Does project-based learning enhance Iranian EFL learners' vocabulary recall and retention?

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A B S T R A C T

Vocabulary knowledge is an integral part of second/foreign language learning. Thus, using teaching methods that can help learners retain and expand their vocabulary knowledge is necessary to facilitate the language learning process. The current research investigated the effectiveness of an interactive classroom method, known as Project-Based Learning (PBL), in helping Iranian EFL learners not just learn but retain new vocabulary knowledge. To this end, an experimental approach using two groups of participants (i.e. experimental and control) was employed. The experimental group was taught using the PBL method while the control group was taught using the conventional method. The findings of the study indicated that learners who were taught using the PBL approach (i.e. the experimental group) had a significant improvement in their vocabulary recall and retention rate. Besides, they even showed better retention of new vocabulary with higher level of difficulty. This supports previous findings on the effectiveness of PBL as a vocabulary teaching method in the EFL context which could contribute to the betterment of the existing teaching methods.

Keywords: project-based learning (PBL); vocabulary knowledge; vocabulary recall; vocabulary retention; collaborative learning

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A R T I C L E   H I S T O R Y

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Introduction

Knowing how a language works may not necessarily enable one to communicate in the language; however, it is usually possible to communicate if one has the vocabulary of the language (Wallace, 1988). In other words, vocabulary knowledge is "the basic building block of language, the units of meaning from which larger structures such as sentences, paragraphs and whole texts are formed" (Read, 2000, p. 1). Vocabulary is an essential part of a speaker's linguistic competence as it provides input for other language skills such as speaking and writing (Nation & Waring, 1997). Without the vocabulary, speakers of a language cannot convey meaning and communicate effectively.

According to Bowen, Madson, and Hilferty (1985), lexical problems, which refer to inappropriate use of words, would break down communication. Therefore, vocabulary is a pivotal component of every language. Furthermore, any experienced teacher knows that even when students have more or less mastered the English grammar, they still face masses of unknown words as they continue studying (Allen, 1983). Since vocabulary knowledge is an integral part of any language learning process, it would be impossible to learn a language without vocabulary. Additionally, Rivers (1981, p. 110) mentioned that "vocabulary should be presented, and explained in all kinds of activities to promote better learning." This specifically suggests that language teachers play crucial roles in rising interest and creating excitement on teaching vocabulary to the students. More importantly, they can help their students by giving ideas on how to learn vocabulary and some guidance on what to learn.

Since vocabulary is a crucial part of learner's linguistic repertoire, it is pivotal to consider the challenges involved in learning and acquiring it. This is essentially because vocabulary knowledge is measured not just in terms of number of words (i.e. breadth), but also in terms of quality (i.e. depth). Therefore, vocabulary acquisition involves several different learning processes, and as research suggests employing effective vocabulary instruction is fundamental to ensure learners retain new vocabulary knowledge. In other words, the teaching techniques used in the classroom should ensure that learners not only learn, but also acquire new vocabulary knowledge of the target language (Dobinson, 2006).

Despite the call for effective vocabulary teaching and learning methods, the employment of outdated teaching techniques is still a key problem in many non-native English language learning contexts. As Gu (2003) stated, the traditional approach of lectures and laboratory exercises provides the necessary foundation of knowledge, but it often limits students' participation in the learning process, whereas vocabulary acquisition is a very learner-centred activity which can promote motivation towards new vocabulary acquisition. Indeed, this is the case in Iran where English is a foreign language, taught in most schools using a combination of the grammar-translation method (GTM) and the audio-lingual method (Shafaei, 2008). As these approaches emphasize content and rote-learning, English vocabulary lessons commonly require teachers to translate lessons into Persian, the learners' native language, before providing them with the meaning of new vocabulary. This one-way learning method essentially means that learners rely heavily on their teachers and do not have the opportunity to be engaged in active learning (Shafaei, 2008). Such ineffective classroom methods naturally do not promote learners' vocabulary development. Outside the classroom, the foreign language context further compounds learners' problem of poor vocabulary development as there is hardly any opportunity for learners to use the language for every day interactions. Even with new ways of learning that are available with the advent of technology as well as the internet, there seems to be little improvement in teaching methods. In other words, despite the opportunities, vocabulary teaching strategies remain uninteresting and ineffective, with little focus on context and active learning (Kamyab, 2007).

The Iranian EFL teaching and learning realities, therefore, indicate that in spite of the progress in the field with regards to approaches, methods and techniques, the educational system adamantly adheres to the behaviourist-advocated pedagogic approaches. The problems faced by learners and teachers strongly suggest that there is a desperate need for a shift in the way English is approached in the classroom (Talebinezhad & Aliakbari, 2002). With regards to teaching and learning, this essentially calls for innovative methods that not only help overcome passive learning and engage learners, but also importantly motivate them, enhance their vocabulary knowledge and improve learning outcomes. Additionally, learners' engagement with vocabulary is very crucial to facilitate vocabulary learning and acquisition. As such, promoting engagement is considered as one of the most essential tasks of teachers (Schmitt, 2008). In relation to vocabulary, this engagement can be promoted through interactive classroom activities that involve communicative tasks and teamwork. These activities not only provide learners with opportunities to harness their spoken skills, but also to negotiate new knowledge, including vocabulary knowledge, with members of their group (Nation, 2002).

Thus, it is paramount for students to become aware of their potentials and capabilities in completing tasks. As Vygotsky (1978) emphasized, language and consciousness are within the same matrix of social activity, so language is not something isolated. If the students are conscious about their abilities, they can perform well in learning and also actively participate in social activities of language which cause language learning. Project-Based Learning (PBL) is one of the modern teaching methods based on constructivist pedagogy that intends to engage learners in deep learning process with issues and questions that are rich and relevant to the topic of lesson. It is designed to be used for complex issues that require learners to investigate in order to understand (Barron et al., 1998).

This fundamentally means that PBL provides learners with the opportunity to acquire a number of important skills, such as learning from their peers, being responsible for each other as well as setting and achieving their learning objectives (Gillies, 2007; Wang, 2012). Learners' interactive learning will, in turn, help them in the construction of knowledge through exploration (Jang, 2006; Johnson & Aragon, 2003; Prince & Felder, 2007). Learners reflect on their ideas through negotiation and communication with their peers that can enhance their language skills, promote their acquisition of new knowledge and help them achieve their goals (Diehl, Grobe, Lopez, & Cabral, 1999).

In PBL, context is central and in line with the findings of a study by Webb (2007), context plays a fundamental role in gaining vocabulary knowledge. This fundamental feature of PBL makes it suitable for the L2 and EFL classrooms since context is necessary to provide comprehensible input (Krashen, 1989). In other words, PBL is likely to provide large doses of acquisition activities in the classroom, with a very minor role of learning that is recommended in the language classroom (Brown, 2000). Given its potential as a teaching method that promotes collaborative and active learning, and the gap in the literature on PBL in the vocabulary classroom, the present study aims to investigate the effectiveness of this method on the acquisition of new vocabulary by EFL learners. In the following sections, central issues concerning vocabulary knowledge, vocabulary acquisition and learning, and PBL are discussed.

Vocabulary knowledge and learning

Vocabulary knowledge has been discussed from two main perspectives, namely its breadth and depth (Nation, 2001). Vocabulary breadth refers to the quantity of vocabulary items known by an individual. Knowing an item does not only mean knowing its meaning (concepts, referents, associations), but also its form (spelling, pronunciation, word parts) and use (functions,

collocations, constraints) (Nation, 2001). Nation and Waring (1997) argued that the breadth of knowledge is concerned with the question: *How much vocabulary does a second language learner need?* In relation to this, Vermeer (2001) suggested that breadth is a reflection of input. More input leads to greater depth, which essentially refers to the quality of that vocabulary knowledge (Nation, 2001). Nonetheless, both depth and breadth of vocabulary could be the important dimensions of input to determine learners' vocabulary knowledge (Richard, 2011).

According to Nation (1990), knowing a word receptively involves being able to distinguish the word from other similar words, judge whether the word sounds right or looks right, have an expectation about the word's grammatical pattern as well as its collocation with other words, and recall its meaning when it is met. Measuring learners' vocabulary recall can reveal their learning of new vocabulary in the target language. Vocabulary acquisition, which involves cognitive search and evaluation activities, on the other hand, can only be revealed by measuring learners' vocabulary retention (Hulstijn & Laufer, 2001).

Learners' vocabulary recall and retention are influenced by a number of factors such as the role of teacher, the role of input in vocabulary lessons and the role of classroom interaction in vocabulary lessons (Dobinson, 2006). While these are crucial, it may be argued that the learning process is fundamental. In relation to this, the literature shows that researchers draw a distinction between implicit and explicit vocabulary learning (R. Ellis, 1995). Implicit (or incidental) learning is often defined in negative terms, e.g. as accidental learning of information without the intention of remembering that information (Hulstijn, Hollander, & Greidanus, 1996). However, Huckin and Coady (1999) argued that implicit learning cannot be totally incidental because the latter is a completely "subconscious" process. In implicit learning, at least some attention must be paid to the input by the learner. However, explicit learning focuses on learners' application of several vocabulary learning strategies (Klykova, 2008). In essence, when learners acquire knowledge naturally, simply and without conscious operation, it is regarded as implicit learning, whereas when they learn knowledge consciously by searching, testing hypotheses and involving themselves in the process of learning, it is called explicit learning (N. C. Ellis, 1994).

Research in vocabulary learning in the second and foreign language contexts shows that implicit learning should be accompanied by explicit learning to promote vocabulary acquisition (Sökmen, 1997). Given this, PBL as an innovative instructional strategy which emphasizes on the role of context as well as learning by doing can promote both explicit and implicit ways of learning vocabulary (Liu & Hsiao, 2002). This brings the discussion to the issue of PBL as a learning method and its application in the vocabulary classroom.

Project-based Learning Method

PBL is essentially a teaching/learning approach which organizes students' learning activities around projects and was introduced into the field of second and foreign language education as a way to reflect the principles of student-centred teaching (Hedge, 1993). The method is commonly associated with the constructivist theory of learning which states that all individuals are born with an innate drive to understand the world around them and to make meaning of their experiences (Caine, Caine, & McClintic, 2002).

A review of early second and foreign language acquisition literature shows that the major goal of project-based instruction is to provide opportunities for language learners to receive comprehensible input and produce comprehensible output (Eyring, 1989). In line with this, PBL shifts the learning focus from "teacher telling" to student-centred "learning by doing" and emphasizes the employment of real life activities to promote learning (Project Based Learning,

2007). Besides, Hulstijn and Laufer (2001) highlighted the role of three components involved in learners' vocabulary engagement namely; *need, search* and *evaluation* which can lead to vocabulary learning and acquisition. This feature of PBL facilitates students' vocabulary learning because, as Dobinson (2006) argued, activities that consider the role of *context, research, teacher, classroom interaction* as well as *input* in vocabulary lessons can lead to the enhancement of students' vocabulary knowledge. Indeed, the more processes which are involved in learning a word could result in better retention and recall (Carter, 1998; Ramachandran & Rahim, 2004).

Consequently, a study was carried out with the objective of investigating the extent to which the PBL method promotes the acquisition of new vocabulary among Iranian learners of English. To achieve the objective of the study, the PBL method was compared to the conventional method in the recall and retention of new vocabulary by Iranian learners of English. The research questions that the study set out to address are:

1. Do Iranian learners who learn new English vocabulary through the PBL method recall the meaning of the words learnt more effectively?

2. Do learners who learn new English vocabulary through the PBL method have a better retention rate?

Method

Guided by the research questions, a semi experimental study, using experimental and control groups, was carried out. According to Farhady (2006), the powerful nature of experimental method makes it more appropriate to examine the effectiveness of a new teaching method. As such, the experimental group was taught using the PBL method, while the control group was taught using the usual conventional method practised in Iranian classrooms. Two stages were involved in this study, namely preliminary and main stages. The former involved the administration of a preliminary test and a pilot study to select the lexical items that were needed for the main study. The latter was essentially the main experimental study which involved the administration of the pre-test, treatment, post-test, delayed post-test and delayed delayed-post-test to the two groups of participants. The study treatment was applied through PBL and conventional methods. Figure 1 illustrates the design of the study.
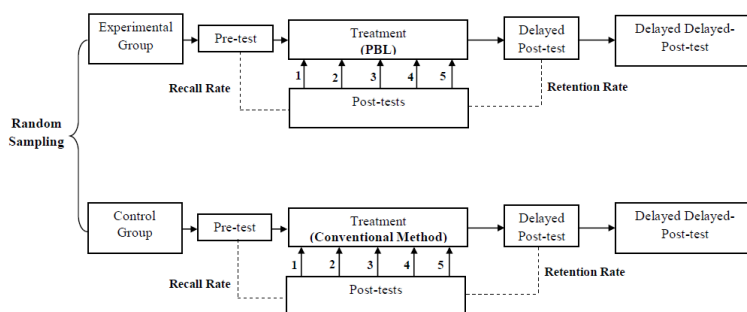

Figure 1. Research Design

Participants

The participants of the study included 40 EFL learners aged 16-18, who were attending a private English language institute in Rasht, Iran at the time of study. They possessed an equal level of vocabulary knowledge which was determined through the pre-test that was administered prior to the treatment sessions in the main stage of the research. They were then randomly selected and divided into experimental and control groups. The experimental group (n=20) underwent PBL method, while the control group (n=20) was taught the conventional way (i.e. the teacher-centred method used at the institute).

Instruments

The study employed two kinds of instruments, teaching and testing. The teaching instrument consisted of the stimulus items, and teaching materials used in the treatment stage. In total, 30 lexical items, extracted from the learners' textbook *American Cutting Edge: Level 1* published by Longman, formed the stimulus items for the study. While both groups were taught the 30 lexical items, the teaching materials used were different. The control group participants were completely dependent on their textbook while the experimental group (PBL group) used other materials such as hand-outs, pictures, posters, interviews, power points, and technology applications such as computer and the internet.

The testing instruments consisted of two tests, a preliminary test and a vocabulary test. The preliminary test was administered to 40 elementary learners at the institute who were not involved in the main study. It was a multiple-choice question (MCQ) test on 100 lexical items extracted from institute's final exam papers. The test was administered 2 weeks before the main study by a group of teachers.

The 100 lexical items were taken from 5 different modules. Items from each module that students had the least knowledge of (identified through the lower scores) were selected as stimulus items for the vocabulary test that was needed for the main study. In total, 30 items comprised of nouns and adjectives were selected as presented in Figure 2. The 30 words formed the stimulus items that were used in the vocabulary tests (pre-, post-, delayed post- and delayed-delayed-post- tests) administered in the main study, in the form of Multiple Choice Questions. To ensure the reliability of the test as well as the treatment that was designed for the main study, a pilot study was conducted using 10 learners. One module of the lesson was taught to them using the PBL method. The results of the pilot study were useful in revising the lesson plans for the actual study.

Weeks	Vocabulary Items
Week 1	Blues, Reggae Album, Poetry, Director, Detective stories, Perfume
Week 2	Castle, Hostel, Skyscraper, Trails, Geysers, Metropolitan
Week 3	Adam's apple, Bone, Skull, Calf, Muscle, Armpit
Week 4	Extraordinary, Polluted, Crowded, Precious, Naughty, Adorable
Week 5	Track suit, Craft, Cosmetics, Pouch, Briefcase, Leather

Figure 2. The 30 Stimulus Items

Main study

As illustrated in Figure 1, the main study consisted of a pre-test, treatment, post-test, delayed post-test and delayed delayed-post-test. The process took 12 weeks to complete. The pre-test was administered to both groups two days before the actual treatment. As stated earlier, the pre-test was administered to gauge the level of vocabulary knowledge of participants in both groups before the treatment phase. The results of the pre-test show that both groups had the same mean score of .80 out of a possible score of 30. This means at the point of the treatment, both groups demonstrated very little knowledge of the stimulus items. Following the pre-test, the learners were randomly divided into two groups, control and experimental and the treatment phase began. Over the five weeks of treatment, the participants in both groups were taught the 30 lexical items. In other words, participants were taught six new items each week. The rationale for teaching only six vocabulary items to the EFL learners is that according to Wallace (1988) between five to seven new lexical items per lesson remain in the active vocabulary. To keep in line with the rules of the English language institute, five lessons were supposed to be taught during one academic term. Consequently, 30 new vocabulary items from five lessons were taught to the EFL learners during the treatment sessions. Each treatment session for both groups was 100 minutes, carried out twice a week.

In the PBL classroom, at the beginning of the first treatment session, the classroom teacher briefed the participants on the new method and introduced the procedures as well as the integrated projects options to them. After a brainstorming session, participants were divided into several groups, each consisting of 4-5 learners. In each treatment session, participants were given a topic for their project which necessitated the application of the new stimulus items for the respective week. Real-world projects required the students to identify the topics and carry out their projects by making choices and decisions and reporting them both orally and in writing. Specifically, learners started sharing ideas with their group members in order to find the best tools, materials and sources of information and later on reporting them orally and in writing in the form of a journal, magazine or newspaper, power point presentation, poster presentation, videos, etc. The learners also reported their progress during each session and received feedback from the teacher. Each project took two sessions or one week to be completed and presented in the class and overall 5 modules were taught to the students during 5 weeks. It is necessary to note here that since the design of the PBL class, duration of projects and number of students involved in each project is very context-specific (Atkinson, 2001; Breiter, Fey, & Drechsler, 2005; Glassy, 2006; Janneck & Bleek, 2002; Losoncy, 1996; Reid & Wilson, 2005), both PBL class requirements as well as the case centre requirements were taken into consideration in conducting the treatment sessions.

The control group were taught the same 30 lexical items from the five modules using the method conventionally used at the institute. A treatment session for the control group usually began with the teacher's introduction of the topic. Then, the new lexical items were introduced to the students with their translations provided to them. This means that the interaction was generally one-way. The activities in the textbook which reinforce learning of new words were then assigned to the learners to work on individually. Following this, answers were checked by the teacher and corrections made by the learners. In certain lessons, the teacher provided learners with worksheets that provided learners with more practice.

After each 200-minute treatment session, a post-test on the six items that learners were taught in that week was administered. Given that each group had five sessions of treatment, five post-tests were administered over the five weeks. As they were administered at the end of each treatment session, the post-tests essentially measured learners' recall of the words taught. To measure the retention rate of learned vocabulary, delayed post-tests were administered. The delayed post-tests were essentially the same set of tests used as the post-tests but administered from weeks 7 to 11.

Following Kvam (1999) who measured his subjects' retention rate after a month or more, the current study administered each delayed post-test five weeks after the post-test. For instance, the post-test which was administered after treatment in week 1 was administered as a delayed post-test in week 7. Figure 3 illustrates the schedule of treatment and tests.

Week 1	Week 2	Week 3	Week 4	Week 5
Beginning: Pre-test **During:** Treatment 1 **End:** Post-test 1	**Beginning:** ____ **During:** Treatment 2 **End:** Post-test 2	**Beginning:** ____ **During:** Treatment 3 **End:** Post-test 3	**Beginning:** ____ **During:** Treatment 4 **End:** Post-test 4	**Beginning:** ____ **During:** Treatment 5 **End:** Post-test 5

| **Week 6** Break | | | | |

Week 7	Week 8	Week 9	Week 10	Week 11
Delayed Post-test 1	Delayed Post-test 2	Delayed Post-test 3	Delayed Post-test 4	Delayed Post-test 5

| **Week 12** Delayed Delayed Post-test | | | | |

Figure 3. Schedule of pre-test, treatment, post-tests and delayed post-tests

To measure both groups' retention rate of learned vocabulary, in week 12, the "delayed delayed-post-test" was administered to the participants in both groups. This test, unlike the post-tests and delayed post-tests, combined all the questions together. In other words, the delayed-delayed post-test was carried out to measure the participants' retention of all the 30 lexical items in one session.

Results

To measure the participants' vocabulary recall rate, the number of words both groups learned was measured. An independent sample t-test was then performed to compare the results of the pre-test against the post-test for both groups. Table 1 summarizes the descriptive statistics for pre-test and post-test for both experimental and control groups.

Table 1
Descriptive Statistics of Pre-test and Post-test

	Group	N	Mean	Std. Deviation
Pre-test	Experimental	20	0.80	1.240
	Control	20	0.80	1.436
Post-test	Experimental	20	28.15	1.565
	Control	20	25.30	1.895

The data show that both groups had the same mean score for the pre-test that was administered before the treatment that is .80. This satisfies the requirement that participants in both groups had similar vocabulary knowledge prior to the treatment. The results of the post-tests that were carried out throughout the treatment period show the expected progress for both groups. The experimental group had a mean of 28.15 while the control group had a mean of 25.30. These results essentially reflect participants' recall rate of the 30 items they were tested on. In order to investigate whether there is a significant improvement in the vocabulary recall rate of the experimental group; an independent sample t-test was performed using SPSS 13.0. Table 2 summarizes the results according to the modules.

Table 2
Comparison of Post-test Mean Scores for both Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig.(2-tailed)
Module 1	Equal variances assumed	2.786	0.103	4.018	38	0.000
	Equal variances not assumed			4.018	34.664	0.000
Module 2	Equal variances assumed	0.003	0.959	3.270	38	0.002
	Equal variances not assumed			3.270	36.267	0.002
Module 3	Equal variances assumed	1.841	0.183	0.588	38	0.560
	Equal variances not assumed			0.588	35.989	0.560
Module 4	Equal variances assumed	2.039	0.161	3.961	38	0.000
	Equal variances not assumed			3.961	33.613	0.000
Module 5	Equal variances assumed	7.581	0.009	1.926	38	0.062
	Equal variances not assumed			1.926	32.705	0.063

The t-test reveals that experimental group had a significantly higher post-test score in modules 1, 2 and 4 at a confidence level of 99% while the difference in post-test scores is not significant in modules 3 and 5. This is perhaps because the stimulus items in modules 3 and 5 comprise more nouns than adjectives. This may have decreased the level of difficulty of the two tests because as Sandhofer and Smith (2007) suggest, nouns are easier to learn compared to adjectives. This view is in keeping with previous researchers' claim that nouns dominate and adjectives are rare in vocabulary acquisition (e.g., Dromi, 1987; Gasser & Smith, 1998; Gentner, 1978; Jackson-Maldonado, Thal, Marchman, Bates, & Gutiérrez-Clellen, 1993; Mintz & Gleitman, 2002; Nelson, 1973). They also believe that nouns are learned earlier than adjectives and that adjective learning is dependent on knowledge of nouns. Results of the t-statistics reveal that the experimental group had a significantly higher total post-test mean score than the control group. This shows that PBL significantly improved Iranian EFL learners' vocabulary recall rate at %99 level of confidence.

As stated earlier, participants' vocabulary retention was measured using delayed post-tests which were administered to both groups over five weeks after the post-tests (weeks 7-11). Table 3 shows the mean scores of the post-tests and delayed post-tests for both groups.

Table 3
Descriptive Statistics of Post-test and Delayed Post-test

	Group	N	Mean	Std. Deviation
Post-test	Experimental	20	28.15	1.565
	Control	20	25.30	1.895
Delayed Post-test	Experimental	20	26.05	1.468
	Control	20	21.30	2.003

The results show that the mean score of the delayed post-tests is lower than the mean score of the post-tests for both groups. However, it is clear that the experimental group scored higher (26.05) compared to the control group (21.30). To investigate the significance of mean scores and the difference between the post-tests and the delayed post-tests, an independent sample t-test was carried out. The results are reported in Table 4.

Table 4
Comparison of Delayed Post-test Mean Scores for both Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig.(2tailed)
Module 1	Equal variances assumed	0.269	0.607	5.510	38	0.000
	Equal variances not assumed			5.510	36.417	0.000
Module 2	Equal variances assumed	0.058	0.812	6.631	38	0.000
	Equal variances not assumed			6.631	37.723	0.000
Module 3	Equal variances assumed	0.728	0.399	1.205	38	0.236
	Equal variances not assumed			1.205	36.556	0.236
Module 4	Equal variances assumed	2.499	0.122	4.271	38	0.000
	Equal variances not assumed			4.271	31.522	0.000
Module 5	Equal variances assumed	0.163	0.689	3.760	38	0.001
	Equal variances not assumed			3.760	37.918	0.001

Results of the t-test reveal that the experimental group had a significantly higher delayed post-test score in all modules at a confidence level of 99 %, except for module 3 where the difference was not statistically significant. This could be due to relatively lower level of difficulty for this module compared to the other modules as explained earlier. As shown in Table 5, the experimental group had a significantly higher total delayed post-test score than the control group. This shows that PBL significantly improved participants' vocabulary retention rate at %99 level of confidence.

Table 5
Comparison of Retention Rates for the Control and Experimental Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Post-test	Equal variances assumed	1.049	0.312	5.186	38	0.000
	Equal variances not assumed			5.186	36.694	0.000
Delayed post-test	Equal variances assumed	2.514	0.121	8.555	38	0.000
	Equal variances not assumed			8.555	34.845	0.000

To verify the retention rate of acquired vocabulary by the participants, the delayed delayed-post-test was administered to both groups in week 12 (11 weeks after the first post-test). This test was exactly the same as the pre-test. It comprised of questions on all the 30 stimulus items from all the modules. Results show that the experimental group with a mean score of 23.80 outperformed the control group that scored an overall mean of 17.15, on 99% confidence level (Sig. < 0.01).

Discussion

The results of the descriptive analysis essentially bring to light some significant information. Firstly, the post-tests that were administered immediately after every session over the 5 weeks of treatment show that the experimental group performed better in terms of vocabulary recall. This suggests that regardless of the difficulty of adjectives (Gasser & Smith, 1998; Jackson-Maldonado et al., 1993; Mintz & Gleitman, 2002), the experimental group members who were taught the 30 lexical items using PBL performed consistently better than the control group. In contrast, the control group's highest recall rate was for the module with more nouns. Nonetheless, the score was still lower than that of the experimental group.

Besides having better recall rate, the experimental group also seemed to have better retention rate. This is evident from the comparison between the post-tests and delayed post-tests results. Although the scores for the delayed post-tests for both groups dropped, possibly because students had forgotten what they learned due to the lapse of time between each post-test and delayed post-test, the experimental group were found to have performed significantly better than the control group. This is further confirmed with the results of the delayed delayed post-test.

The results of the study essentially show that PBL is more effective than the conventional method of teaching vocabulary in the Iranian context for a number of reasons. Firstly, the method provided the students in the experimental group with an opportunity to investigate topics, learn from their experiences and apply their gained knowledge, skills and attitudes to real life cases. It may be argued that one of the reasons why students who learned the stimulus items through the PBL method outperformed the other group of learners is that they learned the vocabulary items in contexts rich enough to provide clues to meaning and because they were given multiple exposures to items they were to learn (Davies & Pears, 2003).

An authentic learning environment, made possible with the PBL method, also seemed to have enhanced the experimental group learners' vocabulary recall and retention even for the words with higher level of difficulty. This is evident from the experimental group's better retention of items in the last two modules than the first three modules. According to Chee, Westphal, Goh, Graham, and Song (2003), low-frequency words are more difficult to be retrieved and retained than high-frequency words. However, the fact that the PBL group was able to score higher than the control group proves that an effective teaching method is very crucial to facilitate vocabulary learning and more importantly, improve aquisition (Csikszentmihalyi, 2002). PBL also helped to engage the experimental group learners' interest and motivated them to learn from their peers. In other words, the collaborative nature of the method promoted cooperative learning and emphasised the role of context in learning new vocabulary (Nastu, 2009). According to Bligh (1972) and Johnston et al. (2000), cooperative learning produces deep learning, helps students to apply knowledge in other contexts, and also promotes a positive attitude towards the subject matter which naturally increases knowledge retention. Besides, as proven in the literature, learning in a cooperative manner enhances learners' interaction, motivation and participation in the subject matter which can lead to positive outcomes (Moraga & Rahn, 2009). Since PBL is a learning approach that organizes students' learning activities around projects, it provides a learning environment with cooperative group learning (Center for Occupational Research and Development, 2004) which can enhance EFL learners' vocabulary recall and retention of vocabulary items.

Conclusion

The results of the present study clearly show that parrot-like learning by repeating the meaning of words and phrases does not really work. Learners need to have an active role in their learning process and be responsible for what they learn. They must also be allowed to explore new things and be independent learners. This study shows that PBL is effective in the Iranian EFL context of learning. The opportunity to work in a cooperative and authentic learning environment provided learners with the opportunity to learn and practice a new and different way of learning that ultimately enhanced their vocabulary recall and retention.

In conclusion, the findings of this study may not be generalized to all Iranian EFL learners because the participants were from one area of the country. Nonetheless, the findings suggest that an interactive and effective teaching method is paramount to teach vocabulary to the EFL students, especially for the current Iranian context where there is a desperate need for a shift in the way English language is approached in the classroom. A conscious effort must be made to move away from the existing traditional practices to more effective, practical and useful methods, such as the PBL method. As the results obtained in this study are not conclusive, further research will be helpful to gain more insights into vocabulary teaching methods. To verify the value of the PBL method, it would be desirable to take into consideration other components of curriculum, such as grammar, reading, writing, and include students from different levels of English language proficiency such as beginner, intermediate, and advanced.

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