Problem-based Learning and its Impact on EFL Learners' Engagement and Reading Comprehension

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Abstract

Problem-based learning (PBL) has recently gained prominence because of its potential to engage learners in learning process and to encourage deep meaningful knowledge construction. This quasi-experimental research, hence, aimed at implementing PBL in an EFL context to investigate its impact on participants' engagement and reading comprehension. Two groups of elementary level students, one as experimental group (N = 40) and one as control group (N = 40) whose homogeneity in language proficiency was examined by Key English Test (KET) were selected. The experimental group received PBL and the control group received lecture-based method. The two groups completed pre- and posttests of PETALS engagement instrument (PEI) and reading comprehension. The results,

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based on multivariate analysis of covariance and one-way analysis of covariance, indicated that the PBL group had higher engagement and more enhanced reading comprehension ability. To have highly engaged successful learners in reading comprehension classes, practitioners in EFL context should pay special attention to student-centered methods like PBL.

Keywords: Engagement, Problem-based Learning, Reading Comprehension, self-directed learning, collaboration

Introduction

In modern educational settings, the goal of education must be the facilitation of change and learning; this goal goes beyond cognitive education (Stentoft, 2017) and is in line with an experiential learning which has meaning and involves learners' active participation in knowledge construction (Lin, 2015). Unlike meaningless rote-learning which runs in a rigid way as it is only limited to the knowledge transfer process and students' recall of the transferred knowledge, experiential learning leads to deep meaningful learning, learners' high engagement level and facilitates the use of acquired knowledge in different contexts and situations (Renol et al., 2017).

Looking at academic contexts, the mostly heard complaint in academic contexts nowadays is students' disengagement (Lin, 2017a). There is decline in motivation among students and they try to get by with as little effort as possible. Learners' engagement, then, should be the essence of teaching methods since it encourages success in learning (Wynn Sr et al., 2014). Savin-Baden (2016) defines student engagement as student association with the learning context, peers, and tutors that enable transition of knowledge in learning; the notion of engagement also includes students' degree of desire, interest and attention during the learning process.

Deep meaningful learning is considered another key factor to success in academic settings that can be encouraged though active engagement (MacKenzie, 2015). One of the language skills that requires active engagement on the part of learners to achieve in-depth comprehension and meaningful learning for the purpose of performing cognitive and procedural tasks such as taking a test, writing a paper, giving a speech and also acquiring professional knowledge in educational fields is reading comprehension (Lin, 2017b). However, the main impediment in acquiring deep meaningful knowledge in reading is that teaching comprehension is mostly based on lecture-based methods in most traditional academic contexts (Lin, 2015) which prevents learners to actively participate in the learning process (MacKenzie, 2015).

Problem-based learning (PBL) is an educational method which is based on constructivist theory of learning because learning and understanding in this method is derived from interaction with real problems and the learning environment (Tan, 2003). PBL has been designed to promote deep understanding along with enhancing higher-order thinking skill; This instructional method

centered on the learners (Aryanti & Artini, 2017) and engages the learners as knowledge seekers; persuade them to frequently take a part in questioning, analyzing and interpreting the information and also applying the gained new information in new contexts. PBL, thus, is in accord with modern educational requirements that leads to meaningful life-long learning through interaction and active engagement (Yew & Goh, 2016).

Considering Iranian EFL contexts, it becomes evident that although reading constitutes the major part of the course, most students do not have the required comprehension ability; they are passive and they do not actively engage in learning activities (Weisi, 2012). These problems might stem from imperfect educational system, heavily loaded with traditional methods and little attention paid to meaningful development of knowledge. Reading comprehension courses need to develop learners' active participation to assist them acquire new knowledge easily. Overemphasis on decoding and lack of sufficient exposure to authentic language use might be the major sources of poor engagement and low achievement (Lin, 2017b). As Kohonen et al. (2014) assert, there is a demand for an effective teaching method to create engaging educational context to develop deep meaningful learning. Accordingly, PBL, as an instructional method anchored in constructivism, which encompasses indicators of active engagement (Lin, 2017a) might offer a good solution for the stated problems.

Although a large number of studies have illuminated the role of PBL in different disciplines (e.g., Abu-aisheh et al., 2016; Garnjost & Brown, 2018; Rovers et al., 2018), there is a lacuna of such research focusing on language learning and learners' active engagement in the EFL context. The scarcity of the research endeavors into the possible role of PBL in language learning particularly reading comprehension and also its possible impact on learners' engagement level which is considered the main factor in deep meaningful learning (Rashid & Asghar, 2016) calls for further studies to investigate these issues. Thus, the present research attempted to bridge the gap by probing the instructional effectiveness of PBL, first, on EFL learners' engagement level during the learning process and second, on their reading comprehension ability.

Review of Literature

Problem-based Learning

Traditional educational settings are teacher oriented which transfer only static and fixed information; students have only the role to memorize what the teacher has transmitted to them. The students contribute nothing to the process of learning and consequently, cannot enhance the professional qualities in accord with requirements of modern life (Lin, 2017a). Obviously such content-oriented decontextualized teaching results in surface shallow learning rather than deep meaningful learning (Stentoft, 2017) and doesn't develop learners into good problem solvers to deal with challenges of today's world (Cho et al., 2015). If academic settings continue teaching content to learners without paying attention to the fact that how quickly such content knowledge becomes ir-

relevant, education would fail; teachers would also fail if they focus on learning processes that do not focus on life-long learning (Stentoft, 2017).

According to Farrell and Jacobs (2010), learners need to be able to feel responsible for their own learning and for the learning of those with whom they interact. In other words, as Tan (2003) states, the goal of education must be the facilitation of change and learning; this goal goes beyond cognitive education and includes the education of the whole person; it involves personal growth and the development of self-directed learning.

According to Tan (2003), learners should act as pupil-researchers; they should continuously generate questions, formulate hypothesis and make their best effort to investigate and construct knowledge for themselves. Being self-directed learners requires that individuals identify the knowledge areas they need, develop a plan to find the solution to the problems by searching varieties of resources and also be able to evaluate the results (Stentoft, 2017). Generally speaking, teachers must create an experiential learning environment based on investigation and discovery; a new student-centered method of learning and teaching is required to promote students' team working, problem solving and responsibility for learning (Cho et al., 2015).

Problem-based learning (PBL) is a method of teaching anchored in constructivism. In PBL, understanding is gradually constructed through learners' attempt in pursuing goals, doing research, solving educational problems and reflecting (Lin, 2017a). PBL, according to O'Grady et al. (2012) and Stentoft (2017), is beneficial in dealing with modern academic requirements.

PBL aims at preparing students for real-life settings by requiring them to solve authentic problems. The problems as the starting point to activate the course are considered the centerpiece during the learning process. The more problems the students learn to solve, the more they will be able to apply their knowledge (Lin, 2017b). PBL involves learners with a range of conceptual ideas in problems through self-directed learning and collaboration; this challenges their current knowledge and assists them in identifying and solving their learning needs implementing prior knowledge and knowledge from different sources (Hmelo-Silver, 2013). PBL also encourages reflection which is an important indicator of learning (Hung, 2013).

In PBL, scaffolds are broadly implemented as guides to bring about high level of meaningful learning and to help students achieve their academic ends (Haruehansawasin & Kiattikomol, 2018). Scaffolding can take different forms including group working in class, teacher's social and cognitive congruence and the supports that are developed in advance by teachers like paper-based cognitive tools (Schmidt et al., 2011).

Engagement

Engagement is defined as students' degree of interest and attention during the learning process and their association with the learning context that enables

knowledge transition (Rahmanpanah & Mohseni, 2017; Savin-Baden, 2016) and consequently encourages academic success (Liu et al., 2018).

Engagement comprises three components including cognitive, students' effort to do more than expected and implement strategies to enhance learning, affective, students' feelings toward the learning process, and behavioral, the learners' involvement in tasks, (Zaff et al., 2011).

Students are successful that have high engagement; the higher the engagement, the more the learning will occur; the effectiveness of any educational method depends on its ability to increase engagement (Akbari et al., 2016). By encouraging active personal construction of knowledge, PBL is targeted to inspire highly engaged learning in this research.

Reading Comprehension

Learning to comprehend texts is an important skill to use materials and to acquire professional knowledge in different subject fields (Lin, 2017b). Comprehension is a meaning construction process (Paris & Hamilton, 2009) that necessitates implementing coordinate cognitive processes during which the reader gets textual information and then relates it to his/her background knowledge to understand the text (Arjuna & Jufri, 2016).

In most EFL settings, teaching reading comprehension follows lecture-based method with a focus on direct instruction (Weisi, 2012). Such an instruction suffers from decontextualization which prevents learners to gain a deep meaningful learning (Lin, 2017b). Due to the inefficiency of the lecture-based method to enhance comprehension, PBL may be a good solution by actively engaging learners in personal knowledge construction.

The Related Experimental Studies

PBL has been widely investigated in many different fields of studies. Many of these available studies have reported the positive perceptions of the leaners toward PBL, positive impact of PBL on learners' engagement level and also its facilitative role in learning process. For example, Wosinski et al., (2018) aimed at investigating the perspectives of undergraduate nursing students to identify and synthesize the best available evidence on their success in PBL. This study implemented a qualitative systematic review of the literature according to meta-aggregative methodology. The results of the study showed that clinical reasoning, leadership skills and interaction between the learners in PBL were key elements that led to the success of nursing students.

Another study that emphasizes the positive role of PBL in learning process is a study done by Abu-aisheh et al. (2016). This research implemented PBL to foster engineering students' engagement in the class. Portfolios were used as means of data gathering instrument. The analysis of portfolios indicated that

PBL enhanced the leaners' level of interaction, encouraged active learning and consequently increased their engagement in class. Focusing on students' level of engagement, Savin-Baden (2016) draws on a number of studies over the last 15 years. Savin-Baden argues that conceptually and practically, student engagement in PBL can be troublesome, however, by acknowledging four transdisciplinary threshold concepts including liminality, scaffolding, pedagogical content knowledge, and pedagogical stance, facilitators will be able to enhance student engagement and participation to a high extent in PBL.

In contrast to studies which have focused on positive impact of PBL during learning process, in a research, Garnjost and Brown (2018) concluded that there was no significant difference in students' perceptions between faculty centric pedagogy and PBL. This research compared undergraduate business students' perception toward the effectiveness of faculty centric pedagogy and PBL. Using rubrics and scales, the students' perspectives were measured on problem solving, critical thinking, teamwork, knowledge acquisition, and self-directed learning (SDL).

PBL, however, is a new teaching method in humanities, especially in teaching languages. Although little research has been done in EFL contexts to the best knowledge of the researchers, beneficial impacts of PBL have been emphasized. For example, Lin (2015) implemented PBL in an English course to investigate its effect on elementary students' vocabulary learning. The PBL group learned vocabulary through learner-centered activities, while the control group used lecture-based method. Participants completed pre- and posttests and wrote a topic-based composition and a self-report. The findings indicated that the control group could only acquire vocabulary at the basic 2000-word level and mastered receptive knowledge, while the PBL group could learn vocabulary beyond 2000-word level and mastered productive knowledge.

Caswell (2017) conducted an exploratory, evaluative case study which incorporated PBL within MA TESOL program in teacher education. The results of this mix methods study indicated the facilitative role of PBL in achieving professional development by provision of new roles for teachers and students including lead instructors, collaborating instructors and students as peer-teachers.

Kumar and Refaei (2017) selected one intermediate writing course to investigate how PBL improves students' critical thinking in writing. To create the most appropriate text, the students were supposed to identify the audience of their writing and anticipate their needs. In these activities, students needed to analyze, synthesize and evaluate information. These processes were indicators of critical thinking. Using rubrics, the writings were analyzed and the results indicated that PBL promoted students' critical thinking.

Sulistyo (2017) investigated how effective PBL could be to promote EFL learners' argumentative writing with regard to content, organization, vocabulary, grammar and mechanics in a quasi-experimental study by involving intermediate-level students as the experimental and control groups. Based on the

results, the PBL group could improve argumentative writing and its components to a large extent in comparison to the guided-writing instruction group.

Aryanti and Artini (2017) investigated the effect of PBL on EFL students' productive skills and their attitudes toward language learning in a mixed-methods research. Pretest, posttest, close-ended questionnaire, open-ended questionnaire, observation checklist and interview were used as data-gathering instruments. Results showed that PBL enhanced learners' ability in productive skills and had positive impacts on their attitude.

Baresh et al. (2019) implemented Hybrid PBL (HPBL) method in an English speaking course to investigate the impact of PBL on EFL learners' speaking ability. The participants of the study were a class of 30 first-year undergraduate students in a public university in Libya. Semi structured interviews and observations were used as data-gathering instruments. The results showed HPBL's effectiveness by making students involved in learning to speak English fluently and enabling them to work more autonomously.

Bashith and Amin (2017) examined the impact of PBL on EFL students' critical thinking skill and learning outcomes through a quasi-experimental method with non-equivalent control group design. Pre and post essay tests were used as instruments to gather data on learning outcomes. The critical thinking skill data were from the test scores of each class. The findings of the study indicated that PBL enhanced EFL learners' critical thinking skill and b about positive learning outcomes in comparison to the control group.

Lin (2017a) incorporated PBL in one web-based English reading course to investigate its impact on learners' comprehension ability and their perceptions. Two classes of intermediate university students were randomly assigned into the PBL and Non-PBL groups. Comprehension pretest and posttest, an instructional questionnaire and self-reports were implemented to gather data. The results indicated that PBL learners enhanced their comprehension in comparison to the control group. The questionnaire and self-reports analysis revealed that PBL increased active learning and synthesized cognitive processing.

Another study by Lin (2017b) investigated whether implementing PBL in English reading course can foster EFL learners' comprehension ability, strategy use and their active learning. Two reading classes were randomly assigned into the PBL and Non-PBL groups. Comprehension pre- and posttests and English active learning questionnaire were used to gather data. The results indicated high positive impacts of PBL on learners' comprehension and strategy use. The analysis of questionnaires also showed that PBL participants had more active learning attitude.

Lee et al. (2019) implemented PBL in an EFL class. Sophomore English majors were participants of the study. They engaged in recursive reading and writing practices. They took part in considering the collected multimodal resources and writing a multimodal text so as to make the target audience interested. Corpus and qualitative analyses revealed that students developed their ability in vocabulary use, sentential complexity, and overall expressive fluency.

As the research literature indicates, some research has been carried out on PBL in EFL contexts (e.g., Aryanti & Artini, 2017; Kumar & Refaei, 2017; Lin, 2015), but only a few limited studies, to the researchers' knowledge, have been conducted on the impact of PBL on reading comprehension (Lin, 2017 a & b). These studies indicated positive impact of PBL on EFL learners' comprehension ability. What is lacked in these studies is the investigation of the undeniable and indispensable role of scaffolding in PBL. To bring sufficient empirical evidence to support superiority of PBL (Lin, 2015), especially in EFL contexts, more research studies are needed to investigate PBL by focusing on scaffolding. In addition, the learners in these two studies were not homogenized which prevents generalizability of the findings. More research is needed to homogenize the learners in proficiency so that more reliable results can be achieved. In addition, in accord with the research literature in EFL, although the notion of engagement has received lots of attention in educational settings (Rashid & Asghar, 2016), almost no research has been done to investigate students' engagement level using PBL. As learners' active participation during learning can foster deep meaningful learning (Liu, et al, 2018), more research is needed to investigate its role in learning in PBL.

To understand the instructional effectiveness of PBL and to fill the gap in the research literature, this study, thus, intends to investigate the effect PBL may have on EFL learners' engagement and comprehension ability in a General English class and aims at comparing this PBL class with another EFL class following a lecture-based method. It is expected that PBL as the constructivist method could solve EFL learners' disengagement problem which can be considered one of the most important impediments in learning and could involve learners in active knowledge construction to encourage deep meaningful learning in reading. For this purpose, the following research questions and null hypotheses were posed:

Research Questions

1. Does PBL have any statistically significant effect on Iranian EFL students' engagement level?
2. Does PBL have any statistically significant effect on Iranian EFL students' reading comprehension ability?

Method

Design

This study followed a quasi-experimental design with pretest-posttest, control group. There were two groups, experimental, and control. The independent variable was PBL and the dependent variables were EFL learners' engagement and comprehension ability.

Participants

Both male and female undergraduate junior students (N = 118) with age range of 19-27 comprising three General English classes were initial participants in

this study. They were majoring in different engineering courses including electronic and computer engineering. In these classes, 102 met the criterion of one standard deviation (SD = 12.05) above and below the mean (M = 29.30), based on the results of Key English Test (KET). After assigning one group as the pilot group (N = 22), one experimental group (N = 40) and one control group (N = 40) were selected. Convenience sampling as a non-probability sampling technique was used in this study. The experimental group received PBL and the control group received lecture-based method. Their English proficiency was limited to restricted hours of EFL instruction at high school based on the interview in class.

Instruments

The Key English Test (KET)

KET was used in the PBL and control groups to test students' homogeneity level in proficiency. It is a Cambridge ESOL exam including four sections of reading, listening, speaking and writing. This test is suitable for elementary-level learners. Due to practicality problems in this research, the listening and speaking sections were not utilized and only the reading and writing sections were implemented. The Reading and Writing paper has nine parts. There are 60 possible marks in reading and writing sections. Through Kuder-Richardson' formula, its reliability was calculated to be .73, which was acceptable. The content validity of this test was also ensured by consulting three experienced EFL teachers teaching at the university.

The PETALS Engagement Instrument (PEI)

PEI was used to investigate the learners' engagement level in both the PBL and control groups (Appendix A). This questionnaire has been designed by Ministry of Education, Singapore (2009). The learners' survey contains eight scales altogether; Pedagogy (P), Experience of Learning (E), Tone of Environment (T), Assessment (A) Learning Content (L) as five dimensions of engaged learning and Affective Engagement (GA), Behavioral Engagement (GB) and Cognitive Engagement (GC) as three types of engagement. Each of the eight scales consists of 5 items. There are 40 items in all. For all the items, the learners are required to rate the extent to which each statement describe the lessons that they have gone through based on the given 10 Point-Likert type scale. However, in this study, the questionnaire was adapted to be better suited for using in the class by highlighting comprehension in all questions. The scale was also modified into 5-point Likert scale type and eight reverse questions were added to increase the validity of the questionnaire. The content validity of PEI was ensured by consulting two experienced EFL teachers at the university. The items were rated for readability, clarity and comprehensiveness. The questionnaire was translated into Persian and validated with regard to content consulting experienced EFL teachers at the university and then the reliability of the questionnaire was calculated through Cronbach's alpha formula to be .91.

Reading Comprehension Pre- and Posttest

Learners' comprehension was measured by pre- and posttests at the beginning and end of the study. Based on learners' proficiency level specified by the test of KET to be at the elementary level, "Select Readings: Teacher-Approved Readings for Today's Students" (Lee, 2011), an elementary level textbook of General English courses at the university, was implemented as the source in these tests as well as the instruction. Both pretest and posttest included 57 questions to assess learners' comprehension. The total score was 20. Through Kuder-Richardson' formula, its reliability was calculated to be 0.97 which was acceptable. The content validity of pre- and posttest was also ensured by consulting two experienced EFL teachers at the university.

Scaffolds

As the means of scaffolds, Problem Definition Template (PDT) and worksheets were used in the PBL group. PDT, with three columns of "what they know", "what they do not know", and "what they need to know" was used as a cognitive template to help students to make their prior knowledge and learning issues explicit in reading and propose an action plan to solve the problems (Appendix B). Worksheets were implemented to engage learners in doing different tasks to solve comprehension problems (Appendix C).

Procedure

At first step and before the treatment, the results in KET were used to check the students' homogeneity in three general English courses in the first session. After that and before the main research, a pilot study (n = 22) was done in four sessions to calculate PEI and the pre-and posttest' reliability, to understand what type of problems students have (using PDT and the worksheets), and to facilitate the treatment procedure in the main study, especially in terms of PBL stages and time requirements. After the pilot study, the researchers made some changes in comprehension questions to make them more understandable.

After the pilot study, the main research was conducted. First, comprehension and PEI pretests were administered to both groups. Next, for two sessions in the PBL group, the teacher explained and modeled PBL to the students (i.e., training sessions). After the treatment, reading comprehension and PEI posttests were administered in both groups. PDT and worksheets were used as scaffolds to assist students during the learning process in PBL. The treatment and administering tests lasted 16 sessions. Every session was 90 minutes. Totally six lessons were covered and each lesson was taught in two sessions. Teaching was conducted by one of the researchers in this study.

Treatment in the PBL group

The learners were divided into groups and went through phases:

Problem Presentation. An authentic problem was presented to students in every reading text. Students needed to solve the problem, reading the textbook. An example was like what follows:

> "Oil, one natural resource that most countries use will finish one day. Are there any other natural resources? Can countries build cities that use other resources? "

Pre-reading and Reading. The problem was read and discussed by the students in groups to understand it. To specify learning needs taking the stated problem into account, PDT was given to the students. They completed the first column based on their background knowledge writing what they knew regarding the problem. They wrote what they did not know in the second column. Students, here, were asked to discuss their problems and state them in words. They wrote what they needed to know in the last column. The assigned text was, then, given to each group. To solve the stated problem, students were required to read the text and discuss the problems that impede comprehension. They were asked to complete PDT again considering their comprehension problems. This phase helped learners to contextualize reading problems from their own points of views. The teacher encouraged learners to propose an action plan by prioritizing the problems and deciding the ways they can use to solve problems. The main goal at this stage is specifying learning needs. Phases one and two lasted about 45 to 60 minutes.

Self-directed Studying. The teacher as facilitator guided students toward self-directed studying at home by introducing different resources (Grammar in Use, vocabulary books, Internet, Oxford and Thesaurus dictionaries). To organize their thought, learners were required to study PDT at home. To pace their learning (O'Grady et al., 2012) and to facilitate their job, a worksheet was given to be completed at home. Worksheets smoothly moved learners to identify and solve their problems by asking appropriate questions and providing the necessary cues. Students were required to take PDT and worksheet to the class to discuss the findings.

In-class Presentation and Discussion. In this phase, learners, first, discussed solutions to the problems collaboratively. A summary of major findings was, then, provided and presented to the class. The teacher assisted learners in presenting the solutions, and gave extra explanation when needed.

The Learning Process Evaluation. Learners reviewed and evaluated their learning process by means of self- and peer-evaluation reports.

Instruction in the Control Group

Lecture-based method was implemented in the control group. First, the learners were asked to look at the topic of reading to guess the meaning of topic and predict what the text can be about. After asking and answering some textual and contextual questions involving the ones related to pictures, headings and subheadings, the learners could get general idea of what the text was about.

The teacher, then, started teaching the main text by reading the text line by line and translating it. The teacher also emphasized the right pronunciation of words and asked the learners to repeat the words to learn the correct pronunciations. In addition, the teacher also provided all other essential explanations important in comprehending the text including grammatical points like the verb tenses. After finishing reading, the teacher required learners to ask any questions they have with regard to the text. Reading and understanding the text approximately took 70 minutes. The teacher, then, asked the learners to devote the rest of the class time to answer comprehension questions. After checking the answers, the teacher told the students to do all the other follow-up reading tasks including vocabulary exercises and grammatical questions at home. The next session, the learners were required to read and answer all the exercises in the class and ask their problems and questions. The teacher also provided the learners with the necessary explanations.

Results

Proficiency Test of KET

To determine the homogeneity of the participants in pilot, control and PBL groups, first, One-Sample Kolmogorov-Smirnov was conducted to consider normality of scores' distribution in KET (Table 1).

Table 1.
One-Sample Kolmogorov-Smirnov Test in KET

	N	*Kolmogorov-Smirnov* Z	Sig.
Pilot	22	.13	.20
PBL	40	.13	.07
Control	40	.13	.08

As Table 1 indicates, the test revealed normal distribution of scores in three groups ($p > .05$). Then, descriptive statistics were calculated as Table 2 indicates.

Table 2.
Descriptive Statistics in KET

	N	Mean	Std. Deviation	Std. Error
Pilot	22	29.50	5.93	1.26
PBL	40	31.5	7.07	1.11
Control	40	29.22	6.05	.95
Total	102	30.00	6.44	.63

According to Table 2, the mean scores in the pilot, PBL and control groups are close to one another. To see whether the differences in mean scores are significant, one-way analysis of variance was conducted (Table 3).

Table 3.
One-Way ANOVA Results in KET

	Sum of Square	df	Mean Square	F	Sig.	Effect Size a
Between groups	73.62	2	36.81	.88	.41	.01
Within groups	4120.37	99	41.62			
Total	4194.00	101				

a Eta Squared

As Table 3 displays, one-way analysis of variance indicated that the difference in language proficiency level is not meaningful, F (2, 99) = .88, P = .41 > 0.05, indicating that the three groups were homogeneous.

Research Question 1

Regarding the first research question, first the distributions of scores in PEI pretest and posttest in the control and PBL groups were taken into account with regard to normality by means of One-Sample Kolmogorov-Smirnov (Table 4).

Table 4.
One-Sample Kolmogorov-Smirnov Test in PEI Pretest and Posttest in the PBL and Control Groups

Variables	Group	N	*Kolmogorov-Smirnov* Z	Sig.
PEI Pretest	Control	40	.75	.60
	PBL	40	.76	.62
PEI Posttest	Control	40	1.00	.26
	PBL	40	.65	.77
Pedagogy pretest	Control	40	1.29	.07
	PBL	40	1.28	.07
Pedagogy posttest	Control	40	1.23	.09
	PBL	40	.67	.75
Experience of Learning Pretest	Control	40	1.63	.06
	PBL	40	1.53	.06
Experience of Learning Posttest	Control	40	.95	.31
	PBL	40	.57	.89
Tone of Environment Pretest	Control	40	1.16	.13
	PBL	40	1.16	.13
Tone of Environment Posttest	Control	40	1.27	.07
	PBL	40	.67	.75
Assessment Pretest	Control	40	1.13	.14
	PBL	40	1.05	.21
	Control	40	1.59	.05

Assessment Posttest			
PBL	40	.92	.36
Control	40	1.45	.05
Learning Content Pretest			
PBL	40	1.50	.07
Control	40	1.60	.06
Learning Content Posttest			
PBL	40	.85	.45
Control	40	1.55	.05
Affective Engagement Pretest			
PBL	40	1.41	.07
Control	40	1.67	.05
Affective Engagement Posttest			
PBL	40	.94	.33
Control	40	1.50	.05
Behavioral Engagement Pretest			
PBL	40	1.80	.05
Control	40	1.70	.05
Behavioral Engagement Posttest			
PBL	40	.94	.33
Control	40	2.14	.05
Cognitive Engagement Pretest			
PBL	40	2.32	.05
Control	40	2.06	.05
Cognitive Engagement posttest			
PBL	40	.98	.28

According to Table 4, the results showed that the score in PEI pre- and post-test and its subscales in the control and PBL groups have normal distribution ($p > .05$). Therefore, the significance values in all score distributions indicates that parametric tests used for all variables are acceptable.

At the second step, learners' scores in eight scales and also their total scores in PEI were calculated in two groups. There were six questions in each scale. Therefore, the scores in eight scales ranged from 6 to 30. The lowest mark in total score was 48 and the highest mark was 240. After conducting linearity and normality tests and ensuring that there is no deviation, the equality of variance-covariance matrix was taken into account. It indicated that as $F = 2.15$, $P = .002 > .001$, covariance matrices of the dependent variable are equal across groups. To test the equality of error variances, Levene's Test of Equality of Error Variances was also conducted. The results indicated that as $p > .01$, there is equality of error variances for dependent variables across groups. To investigate the effect of PBL on students' engagement level, Mancova was used (Table 5).

Table 5.
Multivariate Test Box: Mean Difference between the PBL and Control Groups

	Value	Sig.	F
Wilks' Lambda	0.02	0.000	261.42

As Table 5 indicates, $F= 261.42$, $P = 0.000 < 0.05$ and Wilks' $L= 0.02$ in multivariate analysis of covariance yielded a significant and meaningful difference

in engagement level in both groups. To investigate the significance of difference in learners' engagement level in eight sub-scales in PEI, F test was used as Table 6 indicates.

Table 6.
F Test to Compare Engagement Level in the PBL and Lecture-Based Groups

Scales	F	df	Sig.
Pedagogy	1407.78	1	0.000
Experience of learning	1561.69	1	0.000
Tone of environment	1621. 65	1	0.000
Assessment	1297.99	1	0.000
Learning content	2393.64	1	0.000
Affective engagement	2744.09	1	0.000
Behavioral engagement	2355.5	1	0.000
Cognitive engagement	4634.21	1	0.000

As Table 6 presents, there is a meaningful and significant difference between the PBL and lecture-based groups in eight scales taking significant values ($P < 0.05$) into account. To compare the PBL and lecture-based groups' engagement level, descriptive statistics in engagement subscales have been indicated in Table 7.

Table 7.
Means and Standard Deviation of Scores in the PBL and Control Groups

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
P Posttest	PBL	20.28a	.43	19.41	21.15
	Lecture-based	11.54a	.43	10.66	12.41
E posttest	PBL	19.96a	.57	18.82	21.10
	Lecture-based	10.75a	.57	9.61	11.89
T Posttest	PBL	20.35a	.57	19.21	21.49
	Lecture-based	10.96a	.57	9.83	12.10
A posttest	PBL	18.91a	.45	18.01	19.80
	Lecture-based	10.51 a	.45	9.61	11.41
L posttest	PBL	19.53a	.56	18.41	20.66
	Lecture-based	8.13a	.56	7.00	9.26

GA posttest	PBL	21.66a	.45	20.75	22.57
	Lecture-based	9.45a	.45	8.54	10.36
GB posttest	PBL	21.84a	.66	20.52	23.15
	Lecture-based	10.53a	.66	9.21	11.84
GC posttest	PBL	23.29a	.40	22.48	24.10
	Lecture-based	7.42	.40	6.61	8.24

A Covariates appearing in the model are evaluated at the following values: pedagogy-pre= 8.1250, experience of learning-

Pre= 7.2500, tone of environment-pre= 8.1875, assessment-pre = 9.2750, learning content-pre= 6.850, affective engagement-pre= 9.6250, behavioral engagement-pre= 10.6000, cognitive engagement-pre=7.1125

Taking the mean scores in all eight subscales into account (Table 7), it became evident that the learners had high engagement level in the PBL group in comparison to the learners in the lecture-based group. Therefore, the first null hypothesis indicating that PBL will not have statistically significant effect on EFL learners' engagement level was rejected.

Research Question 2

Regarding the second research question, the distributions of scores in comprehension pre- and posttests in both groups were taken into account with regard to normality by means of One-Sample Kolmogorov-Smirnov (Table 8).

Table 8.
One-Sample Kolmogorov-Smirnov Test in Comprehension Pretest and Posttest in the PBL and Control Groups

Variables	Group	N	*Kolmogorov-Smirnov* Z	Sig.
Comprehension Pretest	Control	40	.93	.34
	PBL	40	.82	.50
Comprehension Posttest	Control	40	.84	.46
	PBL	40	.94	.34

According to Table 8, the significant values (P > .05) in test results indicated that the scores in comprehension pretest and posttest in both groups had normal distribution. At the second step, learners' total scores in comprehension pre- and posttest in both groups were calculated out of 20. After conducting linearity and normality tests and ensuring that there is no deviation, the equality of variance-covariance matrix was taken into account. It indicated that as F = 1.51, P = .17 > .001, covariance matrices of the dependent variable are equal across groups. To test the equality of error variances, Levene's Test of Equality of Error Variances was also conducted. The results indicated that as F = 1.76, p

> .05, there is equality of error variances of dependent variables across groups. To measure the effect PBL had on learners' comprehension ability, Ancova was conducted (Table 9.

Table 9.
Analysis of Covariance between the PBL and Lecture-Based Groups

	Sum of Squares	df	Mean Square	F	Sig	Eta
Pre	132.98	1	132.98	27.97	0.000	.26
Group	433.91	1	433.91	91.28	0.000	.54
Error	366.01	77	4.75			

As Table 9 indicates, statistically controlling the impact of comprehension pretest scores (covariates) in both groups, F = 91.28, P = .000 < .05, ηp2 = .54 in on-way analysis of covariance indicates a significant and meaningful difference in learners' comprehension ability in both groups in posttest. After statistically controlling the covariates, the descriptive statistics in comprehension posttest in both groups were calculated according to Table 10.

Table 10.
Dependent variable: Posttest

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
PBL	16.02	0.34	15.34	16.71
Control	11.37	0.34	10.68	12.05

Table 10 clearly shows the mean scores in comprehension posttest in the PBL and control groups indicating that there is significant difference between both groups considering comprehension ability. The PBL group could improve their reading comprehension ability to a high extent. Therefore, the second null hypothesis indicating that PBL will not have statistically significant effect on EFL learners' reading comprehension ability was rejected.

Discussion

The present study was an endeavor to investigate the impact PBL had on EFL learners' engagement and reading comprehension ability. The results for the first research question indicated that the PBL group had high active engagement during the learning process in comparison to the lecture-based group. This finding is in line with the results of the studies which report that PBL increases engagement in learning (Abu-aisheh et al., 2016; Savin-Baden, 2016; Wynn Sr. et al., 2014). The results for the second research question also indicated that in comparison to the control group, the PBL group enhanced their

comprehension ability to a high extent. This result is consistent with prior findings which indicated that PBL enhances comprehension ability (Lin, 2017a, b). The findings in this study can be justified based on the PBL theory which states that engagement and learning are enhanced by encouraging learners to solve authentic problems through self-directed studying, acquiring and implementing knowledge collaboratively, and also reflecting on learning (Hung, 2013). As Rahmanpanah and Mohseni (2017) state, meaningful learning is best accomplished when students actively engage in knowledge construction.

Active engagement and high comprehension ability in the PBL group can be explained by supreme position of PBL as a constructivist teaching method which emphasizes learning through experience; the focus is on application of acquired knowledge through reflective and experiential learning rather than transmission and memorization of knowledge (Keegan et al., 2017). The experiential learning process initiated by presenting the authentic problems and continues by setting and perusing learning goals through collaboration and self-directed studying leads to progression of knowledge which in turn enhances students' autonomy, engagement and deep learning (Abu-aisheh et al., 2016). In this study, presentation of authentic problems supplied realistic goals for the PBL group to pursue. Using prior knowledge and the scaffolds, students were smoothly moved toward identifying their reading impediments. To gain the required knowledge, particular PBL tasks were assigned. Using the textual information, they, then, could easily solve the stated problem. In simple terms, efforts to gain more knowledge independently, and more self-determination increased students' engagement and assisted them to improve their comprehension.

Group working can be considered as the first contributing factor in PBL. Collaboration is a motivational tool that decreases stress especially for elementary learners, help them to easily construct knowledge and increases engagement (Michaelsen et al., 2014). In the PBL group, collaboration as a motivational factor decreased the stress associated with students' proficiency and increased their engagement. This assisted them to share their learning needs, discuss solutions, and try to acquire knowledge from their friends. This is congruent with Zhang et al. (2017) who mentioned group working as the most efficient factor in PBL which assists learners to increase their effort and helps them to easily acquire knowledge.

Scaffolding is the second contributing factor. PBL should present learners with right kind of scaffolds to enhance deep and meaningful learning and also to increase engagement in tasks that would otherwise be beyond their current abilities (Belland et al., 2013). In this research, scaffolding assisted learners in class systematically and encouraged them to work independently during self-directed learning. PDT helped learners to specify their learning needs, recognize the importance of background knowledge, and encouraged them to develop an action plan to solve reading problems. Worksheets also provided learners a smooth pathway to identify and solve comprehension problems. Implementing scaffolding, thus, increased their active involvement and as a result, im-

proved their comprehension. This achievement could be impossible without scaffolding as leaners' prior knowledge could not suffice to help them move forward in comprehension. This is in line with Haruehansawasin and Kiattikomol (2018) who stated that in classes with many low-achievers, scaffolds are considered the needed help; requiring students to be active in class without preparation prevents teacher's facilitation to be effective. The results also confirm the findings by Hmelo-Sliver (2013) who confirmed that success of PBL depends on scaffolding.

Self-directed learning as the third contributing factor assisted students to become independent. An autonomy-supported context assists learners to think and act independently and helps them to control their learning process and as a result enhances their engagement and meaningful learning (Fukuda et al., 2017; Rashid & Asghar, 2016). In this research, scaffolding and introducing different sources by the facilitator persuaded students to control their learning and enhanced their involvement in tasks during self-directed studying and made it easy for them to acquire the required knowledge. This is in accord with Hamed et al. (2015) who found that self-directed studying maximizes learning by engaging students in deep active learning.

Reflection as the last stage in PBL assisted students to find out their points of weakness and strength and helped them to assess their progress and in this way, increased their engagement in reading tasks to enhance their comprehension. This confirms Reid et al. (2017) who stated that reflection enhances metacomprehension which positively affects engagement and as a result, regulates and enhances learning.

The low engagement and less enhanced comprehension ability in the control group can be attributed to lecture-based method in which there was no problem to be solved collaboratively and no scaffolding and self and peer-evaluation existed. In this method, knowledge is imparted through giving lecture; this makes learners passive and prevents their deep active learning (Weisi, 2012). In this research, the control group followed lecture-based method which was based on listening to the instructor's initiated questions and her transfer of knowledge. Students didn't have any role in determining learning needs and didn't have any chance of constructing knowledge; this had negative impact on their engagement and comprehension ability. This affirms JaleniauskienL· (2016) who concluded that the students can enhance their deep-learning that actively construct knowledge for themselves rather than receiving knowledge passively.

Conclusion

This study provides support for implementing PBL in EFL classes to improve the learners' level of engagement and their deep meaningful learning in comprehension. The significance of this study lies in the fact that, due to the lack of enough empirical evidence, it explored PBL in a General English class to demonstrate its effectiveness and drew attention to the notion of disengage-

ment which is considered an important problem in educational settings and forms the basis for academic achievement as Akbari et al. (2016) indicates.

Teachers can make use of the findings of this study in helping EFL learners improve their level of engagement and comprehension abilities which are considered two important factors for success in language learning through experiential learning. To meet the threshold level of proficiency in classes with many low-achievers, teachers should implement the right kinds of scaffolding in EFL settings. It is also important for teachers, teacher trainers and curriculum developers to pay attention to student-centered methods of teaching like PBL if they want to bring about life-long learners.

While it is found that PBL is very useful in the EFL context of Iran, the limitation of the study should not be overlooked. First, although having one teacher ensures the procedures which have been implemented carefully, it makes difficult to generalize the findings due to the bias the teacher, as one of the researchers, might have with the efficacy of PBL. Second, the results should be generalized to the population with caution due to the small sample size. Third, the participants in this research were non-English majors; thus, the findings cannot be generalized to learners with an EFL major.

This study has presented some useful recommendations to open some potential new areas of research. Future research are recommended to investigate PBL in classes with EFL majors. Because of the efficacy of hard scaffolds in classes with large number of low-achievers (Haruehansawasin & Kiattikomol, 2018), soft scaffolds were not taken into account in this study. To shed light on efficacy of different types of scaffolding in PBL, it is suggested to be a comparison between hard and soft scaffolds in future studies.

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Appendix A

PETALS Reading Engagement Instrument

		Strongly disagree	Disagree	undecided	Agree	Strongly Agree
Q1	I learn through reading activities in class.					
Q2	I study alone when I want to learn more.					
Q3	I actively participate in the reading class.					
Q4	I learn from the examples that my teacher presents based on reading texts.					
Q5	What I learn in texts and activities can be found in the real world.					
Q6	Learning how to comprehend texts easily is exciting.					
Q7	I follow classroom instructions for comprehension.					
Q8	I am willing to do hard activities.					
Q9	I don't use different materials to understand texts.					
Q10	I learn through group-working.					
Q11	Comprehension increases when I ask 'why' questions					
Q12	I feel belonged to the class.					
Q13	I know how much more I've learnt from the beginning.					
Q14	I cannot learn independently.					
Q15	I learn to work well collaboratively.					
Q16	I enjoy doing the comprehension activities that my teacher gives.					
Q17	I follow class rules.					
Q18	I come up with different ideas when I do my work.					
Q19	I understand texts better when my teacher teaches in different ways.					
Q20	What I've learnt in one text helps me understand other texts.					
Q21	My classmates and I help one another in all comprehension activities.					
Q22	I know how I can improve my comprehension.					
Q23	I learned to tell my classmates about my ideas.					
Q24	I like working with reading texts.					
Q25	I listen carefully to my					

		Strongly disagree	Disagree	undecided	Agree	Strongly Agree
	teacher during comprehension activities.					
Q26	Following classroom instructions is difficult.					
Q27	I think about what I learned after the lesson.					
Q28	I use different materials to understand texts better.					
Q29	I discuss with my classmates what I've learnt.					
Q30	I don't know how I can improve my comprehension.					
Q31	I do comprehension activities even if they are hard.					
Q32	I like to participate in different comprehension activities.					
Q33	I know it is important to increase our ability in comprehension.					
Q34	I can use what I've learnt in different activities.					
Q35	I cannot use What I've learnt in other contexts.					
Q36	I help to check my friends' works.					
Q37	I like to know how to increase my comprehension.					
Q38	I continue to learn independently and increase my knowledge in comprehension after class.					
Q39	I think about how I can learn more about texts.					
Q40	For me learning how to comprehend texts is not important.					
Q41	The teacher uses my prior knowledge to help me understand texts.					
Q42	I offer my ideas during comprehension activities.					
Q43	I want to learn more about reading texts.					
Q44	I don't like to do hard reading activities.					
Q45	What I learn in texts makes sense to me.					
Q46	I pay attention to my work in class.					
Q47	I am not interested to increase my knowledge in comprehension.					
Q48	I check my own work in comprehension activities.					

Appendix B
Problem definition Template (PDT)

What do We know?	What do we not know?	What do we need to know?
To discover prior knowledge on - problem scenario - language	To discover - Unknown aspects of problem scenario - Unknown language	To enable students to propose an 'action plan', by asking them to list and prioritize reading problems.

Adopted from O'Grady et al. (eds.), One-Day, One-Problem: An Approach to Problem-based Learning (2012)

Appendix C
A Sample Worksheet

A. Look at the reading text and then complete the followings:
- Reading Title
- People and places
- Key words (words that appear more than one time)
- Does this information help you in comprehension? How?

B. The followings are sentences from the text. Write Synonyms for underlined words and antonyms for bold words.

1. People have **different** ideas.
2. People want a house with every convenience.
3. Mukesh Ambani is the owner of the most **expensive** house.
4. The house has room for everything his family wants.
5. His house is in the woods near the lake.
6. He became a **famous** basketball player.

C. Write different forms of the following words.

1. own
2. beauty

Use the above words in the following sentences.

1. She -------- a big house.
2. The -------- of the factory is rich.
3. My friend's girl is ----------.
4. You see the ---------- in nature.

D. Which of the following is accurate? Explain the problem with wrong sentences.

1. The boy eats an apple.
2. Eats the boy an apple.
3. An apple the boy eats.

E. Fill in the missing parts.

A professional basketball ---------- built a very -------- type of home (different – player). He -------- to be a doctor but instead he became a ---------- basketball player (wanted – famous).

F. Can you understand the following text without the first sentence?

----------. Some people dream of a simple house in a special place. Some want a large house with every convenience and some prefer a wooden small house in jungle.

1. Find the first sentence from the text and complete it. What is the role of the first and other sentences?
2. The paragraph shows a particular text structure? What is it? Talk about its signal words.
3. Search the text and find paragraphs with similar text structure.