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Research Paper

Problem-Based Learning Affecting Features of Speaking Proficiency

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Abstract

The present experimental research was designed to explore the impact of a problem-based learning (PBL) methodology on EFL learners' speaking proficiency and its features of communicative success, pronunciation, grammatical accuracy, and lexical choice. Ninety preintermediate EFL learners were randomly distributed into 3 distinct groups: an online PBL group, a face-to-face PBL group, and a control group. The 2 experimental groups received instruction based on PBL (one conventional and one online PBL). They were offered speaking lessons according to the model of PBL introduced by Ansarian and Lin (2018) during 10 sessions. The control group was taught using the current conventions without any problem-based activities. Pre and posttests of speaking proficiency were administered at the beginning and at the end of the course. Data underwent analysis through ANCOVA. Findings showed that whereas the 2 forms of PBL significantly and positively affected the EFL learners' speaking proficiency, pronunciation, and grammatical accuracy, online PBL was significantly more effective than conventional PBL. Results also showed that the online PBL group performed significantly better than both the conventional PBL and the control groups in communicative success and lexical choice, whereas the difference between the latter 2 groups was insignificant. Findings can have pedagogical implications for English language teachers, especially for those who teach speaking skills and wish to implement PBL in language teaching classes, following a model of PBL exclusively for EFL classes.

Keywords: Communicative Success; Grammatical Accuracy; Lexical Choice; Problem-based Learning (PBL); Pronunciation; Speaking Proficiency.

1. Introduction

As one of the latest trends in the field of learning and teaching, problem-based learning (PBL) has attracted the attention of scholars from different fields of study including medicine (e.g., Shamsan & Syed, 2009), engineering (Dahms et al., 2016), and, to a lesser extent, English language teaching (Ali, 2019; Ansarian & Lin, 2018). PBL benefits from higher-order cognitive skills in the process of learning and provides learners with the opportunity to have ideal participation in the learning process. Ideal learning occurs when preceded by a problem that requires learners to have higher-order thinking engagement (Weiss, 2003). Moreover, the PBL approach provides an ideal context for a student-centered methodology (Tan, 2003; Uyeda et al., 2002; Woods, 1996). This approach benefits from collaboration since learners should collaborate in groups to construct the necessary knowledge to solve a problem. It is a learner-centered educational method characterized by self-directed learning and teamwork skills (Rotgans & Schmidt, 2011).

Generally, in the PBL approach, learning is initiated by a given problem rather than exposing students to conventional face-to-face information sharing in a class. Woods et al.'s (1996) definition of PBL postulates that PBL is when students in a group are given a problem to solve, and they mostly rely on checking their previous knowledge, finding the gap in their knowledge, and managing themselves through learning collaboratively, that is, every student goes about



finding and understanding the required points, then getting back to the group and sharing with others; after solving the problem, students provide feedback and reflect on the knowledge.

However, representing PBL in this way offers confusion in distinguishing PBL from project-based learning because both are usually abbreviated as PBL. Larmer (2014) distinguishes between the two pedagogies of problem-based and project-based learning. Accordingly, he provides a clear-cut description of the two, claiming that in PBL, the results and educational objectives are ongoingly shared with the teacher, whereas the goals are set in advance in project-based learning. These two concepts also differ in their length, in which project-based learning is supposed to be longer due to its interdisciplinary nature; in contrast, PBL is expected to be only focused on one subject and is, therefore, shorter. Project-based learning follows general steps, but PBL specifies required steps. Unlike project-based learning, PBL seems to be less related to authentic and real-world problems since it follows scenarios and cases.

Taking the role of a facilitator whose main effort is to help students go through the problems and activities by themselves, the teacher no longer occupies the central role in the learning context. That is, the teacher is never an information provider. The teacher, first, offers appropriate problems to the students and then aids them in realizing the required information and materials for solving the problem and providing them with the necessary feedback during the process of dealing with the problem and assessing the final product of the students. It is also emphasized that, since PBL enriches the problem-solving skills of learners, it is effective when working with self-directed problems that require higher cognitive loads, provided that it is a well-designed PBL (Nilson, 2010).

Research on the application of PBL, as a newcomer to the area of language teaching and learning, is still in its infancy in EFL contexts (Ansarian & Lin, 2018). Part of this paucity of empirical data on the subject can be explained by the nuances and difficulties involved in the proper implementation of the method (Ansarian & Lin, 2018). Despite the studies conducted examining the effect of PBL on language learning and the four skills, many second and foreign language learning areas have remained intact.

Previous research is mainly indicative of learners' dissatisfaction with the current ways of developing speaking skills (Boonkit, 2010; Cong-Lem, 2018; Iwashita et al., 2008; Thornbury, 2005). They believe that despite the attempts that they make, the results usually fall short of expectations. Learners' disappointment in the optimum learning of a foreign or second language has largely revolved around productive skills (Golkova & Hubackova, 2014; Payne, 2020; Roquet & Pérez-Vidal, 2015). As one of the productive skills, speaking has been a yardstick for the effectiveness of instruction. Because a proficient user of a language is considered an individual who can use the language in various contexts easily, EFL learners' speaking proficiency is believed to be an indicator of mastery in English.

Ansarian and Lin (2018) argued that one of the most burning areas calling for further research is the implementation of PBL for enhancing speaking proficiency, in general, and the features of speaking, in particular. They introduced some of the most relevant features of speaking skills including (1) communicative success, (2) pronunciation, (3) grammatical accuracy, and (4) lexical choice. Altogether, the four categories can determine the level of a testee's speaking proficiency, which is one of the variables investigated in this study. Cummins (2000) considered speaking proficiency as learners' knowledge of the language due to their performance and the actual use of language in specific contexts. Communicative success refers to the listener's ability to realize what the speaker intended to convey (Bosco et al., 2006). Grice (1989) defines successful communication as when the interlocutor can realize the meaning intended by the speaker. Similarly, Gholami et al. (2021) point out that grammatical rules can become pointless without rules of language use. In the present study, communicative success was evaluated by employing the IELTS speaking test rubric under the subsets of fluency and coherence. The third variable of the present study, pronunciation, is defined as the phonological features of speech production and how it is seen and comprehended by the hearer (Burgess & Spencer, 2000). Pronunciation, in this study, was measured using the IELTS speaking rubric. Another important feature of speaking is grammatical accuracy. It is defined as not committing types of grammatical errors, for example, the use of articles, prepositions, verb tenses, and so on (Brown et al., 2005; Hashemian & Farhang-Ju, 2018). In the present study, grammatical accuracy was measured as grammatical range and accuracy presented as a subset of the IELTS speaking test rubric. Lastly, lexical choice has to do with the how and what of the vocabulary that learners of a language can choose to use in a particular context to make communication and transfer of meaning possible (Weigand, 1998). The rubric used for assessing the lexical choice of EFL learners in this study was the IELTS speaking test rubric, which presents lexical choice under the title of lexical resources.

Bearing this in mind, and considering the effectiveness of PBL in language teaching and the relative scarcity of research examining the effects of PBL on features of speaking, it may be fair to assume that any study carried out in this area can make a significant contribution to extending the existing understanding of the topic and is, therefore, worth doing.

Given that students are mostly in charge of providing what they need to solve a problem and spend their time collaborating and communicating their solutions, they are provided with the opportunity to verbally practice the target language, especially when the focus is on the speaking skill. The present research considered the role of PBL as an important way of improving the speaking skills of EFL learners. The central aim of this study was to investigate the effectiveness of the PBL approach on Iranian preintermediate EFL learners' speaking proficiency. It also sought to examine the effect of PBL instruction on the features of speaking proficiency such as communicative success, pronunciation, grammatical accuracy, and lexical choice.

2. Literature Review

Previous studies have tried to evaluate PBL as a new approach in language teaching. Berenji et al. (2020) and Lin (2017) reported both the positive effects of PBL on reading comprehension and learners' high degree of positive attitude toward the approach. In terms of writing skills, Kumar and Refaei (2017) and Othman and Shah (2013) reported a significant improvement of the learners' writing skills due to PBL, specifically in providing supportive and argumentative techniques for writing. Furthermore, Lin et al. (2019) stated that PBL significantly improved the listening skills of EFL learners. However, recent publications on the topic in top-tier journals are scant. In what follows, relevant studies on the variables of the present research are reviewed.

The effectiveness of the PBL approach in improving learners' speaking skills in ESL and EFL classes has been reported by some researchers (Ansarian et al., 2016; Aryanti & Artini, 2017; Azman & Shin, 2012; Kassem, 2018; Keong & Mohammed, 2015; Montafej et al., 2021; Prancisca, 2016; Sutrisna & Artini, 2020). These researchers stated that the PBL approach provided the language learners with more active participation and a high rate of concentration on the problem and feeling more confident when speaking in the target language. They ascribed the usefulness of the PBL on speaking proficiency to developing and administrating contextualized materials based on PBL, which enables students to sustain operative communication when discussing real-life problems and to provide possible solutions when working in groups. They also reported that the learners had a positive attitude toward the PBL-related activities, such as discussing the problem, sharing ideas, and cooperating in solving the problem. However, some research has reported no significant effects of PBL instruction compared with the conventional method of instruction on the learners' productive skills, especially speaking (Puspitasari, 2019).

Making learners able to communicate effectively has been investigated through the implementation of the PBL approach. For example, Farmer and Wilkinson (2018) investigated the effects of PBL on learners' communicative competence. They argue that PBL maximizes learners' communicative competence, and students practically acquire communicative competence in the PBL approach because they must collaborate in groups to analyze ill-structured problems and find possible solutions. The role of PBL instruction on learners' communication skills, evaluated by Setyawana et al. (2021), also suggested that implementing the PBL instruction in the Lesson Study (LS) provided the learners with better communication skills. Because LS is a collaborative approach and because the PBL instruction similarly benefits from the collaborative aspect of learning, incorporating LS with the PBL principles develops learners' communication skills. Such effectiveness is enforced by the works of Farmer and Wilkinson (2018), Salari et al. (2021), and Ustün (2006), discussing that the students in the PBL courses improved their self and in-group communication and purposeful communication skills. They reported that the PBL approach is advantageous for developing learners' research skills, appropriately choosing equipment and techniques, designing and conducting an experiment, analyzing the results related to real-life situations, communicating the results in an appropriate technical voice, and working collaboratively. Similarly, Humalda and Zwaal (2016) argue that students attending the PBL language learning courses significantly develop collaboration and language learning skills.

Studies conducted in EFL and ESL contexts have sporadically been focused on investigating the effects of PBL instruction on learners' speaking skills. These studies have focused on students' pronunciation ability as a subfeature of their speaking skills. Baresh et al. (2019) suggest that the PBL approach, more specifically the hybrid problem-based

learning (HPBL) instruction, effectively improves EFL learners' speaking performance in terms of their vocabulary, grammar, pronunciation, and intonation skills, level of speaking confidence, and fluency. This effectiveness is also reinforced by Puspitasari (2019), proposing that the PBL approach improves learners' pronunciation skills. The employment of the PBL approach to improve EFL learners' writing and speaking skills and their self-efficacy was also examined by Fahmi et al. (2021), who evaluated pronunciation as one of the subfeatures of speaking assessing the students' speaking skill. It was reported that the learners in the PBL groups significantly outperformed the control group in some subfeatures of speaking such as pronunciation and intonation skills.

PBL has also been considered for its effectiveness in the learning and teaching of grammar. Haryudin and Syahrizal (2018) and Pohan (2019) investigated the usefulness of PBL in teaching grammar and reported significantly improved English language grammar of EFL learners. They also argued that the collaborative and cooperative nature of PBL makes it advantageous for language pedagogy. Similarly, the effects of a problem-based approach on EFL learners' grammatical competence were investigated by Zuhriyah (2017), reporting a significant improvement in learners' grammar competence. Other studies have also approved the effectiveness of the PBL approach in teaching the grammatical structures of a language (Chiou, 2019; Hairuddin et al., 2018).

PBL has also been thought-provoking for researchers in the field of vocabulary learning. A significant improvement in learners' vocabulary knowledge in a course based on the PBL approach was reported by Mohammadi (2017). Similarly, Chai and Swanto (2020) also reported a significant improvement in ESL learners' vocabulary knowledge due to the implementation of the PBL. The effectiveness of PBL in teaching vocabulary is also suggested by EhsaniFard and Vakili (2018). One of the most distinguished works conducted on the topic is that of Lin (2015), who implemented the PBL approach for teaching vocabulary following a PBL model and reported the learners' improvements in the use of vocabulary in writing tasks even with the use of the words that were not among the vocabulary list defined for the course.

PBL can help provide an appropriate context where students are actively engaged with the target language (Boothe & Caspary, 2017). Employing PBL methodology in EFL classes facilitates the creation of a collaborative context in which EFL learners can learn and practice the language in different ways as it is related to real-life needs. It seems that in language teaching classes where learners learn and utilize EFL only in the context of the class, and it infrequently happens that Iranian EFL learners employ the English language in their daily routine, measures should be taken for changing the current state of English language classes to a more collaborative one. It appears to be rational that if we can shift our present static competitive EFL context to a dynamic and active learning setting, learners will be more adapted to face the target language needs in context. Therefore, the real problem that this study addressed is the lack of suitable situations where EFL learners can interact and have oral interactions efficiently using the language in the classroom. Despite the effectiveness of the PBL approach (Astuti, 2017; Azer, 2004; Babae & Borji, 2017; Husin, 2007; Syarafina et al., 2018), less attention has been paid to the administration of the PBL in ESL and EFL contexts compared to other subject matters. The abovementioned studies are mostly about the application of the PBL approach in other disciplines. Given the limited focus on measuring the effects of the PBL approach on speaking skills, the objective of this study was to assess the effect of PBL on speaking proficiency and some of its features. Accordingly, the questions of the present study are listed as follows:

1. Are there any significant differences among the effects of online PBL, face-to-face PBL, and conventional instruction on the speaking proficiency of EFL learners?
2. Are there any significant differences among the effects of online PBL, face-to-face PBL, and conventional instruction on the communicative success of EFL learners?
3. Are there any significant differences among the effects of online PBL, face-to-face PBL, and conventional instruction on the pronunciation of EFL learners?
4. Are there any significant differences among the effects of online PBL, face-to-face PBL, and conventional instruction on the grammatical accuracy of EFL learners?
5. Are there any significant differences among the effects of online PBL, face-to-face PBL, and conventional instruction on the lexical choice of EFL learners?

3. Methodology

3.1. Participants

Participant selection, employing a convenience sampling method, involved recruiting 140 EFL learners enrolled in a speaking course. The recruitment was based on a public announcement offering a free 10-session speaking course at an English language institute in Zahedan, Iran. A total of 140 language learners, 97 females, and 43 males, registered for the course. Because the language proficiency of the participants could influence their performance on the target variables, it was important to select only those who were homogeneous regarding their general language proficiency. Therefore, instead of including all the available participants, only those who met the criterion of proficiency level were included. The participants' language proficiency level was roughly evaluated as preintermediate. Therefore, the Oxford Placement Test (OPT) was administered to make the participants homogenous for the study. Those students who met the preintermediate score range as defined by OPT, that is, 120 to 135, were selected for the study. The total number of the participants was 90 students who were randomly assigned into three classes: (1) a face-to-face PBL class, (2) an online PBL class, and (3) a control group. Each group consisted of 30 students. Although age was not a variable in this research, the participants' ages ranged from 17 to 26 years ($M = 20.67$, $SD = 2.538$).

Two raters scored the speaking of the participants. One of them was a certified IELTS examiner, a TEFL M.A. holder, with 14 years of experience in teaching English. The other one was an English language teacher, a TEFL Ph.D. candidate with 15 years of teaching experience who was also a university instructor. The first rater knew the procedure and objectives of the IELTS speaking test rubric; he was only informed about the aim of the study and the scaling. The second rater was given clear instructions about the objectives of the study and the IELTS Speaking test scoring rubric.

3.2. Instrumentation

To explore the research questions, the following methods were employed:

3.2.1. Placement Test

OPT was administered to determine the participants' English language proficiency level. As claimed by Allan (2004), OPT provides a precise assessment of English language proficiency aligned with the Common European Framework of Reference (CEFR). The test consisted of two sections: (1) use of English and (2) listening. The first section, including 100 multiple-choice items, assessed the learners' grammar and vocabulary knowledge. The second section included 100 multiple-choice items and evaluated the students' general listening ability. The reliability coefficient of OPT was checked through the KR-21 for the present study, and the result was (0.85).

3.2.2. Pretest and Posttest of Speaking

A pretest and a posttest of speaking were administered individually to all the groups. The test was taken from the IELTS exam speaking tests. The test rubric offered officially by IELTS contains features of speaking such as fluency and coherence, lexical resource, pronunciation, grammatical range, and accuracy. Each speaking test took about 15 min and consisted of three parts. The first section was dedicated to the general questions about the test takers and lasted from 4 to 5 min. The students were expected to answer a range of questions related to familiar topics such as family, home, and so on. In the second part, a task card was given to the test takers. They had 1 min to review the task and prepare themselves to talk about it in 2 min. In section 3 of the test, which took about 5 min, the test takers were asked some further questions related to the topic of the second section. This section aimed to assess the ability of the test-takers to discuss abstract ideas and issues. The reliability and validity of the test were checked in the context of this study. The interrater reliability index for the IELTS speaking tests was (0.87) for the pretest and (0.95) for the posttest. To check the content validity of the test, prior to the implementation, the pretest and posttest were both reviewed by two university professors specializing in TEFL.

3.3. Data Collection Procedure

Having selected the participants, a pretest of speaking proficiency was administered individually to the students in each of the three groups. This test was taken from IELTS and was administered according to IELTS speaking test rubric, which included the speaking assessment criteria consisting of all the five features of speaking assessed in the present study. This rubric includes four categories of (1) fluency and coherence, (2) lexical choice, (3) grammatical range

and accuracy, and (4) pronunciation. The overall score obtained from the four categories can determine the level of a testee's speaking proficiency. These features of speaking are measured equally in the IELTS speaking test. Their overall score defines the speaking section score of the candidate out of the maximum score of 9. Therefore, the maximum possible score in the speaking section of IELTS is 36. Because we used only the speaking section, we changed the scale of each feature to a maximum of 5 so that the overall score for speaking proficiency could be 20. This was done only as a matter of convenience to assign a score that was more compatible with the educational system of Iran and, therefore, more easily interpretable. Each speaking test took about 15 min and consisted of three parts.

After the pretest, the two experimental groups received instruction based on conventional PBL and online PBL. They were offered speaking lessons according to the model of PBL introduced by Ansarian and Lin (2018) during 10 sessions. One of the present study researchers was in charge of offering classes for the two PBL classes and the control group. In every session, a well-designed ill-structured problem, in the form of a scenario, was offered to the students. The students were informed about how to find the possible solutions to the problem. The class was divided into five groups of 6 students who worked on the problem together. The instructor facilitated students by guiding them in the formulation of pertinent questions pertaining to the identified problem. The students were also informed of the available supportive resources to assist in solving the problem, for example about how to locate necessary information in available resources. The groups were tasked with documenting the resources and vocabulary terms utilized during their work on the problem. After finding the solution to the problem, each group was asked to offer the final solution. Then, the discussion took place among all the students of the class to give their feedback about the solutions. The online PBL class was delivered through Zoom, a cloud-based platform providing video conferencing and virtual classroom services. This Web-based platform makes one-on-one and group meetings easily possible. Zoom platform has also been offered in Zoom Outlook plugin and Zoom browser extensions, especially for users attending an online class. The instructor, as the host, was able to invite the students to the class by sharing an invitation link. The participants could easily be managed by the host to chat or to talk with each other. Because of the nature of the PBL classes, this platform, which is designed to offer a collaborative online environment, was used in the present study. On the other hand, the control group was taught using a conventional method. This group received a speaking course based on the course book offered by the *Top Notch* books series. *Top Notch 1A* textbook, for preintermediate learners, was used as the course material in the control group. The control group did not engage in group assignments, and no problems or scenarios were incorporated into their instructional sessions. The teacher in the control group taught the abovementioned textbook with the main focus on speaking skills.

At the end of the course, all the learners in the three groups took the IELTS speaking test. The collected data were analyzed using five separate one-way ANCOVA procedures through SPSS to see if there were any significant differences among the three groups after controlling for the preexisting differences.

4. Results

This study was undertaken to investigate the effects of online PBL, face-to-face PBL, and conventional instructions on the improvement of speaking proficiency and its features of communicative success, pronunciation, grammatical accuracy, and lexical choice.

4.1. Assumptions

Prior to employing ANCOVA, a thorough examination of the assumptions for each of the five questions was conducted. These encompassed ensuring the absence of treatment effects on covariate measurement, assessing covariate reliability, verifying the absence of significant correlations among covariates, confirming a linear relationship between the dependent variable and covariate, and establishing homogeneity of regression slopes (Pallant, 2016). Given that the covariates were assessed before the implementation of the treatment, any potential influence from the treatment on these covariates was precluded. Additionally, each ANCOVA analysis incorporated only a single covariate. Hence, the assumption of correlation among covariates was not pertinent in this context. Scatter graphs were examined to ascertain that the association between the dependent variable and covariate did not exhibit a curvilinear pattern in each question. The assumption of homogeneity of regression slopes was verified by testing the interaction between the independent variable and the covariate across all research questions, yielding nonsignificant statistical results.

4.2. Results for Speaking Proficiency

The first research question aimed to investigate potential significant distinctions in the impact on the speaking proficiency of the EFL learners when exposed to online PBL, face-to-face PBL, and conventional instructional methods. Table 1 displays the descriptive statistics:

Table 1. *Descriptive Statistics of Speaking Proficiency Scores on Pretest and Posttest*

Test	Group	N	Mean	SD	SEM
Pretest	Online PBL	30	9.475	2.73810	.499
	Face-to-Face PBL	30	9.675	2.437	.444
	Control	30	9.900	1.995	.364
Posttest	Online PBL	30	12.805	2.14525	.391
	Face-to-Face PBL	30	10.813	2.110	.385
	Control	30	10.156	1.570	.286

Table 1 shows that the mean score of speaking proficiency in the online PBL group ($M = 9.47$, $SD = 2.74$), face-to-face PBL group ($M = 9.67$, $SD = 2.43$), and control group ($M = 9.90$, $SD = 1.99$) are not far from each other on the pretest; nonetheless, the mean score of speaking proficiency in the online PBL group ($M = 12.80$, $SD = 2.14$) is much higher than the mean of both face-to-face PBL group ($M = 10.81$, $SD = 2.11$) and the control group ($M = 10.16$, $SD = 1.57$) on the posttest.

Table 2 summarizes the results of the ANCOVA. After adjusting for the speaking proficiency scores on the pretest, there was a significant difference among the speaking proficiency mean scores of the three groups on the posttest ($F_{(2, 86)} = 57.21$, $p < .005$, partial eta squared = .57). Therefore, it can be claimed that online PBL, face-to-face PBL and conventional instruction have differential effects on EFL learners' speaking proficiency:

Table 2. *Tests of Between-Subjects Effects on Speaking Proficiency*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	345.240a	3	115.080	95.604	.000	.769	
Intercept	112.954	1	112.954	93.838	.000	.522	
Pretest	230.680	1	230.680	191.639	.000	.690	
Group	137.739	2	68.870	57.214	.000	.571	
Error	103.520	86	1.204				
Total	11855.140	90					
Corrected Total	448.760	89					

As it is evident from Table 2, after adjusting for the speaking proficiency scores on the pretest, there were significant differences among the speaking proficiency mean scores of the three groups on the posttest ($F_{(1, 86)} = 191.64$, $p < .005$, partial eta squared = .69) with a strong effect size. To locate the significant differences among the three groups, pairwise comparisons were made. As seen in Table 3, pairwise comparison results yielded a statistically significant difference) between the online PBL and face-to-face PBL groups, with a mean difference of 2.13 in favor of the online PBL group:

Table 3. *Pairwise Comparisons for Speaking Proficiency Scores*

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Online PBL	Face-to-Face PBL	2.135*	.283	.000
	Control	2.939*	.284	.000
Face-to-Face PBL	Control	.804*	.283	.007

Similarly, the results showed a statistically significant difference in speaking proficiency means between the online PBL group and the control group, with a mean difference of 2.94 in favor of the online PBL group. Likewise, a statistically significant difference was seen between the face-to-face PBL group and the control group, with a mean difference of .80 in favor of the face-to-face PBL group.

4.3. Results for Communicative Success

The second research question was formulated to ascertain if there are any significant differences among the effects of online PBL, face-to-face PBL, and conventional instruction on the communicative success of the EFL learners. Analysis of covariance was used to address this question. Preexisting disparities between the groups are accounted for by treating the pretest scores as a covariate. Table 4 presents the descriptive statistical data:

Table 4. *Descriptive Statistics of Communicative Success Scores on Pretest and Posttest*

Test	Group	N	Mean	SD	SEM
Pretest	Online PBL	30	2.615	.727	.132
	Face-to-Face PBL	30	2.631	.621	.113
	Control	30	2.642	.645	.117
Posttest	Online PBL	30	3.416	.641	.117
	Face-to-Face PBL	30	2.841	.558	.102
	Control	30	2.700	.550	.100

As seen in Table 4, the mean score of communicative success in the online PBL group ($M = 2.61$, $SD = .73$), the face-to-face PBL group ($M = 2.63$, $SD = .62$), and the control group ($M = 2.64$, $SD = .64$) are close to each other on the pretest; however, on the posttest, the mean score of communicative success in the online PBL group ($M = 3.42$, $SD = .64$) is notably higher than that of both face-to-face PBL group ($M = 2.84$, $SD = .56$) and control group ($M = 2.70$, $SD = .55$).

According to Table 5, after adjusting for the communicative success scores on the pretest, a statistically significant difference was observed among the communicative success mean scores of the three groups on the posttest ($F_{(2, 86)} = 35.72$, $p < .005$, partial eta squared = .45). Therefore, online PBL, face-to-face PBL, and conventional instruction have differential effects on EFL communicative success. Table 5 indicates that after adjusting for the communicative success scores on the pretest, there were significant differences among the communicative success mean scores of the three groups on the posttest ($F_{(1, 86)} = 153.12$, $p < .005$, partial eta squared = .64) with a large effect size:

Table 5. *Tests of Between-Subjects Effects on Communicative Success*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	27.711	3	9.237	74.176	.000	.721	
Intercept	6.891	1	6.891	55.339	.000	.392	
Pretest	19.068	1	19.068	153.122	.000	.640	
Group	8.896	2	4.448	35.719	.000	.454	
Error	10.709	86	.125				
Total	840.938	90					
Corrected Total	38.420	89					

Pairwise comparisons were made to explore the possible significant differences among the mean scores of communicative success of the three groups. Pairwise comparisons (see Table 6) showed the mean score of the online PBL group was significantly higher than that of both face-to-face PBL and control groups:

Table 6. *Pairwise Comparisons for Communicative Success Scores*

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Online PBL	Face-to-Face PBL	.581*	.091	.000
	Control	.728*	.091	.000
Face-to-Face PBL	Control	.148	.091	.109

*The mean difference is significant at the 0.05 level.

4.4. Result for Pronunciation

The purpose of the third research question was to see if there were any significant differences among the effects of online PBL, face-to-face PBL, and face-to-face instruction on the pronunciation of the EFL learners. To investigate this research question, another ANCOVA was used. Descriptive statistics are summarized in Table 7:

Table 7. Descriptive Statistics of Pronunciation Scores on Pretest and Posttest

Test	Group	N	Mean	SD	SEM
Pretest	Online PBL	30	2.333	.720	.131
	Face-to-Face PBL	30	2.483	.572	.104
	Control	30	2.383	.485	.088
Posttest	Online PBL	30	3.183	.575	.105
	Face-to-Face PBL	30	2.733	.552	.100
	Control	30	2.416	.432	.078

Table 7 confirms that the mean scores of pronunciation in the online PBL group ($M = 2.33, SD = .72$), the face-to-face PBL group ($M = 2.48, SD = .57$), and the control group ($M = 2.38, SD = .48$) are not far from each other on the pretest; nonetheless, the mean score of pronunciation in the online PBL group ($M = 3.18, SD = .57$) is much higher than the that of both face-to-face PBL group ($M = 2.73, SD = .55$) and control group ($M = 2.42, SD = .43$) on the posttest.

Table 8 suggests that after adjusting for the pronunciation scores on the pretest, there was a significant difference among the pronunciation mean scores of the three groups on the posttest ($F_{(2, 86)} = 28.07, p < .005$, partial eta squared = .39). Thus, online PBL, face-to-face PBL, and conventional instruction affect EFL pronunciation differently. Furthermore, covariate was statistically significant ($F_{(1, 86)} = 51.33, p < .005$, partial eta squared = .37):

Table 8. Tests of Between-Subjects Effects on Pronunciation

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	17.839	3	5.946	34.168	.000	.544	
Intercept	11.512	1	11.512	66.152	.000	.435	
Pretest	8.933	1	8.933	51.332	.000	.374	
Group	9.770	2	4.885	28.068	.000	.395	
Error	14.967	86	.174				
Total	727.250	90					
Corrected Total	32.806	89					

Pairwise comparisons were made to locate the possible significant differences among the three groups. The results (see Table 9) showed that the mean score of the online PBL group was statistically higher than that of the other two groups and that both BPL groups performed better than the control group:

Table 9. Pairwise Comparisons for Pronunciation Scores

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Online PBL	Face-to-Face PBL	.530*	.108	.000
	Control	.793*	.108	.000
Face-to-Face PBL	Control	.263*	.108	.017

*The mean difference is significant at the 0.05 level.

4.5. Results for Grammatical Accuracy

The fourth research question attempted to see whether there are any significant differences among the effects of online PBL, face-to-face PBL, and face-to-face instruction on the grammatical accuracy of the EFL learners. Before using ANCOVA, descriptive statistics were summarized in Table 10. It can be seen that the mean scores of grammatical accuracy of the three groups are not far from to each other on the pretest; however, the mean score of the online PBL group ($M = 3.10, SD = .54$) is much higher than the that of both face-to-face PBL group ($M = 2.63, SD = .53$) and control group ($M = 2.52, SD = .41$) on the posttest:

Table 10. Descriptive Statistics of Grammatical Accuracy Scores on Pretest and Posttest

Test	Group	N	Mean	SD	SEM
Pretest	Online PBL	30	2.300	.775	.141
	Face-to-Face PBL	30	2.191	.727	.132
	Control	30	2.391	.555	.101
Posttest	Online PBL	30	3.100	.543	.099
	Face-to-Face PBL	30	2.633	.532	.097
	Control	30	2.525	.406	.074



The ANCOVA results (see Table 11) show that after adjusting for the grammatical accuracy scores on the pretest, there was a significant difference among the grammatical accuracy mean scores of the three groups on the posttest ($F_{(2, 86)} = 29.55, p < .005$, partial eta squared = .41). Meanwhile the covariate was statistically significant ($F_{(1, 86)} = 125.11, p < .005$, partial eta squared = .59):

Table 11. *Tests of Between-Subjects Effects on Grammatical Accuracy*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	18.394	3	6.131	59.966	.000	.677	
Intercept	16.003	1	16.003	156.517	.000	.645	
Pretest	12.792	1	12.792	125.114	.000	.593	
Group	6.042	2	3.021	29.546	.000	.407	
Error	8.793	86	.102				
Total	709.188	90					
Corrected Total	27.187	89					

Pairwise comparisons that were made to locate the significant differences among the three groups (see Table 12) showed a statistically significant difference between the online PBL group and both of the other groups; moreover, the mean score of the face-to-face PBL group was significantly higher than that of the control group:

Table 12. *Pairwise Comparisons for Grammatical Accuracy Scores*

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Online PBL	Face-to-Face PBL	.407*	.083	.000
	Control	.626*	.083	.000
Face-to-Face PBL	Control	.219*	.083	.013

*The mean difference is significant at the 0.05 level.

4.6. Results for Lexical Choice

The purpose of the fifth question was to see if there are any significant differences among the groups in terms of lexical choice. Before using ANCOVA to investigate this research question, descriptive statistics were reported in Table 13:

Table 13. *Descriptive Statistics of Lexical Choice Scores on Pretest and Posttest*

Test	Group	N	Mean	SD	SEM
Pretest	Online PBL	30	2.225	.677	.123
	Face-to-Face PBL	30	2.375	.718	.131
	Control	30	2.491	.644	.110
Posttest	Online PBL	30	3.110	.555	.101
	Face-to-Face PBL	30	2.600	.547	.100
	Control	30	2.515	.432	.078

Table 14 summarizes the results of the ANCOVA. After adjusting for the lexical choice scores on the pretest, there was a significant difference among the lexical choice mean scores of the three groups on the posttest ($F_{(2, 86)} = 41.81, p < .005$, partial eta squared = .49):

Table 14. *Tests of Between-Subjects Effects on Lexical Choice*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	19.840	3	6.613	60.394	.000	.678	
Intercept	12.448	1	12.448	113.676	.000	.569	
Pretest	13.664	1	13.664	124.775	.000	.584	
Group	9.158	2	4.579	41.815	.000	.493	
Error	9.418	86	.110				
Total	705.490	90					
Corrected Total	29.258	89					

Table 15 summarizes the result of the pairwise comparisons. It shows that the mean score of the online PBL group demonstrated a significantly superior performance compared to the other two groups, and that the mean score of both PBL groups was better than that of the control group:

Table 15. *Pairwise Comparisons for Lexical Choice Scores*

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Online PBL	Face-to-Face PBL	.595*	.086	.000
	Control	.749*	.087	.000
Face-to-Face PBL	Control	.153	.087	.078

*The mean difference is significant at the 0.05 level.

5. Discussion

The current research examined how the PBL approach impacts the speaking capabilities of Iranian EFL learners. It also evaluated how the employment of the PBL approach possibly affects the features of speaking skill in order to address the gap in the English language teaching literature introduced by different scholars (Ansarian & Lin, 2018; Jaleniauskien, 2016).

The outcomes of the data analysis revealed that the implementation of both forms of PBL instruction were effective in improving the EFL students' performance in their speaking skills. Although the results of the present study in answering the first research question, to some extent, could be in line with that of others (Ansarian et al., 2016; Keong & Mohammed, 2015; Prancisca, 2016), they support us in cultivating an enhanced comprehension of the application of the other form of the PBL instruction, that is, online PBL classes, to develop learners' speaking proficiency and its fundamental features. The results showed that not only is the PBL approach efficient in teaching speaking but also offering the online form of the PBL approach seems to be more productive than the conventional or face-to-face forms of the PBL classes.

The effectiveness of the online PBL, which is known to be a category of the interactive media environment, over the face-to-face PBL classes has been criticized for lacking operative settings (Noble, 2001; Oliver & Herrington, 2003; Reeves, 2002). They argue that the focus, however mistakenly, is placed on the nature of the technology itself, not the designing of educational materials that can be best fitted into interactive media environments. Considering this issue, Oliver and Herrington (2003) maintained that learners should be offered diverse resources to use in knowledge-construction environments. They also believed that it is crucial for resource development to provide learners with enough content that gives them perspectives from many sources. Due to this reason, not all the materials should be necessarily online. The results of this study contradict the abovementioned claim about online classes or courses; they also contradict the argument made by Barrows (2002) that online PBL possibly lacks productive student interaction and effectual materials.

Moreover, the EFL learners who attended the PBL courses in both online and face-to-face forms outperformed the control group. The improvement of the learners' speaking proficiency in the present study is in line with other similar works (Ansarian et al., 2016; Aryanti & Artini, 2017; Kassem, 2018; Keong & Mohammed, 2015; Prancisca, 2016; Sutrisna & Artini, 2020). However, the type of PBL model used for implementing the PBL classes makes the present study different from the works mentioned above. As discussed earlier, other similar studies were only conducted according to the PBL approach framework related to different disciplines such as medicine. However, the model of PBL applied in the present study was the model proposed by Ansarian and Lin (2018) for language learning classes.

The results of the present study are congruent with the study of Kassem (2018), suggesting that the PBL approach both actively motivates and involves EFL/ESL learners in a self-directed learning process. Learners in a PBL speaking class engage themselves more in directed tasks, scaffold the learning process of themselves, and are trained to be autonomous learners (Ansarian et al., 2016). Moreover, according to Aryanti and Artini (2017), learners who attend PBL classes feel more independent and grow a sense of self-directed learning, resulting in an acceptable proficiency level. Because learners in PBL classes develop their problem-solving skills and also experience encouraging attitudes toward the effective use of the target language, they are more likely to become proficient users of the language (Haryudin &

Syahrizal, 2018). Additionally, the PBL approach in speaking classes is believed to be a method of teaching to motivate students to actively work and learn through real-life problems, which leads to their oral proficiency (Prancisca, 2016).

Concerning communicative success, the online PBL group showed the best performance. Although some researchers (Farmer & Wilkinson, 2018; Humalda & Zwaal, 2016; Salari, 2021; Setyawana et al., 2021; Ustün, 2006) have documented the usefulness of the PBL approach in learners' communicative success or communication skills, the present study failed to find any communicative success superiority in the face-to-face PBL group compared with the control group. In other words, in measuring the communicative success, the results of the present study for the face-to-face PBL group do not lend support to the works mentioned above, most of which reported the effectiveness of the PBL approach on communicative success of language learners.

According to the findings of this study, the online PBL group members enjoyed a better level of communicative success. In other words, they were more successful in learning and taking advantage of their communication skills. These results reinforce the conclusion made by Setyawana et al. (2021), who believed that the collaborative nature of the PBL and the ill-structuredness of the problem/scenario is advantageous for learners to enhance their communication skills. Moreover, the better level of learners' communicative success in the online PBL group could be in line with the findings of Salari et al. (2021), although the context of their research was a medical field.

Self and in-group collaborations in the PBL approach provide learners with better communication skills (Ustün, 2006). Accordingly, the PBL approach makes purposeful communication possible for learners. Due to the fact that students learn and use the subject matter purposefully according to their professional needs, they show a better performance in terms of communicative success or communication skills. Farmer and Wilkinson (2018) argue that the developed level of learners' communicative success is because they are required to work collaboratively while finding the research skills, planning, designing, and choosing appropriate answers to the problem/scenario. However, considering the results of the present study, the efficiency of the PBL approach in relation to the communicative success of the EFL learners is only justifiable for the online PBL group, not the face-to-face PBL class. In other words, the face-to-face PBL group results do not confirm the claim made by Humalda and Zwaal (2016), who stated that PBL instruction is beneficial for developing students' communication skills.

The outcomes of this investigation also indicated that students exposed to PBL instruction performed better than the control group in their pronunciation as one of the features of speaking. Both the online PBL and the face-to-face PBL groups were positively affected by the PBL instruction in terms of their pronunciation skill. This observation aligns with findings from several other studies (Baresh et al., 2019; Fahmi et al., 2021; Puspitasari, 2019), claiming that PBL instruction provides EFL learners with better pronunciation and intonation in their speaking skills.

The collaborative nature of PBL differentiates this approach from other similar disciplines in language learning methodologies. According to the results, it may be fair to claim that the reasons for the improved pronunciation of the learners in the PBL groups could be factors like providing the students with authentic learning materials, making the students more autonomous, and in-group collaborations (Baresh et al., 2019). Presenting the problems/scenarios to the learners in the PBL approach provides them with more authentic materials in line with their target needs and helps them explore possible solutions. In this case, especially in speaking classes, they can practice the knowledge they have learned to check the correct pronunciation and intonation.

The findings of this study also confirmed the arguments made by Puspitasari (2019) that offering speaking classes according to the PBL approach not only helps students in achieving a better speaking ability but also improves their pronunciation. Puspitasari also held that employing PBL instruction significantly affects learners' pronunciation and other speaking features such as grammar and vocabulary. Puspitasari associated the pronunciation development of learners in PBL classes with their level of self-efficacy that is created and promoted because of the PBL approach. Such an effective role of the PBL seems to confirm the findings of the present study in terms of the learners' self-efficacy and their speaking improvement. Moreover, Fahmi (2021) states that learners' improvement in their pronunciation is possibly interconnected with the collaborative nature of PBL instruction. It seems that learners in the PBL approach find the opportunity to have in-group collaborations in the target language and, more importantly, to experience what they really will need in the target situations. In such an environment, their pronunciation and hopefully all of their speaking features could be developed.

The effectiveness of the PBL approach has been shown in teaching the grammatical structures of a language (Chiou, 2019; Haryudin & Syahrizal, 2018; Pohan, 2019; Zuhriyah, 2017). The reports confirm the findings of the present study regarding the grammatical accuracy of the learners attending PBL classes. The results of this study not only showed that better grammatical knowledge could be guaranteed through implementing the PBL approach but also extended the productiveness of the PBL approach from the face-to-face to the online PBL classes.

The results of this study also revealed that the learners in the online PBL and the face-to-face PBL groups showed better performance in their lexical choice compared with the control group. This finding seems to be compatible with Chai and Swanto (2020), EhsaniFard and Vakili (2018), and Lin (2015), who concluded that the PBL approach allows language learners to promote their vocabulary learning. One possible reason for this finding, as Mohammadi (2007) argues, is that the PBL tasks improve language learners' cognitive and metacognitive skills. This claim is also supported by Chai and Swanto (2020), who concluded that the PBL approach changes regular classes into a practical and dynamic learning environment.

The findings, in terms of lexical choice, support the claim made by EhsaniFard and Vakili (2018) who reported that the effectiveness of the PBL in vocabulary learning is, among other factors, due to the language learners' exposure to the ill-structured scenarios. The study revealed that both online PBL and face-to-face PBL groups outperformed the control group in which no PBL instruction and ill-structured scenarios were employed. Another potential reason for the efficiency of the PBL methodology in vocabulary learning could be the learner-centeredness of the PBL approach (Lin, 2015).

6. Conclusion

Drawing from the current study's outcomes, the conclusion can be reached that the application of the PBL approach generally provides learners with better learning opportunities and, as a result, improves most of the features of speaking proficiency examined in this study better than conventional instruction. It can also be concluded that the type of PBL also makes a difference in improving the features of speaking proficiency in the sense that online PBL is more effective than face-to-face PBL in improving all the features of speaking proficiency. This conclusion is confirmed by the observation that face-to-face PBL and conventional instruction exhibited no statistically significant differences in terms of their effectiveness in improving learners' lexical choice and communicative success. From this observation, it may also be concluded that when the requirements of an online PBL course are met, we may apply for the course without hesitation. However, the choice between face-to-face PBL and conventional instruction depends, to some extent, on the feature of speaking proficiency which is the target of instruction. This means that even though face-to-face PBL is generally more effective than conventional instruction on improving features of speaking proficiency, there are certain features, such as lexical choice and communicative success, in which the difference between the two types of instruction is not statistically significant. Therefore, if improving these features is among the goals of instruction, blind adherence to face-to-face PBL may not be advisable, especially when the requirements of PBL instruction make it less economical and cost-effective. Or in situations where learners or teachers resist PBL, probably because of the fear of taking risks, feelings of uncertainty about the result, or the security of following their own comfortable conventional learning/teaching path, there should be no undue pressure to force learners to learn through face-to-face PBL. Sometimes, the negative consequences of such undue pressures may outweigh the potential benefits of face-to-face instruction.

The outcomes of the current research may prove beneficial for offering some pedagogical implications for English language teachers, especially for those who teach the speaking skill. This study can help EFL teachers in how to conduct problem-based or scenario-based teaching methods, particularly when they need to improve one or some of the features of speaking similar to the ones investigated in the present study. That is, if EFL teachers find their classes and students ready to work based on the problems, they can come up with useful hints regarding the implementation of the PBL method, as conducted and practiced in the present study based on the model of PBL exclusively developed and proposed for the language teaching classes (Ansarian & Lin, 2018). The results can also be helpful for EFL course designers and curriculum developers to improve the quality of materials to enhance the critical thinking ability of EFL learners through PBL learning methodology. That is, developing course materials blended with the problem/scenario which requires learners' deep understanding and self-experiential activities facilitated by the teacher's guidance possibly contributes to the development of learners' critical thinking skills.

Nevertheless, given the lack of qualified and reliable resources concerning PBL and its implementation in language teaching methodology, the researchers had to rely on the theoretical definitions of PBL as it is related to language teaching, primarily in the phase of defining the type of the problem/scenario. Secondly, the present research coincided with the COVID-19 pandemic, which posed a significant challenge to collecting data. That is why further studies are suggested to check the generalizability of these findings.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Data Availability

The authors confirm that all the data collected or analyzed during this study are included in this published article.

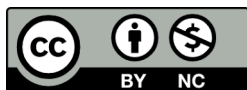
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