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Online vs. offline Problem-based Learning Affecting Foreign Language Learners' willingness to communicate, self-efficacy, and classroom anxiety

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ABSTRACT

Background and Objectives: The essence of Problem-based Learning (PBL) is to find a prêt-à-porter solution to a problem, which is also known as scenario. Several features differentiate this teaching methodology from other typical approaches in language teaching contexts. In order to reinforce the association between learners' construction of the required knowledge to solve an ill-structured problem when assessing different possible solutions and attempting to find an acceptable solution, learners need to collect necessary information mostly on their own with the help of a teacher as a facilitator. PBL can also be considered as a potentially useful approach to language teaching and learning, especially with regard to productive skills in which leaners practice more fluently if they experience more involvement in the learning process. The PBL also contributes to learners and learning psychological aspects. Despite the generally acknowledged benefits of PBL, it has not been commonly used, especially in foreign language learning contexts. One reason for this may have been concerns about how the method might affect foreign language learners' feeling of anxiety, self-efficacy and willingness to communicate. The major objective of this study was to bridge the gap in our understanding of how the implementation of the PBL approach affects English as a Foreign Language (EFL) learners' psychological factors of willingness to communicate, self-efficacy, and classroom anxiety.

Materials and Methods: Ninety pre-intermediate EFL students were selected according to the Oxford Placement Test (OPT) and purposeful sampling method. They were randomly assigned into 3 groups of online PBL, face-to-face PBL, and control group with 30 learners in each. Students in both online PBL and face-to-face PBL classes embarked on a 10-session speaking course according to the framework of the PBL approach. Meanwhile, the control group received speaking instruction based on a conventional method other than the PBL. Three questionnaires of Willingness to Communicate (WTC), English self-efficacy, and foreign language classroom anxiety scale were administered before and after the course to all participants. Analysis of covariance (ANCOVA) was employed to analyze the data.

Findings: Results showed that EFL learners in the online and face-to-face PBL classes outperformed those in the control group in their WTC and self-efficacy. In addition, learners in the online and face-to-face PBL groups meaningfully experienced a lower level of classroom anxiety compared with the control group.

Conclusions: The findings of the present study suggest that the PBL approach efficiently motivates learners to communicate and interact within the classroom context. In addition, learners in the online and conventional PBL groups felt more self-determining and responsible for their learning as a result of feeling more comfortable in the learning environment. Results also shed light on the idea that due to the experiential aspect of PBL, when learners explore the solutions to the problem/scenario and discuss them with others, that forms an environment with a minimized classroom speaking anxiety. Implications are also discussed at the end of the study.

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9

تاثیر یادگیری مبتنی بر مسئله برخط و حضوری بر تمایل زبان آموزان به برقراری ارتباط، احساس خودکارآمدی، و اضطراب کلاس درس

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چکیده

پیشینه و اهداف: یکی از ملاحظات اساسی در یادگیری مبتنی بر مسئله عدم وجود یک راه حل واحد برای پاسخگویی به مسئله است که البته در آموزش زبان به آن سناریو نیز گفته می‌شود. با این‌حال، شیوه یادگیری مبتنی بر حل مسئله دارای ویژگی‌های دیگری نیز می‌باشد که آن را از دیگر شیوه‌های مرسوم یادگیری زبان متمایز می‌سازد. در این شیوه، به منظور برقراری ارتباط پایدار و معنی‌دار میان کسب دانش لازم برای پاسخگویی به مسئله از طریق کشف و بررسی راه حل‌های ممکن و انتخاب مناسب‌ترین راه حل، لازم است تا زبان‌آموز صرفا از طریف خود اکتشافی به بررسی و ارزیابی اطلاعات لازم برای پاسخ به مسئله بپردازد. البته، معلم، صرفا در نقش تسهیل‌گر ظاهر شده و در صورت لزوم زبان آموزان را راهنمایی می‌کند. این شیوه از یادگیری می‌تواند دررابطه با مهارت‌های تولیدی زبان‌آموزان بسیار موثر باشد، چرا که آن‌ها در صورت مشارکت در فرایند یادگیری- آن چه که این شیوه بر آن تاکید میکند - شیوایی کلام بهتری را تجربه می‌کنند. بدین‌ترتیب می‌توان گفت که این شیوه از آموزش صفات روانشناختی فراگیران را نیز تحت تاثیر قرار می‌دهد. از این‌رو، مطالعه حاضر خلاء تحقیقاتی در مورد کاربرد شیوه مسئله محور و تاثیر آن بر عوامل روانشناختی از قبیل تمایل به برقراری ارتباط، خودکارآمدی، و اضطراب کلاس درس می‌پردازد.

روش‌ها: تعداد ۹۰ نفر از زبان آموزان سطح پیش متوسط زبان انگلیسی بر مبنای آزمون تعیین سطح آکسفورد و روش نمونه گیری هدفمند انتخاب شدند. افراد مورد نظر، به صورت تصادفی در سه گروه ۳۰ نفره (۱) گروه شیوه مبتنی بر مسئله شیوه مبتنی بر مسئله برخط، (۲) گروه شیوه مبتنی بر مسئله حضوری، و (۳) گروه کنترل با شیوه تدریس غیر از یادگیری مبتنی بر مسئله تقسیم بندی شدند. زبان آموزان در هر سه گروه فوق در یک دوره ۱۰ جلسه‌ای آموزش مهارت گفتاری شرکت کردند. سه پرسشنامه تمایل به برقراری ارتباط، خودکارآمدی، و اضطرب در کلاس زبان در ابتدا و پایان دوره توسط زبان آموزان پاسخ داده شدند. برای تجزیه و تحلیل داده های جمع آوری شده از پرسشنامه ها از تحلیل کواریانس (انکووا) استفاده شد.

یافته‌ها: نتایج نشان داد که کاربرد شیوه مبتنی بر مسئله در کلاس برخط به طور قابل توجهی موثرتر از شیوه مبتنی بر مسئله در کلاس حضوری بوده است. یافته ها همچنین نشان داد که فراگیران زبان انگلیسی در کلاس‌های برخط و حضوری با بکارگیری شیوه مبتنی بر مسئله نسبت به زبان آموزان گروه کنترل در زمینه تمایل به برقراری ارتباط عملکرد بهتری داشــتند. علاوه بر این، زبان آموزان در گروه های آموزش مبتنی بر مسئله برخط و حضوری به طور معناداری سطح پایین‌تری از اضطراب کلاس درس را در مقایسه با گروه کنترل تجربه کردند.

نتیجه‌گیری: بر اساس یافته های مطالعه حاضر می‌توان چنین اســتنباط کرد که شیوه مبتنی بر حل مسئله در ایجاد انگیزه زبان آموزان در جهت ایجاد ارتباط کلامی در زبان مقصــد موثر اســت. علاوه براین، زبان آموزانی که در کلاس‌های برخط تحت تاثیر این شیوه قرار می‌گیرند، حس مسئولیت بیشتری را نسبت به یادگیری خود پیدا می‌کنند و در نتیجه احساس خوشنودی بیشتری را نیز تجربه می‌کنند. از سویی دیگر، بدلیل خود اکتشافی بودن این شیوه بویژه زمانی که زبان آموز به کشف راه حل پرداخته و آن را با هم کلاسی‌های خود مورد بحث قرار می‌دهد، اضطراب بســیار کمتری را تجربه کرده که به فرایند یادگیری کمک می‌کند. کاربردهای اســـتفاده از نتایج این مطالعه در پایان مورد بررسی و پیشنهاد قرار گرفته است.

Introduction

The twentieth century is characterized by a radical shift in teaching methodologies as a result of the emergence of constructivist ideas [1]. The constructivist perspective to learning is built upon the active construction of knowledge by learners and was an attempt to dethrone the reductionist behavioral approaches to learning. Drawing on the tenets of constructivism, PBL is one of the latest trends in teaching EFL [2]. In PBL, problems play a central role for which learners have to work, in groups or individually, to find solutions. Another central concept in this regard is collaboration since emphasis is placed on group work and the construction of possible solutions. This collaborative aspect, along with the authentic nature of the problems proposed to students can prove beneficial in developing learners' communicative skills [3].

Accordingly, learners first think of a plan to solve the problem, and during their planning, they identify the necessary changes, possibilities, and procedures to synthesize a solution to the problem. This helps students in the subsequent levels where a more profound understanding is required, that is, the analysis of the problem. Then, depending on the nature of the problem, learners in their group create new ideas generated from the already discussed ones, segmentize and unify the components, and categorize the patterns in predicting the possible outcomes of the solution [4]. Finally, learners try to apply what they have learned, especially in other situations, to see if they can make use of their solutions on different occasions.

Given that possible answers to problems are formed learners' minds, according to their understanding of the problem, PBL can be considered as a salient instance of constructivism. Since there are no pre-defined solutions to the problem at hand, possible answers may vary between groups and individuals; therefore, answers are all considered acceptable as long as the problem is solved [5]. Learners' construction of required knowledge for solving the problem, trying different possible solutions, and struggling with ill-structured problems to reach an acceptable solution is primarily linked to the constructivist philosophy of learning. It can also be considered as a potentially useful approach to language teaching and learning, especially with regard to productive skills. It can improve learners' WTC [6] and self-efficacy target language use [7]. Furthermore, PBL can help learners overcome their classroom anxiety [8].

The present study seeks to investigate the effects of the PBL approach on EFL learners' psychological factors of WTC, self-efficacy, and classroom anxiety. The effects of various variables on promoting language learners' WTC [9, 10, 11, 12], and self-efficacy [13, 14] have been studied in the literature. However, fewer attempts have been made to implement PBL to facilitate EFL learners' WTC and self-efficacy. Since the PBL approach considers learning through interpersonal interaction [15], it can be beneficial for maximizing learners' WTC in the classroom context.

Furthermore, given the hindering effect of anxiety on students' classroom performance [16, 17, 18, 19], it is of great importance to find ways to minimize students' anxiety. One potential solution is to make learners participate more in classroom activities [20]. Since active participation and collaboration are essential characteristics of the PBL approach, this teaching method can effectively minimize learners' classroom anxiety [21]. Accordingly, it is necessary to evaluate the effects of the PBL approach on reducing classroom anxiety in different contexts to help learners experience effective learning. Equally important, given the rise of online learning and teaching, the

importance of shedding light on the application of PBL in an online context cannot be emphasized enough. In an attempt to address these issues, this study attempts to answer these questions:

o Are there any significant differences among the effects of online PBL, face-to-face PBL and conventional instruction on EFL learners' WTC?

o Are there any significant differences among the effects of online PBL, face-to-face PBL and conventional instruction on EFL learners' self-efficacy?

o Are there any significant differences among the effects of online PBL, face-to-face PBL and conventional instruction on EFL learners' level of speaking anxiety?

Review of the Related Literature

Problem-based Learning

At the time of rapid change, one of the most important skills that learners should be equipped with is problem-solving [22]. Dating back to the 1970s, PBL rose against a lecture-based model of teaching where feeding ideas to students formed the central concept of teaching [23]. The traditional transmissionist approach to teaching in which the teacher is the only source of information and tries to transfer chunks of information to students, who must memorize them with little/no cognitive involvement in the process of learning, creates additional problems in learning such as lack of necessary experience and the low rate of knowledge retention [24]. That is, lecture-based teaching does not deliver practical experience and may not lead to optimum learning [4]. As a reaction to such problems, PBL is a student-centered approach that encourages students to resort to their research abilities, collaborate, and draw on their creativity and

other cognitive repertoire to come up with a viable solution to an ill-defined problem [23].

Before proceeding any further, it would not be amiss to contextualize the notion of 'problem' within PBL. A problem can serve as a strong stimulus in convincing learners to work together and draw on the collective resources of the group to solve the problem [25]. The nature of the problem is also of great importance and it is not to be confused with such concepts as 'puzzle'. The main difference between 'problem' and 'puzzle' is that the former is *intended* to be ill-formed for which learners can find a multitude of solutions. On the other hand, puzzles are well-formed, and there is only one possible solution to them [26]. The multiplicity of problems is of great importance since it can drive learners' creativity and their reliance on the collective resources of the group to find any possible solution to the problem at hand. PBL is characterized by authenticity since learners deal with real-life problems [27]. The high level of cognitive engagement can be a trump card for galvanizing learners' critical thinking skills [28].

The ill-structured nature of problems, on the one hand, and the collaborative nature of the work, on the other, give way to a large number of solutions in the learning context. As a result of this diversity, a number of PBL models have been created, integrating the characteristics and objectives of PBL into a unified whole [3]. However, the multitude of existing PBL models has paved the way for the misapplication of the method. Many studies in the field of language pedagogy have faltered in the correct implementation of the model. Since PBL has been applied in different disciplines, a version of PBL tailored to language learning classes should be of the highest order since learning does not occur identically [5]. Moreover, even when PBL is designed specifically for the purpose of language

teaching, it is unclear how it might affect learners' affective variables. This study in intended to address this issue.

Affective Variables

Willingness to communicate (WTC) refers to individuals' intention to communicate [29]. This aspect of communication is highly affected by individuals' characteristics, especially the desire to initiate communication. In language learning, learners bring to class characteristics that might be influential in their language learning achievement. One of these characteristics is WTC. According to [29], WTC has been more influential in communication than other variables such as anxiety or communicative competence. WTC has been shown to be the prediction of communication initiation both in L2 and L1 [30].

Self-efficacy is a self-judgment that one may make to see how much s/he can perform a domain-specific task [31]. Self-efficacy partakes a mutual relationship with one's performance in which a high degree of self-efficacy positively affects one's performance on a specific task, and this good performance will, in turn, enhance self-efficacy [32]. Accordingly, it is believed that self-efficacy can affect the factors that predict motivation.

PBL provides learners with the opportunity to direct their own learning. This self-directedness, as one of the components of PBL, can be achieved when learners have higher self-efficacy [33]. According to [34], learners who experience PBL courses gain more self-sufficiency since they are in charge of their own learning. The possible relationship between PBL and learners' self-efficacy reinforces [35]'s idea that PBL can develop learners' competence and creativity in new problem-solving activities where they can think critically to adopt suitable solutions.

Anxiety refers to an individual's feeling of tension, nervousness, apprehension, and worry due to stimulation of the autonomic nervous system [36]. Horwitz [37] argued that the notion of anxiety is a multi-dimensional concept; psychologists have identified different types of anxiety including trait anxiety, achievement anxiety, facilitative-debilitative anxiety, state anxiety, and achievement anxiety. In the late 1980s, the concept of anxiety was seriously inspected in language teaching after the work of [36], who introduced Foreign Language Anxiety (FLA). MacIntyre et al.'s [38] definition of FLA refers to the state of worry or negative feelings learners develop towards learning a foreign language. Horwitz et al.'s [39] definition of FLA still seems a comprehensive description that FLA includes one's feelings, beliefs, and behaviors resulting from learning and using foreign languages. Accordingly, the performance of foreign language learners can be highly negatively affected by the stress of classroom situations. There are some affective psychological variables like motivation, attitudes, self-confidence, and anxiety that possibly create or intensify difficulties in language learning. As Toyama and Yamazaki [40] concluded, FLA is seen as an affective filter in foreign language learning contexts.

A number of studies have been conducted on the implementation of the PBL approach in language learning classes and its possible effect on learners' engagement and willingness to communicate [41, 42, 43, 44, 45]. In addition to reporting a significant improvement in learners' oral communication, the above-mentioned studies reported a significantly higher engagement of students in the PBL classes compared to lecture-based ones. The researchers also noted that not only does PBL allow learners to be more willing to communicate when using the target language

verbally, but it also helps improve learners' oral communication ability. Since PBL triggers EFL learners' critical thinking, particularly when students explore the possible answers to the problem/scenario, it leads to more WTC [44].

As another variable considered in this study, self-efficacy has always been evaluated by researchers in the area of PBL. The PBL approach develops thinking and problem-solving skills and helps learners to become self-sufficient in their problem-solving tasks [46]. In other words, PBL provides the opportunity for students to achieve a cognitive skill, in general, and cultivates learners' sense of self-efficacy, in particular [8]. According to Dunlap [7], since PBL is a practice for real-life problem-solving activities, providing students with the possibility of obtaining the required skills and knowledge in their future profession, it considers students' self-efficacy fundamental for their performance. This concept is also reinforced by Maulidia et al. [47] and Risnawati et al. [48], believing that PBL improves learners' creative thinking and improves their self-efficacy. Learners' improved self-efficacy is due to the PBL nature, which provides students with a sense of responsibility for their own learning, an in-depth understanding of the materials, and the proximity of the application of PBL with their future needs and professional life. Indeed, PBL allows learners to be self-directed in their learning and makes them feel more self-efficacious concerning problem-solving activities [49]. Altogether, PBL provides students with a sense of autonomy and makes them responsible for their learning [34]. In conclusion, studies indicate that PBL is advantageous in refining learners' self-efficacy targeting students' learning and practicing social skills.

In terms of classroom anxiety, several studies have examined classroom speaking anxiety in the PBL context. As Toyama and Yamazaki [40] argued, since learners in PBL classes have more engagement while finding answers to the problem and working with the materials, they experience less speaking anxiety than students attending conventional classes. The PBL approach is helpful in minimizing learners' speaking anxiety [21]. The effectiveness of PBL on classroom anxiety was also reported by Babaee and Borji [50] in a writing course. They reported that not only did EFL learners' writing anxiety decrease in the PBL group, but the EFL learners also outperformed the control group in writing. Pinter [51] examined the effects of PBL instruction on math students' anxiety. The researcher concluded that PBL significantly reduces learners' classroom anxiety. However, Jatisunda et al. [20] reported that PBL negatively influences students' level of anxiety. They claimed that using PBL to offer problem-solving tasks provides students with mathematics anxiety, which prevents them from showing optimum performance in solving problems.

Since PBL is still in its trial and error stage in language teaching [5], not only can this approach provide us with valuable feedback regarding its effects in different contexts, but also investigating the effects of such an approach on learners' psychometric characteristics can best help the improvement of PBL in line with the developments in language learning contexts. This suggests that studying the positive or negative effects of PBL is only obliging when we consider the role of contexts and learners. It is what most of the studies mentioned above lack. These studies merely administered the same PBL methodology borrowed from other fields, e.g., medicine, engineering, etc., and practiced it in language teaching contexts to measure learners' affective filters while working with PBL. Although they have reported the positive effects of PBL on learners' psychometrics

variables, the gap remains untouched about employing a model of PBL developed and tuned for teaching a language in EFL contexts. To fill this gap, this study attempted to employ a model of PBL specific for language teaching classes to check its effect on the mentioned psychological variables.

Method

Participants
A public announcement was made for a free speaking course lasting for ten sessions, and 140 Iranian EFL learners registered for the course. The announcement was made through an English language institute in Zahedan, Iran. To prevent the possibility of language proficiency influencing the selected variables, only the applicants with pre-intermediate level of language proficiency were of interest. To determine the applicants' level of language proficiency, Oxford Placement Test (OPT) was administered. The target score range for the applicants to be included in the study was 120 to 135. Upon screening, 90 participants remained who were randomly assigned to three different classes (with 30 learners each): face-to-face PBL speaking class, online PBL speaking class, and a control group. The participants included both male and female learners with an age range of 21 to 39.

Instruments
The utilized instruments and materials for this research were as follows:

Placement Test
The OPT was used to determine the applicants' level of English proficiency. The main reasons for the selection of this test were availability and practicality. It is a 200-item multiple-choice test providing an exact yardstick through which English language proficiency level can be ascertained in relation to the Common European Framework of Reference (CEFR). The test is composed of two sections: (1) language use, and (2) listening. The first section is comprised of 100 multiple-choice items, focusing on knowledge of grammar and vocabulary. The response time for this section is 50 minutes. The second section, consisting in 100 multiple-choice items, is concerned with test takers' listening abilities. Since OPT is internationally renowned and has already been widely used in multiple studies for the same purpose, its validity was taken for granted. Its reliability coefficient was calculated via the KR-21 to be 0.85.

Web-based Platform
Zoom, a cloud-based online platform offering video conferencing services and online classes, was used to offer the online PBL class. This online teaching platform makes it possible to hold one-to-one and group meetings in an online environment. An invitation link was shared with the learners by the instructor. The participants could easily chat or talk with each other in the class. The rationale behind the usage of this platform was that it could provide the necessary environment to run a PBL language class, one in which collaboration between students could be realized.

The WTC Questionnaire
The WTC questionnaire [30] was used to measure learners' WTC. The questionnaire included 27 items that were categorized into four sections according to each of the language skills concerning the learners' feelings about communication with others in the classroom. In this scale, for each item, learners indicated their WTC through a five-level Likert-type scale which ranged from 1 (almost never willing) to 5 (almost always willing). Cronbach's alpha reliability indices for the pretest and post-test

of WTC were ($\alpha = 0.965$), and ($\alpha = 0.969$), respectively.

English Self-efficacy Questionnaire

The learners' self-efficacy was measured using Wang's questionnaire of English self-efficacy. The questionnaire included 32 items on a 7-point Likert-type scale which ranged from (not at all confident = 1) to (extremely confident = 7). This scale measures the English self-efficacy of EFL learners in all the four skills; it has seven items of listening, six items of speaking, six items of reading, and five items of writing. On this scale, higher scores mean higher levels of self-efficacy. The Cronbach's alpha reliability indices for the pretest and post-test of self-efficacy were ($\alpha = 0.924$) and ($\alpha = 0.971$), respectively. Their validity was based on the validity reported by Fahmi et al. [54] and Sutrisna and Artini [55]. To check the content validity of the questionnaire, it was submitted to two TEFL university professors as experts, and they confirmed its validity prior to administration.

The Foreign Language Classroom Anxiety Scale

The Foreign Language Classroom Anxiety Scale (FLCAS) [36] was administered for measuring students' level of anxiety. The questionnaire is composed of 33 statements that require students to rate themselves based on a 5-point Likert-type scale ranging from 1 (strongly agree) to 5 (strongly disagree). The reliability of the scale was estimated in the context of this study using Cronbach's alpha. The reliability indices were 0.961 for the pretest and 0.945 for the post-test of FLCAS.

Procedure

After the participants were selected and assigned to the treatment groups, the PBL model proposed by [5] was utilized to offer speaking lessons to students in the two experimental groups. In the first session, the learners were informed about the method of teaching. Due to the Coronavirus pandemic, it was not possible to run a face-to-face class with 30 EFL learners simultaneously. Therefore, the class was divided into two classes of 15 students, and each class was divided into 2 or 3-member groups. However, in the online class, all the 30 students could attend the class together; therefore, they were divided into six groups of five members.

A topic in the form of a problem was introduced to the class at the beginning of each session. The problem was presented in the form of a scenario. The scenario was introduced by the teacher reading and explaining it in the class. The teacher then asked the students to imagine themselves in a context introduced by the problem and think about possible solutions to the scenario. The teacher helped the students about how to create some related questions about the problem. Meanwhile, the students were also notified about the available helpful resources for answering the problem. Groups were asked to record a list of resources and vocabulary items they employed while working on the problem. Then, the groups were provided with time to compile their possible solutions. The allocated time for both face-to-face and online PBL classes was 40 minutes. The teacher questioned the students to rationalize their answers by asking themselves the question 'Why is this the possible solution to the problem?'

Next, the students used the target language to talk about their understandings. In the face-to-face PBL class, the teacher observed the students by walking around the class and providing comments, if necessary. The students were also allowed to ask for the teacher's help when required. In the online PBL class, a similar procedure was followed. When the students came up with their final solutions to the problem, each group was asked to share the

solution. For the online PBL class, when the time was over, all groups were closed and all the students were sent to the meeting room.

The students were asked to comment on the suggested solutions and offer their feedback. They were also asked to take notes regarding the feedback they received concerning their solutions. After applying the applicable feedback, the final solutions were presented. The students were asked to discuss the reasons for their (dis)agreements with the suggestions they received. At the end of the session, the students selected one or more solutions as the best one(s) with the help of the teacher.

In the control group, 30 participants were randomly assigned to speaking courses offered on the basis of Top Notch book series [52]. Since their proficiency level was pre-intermediate, Top Notch 1A textbook was used as the course material. In this group, no group assignments and no problems or scenarios were used. Lesson plans were developed for all the ten lessons to be taught. At the start of each lesson, the grammar and vocabulary points that students would study through the lesson were presented. This was to be complemented with the corresponding exercises in the workbook which students had to complete on their own. The new vocabulary items were written on the whiteboard, and the students were asked to provide English definitions and synonyms for the presented words. This took around 10-15 minutes; the teacher tried to encourage the students to participate more in the class by asking questions such as 'What does it mean?', 'What is the synonym for that word?', etc.

Next, the teacher engaged students' in Photo Story and short conversations. The students were asked to discuss their understanding of the conversation. Then, the students were asked to close their books and listen to the short conversations. In this stage, some questions were written on the board which the students were asked to answer. Using the presented speaking strategies, the students were asked to (dis)agree with the answers of other students. The same procedure was followed in the reading section of each lesson. Before each reading section, the unfamiliar words were worked on by asking students to review and scan the passage. The students were asked to speak about their understanding of the text. Then, the questions following each reading passage were answered. Throughout the class, the teacher provided corrective feedback on students' use of grammar and vocabulary. The class was concluded with the assignment of homework to students.

In the beginning and at the end of the course (after 10 sessions of instruction), an online version of each of the questionnaires was developed and presented to the participants in all the three groups. The collected data were analyzed using three separate one-way ANCOVA procedures to see if there were any significant differences among the online PBL, conventional PBL, and control groups in terms of their WTC, self-efficacy, and FLCAS.

Design
Problem-based learning was the independent variable and willingness to communicate, self-efficacy and classroom anxiety were the three dependent variables of the study. Almost all the conditions of true-experimental designs were met. However, although the assignment of each group of participants to different treatment conditions was done randomly, the initial selection of the participants was not done on a random basis. Therefore, the design of the study was quasi-experimental.

Results and Findings

The present study aimed at investigating the effects of face-to-face and online PBL on EFL

learners' psychological factors of willingness to communicate, self-efficacy, and classroom anxiety. To address each of these questions, a one-way Analysis of Covariance (ANCOVA) was used. Before using ANCOVA, its assumptions were checked, and there were no violations.

Results on WTC

The first research question compared online PBL, face-to-face PBL and conventional instruction groups in terms of EFL learners' WTC. Descriptive statistics for pre-and posttests of WTC are presented in Table 1.

Table 2 shows the main results of one-way ANCOVA. The results (F $_{(2, 86)}$ = 15.35, p < .01, partial eta squared = .263, representing a large effect size) indicated that there were significant differences between the three groups' means

on post-test of WTC after controlling for the effect of the pretest.

The significant results were followed by post-hoc comparison tests (Table 3) to compare the groups in pairs.

Based on these results, it can be concluded that:

A) The online PBL group significantly outperformed the face-to-face PBL group) on the post-test of WTC (p < .01).

B) The online PBL group (M = 86.96) significantly outperformed the control group on the post-test of WTC after controlling for the effect of the pretest (p < .01).

C) The face-to-face PBL group significantly outperformed the control group on the post-test of WTC (p < .01).

Table 1: Descriptive Statistics for Willingness to Communicate

Test	Group	N	PretestMean scores	Posttest Mean scores
Pretest	Online PBL	30	63.93	88.57
	Face-to-face PBL	30	64.37	77.20
	Control	30	57.03	59.17

Table 2: Tests of Between-Subjects Effects on WTC

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pretest	28402.725	1	28402.725	100.200	.000	.538
Group	8706.920	2	4353.460	15.358	.000	.263
Error	24377.608	86	283.461			
Total	571918.000	90				

Table 3: Post-hoc Comparisons on WTC

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Online	Face-to-face	11.690[*]	4.347	.026	1.075	22.304
	Control	24.259[*]	4.377	.000	13.570	34.947
Face-to-face	Control	12.569[*]	4.381	.016	1.871	23.267

*. The mean difference is significant at the .05 level.

Results on Self-efficacy

The second research question investigated the effects of online PBL, face-to-face PBL, and conventional instruction on self-efficacy. A one-way ANCOVA was used to address this question. Descriptive statistics are presented in Table 4.

As seen in Table 5, the online PBL group had the highest mean score on the post-test of self-efficacy. This was followed by the face-to-face PBL and control groups. One-way ANCOVA results ($F_{(2, 86)}$ = 37.64, p < .05, partial eta squared = .467, representing a large effect size) indicated significant differences among the three groups' mean scores on the post-test of self-efficacy.

Pairwise comparisons (Table 6) suggested that, the online PBL group significantly outperformed the face-to-face PBL group on the post-test of self-efficacy. Moreover, the online PBL group significantly outperformed the control group. Meanwhile, the face-to-face PBL group significantly outperformed the control group.

Results on Classroom Anxiety

The third research question explored the differences among the online PBL, face-to-face PBL, and conventional instruction groups in terms of classroom anxiety. A one-way ANCOVA was used to answer this question. Table 7 summarizes the descriptive statistics.

The main results of one-way ANCOVA (Table 8) suggested significant differences among the three groups' means on the post-test of classroom anxiety ($F_{(2, 86)}$ = 16.68, p < .01, partial eta squared = .280, representing a large effect size).

Post-hoc comparison tests (Table 9) indicated that all three comparisons resulted in significant paired differences with the control showing the highest level of classroom anxiety and the online PBL the lowest.

Table 4: Descriptive Statistics for Self-efficacy

Test	Group	N	Pretest Mean Scores	Posttest Mean Scores
Pretest	Online PBL	30	89.30	123.17
	Face-to-face PBL	30	80.83	86.93
	Control	30	81.10	70.53

Table 5: Tests of between-Subjects Effects on Self-efficacy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pretest	27409.449	1	27409.449	64.937	.000	.430
Group	31782.874	2	15891.437	37.649	.000	.467
Error	36300.051	86	422.094			
Total	894781.000	90				

Table 6: Post-Hoc Comparisons on Self-Efficacy

(I) Group	(J) Group	Mean Difference (I-J)	Sig.	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
Online	Face-to-face	29.456[*]	.000	16.342	42.570
	Control	46.070[*]	.000	32.965	59.174
Face-to-face	Control	16.613[*]	.007	3.661	29.566

Table 7: Descriptive Statistics on Classroom Speaking Anxiety

Test	Group	N	Pretest Mean Scores	Posttest Mean Scores
Pretest	Online PBL	30	92.07	70.43
	Face-to-face PBL	30	86.40	79.50
	Control	30	85.70	90.90

Table 8: Tests of between-Subjects Effects on Classroom Speaking Anxiety

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pretest	9443.395	1	9443.395	39.462	.000	.315
Group	7984.219	2	3992.110	16.682	.000	.280
Error	20580.172	86	239.304			
Total	616341.000	90				

Table 9: Post-hoc Comparisons on Classroom Speaking Anxiety

(I) Group	(J) Group	Mean Difference (I-J)	Sig.	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
Control	Online	23.207*	.000	13.397	33.018
	Face-to-face	11.701*	.013	1.948	21.455
Face-to-face	Online	11.506*	.016	1.707	21.305

Discussion

The present study sought to investigate the effects of the PBL approach on EFL learners' WTC, self-efficacy, and classroom speaking anxiety. It was found that the EFL learners who participated in online and conventional PBL groups showed a higher rate of engagement in the classes compared to the control group. The results of the WTC questionnaire showed that learners in the PBL groups were more willing to communicate in class. This finding seems to be in line with the works of Delialioğlu [41], Lin [42], Mandeville et al. [43], (Sellnow and Ahlfeldt [45], and Yaghoubi [44].

According to Delialioğlu [41], the high rate of learners' engagement in the PBL class is because of an active learning environment created by PBL. This statement is in line with the teacher's observation in this study indicating the active participation of the learners in PBL classes, especially for the online PBL group. Mandeville et al. [43] argue that students' high

rate of WTC is primarily due to the nature of PBL, which makes learners more interested in verbally communicating with others through the application of target objectives. More comparable to the present research is the study conducted by Lin [42], who observed the effectiveness of PBL in promoting learners' rate of engagement in the class.

The results of the present study in terms of the students' level of WTC also support the result reported by Yaghoubi [44]. He asserted that since the application of the PBL approach provides EFL learners with better critical thinking ability, it leads to the learners' higher level of engagement in the PBL classes. The higher rate of WTC originate from the learners' exploration and preparation of the possible answers to problems in PBL classes, particularly when solutions are supposed to be presented and discussed orally [45].

It was also found that the learners who participated in the two PBL classes were more self-efficacious than those in the control group.

The students' self-efficacy in the online PBL group exceeded that of both the face-to-face PBL and control groups. According to the findings, PBL creates a learning context where learners can develop their thinking and problem-solving skills. The implementation of PBL makes students ready to employ self-regulated skills. It provides the students with a sense of self-efficacy in applying cognitive skills when challenging the proposed problem/scenarios [8]. Generally, the results of the self-efficacy questionnaire in the present research are mostly in line with other similar studies [7, 34, 47, 48].

The learners' higher level of self-efficacy is possibly due to the sense of autonomy resulting from the application of PBL. Mataka and Kowalske [34] concluded that the learners who attended PBL classes showed a higher level of self-efficacy, not just because they experienced learning by themselves but also because PBL made them more responsible for their learning and, as a result, autonomous learners. As discussed previously, the students in the online PBL group were more self-efficacious than those in the face-to-face PBL group. This result reinforces the findings of Alfares [53], who reported that the application of PBL accompanied by online learning platforms significantly affects learners' problem-solving self-efficacy. Online PBL classes benefit learners' learning and improve their social skills. On the other hand, although different researchers have reported the effectiveness of the PBL approach on students' self-efficacy, Fesharaki et al. [54] claimed that any level of gained self-efficacy could possibly be due to the effective nature of education, not the employed methods such as PBL.

It was also revealed that PBL increased students' level of self-efficacy. This is possibly due to the fact that PBL creates situations similar to real-life contexts where students obtain the required skills and knowledge that they need in their target situations [7]. Accordingly, PBL helps learners keep their learning aligned with their learning objectives. Risnawati et al. [48] hold that students' high level of self-efficacy in PBL classes is because PBL provides learners with creative thinking ability and a higher sense of self-efficacy. Additionally, Quang et al. [33] argue that the increased level of self-efficacy is due to the nature of PBL, which maximizes learners' sense of responsibility for their learning about what to learn and why to learn; this is directly influenced by their future needs and professional life.

As Maulidia et al. [47] pointed out, there is a direct relationship between students' self-efficacy and their creativity. This observation is also corroborated by the results of the present study. One of the researchers of this study who was in charge of offering the PBL classes, according to his observation, reported a considerable level of creativity shown by the learners in the PBL classes. The teacher believed that learners in both online and face-to-face PBL classes followed the teacher's instructions to use the resources to find the possible solution to the scenarios. They also attempted other new ways and resources as they asked for the teacher's confirmation of the usefulness of the recommended alternatives. It could be argued that learners in the PBL groups, more noticeably in the online PBL group, applied their own creativity and confidence in solving the scenarios as a result of the higher level of self-efficacy compared with the control group.

The findings of the present study also showed that the implementation of PBL could positively influence learners' classroom anxiety. According to the results, learners in the control group had the highest level of classroom anxiety. Learners in the online PBL group had the lowest classroom anxiety level compared to

the face-to-face PBL and the control group. This improvement in the level of students' anxiety is in line with other similar studies [21, 50]. (Fahmi et al. [55] believe that since learners in PBL are provided with more in-group or in-person engagement to find possible answers to problems/scenarios, they experience less speaking and classroom anxiety. This claim is possibly due to the fact that students' collaboration, particularly their in-group discussion, provides them with a better readiness when they want to talk in public or in a class. Therefore, measures must be taken to minimize speaking and classroom anxiety. (Sutrisna and Artini [56] state that PBL instruction is beneficial to classroom anxiety reduction, and as a result, it helps learners to experience less anxiety in their speaking even out of the classroom. It is also believed that students in PBL classes directly and practically learn their needs in the prospective target situations [50]. This approach helps students to become more self-confident and confront target situations with a lower level of anxiety. In fact, learners attending PBL courses experience a lower level of anxiety and feel more self-efficacious.

Although the effectiveness of PBL instruction on reducing the level of anxiety was shown in this study and other studies mentioned earlier, (Jatisunda et al. [20] reported a different result. They argued that the PBL approach has no effects on decreasing students' level of classroom anxiety. They even claimed that the PBL problems/scenarios could increase students' level of anxiety. This means that learners attending PBL classes might find problems confusing and challenging.

Conclusions

The findings of the present study suggest that the PBL approach efficiently motivates learners to communicate and interact within the classroom context. The high level of willingness to communicate shown by the learners in the online PBL group rationalized the effectiveness of both PBL as a teaching approach and the online form of teaching as a medium of instruction. It should be noted that although the highest level of WTC was observed in the online PBL class, the students in the conventional PBL group also outperformed those in the control group. EFL learners' WTC in the PBL groups showed learners' active participation. It is, therefore, concluded that the PBL approach leads to the active involvement of EFL students, which seems necessary for optimal learning. Therefore, employing the PBL approach both encourages learners' interaction within the context of the class and empowers them to practice the target language outside of the classroom context, by triggering the learners' WTC.

It was also realized that in both online and conventional PBL classes, students showed a significant level of self-efficacy compared to the control group. This means that PBL provided EFL learners with more engagement based on the group activities which were accompanied by more collaborative features when they participated in online PBL groups. Therefore, learners in the online and conventional PBL groups felt more self-determining and responsible for their learning as a result of feeling more comfortable in the learning environment. Accordingly, it can be concluded that the application of the PBL approach improves learners' self-efficacy.

EFL learners in the online and conventional PBL groups showed a lower level of classroom speaking anxiety compared to the ones in the control group. In other words, they were not afraid of talking in class, especially when discussing their solutions in the group or with the class. Hence, it can be concluded that PBL helps EFL learners feel less anxious about

speaking with others by practicing the target language. This seems to be due to the experiential aspect of PBL, when learners explore the solutions to the problem/scenario and discuss them with others, that forms an environment with a minimized classroom speaking anxiety. The lowest level of anxiety felt by the learners in the online PBL group is also indicative of the effectiveness of the PBL when offered online.

The findings of this study can deepen language instructors' insights with regard to the ideal environments for increasing students' communicative skills by reproducing an authentic scenario/problem for students to deal with collaboratively. The knowledge of how PBL affects EFL learners' anxiety, self-efficacy and WTC can help teachers to resist the temptation to abandon using PBL because of its practical challenges. In addition, the findings of this study can encourage EFL students to more open and accepting towards PBL because they will realize that, despite the challenge of having to move away from the security of doing their routines, the method will eventually improve their learning by reducing their anxiety and boosting their self-efficacy and WTC. The findings can even have implications for materials developers; they can design materials that involve problem solving, and by so doing push both teachers and learners out of their routines and encourage them to engage with problem solving activities.

However, the implementation of the PBL approach is not without its limitations. Given the fact that PBL is a relative newcomer in the field, training language instructors qualified in the implementation of PBL is of great necessity. Nonetheless, one of the limiting factors in the process of the present study was that it was conducted during the Covid-19 pandemic. As a result, gathering the participants for the placement tests and running the face-to-face

PBL classes had to be done with the utmost protective measures. The participants of the present research were delimited to the EFL learners who voluntarily attended private English language institutes in Zahedan, Iran. The implementation of PBL was delimited particularly to the psychological factors including WTC, self-efficacy, and FLCAS; therefore, the results should not be generalized to other affective factors.

Further studies need to address how the PBL approach conceivably impacts the psychometric factors touching learners' rate of learning. Given the vital role of online platforms in offering online PBL classes, exploring the possible influential factors when using online or web-based platforms seems necessary for checking which platforms both influence learners' psychological expectations and best fit into the framework of PBL in language teaching and learning. Moreover, investigating the effects of the PBL approach on other affective factors such as motivation, self-esteem, etc. accompanied by other language skills i.e., writing, reading, and listening are areas worth delving into.

Conflicts of Interest

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