' depth of vocabulary knowledge. So, the first hypothesis is rejected.

Testing the Second Hypothesis:

The second hypothesis was "Teacher's delayed feedback does not have any significant effect on EFL learners' depth of vocabulary knowledge."

For this stage, the scores obtained by DFG in the pretest and posttest were compared to ascertain the difference between the mean scores. The results are shown in Table 3 below.

Descriptive statistics' mean, standard deviation, minimum and maximum scores for DFG have been reported as follows:

TABLE 3.

DESCRIPTIVE STATISTICS OF ASSESSMENT SCORES FOR DEPTH OF VOCABULARY KNOWLEDGE IN DFG					
Scale	Step	Average	Standard deviation	Minimum	Maximum
Delayed feedback	pre test	80.45	89.13	33	80
	post test	60.155	28.9	143	174

According to Table 3, the mean scores of pre-test and post-test for delayed feedback respectively are 45/80 and 155/60. The minimum and maximum scores among the pre-test scores are 33 and 80 and the minimum and maximum scores, among post test score are 143 and 174.

To evaluate the effectiveness of delayed feedback on EFL learners' depth of vocabulary knowledge a paired-sample Students' t-test was used. Mean and standard deviation and t value and significance level of the test are given in Table 4.

TABLE 4.

STUDENT'S T TEST FOR TWO GROUPS TO DETERMINE THE EFFECTIVENESS OF TREATMENT WITH DELAYED FEEDBACK.							
scale	Pre test		Post test		t	df	Sig.
	Mean	Sd.	Mean	Sd.			
Iranian EFL Learners' Depth of Vocabulary Knowledge	80.45	89.13	60.155	28.9	60.23	29	0/01

As shown in Table 4, the t value was -23.60 and the significance was 0/01. The difference between the pre- and the post-test was significant ($p < 0/05$). Hence, the second hypothesis which assumed that the scores in the post test in this group are not different from the pretest scores is rejected.

Testing the Last Research Hypothesis:

The last hypothesis was: "There is no difference between EFL learners' depth of vocabulary knowledge in immediate and delayed feedback condition." The scores obtained by both groups after treatment were compared using independent Student t-test statistical procedure to check whether the mean scores of both groups were the same or different. The results of the analysis for question three are presented in Table 5 below.

TABLE 5.

STUDENT T –TEST MEASURING THE DIFFERENCE BETWEEN POST TEST SCORES IN IFG & DFG							
scale	Delayed feedback		Immediate feedback		t	df	Sig.
	Mean	Sd.	Mean	Sd.			
Iranian EFL Learners' Depth of Vocabulary Knowledge	60.155	96.8	80.105	93.22	30.11	73	0/01

The results showed that the mean scores of the IFG ($M = 105/80$, $SD = 22/93$) was significantly different from the DFG's ($M = 155/60$, $SD 8/96$). Also the minimum and maximum score in IFG are 58 and 125 respectively while in the DFG the minimum and maximum score are 143 and 174. In other words, the DFG outperformed the IFG on the post-test. That is, delayed feedback strategy was effective in enhancing the depth of vocabulary knowledge.

According to the results of the study, therefore, the third hypothesis stating that there is no difference between EFL learners' depth of vocabulary knowledge in immediate and delayed feedback conditions, is rejected with $P < 0/05$.

IV. DISCUSSION

A. Answer to Question One

The initial question the study answered is about the effect of teacher's immediate feedback on EFL learners' depth of vocabulary knowledge. The study clearly showed a significant difference between the IFG's pre-test and post-test ($p < 0/05$). According to Table 4, in the IFG, the mean of the students depth scores on the pre -test is (62/87) much lower than the post- test (105/80). This result indicates that teachers' immediate feedback had a significant effect on EFL learners' depth of vocabulary knowledge.

The result reported here is in line with Metcalfe's study (2009). Butler and Roediger (2007b) and Butler, Karpicke, and Roediger (2007) also reported the same results; the processing of feedback after correct responses is quite important, and conditions should be arranged so as to maximize it.

B. Answer to Question Two

The second research question was "What is the effect of teacher's delayed feedback on EFL learners' depth of vocabulary knowledge?" According to the statistical analyses, the overall evaluation of the current study indicated that teacher's delayed feedback has a significant effect on EFL learners' depth of vocabulary knowledge.

Generally, most of the previous research showed the same results as to the positive effect of delayed feedback. The advantage of delaying feedback is a type of spacing effect, one of the oldest and most robust findings in the literature (for review see Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006). There are several control issues related to the timing interval between learners error and teachers feedback. For example, Metcalfe, Kornell, & Finn (2009) showed that "delayed feedback was better than immediate feedback (and both were better than no feedback) when time interval to test was not controlled, but there was no difference between the delayed and immediate feedback conditions when timing to the test was controlled".

The finding of the present study is against the views provided by Kulik and Kulik (1988). They concluded that delayed feedback is generally superior in laboratory studies, whereas immediate feedback is more effective in applied studies in actual classroom settings. Butler & Roediger (2008), also, pointed out that representing learners with their initial errors as part of the delayed feedback message does not impede later memory for the correct information. In addition, "learners are often quite good at remembering their errors" (e.g., Peeck & Tillema, 1979), and "remembering an initial error can actually facilitate error-correction under some circumstances" (Butler, Fazio, & Marsh, 2011).

C. Answer to Question Three

The third research question asked "Is there any difference between EFL Learners' depth of vocabulary knowledge in immediate and delayed feedback conditions?"

The findings of the present study, as mentioned before, showed that the delayed feedback group had higher gain scores on the post-test than the students in the immediate feedback group. In other words, the results of Student t-tests indicated that there is a significant difference between the delayed feedback group and immediate group in depth of vocabulary knowledge.

Anyway, the positive effects of delayed feedback has received some empirical support (Andrew C. Butler, Jeffrey D. Karpicke, & Henry L. Roediger III 2007; Andrew et al., 2007), although there are many findings that argue against it (Metcalf, Kornell, & Finn, 2009).

To sum up, the study indicated that delayed feedback was significantly more successful than immediate feedback in increasing the depth of vocabulary knowledge. Therefore based on the findings of the study, it can be stated that teachers' delayed feedback are more successful than teachers' immediate feedback.

V. CONCLUSIONS

This result indicates that the immediate feedback has improved depth of vocabulary knowledge. The difference between the pretest and posttest was significant ($p < 0/05$).

The findings of this study also, indicated that delayed feedback had a positive impact on depth of vocabulary knowledge of EFL students because based on the results, the researcher gained and analyzed (Table4), there is significance different between the pretest and posttest of DFG ($p < 0/05$).

Moreover, a according to Table 5, there is a significant difference ($P < 0/05$) between mean scores of two groups, immediate feedback and delayed feedback. The mean of the post-test scores of delayed feedback is larger than immediate feedback, so the effect of delayed feedback is more than immediate feedback.

Regarding the fact that almost none of the previous research in feedback area was conducted on depth of vocabulary, the results suggest that to increase the depth of vocabulary knowledge, teacher's feedback is essential, either delayed or immediate. But, in order for the learners to know the words completely with all their collocates and associates and to broaden their word nets, it's better to give them some times to practice with the words and even use them in their production and then, direct their attention to their errors. If the learners' vocabulary errors are addressed immediately when the words are newly presented to them without enough practice and use, the feedback will be less helpful in deepening their vocabulary knowledge.

The greater effectiveness of delayed feedback in this study can also be indicative of the complexity of depth construct. Depth of vocabulary knowledge has some inherent layers that cannot be enhanced by the sole correction of errors upon presentation of the words; it needs further practice and production which should be later on accompanied by teacher's feedback.

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