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The Contribution of Word Webbing to Project-based Learning in Teaching Vocabulary: A Comparative Study in an EFL Context

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Abstract—This study was an attempt to investigate the effect of applying word web strategy with and without project based learning (PBL) on EFL learners' vocabulary learning. Ninety female EFL learners from a high school in Tehran were the participants of this study. They were at intermediate level of language proficiency and in three intact classes of 30 members. The three classes were randomly assigned as one control and two experimental groups. The homogeneity of three intact groups in terms of general language proficiency and knowledge of vocabulary was determined by comparing their mean scores after performing on a PET and a pretest of vocabulary respectively. After that, the participants received 12-session treatment, including teaching vocabulary using word web (WW) strategy without PBL for one experimental group, and using WW with PBL for another while the control group received the usual instruction of the teacher for the same new words without WW and PBL. At the end of the treatment, the teacher-made vocabulary posttest was administered to the study groups. To test the hypotheses of the study with respect to the violation of the normality assumption, Kruskal-Wallis test was run on participants' scores. The results showed that the participants in both experimental groups significantly outperformed the participants in the control group in terms of vocabulary learning. The results also showed that the students who received WW with PBL outperformed those who received it without PBL.

Index Terms—project based learning, word webbing, WW with PBL, WW without PBL, EFL context

I. INTRODUCTION

The significant role of vocabulary as a key element in learning a language can hardly be denied. Vocabulary knowledge is valuable because it involves the words we must know to access our background knowledge, express our beliefs and ideas, communicate successfully, and learn new notions (Rupley, Logan, & Nichols, 1999). As Thornbury (2002) states, "if you spend most of your time studying grammar, your English will not improve very much, but if you learn many words and expressions; you will see the most enhancement" (p.114). According to Morin and Goebel (2001), despite different procedures that teachers apply in vocabulary teaching, strategies are the best tools for developing vocabulary knowledge and they can apply them as a facilitator to raise the efficiency of teaching.

Among different vocabulary learning strategies, graphic organizers are highly recommended as they provide learners with visual scaffolds (Chularut & DeBacker, 2003). Word webbing is a kind of graphic organizer that according to Pierson, Cerutti, and Swab (2006) is appropriate for developing and reviewing vocabulary. Kagan (2001) states that word webbing is a graphical way of organizing words that make connections between similar words or ideas which are known by various names, including clustering and web maps.

On the other hand, Demirhan (2002) states that "Project-based learning is a comprehensive approach to classroom teaching and learning that has been designed to engage students to investigate complex, authentic problems and carefully designed products and tasks" (p.38). With respect to the vital role of vocabulary knowledge in effective communication and considering the deficiencies that still exists in the domain of vocabulary teaching, the authors of this paper sought to find an appropriate strategy to be applied in EFL classes to help learners overcome some of their problems with vocabulary learning. From among various vocabulary learning strategies, word webbing could be the one that looked both interesting and innovative. Levy (1997) states that many students are interested in webbing technique as it applies their ability to think and visualize. It provides structure for ideas and facts and gives students a flexible framework for organizing and prioritizing information.

Moreover, cooperative learning in the form of projects accomplished by the group of learners was another activity found by the researchers as probably effective in enhancing learners' vocabulary achievement. In fact, Project-Based Learning is an exciting and pleasurable learning process which has been founded on the basis of learners' active

involvement in the learning process, that is, learner centered teaching style. A number of empirical studies have confirmed that word web strategy and PBL have significant effect on EFL learners' skill (Agustini & Sianipar, 2013; Cha'vez, 2013; Rahmawati, 2011). As a result, this study was conducted to integrate word webbing as one of the vocabulary learning strategy with PBL and to investigate the viable effect that WW with and without PBL might have on Iranian EFL Learners' vocabulary learning. It's worth mentioning here that word webbing with PBL is operationalized in this study as requiring the students to prepare wall paper or the power point in order to present the word webs they have developed collaboratively.

II. RESEARCH QUESTIONS AND HYPOTHESES

With respect to the significant role that both word webbing and PBL have proved to have in different areas of second language learning and considering the lack of research related to the application of these teaching tools in the field of vocabulary learning in an EFL context, such as Iran, this research is hoped to have contribution to the attempt being done in this field. Considering these points, the following research questions were addressed in the present study:

Q1. Does applying word webbing without PBL have any significant effect on EFL learners' vocabulary learning?

Q2. Does applying word webbing with PBL have any significant effect on EFL learners' vocabulary learning?

Q3. Is there any significant difference between the vocabulary achievement of learners who receive WW with PBL and those who receive WW without PBL?

With respect to the raised research questions, the following null hypotheses were formulated:

H₀₁. Applying word webbing without PBL has no significant effect on EFL learners' vocabulary learning.

H₀₂. Applying word webbing with PBL has no significant effect on EFL learners' vocabulary learning.

H₀₃. There is no significant difference between the vocabulary achievement of learners who receive WW with PBL and those who receive WW without PBL.

III. METHOD

A. Participants

The participants of the present study were 90 female Iranian high school students of third grade in Tehran. They were at the intermediate level of general language proficiency and were at three intact classes of 30 members with the age range of 16 to 17. The homogeneity of three intact groups in terms of general language proficiency and knowledge of vocabulary was determined by comparing their mean scores after performing on a PET and a pretest of vocabulary respectively. One class was assigned randomly to the experimental group one, who received word web strategy without PBL as their treatment, while the other thirty-member class was assigned to another experimental group, group two, who received word web strategy with PBL. Also thirty learners from the third class were assigned to the control group

B. Instruments

In order to obtain measurable data with which the results of the study could be statistically analyzed, the following instruments were utilized:

1. Preliminary English Test (PET)

To determine the study groups' homogeneity in terms of their general English proficiency, PET was administered at the outset of the study. It is worth mentioning that concerning the ease of administration and the ease of scoring, and also school time limitation, the speaking and writing parts were excluded from the test. Therefore, the administered test consisted of 60 items as a whole, including 35 reading questions and 25 listening questions. Moreover, the reliability of the test was calculated as .783 through Cronbach's Alpha.

2. Vocabulary test as the pretest/posttest

Prior to the treatment, a teacher-made vocabulary test including 40-item was used as the pretest. The test consisted of 40 questions 25 of which were of recognition type and 15 others as production type. The vocabulary items were mostly developed based on the content of students' course book, with the purpose of evaluating the EFL learners' enhancement of vocabulary knowledge (receptive and productive) after familiarity with words instructed in each section. The time allocated for taking the test was around 40 minutes that was estimated by the researcher after a pilot study.

The pretest was administered in order to make sure that the participants were homogeneous with respect to their vocabulary knowledge at the beginning of the study. As mentioned before, the test was already piloted with a group of 30 students with almost the same characteristics of the target group and after doing item analysis, four items were modified. For ensuring the content validity of the test, the researcher asked three experienced EFL/ESL professors to offer their comments. After some minor modifications, the reliability index of the test was calculated through Cronbach's Alpha as .742 in the second pilot study.

At the end of the treatment, the same pretest was administered as the posttest in order to investigate the students' vocabulary achievement. In other words, the posttest was administered to compare the performance of the three groups to see whether or not there were any significant differences between them.

3. The instructional materials

The same course book was used for the three groups of the study. The course book was the students' "English three", used in Iranian high schools for third grade learners. It is published by the ministry of education and contains six units, each of which includes a text developed based on a given topic and followed by a set of exercises which mainly focuses on vocabulary and grammar. The subjects in this study were expected to cover each unit in two sessions as they had been offered a particularly intensive class held by schools' principal to help them get ready for their main English class. Therefore, the whole six units were covered in 12 sessions and the content of treatment was somehow based on the key words used in each unit.

C. Procedure

The piloted PET was given to three 30- member classes of participants to ensure they are homogenous in terms of their language proficiency. The result of a one way Anova confirmed the homogeneity of three classes. After making sure about the homogeneity of the three groups regarding their vocabulary knowledge as well, via one way ANOVA, the treatment phase was commenced. In all three classes, the teacher taught the reading passage and defined the key words in each text and answered the reading comprehension questions with the help of the students. In the experimental group A, the teacher created the word web to show the related words and ideas with respect to the key words of the previously instructed reading text. To make a word web, the teacher wrote a word chosen from the reading text in the center circle including its synonyms and antonyms (if any). This way, she drew a line out from the circle to create a link and wrote a related word to the center one. More links could be added to the major links to introduce some more related words. The figure below shows the word web sample provided for the key word, TV.

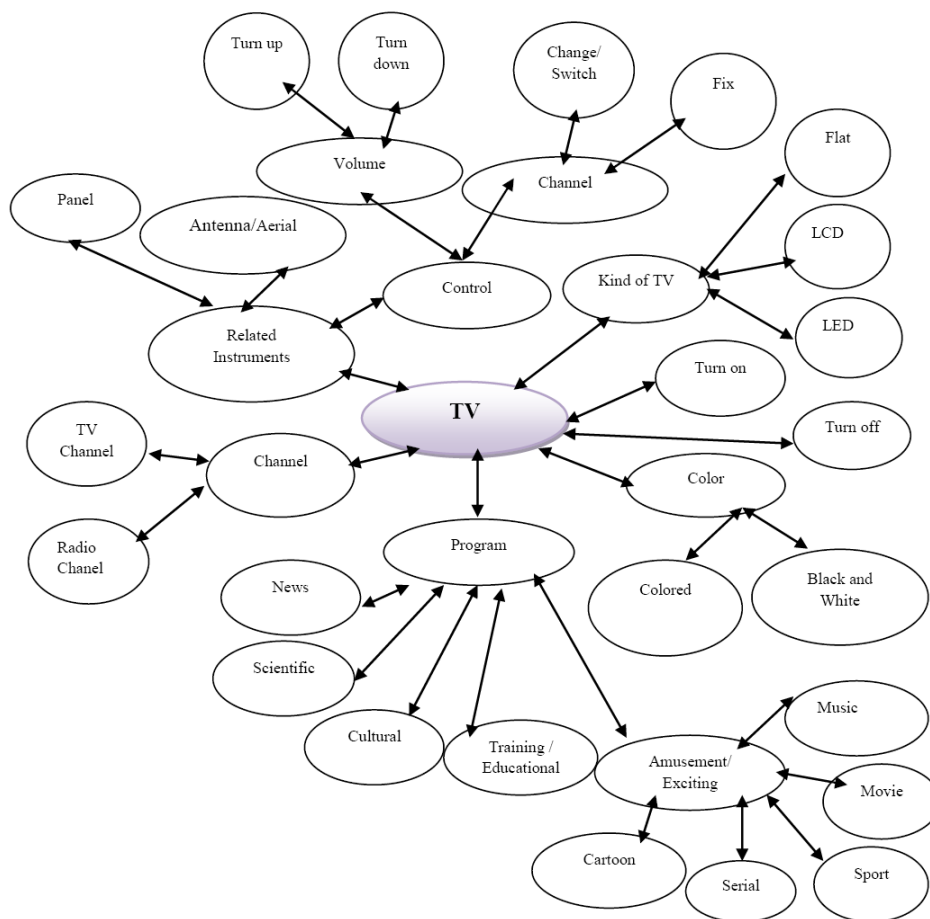


Figure. Word web sample drawn by the teacher for the key word, TV

In the second experimental group, word web strategy with project based learning (PBL) was employed. To this end, the teacher assigned students in six groups of five members in order to collaborate with each other and to do their project cooperatively. At the beginning of the treatment, the teacher briefed the participants on what they were expected to do, and introduced the procedures as well as the intended projects to be performed in the form of a word web. The teacher taught the new words to students through reading a passage of their text book in one session and for the next session she asked the six groups to draw their own web through wall paper or the power point to be performed in the class. Thus six word webs were presented in the following session, each related to one group. The presented projects in the form of word webs were compared by the teacher to find the new words suggested by each group. It is worth noting

that the teacher acted as a facilitator in the class and helped each group to explain about the new words when necessary or to correct their word webs in case of containing any errors.

In the control group, the teacher had the conventional way of teaching new words included in a reading book through giving definitions for the key words in one session and asking students to look up the new words in dictionary and to find and write their definitions, as well as its synonyms and antonyms (if there were any), for the next sessions. Then the students were asked to read aloud whatever they had looked up to be corrected by the teacher.

At the end of the 12 session treatment, the same 40-item researcher-made pretest of vocabulary was given to all three groups as the posttest to compare their performances and to see whether or not the given treatment had any significant influence on their vocabulary learning.

IV. RESULTS AND DISCUSSION

In order to answer the afore-mentioned research questions, a series of pertinent calculations and statistical routines were conducted and the following results were came up.

A. Pretesting

At the outset of the study, the piloted proficiency test (PET) was administered to 90 students who participated in the study. They were in three intact classes, each including thirty students. In order to make sure that the three groups manifested no significant difference in terms of their general language proficiency, a one-way ANOVA test was run. Table 1 shows the descriptive statistics of each group's scores for PET.

TABLE 1
DESCRIPTIVE STATISTICS FOR PET

PET at Outset	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
					Control	30		
Experimental one	30	38.1333	2.90936	.5311	37.0470	39.2197	32.00	42.00
Experimental two	30	37.9000	2.75869	.5036	36.8699	38.9301	32.00	42.00
Total	90	38.0111	2.74985	.2898	37.4352	38.5871	32.00	42.00

Before running ANOVA, the assumption of homogeneity of variances had to be checked. The result of Levene's test of equality variances showed that the variances among the three groups were not significant (Levene'sF (2,87) = .92, p> .05); thus the assumption was met. As it is evident from Table 2 (F(2,87) = .05, p = .95 > .05), the three groups were almost the same regarding the general English proficiency at the outset.

TABLE 2
ANOVA; PET AT THE OUTSET

PET at Outset	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.822	2	.411	.053	.948
Within Groups	672.167	87	7.726		
Total	672.989	89			

The piloted researcher-made vocabulary test was also administered to the homogenous study groups in order to make sure that the participants of the three groups were not significantly different from each other in terms of their vocabulary knowledge at the outset. Table 3 shows the descriptive statistics resulted from the test.

TABLE 3
DESCRIPTIVE STATISTICS FOR THE PRETEST OF VOCABULARY AT THE OUTSET

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
					Control	30		
Experimental 1	30	9.2333	1.52414	.27827	8.6642	9.8025	6.00	12.00
Experimental 2	30	9.1000	1.39827	.25529	8.5779	9.6221	6.00	12.00
Total	90	9.2000	1.48551	.15659	8.8889	9.5111	6.00	13.00

In order to make sure that the three groups had no significant difference in terms of their vocabulary knowledge, the researcher decided to run a one-way ANOVA. Before running ANOVA, however, the normality of the distribution of scores had to be checked. To test the normalcy of distribution of score in three groups, Kolmogorov-Smirnov test of normality was run. As displayed in Table 4, the Kolmogorov-Smirnov indices of normality were all significant (p < .05); hence normality of the present data was violated. Thus, the researcher decided to run non-parametric test of Kruskal Wallis.

TABLE 4.
TEST OF NORMALITY: VOCABULARY PRETEST

	Group	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	df	Sig.
Vocabulary at Outset	Control	.201	30	.003	.909	30	.014
	Experimental one	.161	30	.046	.950	30	.174
	Experimental two	.195	30	.005	.935	30	.068

a. Lilliefors Significance Correction

As it is evident from Table 5, the three groups were almost the same ($p = .932 > .05$) in terms of their vocabulary knowledge at the beginning of the study. So, any differences in the knowledge of vocabulary at the end of the treatment could be attributed to the effects of treatments.

TABLE 5
KRUSKAL WALLIS TEST STATISTICS^{A,B}: VOCABULARY PRETEST

Chi-Square	.142
Df	2
Asymp. Sig.	.932
a. Kruskal Wallis Test	
b. Grouping Variable: Group	

B. Posttesting

The researcher administered the same test of vocabulary that was used as the pretest at the end of the treatment as the posttest. Followings are the descriptive statistics obtained from the results. The mean differences between three groups can be spied. The experimental group two had the largest mean (30.37), followed by the experimental group one (M = 27.43). The control group had obtained the lowest mean (24.47). Moreover, by calculating the skewness ratio (statistics/std. error) for each set of scores, it could be concluded that the normality of distribution in both experimental groups was violated. So, the researcher decided to run non-parametric tests to answer the research questions.

To test the null hypotheses of the study, the researcher conducted Kruskal Wallis test because, as mentioned above, the assumption of normality of distributions was violated. Table 6 shows the result of Kruskal Wallis test on scores obtained from vocabulary posttest by three groups. The result of Kruskal Wallis test showed that there was a significant difference ($p = .000 < .05$) among the performances of the three groups in vocabulary learning posttest.

TABLE 6
KRUSKAL WALLIS TEST STATISTICS^{A,B}: VOCABULARY POSTTEST

Vocabulary Learning Posttest	
Chi-Square	33.772
Df	2
Asymp. Sig.	.000
a. Kruskal Wallis Test	
b. Grouping Variable: Group	

In order to test the first research hypothesis, a Mann-Whitney U test was run between the performances of control group and Experimental group one. As it is evident from Table 7, there was a significant difference ($Z = -.3.056$, $p = .002 < .05$) between the performances of two groups in the vocabulary learning posttest, indicating that the experimental group one, who received word web strategy without PBL significantly outperformed control group; thus the first null hypothesis was rejected.

TABLE 7
MANN-WHITNEY U TEST STATISTICS^A: CONTROL AND EXPERIMENTAL ONE GROUP S' PERFORMANCES

Mann-Whitney U	244.500
Wilcoxon W	709.500
Z	-3.056
Asymp. Sig. (2-tailed)	.002
a. Grouping Variable: Group	

In order to test the second null hypothesis, a Mann-Whitney U test was run between the performances of control group and experimental group two. As displayed by Table 7, there was a significant difference ($Z = -5.616$, $p = .000 < .05$) between the performances of two groups in the vocabulary knowledge posttest, indicating that the experimental group two, who received word web strategy with PBL significantly outperformed control group; thus the second null hypothesis was also rejected.

TABLE 8
MANN-WHITNEY U TEST STATISTICS^A FOR THE POSTTEST; CONTROL AND EXPERIMENTAL TWO

Mann-Whitney U	71.500
Wilcoxon W	536.500
Z	-5.616
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Group

In order to answer the third research question, a Mann-Whitney U test was run between the performances of Experimental groups one and two. As Table 9 shows, there was a significant difference ($Z = -3.102$, $p = .002 < .05$) between the performances of two groups on the vocabulary posttest, indicating that the experimental group two significantly outperformed experimental group one; thus the third null hypothesis was also rejected.

TABLE 9
MANN-WHITNEY U TEST STATISTICS^A FOR THE POSTTEST; EXPERIMENTAL GROUPS ONE AND TWO

Mann-Whitney U	241.000
Wilcoxon W	706.000
Z	-3.102
Asymp. Sig. (2-tailed)	.002

a. Grouping Variable: Group

C. Discussion

The result of the present study is somehow in line with those found by Cooper (1999) and Rahmawati (2011) who conducted the studies on the usefulness of word web technique on learners' reading comprehension and concluded that webbing is a good technique for students to learn and improve reading comprehension achievement to construct, organize and communicate the students' knowledge. This study's findings showed the enhancement of students' vocabulary learning as one of the components of reading comprehension as well.

With respect to the role of PBL in meaningful learning, the present findings support the findings of the previous research conducted by Shafaei (2011) who investigated a study on the effectiveness of using PBL on vocabulary learning. Similarly, the outcomes of this analysis indicated that PBL had a significant effect on learners' vocabulary learning. Moreover, the PBL group performed better than the control one. The present findings also support the findings of Zarei and SahamiGilani, (2013) who examined the various collaborative techniques on L2 learners. They found that word webbing was the best technique that had a significant effect on vocabulary learning.

In addition, the present findings support those of Soleimani, Rahimi, and Sadeghi's (2015) study that investigated the effects of PBL on learners' language performance, based on the factual information obtained from pre-test and post- test. The analysis of the collected data through out of this study confirm that, the PBL group's progress in all measured scopes were statistically significant. The researchers believe that using project-based learning in Iranian EFL courses positively affects the learners' reading ability and accelerates their vocabulary learning.

V. CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS

A. Findings

This research was an attempt to suggest two effective teaching aids, namely word webbing and project-based learning, for presenting vocabulary in EFL classrooms which might reinforce the learners' achievement. The results revealed that the participants in both experimental groups performed better than those in the control group.

Word Webbing, which is also known as semantic/concept mapping, gives students an opportunity to think deeply about the relationship between the terms being learned and the previously learned words in order to visualize them semantically and learn them meaningfully, accordingly. In other words, word webbing can support meaningful learning of vocabulary.

Project-based learning, on the other hand, can give the students the opportunity to practice their understanding on the instructed words through interacting and communicating with their peers in the groups. PBL is actually a student-driven method of instruction (Bell, 2010) that helps students organize their learning through creating their own projects. And finally, integrating word webbing with PBL is believed to reinforce learners' motivation as it enables them to make their own decisions and choices and to apply their creativity in their learning process. As a result, students could have more ownership over their learning and a deeper understanding of what they have been instructed (Bezon et al., 2007). In other words, assigning the students to do their projects collaboratively would lead to a different type of learning in which the learners share their understanding and the responsibility of the learning process.

B. Implications

The present study findings are hoped to provide EFL teachers with applicable and motivating techniques for presenting vocabulary to their learners. Correspondingly, teacher trainers may devise and plan courses through which teacher trainees become familiar with how to employ word web strategy with and without PBL which best helps students improve their vocabulary learning process.

The opportunity to work in a cooperative learning environment, on the other hand, can help the students to learn and practice a new and different way of learning that ultimately enhances their vocabulary achievement. Moreover, involving learners in word webbing can help them to learn more meaningfully through giving them an active role in their learning process as well as activating their visualization and enabling them to establish the relationship between the terms being learned.

Syllabus designers and materials developers may also wish to enhance the quality of the materials with appropriate tasks that familiarize learners with vocabulary learning through word web strategy and add more interest and creativity to students' learning process. Moreover, requiring students to do tasks that could be accomplished as projects may enhance both cooperative and meaningful learning among L2 learners.

C. Suggestions for Further Research

The present study employed WWS with and without PBL to investigate their effect on EFL learners' vocabulary learning. Further studies may be needed to investigate the effectiveness of the same learning aids on the learning of other language skills or components. The study was carried out among female students. A similar research could have been done with male learners to see whether the gender would be a significant factor or not. And finally, this research was conducted with young EFL learners at public schools; the same experiment could be carried out with other age groups to see whether or not age is a determining factor.

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