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The Effect of Problem-based Learning with Hard Scaffolds on Iranian EFL Learners' Reading Comprehension

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Abstract
To cultivate effective reading, all teaching practices must develop higher-order processing, which involves enhancing reading comprehension and its components of vocabulary, grammar, and text structure. This quasi-experimental research aimed at implementing problem-based learning (PBL) with hard scaffolds in a general English course in the Iranian EFL context to investigate its impact on the participants' reading comprehension. Two intact groups of elementary students, one as the experimental group (N = 40) and one as the control group (N =40) whose homogeneity in language proficiency was checked through the Key English Test (KET) were selected. The experimental group underwent the PBL method with hard scaffolds and the control group received a mainstream reading instruction method. The two groups completed pre-and posttests of reading comprehension. The results of the study, based on multivariate analysis of covariance, indicated that the PBL group with hard scaffolds outperformed the control group in reading comprehension, including its components of vocabulary, grammar, and text structure. The results of the study suggest that practitioners could pay special attention to the PBL method in EFL educational contexts to enhance students' higher order processing, vocabulary and grammar learning, and text structure knowledge.

Keywords: Hard scaffolds; Problem-based learning; Reading comprehension

INTRODUCTION

Learning to comprehend English text is an important skill to use materials and to acquire professional knowledge in different subject fields(Lee & Mayer, 2015; Lin, 2017b). Reading comprehension can be broadly defined as a meaning construction process(Paris, Hamilton, Israel, & Duffy, 2009) which incorporates a number of coordinate cognitive processes during which the reader gets textual information and then relates it to his/her background knowledge to comprehend the text (Arjuna & Jufri, 2016). This meaning construction implies higher-order processes.

Grabe (2009) and Grabe and Stoller (2013)believe that to enhance comprehension, readers must apply higher-order processes which account for construction-integration model of Kintsch (1998)and involves text model of reader comprehension and situation model of reader interpretation. The text model necessitates literal comprehension based on the language (vocabulary and grammar) and text structure knowledge, which has recently been emphasized by most scholars (Michener, Proctor, & Silverman, 2018; Ponce, Mayer,

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Figueroa, & López, 2018; Tong & McBride, 2017). The situation model implies integrating text information with prior knowledge through elaboration and situational inference to construct independent interpretation of the text. Different levels of reading proficiency entail more emphasis either on text or situation model (Grabe, 2009; Saadatnia, Ketabi, & Tavakoli, 2016). Nassaji (2003) also asserts that comprehension involves the integration of low level processes including decoding the text and encoding visual configuration and high-level skills of syntactic, semantic and text structure processing, higher-order knowledge of text representation and the integration of ideas with the reader's global knowledge.

In most traditional EFL settings, teaching reading comprehension is mainly based on teacher-centered explicit lecture method (Lin, 2015), which makes learners bored and may lead to the lack of achievement. Considering Iranian EFL context, it becomes evident that although reading constitutes the major part of the EFL courses, most of the students do not have the required comprehension ability (Weisi, 2012). This problem might be rooted in malfunctioning in reading comprehension courses, heavily loaded with grammar translation method, ignoring attention to meaningful development of vocabulary, grammar within the reading contexts, along with text structure knowledge. Reading comprehension courses, in general, and General English courses, in particular, at university level, accompanied with reading comprehension as the basis, need to develop not only grammar and vocabulary but also text structure knowledge. Reading comprehension with overemphasis on decoding, lack of sufficient exposure to authentic language use, and also almost no literacy to recognize the importance of comprehension components, including vocabulary, grammar and text structure to develop high-level processing might be the major sources of poor reading comprehension (Saadatnia et al., 2016; Zarrati, Nambiar, & Maasum, 2014). This content-oriented decontextualized teaching and learning mode doesn't develop learners into good problem solvers to deal with challenges of today's world (Cho, Caleon, & Kapur, 2015). According to Kohonen, Jaatinen, Kaikkonen, and Lehtovaara (2014), there is a growing demand for an effective method to foster personal growth, create engaging educational context, prepare learners for life and develop complex learning and thinking skills.

In line with this orientation in education, problem-based learning (PBL) is an instructional method rooted in constructivism. It is aimed at preparing students for real-life settings. It requires students to solve authentic problems by engaging with a breadth of conceptual ideas in problem, which leads to challenging their current knowledge. It also assists students in identifying their learning needs, encouraging collaboration and self-directed learning, making emphasis on implementing prior knowledge and knowledge from different sources; thus, it encourages students to reflect on self and peer learning (Hmelo-Silver, 2013; Hung, 2013). PBL, according to O'Grady, Yew, Goh, and Schmidt (2012) and Stentoft (2017),is beneficial in dealing with modern educational requirements, and increases learners' intrinsic motivation and engagement (Lee, Shen, & Tsai, 2010).

In PBL, scaffolds are extensively used as guides to bring about high level of meaningful understanding and learning and to assist learners achieve their goals (Haruehansawasin & Kiattikomol, 2018). The dynamic and context specific scaffolds including facilitator's social, cognitive congruence and collaboration are considered soft while the static supports that are developed in advance by facilitator like computer or paper-based cognitive tools are called hard (Nussbaum, Alvarez, & Mcfarlane, 2009; Schmidt, Rotgans, & Yew, 2011). Different scaffolds like problem definition template (PDT) and worksheets have been classified as hard or soft based on the way they are implemented in the learning process(An & Cao, 2014; O'Grady et al., 2012). When scaffolds are designed by the facilitator in advance and are mostly accomplished by learners during self- directed studying without the teacher's guidance and leading questions, they are classified as hard ones; however, when the

teachers have the main role in guiding the learners toward answers in scaffolds, they are categorized as soft ones.

Different aspects of PBL have widely been studied in different disciplines (Garnjost & Brown, 2018; Hemker, Prescher, & Narciss, 2017; Phungsuk, Viriyavejakul, & Ratanaolarn, 2017; Rovers, Clarebout, Savelberg, & van Merriënboer, 2018; Wosinski et al., 2018). However, PBL is a new method in humanities, especially in teaching languages. Although little research has been done in language learning, beneficial effects of PBL have been highlighted. For example, Othman, Shah, and Ismail (2013)investigated the effect of PBL in English language classes on course content and language development. The findings indicated that in terms of course content, both PBL and non-PBL groups improved but in terms of language proficiency PBL group showed more improvement. Lin (2015)implemented PBL in an English course to investigate its effect on elementary students' English vocabulary learning and use. The findings indicated that in comparison with the control group who could only acquire vocabulary at the basic 2000-word level and mastered receptive knowledge, the PBL group could learn vocabulary beyond 2000-word level and mastered productive knowledge. Kumar and Refaei (2017) demonstrated the power of PBL to promote students' critical thinking in a second-year research-writing course. PBL helped learners to develop critical thinking by requiring them to evaluate their audience's needs and develop purposes for their writings. Therefore, they had to evaluate the writing situation to create the most appropriate text. Bashith and Amin (2017)also indicated that implementing PBL increases learners' critical thinking skill. Sulistyo (2017) investigated the effectiveness of PBL on learners' argumentative writing skills with regard to content, organization, vocabulary, grammar and mechanics. The findings of the study indicated PBL group's high improvement in argumentative writing and its components in comparison to guided writing instruction group. In a mixed-method study, Aryanti and Artini (2017) investigated the effect of PBL on students' productive skills and attitudes. The results of the study showed that PBL enhanced learners' ability in productive skills and had positive impacts on their attitude toward language learning. Caswell (2017) incorporated PBL within MA TESOL program in teacher education. The results of this mix method 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.

Regarding reading comprehension, a research conducted by Lin (2017a) indicated high positive impacts of PBL on EFL learners' reading comprehension, strategy use and attitudes. Lin (2017b)also incorporated PBL in one web-based English reading course to investigate its impact on learners' comprehension and compared it with traditional class. The results indicated that PBL enhanced participants' active learning, cognitive processing and ultimately comprehension ability.

In Iranian EFL context, there are few studies, among which a research done by Ansarian, Adlipour, Saber, and Shafiei (2016) investigated the effect of PBL through cognition-based tasks on speaking proficiency of Iranian intermediate EFL learners in comparison to the effect of objective-based tasks offered in the traditional class. The findings indicated high positive impact of PBL on learners' speaking proficiency using cognitive-based tasks.

Despite the fact that some research has been done in some aspects of English language learning based on PBL, there is still lack of sufficient empirical evidence to support superiority of PBL (Lin, 2015; Sanson-Fisher & Lynagh, 2005), especially in Asian EFL contexts. To the best knowledge of the researchers, there have been few studies, if any, on the effect of PBL with hard scaffolds on students' reading comprehension, including its components (vocabulary, grammar, and text structure) in the Iranian EFL context. By considering the importance of comprehension skill in academic contexts, it is suggestible to feed

learners with required basic knowledge through an efficient method. Thus, to understand the instructional effectiveness of PBL in reading comprehension and to fill the gap in the research literature, this study posed the following research question:

> Does PBL with hard scaffolds have any significant effect on students' reading comprehension and its components of vocabulary, grammar, and text structure?

METHODS

Participants

The initial participants of this study were 118 male and female undergraduate junior students, with age range of 19-27 in three classes of General English from whom 102 met the criterion of one standard deviation above and below the mean, based on the proficiency test of Key English Test (KET), which is used for elementary level students. After assigning one group as the pilot group (N = 22), one experimental group (N = 40) and one control group (N = 40) were selected. The experimental group received PBL method with hard scaffolds and the control group received traditional method. Their background in English was restricted to high school and they did not have the experience of attending English language institutes.

Materials

Learners' level of homogeneity in reading and writing proficiency was tested by Key English test (KET), an ESOL proficiency exam suitable for elementary level English learners. This test contains reading, listening, speaking and writing sections. There are 60 possible marks in the reading and writing sections. Listening and speaking sections were not used due to practicality problems.

At the beginning and end of the study, learners' reading comprehension ability, including its components of vocabulary, grammar, and text structure, was measured by pre- and posttests, based on reading passages. The sources of theses passages, together with passages used for the instruction in the experimental and control groups was "Select Readings: Teacher-Approved Readings for Today's Students" by Lee (2011), which was the textbook of the general English courses in the university, where the study was conducted. This is a book suitable for learners at elementary level in EFL contexts, which expose learners to a variety of text types.

The questions of the reading comprehension tests included three parts. The first part contained 18 items requiring learners to use their knowledge in text structures including description, definition, cause-effect, comparison-contrast, sequence, problem-solution and their textual signal words to answer the questions. The second part included 18 items testing learners' understanding of vocabularies within the text. The last part involved 22 items measuring learners' knowledge of grammar important in comprehension. The total score in pretest and posttest was 20. Through Kuder-Richardson' formula the reliability in pre- and posttest was calculated to be 0.99, which was acceptable.

As the means of hard scaffolds, Problem Definition Template (PDT) and worksheets were used in the experimental 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, considering the stated problem and reading comprehension components, and propose an action plan to solve the problems (Appendix A). Worksheets were implemented to engage learners in doing different tasks to make learners recognize their problems in text structure, vocabulary and grammar (Appendix B).

Procedure

Before treatment, the reading and writing sections of KET was administered to check learners' homogeneity. The content validity of pre- and posttest was ensured by consulting two experienced EFL teachers at the university. A pilot study (n= 22) was conducted in four sessions to calculate the pre-and posttest' reliability. The purpose of the pilot study was also to

understand what type of problems students have (using PDT and the worksheets), ensure the learners' weaknesses in comprehension components (vocabulary, grammar, and text structure), and to facilitate the treatment procedure in the main study, especially in terms of the stages of PBL and time requirements. Most of the students had problems in text comprehension due to the lack of knowledge in text structure, vocabulary and grammar. After the pilot study, the researchers also modified comprehension questions.

First, pretest was administered to the control and experimental groups to measure the amount of pre-existing knowledge on reading comprehension. Next, for two sessions of the main study in the experimental group, the teacher explained and modeled PBL method to students (i.e., training sessions). After the treatment, the posttest was administered. Every session was 90 minutes. Totally six lessons were covered and each lesson was taught in two sessions. PDT and worksheets were used as scaffolds to assist learners in the learning process. PDT and worksheets were classified as hard scaffolds as they were designed by the facilitator in advance and used as static tools to assist learners mostly during self-directed studying.

Following Nassaji (2003) and Grabe (2009), the teaching goals of two classes were following text model of comprehension to develop a high-level processing by enhancing knowledge on comprehension components including vocabulary, grammar and text structure. The situation model wasn't the focus of this study because of learners' lack of required reading proficiency.

Treatment in the Experimental Group (i.e., PBL Group).

The learners were divided into small groups and went through six phases:

Presentation of problem. A real-life like problem was presented to learners in every reading text. Students had to deal with and solve the problem, reading the assigned textbook. An example was like what follows:

"Oil is a natural resource that most countries use. One day, however, oil will finish. Are there any other natural resources that countries can use? Can countries build cities that use other resources to get energy? "

Pre-reading and reading. Learners, first, read and discussed the problem in groups to understand it. PDT was given to learners to specify their learning objectives considering the stated problem. In the first column, they wrote what they knew based on their prior knowledge. In the second column, they wrote what they did not know. Students, here, were asked to discuss their problems and try to state them in words. In the last column, they wrote what they needed to know. The teacher, then, gave the assigned text to each group. To find the solution, the teacher required learners to read the text and discuss the problems (vocabulary, grammar and text structure) which hinder comprehension and then complete PDT again. In this phase, problems were contextualized from learners' points of views and the teacher encouraged learners to propose an action plan by asking them to prioritize the difficulty areas and decide the ways they can implement to solve problems. Specifying learning objectives is the main goal at this stage. Phases one and two lasted about 45 to 60 minutes. (See Appendix C for an example of PDT completed by students in one group)

Self-directed reading. By introducing different sources (Grammar in Use, vocabulary books, Internet and the dictionaries of oxford and thesaurus), the learners were guided toward self-directed learning at home. Students were asked to study PDT at home again to organize their thought. To facilitate their job and as O'Grady et al. (2012)state to pace their learning, a worksheet was given to be completed at home. By provision of cues and asking appropriate questions, worksheets guided learners to move from understanding the topic to recognizing the key words, finding synonyms and antonyms, noticing and using the required grammatical rules and also understanding and implementing text structure knowledge. Students were asked to bring PDT

and the worksheet the next session to discuss the findings.

In-class presentation and discussion.. In this phase, learners, first, discussed the solutions in groups by checking PDT and worksheets. They, then, provided a summary of major findings and presented it to the class. The teacher helped the students in explaining the solutions, and gave them extra explanation if needed.

Evaluation of the learning process. Learners reviewed and evaluated their learning process by means of self and peer evaluation reports and reflection journals.

Instruction in the Control Group.

Lecture-based method was applied in control group. The teacher started teaching by introducing the topic and asking questions. The students started to talk about what they knew about the topic. The teacher, then, started to read the text line by line. She explained all the words, provided synonyms and antonyms, mentioned grammatical points and also explained text structure. Students were asked to study for the next session. In the second session, the students answered questions and did follow up activities including answering comprehension questions and doing vocabulary and grammar exercises.

Design and Statistical Analyses

This study followed a quasi-experimental design with pretest-posttest, control group adopting a quantitative approach. There were two groups, experimental (PBL), and control. The independent variable was PBL with hard scaffolds and the dependent variable was reading comprehension with three levels of vocabulary, grammar, and text structure. Multivariate analysis of variance and F-test were conducted to answer the research question.

RESULTS

To ensure the homogeneity of the participants, comprising three groups (One as pilot group and the other two as experimental and control groups), at the first stage, One-Sample Kolmogorov-Smirnov was conducted to consider normality of scores' distribution. The test revealed normal distribution in pilot group D = .13, P = .20> .05, the experimental group D = .13, P= .07>.05 and the control group D = .13, P = .08 > .05. Then, the mean scores were calculated (Table 1).

Table1.

Descriptive Statistics in KET(Pilot, Experimental, and Control Groups)

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

Table 1 indicates that the mean scores in the pilot group (M = 29.50, SD = 5.93), experimental group (M = 31.05, SD = 7.07) and control group (M = 29.22, SD = 6.05) are close to one another. To investigate whether the differences in mean scores are significant, one-way analysis of variance was conducted (Table 2).

Table 2.

One-Way ANOVA Results (Pilot, Experimental, and Control Groups)

	Sum of Squares	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	4194.00101					

a Eta Squared

As Table 2 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. The effect size was also small (eta squared = .01) indicating that the three groups were homogeneous.

Regarding the research question, first, the distributions of scores in pre- and posttest in the control and experimental groups were taken into account with regard to normality by means of One-Sample Kolmogorov-Smirnov. It became evident that in the experimental group, the scores in both pretest D= .82, P=.50 > .05 and posttest D= .94, P= .34 > .05 have normal distribution. Taking into account comprehension components, vocabulary D= 1.32, P = .06 > .05, grammar D = 1.52, P= .052 > 0.05, and text structure D = 1.19, P = .11 >0.05 in the pretest and also in the posttest, vocabulary D = 1.56, P = .052 > 0.05, grammar D =1.62, P= .06 > .05 and text structure D = 1.48, P= .052 >.05, it became clear that the scores have normal distribution. In the control group, the scores in the pretest D = .93, P = .34 > .05 and the posttest D = .84, P= .46 > .05 have also normal distribution. Considering components, vocabulary D= 1.09, P = .18>.05, Grammar D = 1.21, P = .10>.05 and text structure D= .95, P = .32>.05 in the pretest and in posttest, vocabulary D= 1.82, P =.06>.05, grammar D = 1.24, P = .08> .05 and text structure D = 1.05, P = .21>.05, it became clear that the scores have normality in distribution.

To investigate the effect PBL could have on learners' reading comprehension, multivariate analysis of variance was conducted (Table 3).

Table 3.
Multivariate Test box: Mean Difference betweenExperimental and Control groups

Value	Sig.	F	
Wilks' Lambda	0.21	0.000	87.67

As Table 3 indicates, multivariate analysis of variance yielded a significant and meaningful difference in learners' comprehension ability in both groups, F= 87/67, P = 0.000 > 0.05 and Wilks' L= 0.21 indicating that experimental group outperformed control group in comprehension. Considering components of reading comprehension separately, descriptive statistics are indicated in Table 4.

Table 4.
Means and Standard Deviation of Scores in Comprehension Components

Dependent Variable	Group	Std. Error	95% Confidence Interval	
			Lower Bond	Upper Bound
Vocabulary Posttest Experimental	5.39a	.123	5.14	5.63
Control	4.73a	.123	4.49	4.97
Grammar Posttest Experimental	4.71a	.132	4.45	
Control	3.90a	.132	3.64	4.17
Text structure Experimental	5.91a	.157	5.60	6.22
Control	2.73a	.157	2.42	3.05

a Covariates appearing in the model are evaluated at the following values: vocabs-pre= 3.82, grammar-Pre= 3.05, skill-pre= 2.03

Table 4 indicates that the mean scores in vocabulary (M = 5.39), grammar (M = 4.71), and text structure (M = 5.91)in the experimental group are higher than the mean scores in vocabulary (M = 4.73), grammar (M = 3.90), and text structure(M = 2.73) in the control group. To investigate the significance of difference in learners' ability in these components in both groups, F test was used as Table 5 indicates.

Table5

F-test to Compare Ability in Comprehension Components in Experimental and Control Groups

Comprehension Components	df	***F***	Sig.
Vocabulary	***1***	14.26	0.000
Grammar	***1***	18.62	0.000
Text structure	***1***	205.24	0.000

Table 5shows that there is a meaningful and significant difference between control and experimental groups in their ability in comprehension components, vocabulary F= 14/26, P = 0.00 < 0/05; grammar F = 18.62, P = 0.00 <0.05and text structure F= 205.24, P = 0.00 < 0.05, indicating that experimental group outperformed control group in all these components.

DISCUSSION

The results of the study indicated that participants in the PBL with hard scaffolds group outperformed the control group in reading comprehension, including its components of vocabulary, grammar, and text structure. Higher-order processing in comprehension can only be achieved by enhancing knowledge in comprehension components including grammar, vocabulary and text structure (Grabe, 2009; Nassaji, 2003). The findings of this study can be justified based on the PBL theory, which states that learning outcome is enhanced by promoting abilities in acquiring and implementing knowledge collaboratively, solving problems, practicing higher-order thinking skill, self-directing and reflecting (Hung, 2013). Taking few studies conducted in PBL into account, the results in this research are consistent with prior findings, which indicated that PBL enhances students' reading comprehension(Lin, 2017a, 2017b). The results in this study are also supported by other findings, which indicated that PBL enhances language learning in general and language skills in particular (Ansarian et al., 2016; Aryanti & Artini, 2017; Lin, 2015; Othman et al., 2013; Sulistyo, 2017).

Implementing hard scaffolding through PDT and worksheets can be considered as the most efficient factor in enhancing comprehension in the PBL group. Hard scaffolding provided help systematically in the class and encouraged learners for self-directed learning at home. As a cognitive template, PDT helped learners to recognize the importance of their prior knowledge, assisted them to find new learning issues, and moved them toward preparing an action plan to solve the problems (See the PDT sample in Appendix C). To find the solution, worksheets also moved learners along several steps that they may not have known before. For example, in the present study, learners did not notice the importance of grammar and text structure knowledge in comprehension before. They, thus, did not mention them in their action plan. However, worksheets helped them to not only notice their importance but also learn and apply them. As Haruehansawasin and Kiattikomol (2018) state, hard scaffolds are essential in classes with many low-achievers. Haruehansa was in and Kiattikomol continue that requiring these learners to respond in class without preparation makes teacher's facilitation impossible. Effective hard scaffolds that help learners to answer to some predesigned questions will help the teacher in facilitation.

Reflection in the last stage of evaluation also assisted learners to monitor their progress and realize their points of weakness and strength in reading comprehension, attending to vocabulary, grammar, and text structure. As Reid, Morrison, and Bol (2017) remark, reflection increases students' meta-comprehension which results in ef-

fective regulation of learning and performance enhancement.

The low learning outcome in the control group can be attributed to the lecture-based methodology of instruction in which there was no problem to be solved collaboratively and no hard scaffolding and evaluation existed. The reason for low outcome of learning in traditional methodologies is due to teacher-centered instruction (Weisi, 2012), imparting knowledge through giving lecture and making learners less active (JaleniauskienŁ, 2016). In the control group, students just memorized the meanings, synonyms and antonyms that the teacher transferred to them. This parrot-like learning was inefficient in improving their vocabulary, grammar and text structure knowledge. In the control group, scaffolding was merely restricted to the provision of oral feedback by the teacher in questioning and answering, whenever it was needed.

While it is found that PBL is very useful in EFL context, the limitations of the study should not be overlooked. The participants in this study were non-English majors studying English in general courses. The findings cannot be generalized to learners with EFL major. Because of the efficacy of hard scaffolds in classes with large number of low-achievers, which was the focus in the present study, soft scaffolds were not taken into account. To have a comprehensive picture regarding the efficacy of scaffolds in PBL, there should be a comparison between hard and soft scaffolds in future studies.

CONCLUSION

This study provides support for implementing PBL with hard scaffolds in EFL classes to improve learners' reading comprehension and higher-order processing through experiencing a constructivist learning process. The significance of this study lies in the fact that, due to the lack of enough empirical evidence, it explored PBL in General English classes to demonstrate its effectiveness and drew attention to enhancing knowledge in reading comprehension components, including vocabulary, grammar, and text structure, which form prerequisite knowledge for higher-level processing.

The first contributing factor to supreme position of PBL is the problem scenarios. As O'Grady et al. (2012) assert, in PBL, problems act as stimulus and move learners toward solutions by setting goals to pursue. These scenarios supply authentic situations which force learners toward argumentation, reasoning and problem-solving by searching different resources and implementing individual and collective prior knowledge (JaleniauskienŁ, 2016; Yew & Goh, 2016). In the present study, the problem scenarios set realistic goals to pursue. To solve the stated problems, learners were easily guided toward recognizing their comprehension problems including grammar, vocabulary and text structure implementing their prior knowledge and using hard scaffolds. The assigned PBL tasks, hence, provided opportunities to gain the required knowledge and apply them in authentic context. Using the textual information, they, then, could easily provide answer to the stated problem.

The second contributing factor to outperformance of the PBL group refers to solving problems through group work. As Yew and Goh (2016) state, PBL is implemented through group work. Therefore, participants in the PBL group frequently shared learning objectives, discussed findings, and made an attempt to acquire knowledge from their counterparts. In this way, class sociability was enhanced and ultimately, meaning was constructed and knowledge was elaborated from the interaction between the learners within a social context of the class. As Zhao (1996) asserts "knowledge is constructed when an individual is constantly participating in productive activities of communities rather than through transmission from an outside source" (p. 45).

The third prominent contribution of PBL refers to self-directed learning, which is part of the requirements for successful problem solving activity. Learners become independent during self-directed studying; this autonomy-supported context assists learners to think and act independently and control their own learning process (Fukuda, Sakata, & Pope, 2017). Self-directed studying together with collaborative learning maximizes learning in PBL by involving students

in deep active learning (Hamed, Al Masri, Smadi, & Maharmah, 2015).

The results of the study suggests that PBL has implications in EFL settings. It can enhance learning experience of learners. Learners can achieve high-level processing ability, the ultimate goal, in comprehension. Effective learning takes place when learners participate in cooperative active learning; therefore, teachers should encourage social constructivist learning. Teachers should cultivate interest in self-directed learning since human development depends on acquiring knowledge independently. Students should know that personal construction of knowledge would result in authentic learning. Thus, they can use this knowledge in real life. In addition, success in PBL depends on effective scaffolding. There should be more structure in scaffolding to enhance low-achievers' learning outcomes.

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