Problem-Based Learning as a Pedagogical Tool for Developing Interpersonal Communication Skills: An Interactional Analysis of Pre-Service EFL Teachers

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ABSTRACT

Aim. Problem-Based Learning (PBL) is a popular theory in EFL teacher education, that identify and discuss its influence on the acquisition of interpersonal communication skills through fine-grained classroom interactional practices. Specifically, little attention has been given to how pre-service EFL teachers use verbal and non-verbal interactional resources to reach mutual understanding in collaborative problem-solving.

Methods. The present study explored the efficiency of PBL as a pedagogical tool for building interpersonal communication skills, in particular repair strategies, clarification requests, silence, and pausing in classroom conversation. The study used a pre-experimental, one-group pre-test-post-test design with a sample of pre-service EFL teachers engaged in a systematic implementation of PBL over a 15-week instructional session. The interaction data were gathered from audio recordings of group discussions held before and after the intervention.

Results. Interactional discourse analysis was employed as a qualitative analysis to study the sequential organisation and interactional role of the targeted features, and descriptive statistics and the Wilcoxon signed-rank test were used as quantitative analyses to examine changes in the frequency and distribution of these targeted features pre- and post-intervention.

Conclusions. The data showed statistically significant growth in repair and clarification strategies, as well as a more strategic use of silence and pausing in the post-test interactions. By presenting mixed evidence on how PBL can be used to develop interpersonal communication skills at the interactional level in pre-service teacher education, the study contributes to EFL pedagogy.

Keywords: Problem-Based Learning, interpersonal communication skills, pre-service EFL teachers, interactional discourse analysis, classroom interaction

Introduction

The studies of second language (L2) education over the past 20 years have shifted from a focus on isolated linguistic accuracy to a growing emphasis on the process of building interpersonal communication skills that allow learners to successfully negotiate meaning

in interaction. Communicative competence in EFL, however, has become commonly defined as the ability to manage cognitive states, respond to failures, and maintain contact, rather than simply linguistically responding in a grammatically correct way (Alam, 2025a; Hall, 2018). This has prefigured the significance of interactional competence, or learners' application of discourse strategies to manipulate communication, such as repair, clarification, turn management, and pragmatic sensitivity (Young, 2011). As a result, EFL classrooms have increased the importance of interaction with learners, collaboration, and making meaning as the main pedagogical objectives. Nevertheless, empirical evidence indicates that, despite their pre-service status, many EFL teachers still struggle to meet the interactional demands, especially in collaborative environments where misunderstandings, silence, and unequal participation are common (Walsh, 2013). Such obstacles suggest that conventional teaching methods may not be effective in developing the interpersonal communication skills needed to engage in classroom learning (Alam, 2025b). Problem-Based Learning (PBL) is one of the pedagogical approaches suggested for addressing these challenges, as a learner-centred approach based on collaborative inquiry and problem-solving in the real world (Barrows, 1986; Hmelo-Silver, 2004). PBL has been noted to encourage meaningful interaction by requiring learners to articulate ideas, negotiate viewpoints, and mutually construct solutions in small groups. PBL has been linked to higher levels of learner engagement, communicative and reflective participation (Lin, 2017; Norawati & Puspitasari, 2022; Usama, Alam, Hameed et al., 2024) in EFL teacher education. These advantages are largely attributed to the interactive nature of PBL tasks, which provide long-term peer interaction in which teacher-to-student discourse is not the focal point. Furthermore, PBL settings promote learners' ability to manage instances of communicative breakdown and to participate independently, thereby fostering awareness of interaction. Although these pedagogical benefits have been observed, current studies have preferred to focus on macro-levels of learning, such as achievement or attitudes, rather than on the actual manner in which interpersonal communication skills are enacted at the micro-interactional level during PBL activities. Despite the growing popularity of PBL in EFL teaching and learning, there is very little empirical research on the use of specific interactional resources to support the development of interpersonal communication skills in PBL. Specifically, there is extremely little research on the role of repair strategies, clarification requests, silence, and pausing by pre-service EFL teachers in reaching a mutual understanding through collaborative problem-solving. Sealing this gap, this research paper explores Problem-Based Learning as an intervention tool for nurturing the practice of interpersonal communication among pre-service EFL teachers. The data to be studied is interactional discourse (collected before and after a PBL intervention) to investigate alterations in the use and functionality of the most significant interactional resources. Based on this, the objectives that guide the study are the following:

- How do repair strategies and clarification requests contribute to the achievement of mutual understanding during Problem-Based Learning interactions among pre-service EFL teachers?

- How are silence and pausing employed as interactional resources in Problem-Based Learning discourse among pre-service EFL teachers?

Literature Review

Problem-Based Learning in EFL Contexts

The concept of Problem-Based Learning (PBL) has been gaining popularity as a learner-centred pedagogical approach that encourages collaborative learning, interaction, and the resolution of real-world issues (Havenga et al., 2023). PBL began in the field of medical education (Barrows, 1986) and was created to develop the skill of flexibly using knowledge using ill-structured problems. This strategy has, over time, been modified for various learning settings, among them language learning, in which interaction and meaning-making are the two main issues. In EFL classrooms, PBL is not considered just as a classroom strategy, but a pedagogical approach, which places language development within the context of socially mediated action, with the responsibility lying with the learner to formulate ideas, negotiate points of view, and develop solutions in partnership with other learners (Hmelo-Silver, 2004). PBL's pedagogical justification is closely related to sociocultural theory, which views learning as a social construction that occurs through interaction (Vygotsky, 1978). In this view, language development would occur when language learners engage in a dialogic activity, scaffolding one another and co-constructing knowledge in a joint problem space (Alam et al., 2025; Shams, Alam et al., 2025). The possibility of such interaction is structured in PBL environments, where learners are responsible for taking charge of the discourse and the subsequent development of shared knowledge (Bate et al., 2014). According to research, such conditions of interaction encourage more cognitive thinking and communicative participation than teacher-led instructional methods (Hmelo-Silver & Barrows, 2006).

PBL is linked to enhanced learner participation, autonomy, and communicative exchange in EFL classrooms. For example, Nan Lin (2017) concluded that EFL students who were allowed to engage in PBL activities at the university level exhibited better oral participation and reflective awareness than those taught in conventional learning environments. On the same note, Jianer Zhong, Lilliati Ismail, and Ruyin Zheng (2025) also observed that Chinese EFL learners who participated in PBL registered gains in speaking confidence and collaborative competence. To a great extent, these results can be explained by the fact that PBL tasks are highly interactive, requiring learners to maintain a conversation, negotiate meaning, and support their choices in small groups. PBL has also found its way into EFL teacher education, where it is appreciated for its capacity to bridge the gap between theory and practice. Indeed, pre-service educators participating in PBL may need to discuss an authentic pedagogical dilemma, whether it is classroom management or instructional decision-making (Oo, 2021). These tasks reflect the communicative needs of professional teaching situations

and therefore provide an opportunity to practice interpersonal communication (Alam et al., 2022). Research findings have demonstrated that PBL can improve pre-service teachers' professional reasoning, group interaction, and reflective cognition (Amir et al., 2025a; Yew & Goh, 2016). These results could indicate that PBL is specifically well placed to serve interactional competence within teacher education programmes. Despite such pedagogical benefits, much of the prevailing research on PBL in the EFL context has focused on macro-level outcomes, i.e., language achievement, attitudes, and learners' perceived effectiveness. Although these results are valuable, they offer little insight into how interpersonal communication skills are practised and trained during PBL activities. Not many studies have examined the micro-interactional mechanisms by which learners handle misunderstandings, control participation, and maintain mutual understanding to collaborate in solving problems. Consequently, the interactional processes underlying PBL's pedagogical proficiency remain poorly understood. This limitation is especially acute in interpersonal communication, which, by definition, is interactional and process-driven. The use of specific interactional resources by learners in practising PBL activities is critical for understanding how pedagogy can foster the development of communication skills. As a result, discourse-based studies are required, which would involve analysing PBL as a communicative space that shapes communicative behaviour rather than an instructional process that yields quantifiable results.

Interactional Resources in EFL Classroom Discourse

EFL interpersonal communication skills are increasingly conceptualised as interactional competence, which implies the capability to utilise linguistic and interactional resources to engage in participation, negotiate meaning, and reach mutual understanding (Xu et al., 2025). In contrast to the classical concepts of communicative competence, which place greater importance on the personal linguistic knowledge, interactional competence also predetermines the socially situated character of communication and the joint meaning creation. In classroom communication, this competency is achieved through repair, clarification, turn-taking, silence, pauses, and stopping (Hall & Pekarek Doehler, 2011).

Repair strategies are also among the most studied forms of interaction in conversation analysis (Meredith, 2019). Repair is the set of practices through which speakers correct the issues in speaking, hearing, or understanding during communication (Albert & De Ruiter, 2018; Schegloff et al., 1977). Repair is an important element of second language interaction, as it helps not only preserve mutual understanding but also ensure that communication continues (Harumi, 2023). It was found that learners who successfully use self-initiated repair exhibit greater interactional awareness and communicative sensitivity (Kasper & Kim, 2015). Requests for clarification, confirmation checks, and comprehension checks also foster mutual understanding by encouraging elaboration and creating shared understanding between interlocutors (Kääntä & Kasper, 2018).

Repair and clarification practices have been described as pedagogically important through empirical studies conducted in EFL classrooms. Numa Markee (2000) was able to show that both language learning and interactional alignment are facilitated by negotiated interaction. Equally, Olcay Sert (2015) demonstrated that repair sequences in classroom interaction have linguistic and interpersonal roles, including ensuring a sense of rapport and involvement. Nevertheless, little of this has been devoted to peer interaction in a collaborative learning situation, with much attention to teacher-student interaction (Shams, Ajmal et al., 2025). Since PBL heavily depends on peer interaction, it is particularly important to analyse repairs and clarifications in those environments (Dolmans, 2019). Unlike in repair, there is relatively little literature on silence and pausing in EFL research. Conventionally, silence has been understood as a sign of communicative challenge, incompetence, or disinterest (Gutiérrez & Paniagua, 2024). Subsequent studies, however, have developed more recent conceptualisations of silence as a multifunctional interactional resource with cognitive, interpersonal, and organisational functions (Harumi, 2024; Kendrick & Torreira, 2015). Pauses can be used to indicate planning, introduce turn-transition relevance sites, or indicate alignment or opposition based on their location and duration in interaction (Degand & Van Bergen, 2018). In the discourse, classroom silence has been depicted as significant in enabling learners to participate. Steve Walsh (2006) found that teachers' strategic use of silence can provide learners with an interactive space to develop responses. In the case of EFL students, pausing may be used as a planning tool, and this syntactic formulation and lexical retrieval should have time (Tharmalingam & Asmawi, 2024). Further, silence can also be a politeness strategy that allows a learner to address face-threatening acts in cases of disagreement or negotiation (Jaworski & Kohli, 1993; Manyasi, 2025). Despite these observations, empirical research on silence in peer collaborative interaction, especially when PBL is involved, remains limited.

Interactional resources such as repair, clarification, silence, and pausing are likely to be particularly salient in PBL environments. PBL tasks will require learners to handle interactions independently, resolve conflicting perspectives, and organise collaborative action without the teacher's active interference. These requests pre-empt learners' responsibility for interactional coherence and mutual understanding. Nonetheless, the literature has seldom investigated the deployment of these interactional resources in PBL-mediated discourse, particularly in pre-service EFL teacher education settings. Although studies on PBL and interactional competence have advanced significantly, the gap between them remains substantial. Namely, a small body of empirical studies has been conducted to explore the adoption of repair strategies, clarifying requests, silence, and pausing as interactional resources by the pre-service EFL teachers in PBL interactions, or the ways in which such practices evolve after pedagogical intervention. To fill this gap, the current study will take an interactional discourse approach to explore pre- and post-intervention interactions in PBL, thereby adding to a more complex picture of the formation of interpersonal communication skills in the course of pedagogy.

Method

Participants

The participants of the present research were pre-service EFL educators (N = 36) enrolled in a teacher education programme at a Saudi public university, sampled using the convenience approach as the participants of an intact cohort by the end of a semester which included a mandatory course on methodology, and all participants were instructed by the same teacher, which ensured an instructor consistency and minimised the effect of style and classroom management on teaching, and the mean age of the participants was 21 years (SD = 20-23) at the time of the research, with no one reporting Regarding English proficiency, institutional placement records and self-reported data showed that the participants had a B1-B2 level of proficiency in the Common European Framework of Reference of Languages and all of them had already completed basic coursework in English language skills and pedagogy, including listening, speaking, and introductory teaching methodology; meanwhile, they were conversant with collaborative learning formats as pre-service teachers, but lacked prior experience with systematic Problem-Based Learning (PBL) as a fundamental teaching technique. Participants had full information regarding the purpose, procedures and ethical considerations of the study, informed consent was signed and they were assured that the study was voluntary and their academic status would not be affected by their involvement in the study, hence to advance the anonymity aspect all ID information was deleted and pseudonyms were used in the process of transcription and analysis and because the study was a pre-experimental, one-group pre-test post-test, all participants were involved in both stages and thus the comparison of the interactional practices could have been done within-group.

Treatment

The intervention was a 15-week problem-based learning (PBL) instruction, systematically integrated into the participants' normal teacher education coursework (Barrows, 1986; Hmelo-Silver, 2004). The use of PBL was based on the focus on collaborative inquiry, peer interaction, and authentic problem-solving, as these are widely perceived as necessary conditions for the development of interpersonal communication skills among EFL teachers in training (Hall, 2018; Vygotsky, 1978). Instead of explicitly teaching communication strategies, the intervention was oriented toward building interaction-based learning settings in which participants had the opportunity to negotiate meaning, handle communicative failures, and control participation, based on naturally occurring classroom discourse (Walsh, 2006).

The course instructor was the researcher in this study and the implementer of the intervention. The instructor played the role of a facilitator rather than a conventional lecturer to achieve some degree of pedagogical consistency and interactional authenticity. This was done by raising issues, explaining the process for tasks when needed, and facilitating thoughtful debate, with a conscious effort not to interfere with how the parties should talk. This teaching posture was aimed at bringing harness learner autonomy to its fullest extent and give interpersonal communication practices to be self-organised through interaction with peers. The treatment followed a regular pedagogical structure, with recurring PBL cycles throughout the 15 weeks of the intervention. Each cycle began with the introduction of an ill-structured, pedagogically relevant problem in realistic EFL teaching situations. Such issues covered fundamental concerns typical of pre-service teachers, such as classroom interaction management, teaching in mixed-ability classrooms, anxiety among learners, and strategies for facilitating communicative interactions (Alam & Usama, 2023). The issues were deliberately created without a right or wrong so that they would invite debate, argument, elucidation, and collective thought (Hmelo-Silver, 2004). Each PBL session had small groups of four or five participants. In such groups, participants analysed the problem, discussed viewpoints, negotiated potential solutions, and justified their choices. The instructor made the least amount of intervention during group work, and intervention occurred only when there was a need to clarify task requirements or when confusion arose in the process. The adoption of this minimal-intervention strategy was aimed at ensuring that participants retained control over the interaction process, including turn-taking, repair, clarification requests, and silence (Walsh, 2013; Sert, 2015). Every PBL session concluded with a whole-class reflection, during which a group representative recapitulated their solutions and shared reflections on the problem-solving process. This step facilitated cross-group comparisons of ideas and encouraged individual reflection on pedagogical decision-making (Hmelo-Silver & Barrows, 2006). Notably, there was no direct feedback on communication strategies; the pedagogical focus was on the content and arguments behind the suggested solutions. The teaching programme consisted of 1 90-minute session per week over 15 consecutive weeks (see Table 1). Throughout the intervention process, the participants were required to undergo several PBL cycles, which ensured recurring exposure to collaborative interaction and continued opportunities to negotiate meaning, address misunderstandings, and control participation (Hall & Pekarek Doehler, 2011). More importantly, no explicit teaching on repair strategies, clarification requests, and managing silence was involved. Pedagogical priority was placed on establishing an environment in which such interactional resources could occur naturally, thereby enabling the study to test how interpersonal communication skills developed when engaging in PBL (Alam et al., 2023; Crespí et al., 2022).

Table 1
Weekly Structure and Pedagogical Focus of the 15-Week PBL Intervention

Week(s)	PBL Phase	Pedagogical Focus	Interactional Opportunities
1	Orientation	Introduction to PBL procedures and group norms	Initial interaction and participation
2–3	PBL Cycle 1	Classroom interaction management	Turn-taking and clarification
4–5	PBL Cycle 2	Teaching mixed-ability learners	Negotiation of meaning
6–7	PBL Cycle 3	Addressing learner anxiety	Repair strategies
8	Reflective consolidation	Review of prior problem cycles	Meta-discussion and reflection
9–10	PBL Cycle 4	Promoting learner participation	Managing silence and pausing
11–12	PBL Cycle 5	Encouraging communicative engagement	Collaborative reasoning
13	Integrated PBL task	Multi-issue classroom scenario	Sustained interaction
14	Pre–post alignment	Preparation for post-test discussion	Group discussion
15	Final PBL session	Holistic problem-solving	Consolidated interaction

Source. Own research.

Instruments

Interactional discourse data were the primary source of evidence to address the objectives of the study. Collaborative interaction work, audio-taped classroom discussions, and transcription with interactional episodes were used to gather information. This stratified technique allowed paying strict attention to both paralinguistic and verbal characteristics of interpersonal communication.

Collaborative Interaction Tasks

Participants were also given collaborative discussion assignments at both the pre-test and post-test stages. These activities were intended to bring out natural peer interaction and were similar in terms of cognitive load, familiarity with the topic, and interaction complexity. During the pre-test, participants were required to engage in a discussion task that was characteristic of the traditional instructional method and helped define baseline interactional behaviour before extended involvement in PBL. During the post-test, participants were given a parallel discussion assignment after the PBL intervention. In all tasks, participants were to engage in a discussion on a pedagogical topic, share their perspectives, and reach a mutual understanding or decision.

The activities were purposely open to invite negotiation of meaning, clarification, and handling of disagreement. Every discussion within the group was recorded on tape to capture both verbal interaction and non-verbal and paralinguistic cues, i.e., pauses, gaze, and gestures.

Interactional Discourse Data

The interactions that were documented formed the basis of the analysis. All the recordings were transcribed as per conventions that were adjusted according to the conversation analysis (Jefferson, 2004), and particular attention has been paid to creating factors that were relevant to the purposes of the study. Much of the notation of repair sequences, clarification requests, silence, pause, overlaps, and turn-taking organisation was transcribed. Natural classroom settings of the participants were also recorded and external observers were not used when the participants performed the interaction tasks to enhance the ecological validity. There was no need to remind the participants of the particular focus on the analytical focus of the study at the time of the tasks, as they were notified of the recording procedures. This reduced the chances of distorted interactional behaviour.

Data Analysis

Analysis of the data took a mixed-method approach, which comprised of interactional discourse analysis and quantitative analysis of the coded interactional features. All recordings of classroom interactions that were audio-taped were completely transcribed before analysis. The qualitative element was based on interactional discourse analysis and aimed to study how interpersonal communication skills were practiced in naturally occurring interactions during Problem-Based Learning. The sequential analysis was made in consideration of turn-by-turn interaction and the local organisation of meaning-making. In the first research question, interactional sequences of repair strategies and clarification requests were selected and analysed to determine how they resolve misunderstandings and maintain interactional coherence. Repair strategies were divided into self-initiated and other-initiated repair in accordance with pre-existing conversation-analytic procedures (Schegloff et al., 1977), whereas clarification requests were divided into confirmation checks, comprehension checks, and explicit requests to be repeated or elaborated. In the second research question, the incidences of silence and pausing were determined and analysed with respect to the duration and positioning of interactional sequences, and interactional functions were studied in reference to turn management, cognitive planning, and interpersonal alignment (Alam et al., 2024). The representative excerpts were chosen to show the repetition of patterns of interaction. After qualitative coding, a quantitative analysis was conducted to examine varia-

tions in the distribution of interactional features across the different stages of the study. The rates of repairing strategies, asking clarifications, non-saying, and pausing were computed for every participant regarding the pre-test interaction task and the post-test interaction task. All frequencies were normalised to interaction length rate per minute to correct for variation in interaction length. Interactional behaviour was first summarised using descriptive statistics, including means, medians, standard deviations, and ranges. The Wilcoxon signed-rank test was used to test pre- and post-interactional resources statistically. The reason for choosing this nonparametric test is that it is suitable for paired data, does not assume normality, and is applicable to small samples and frequency-based measurements. Effect sizes (r) were computed to reflect the magnitude of changes that had been observed. All statistics were performed in standard statistical software, and significance was determined at the 05 level. Quantitative results were viewed as complementary to the qualitative results and were applied to reinforce, though not substitute for, interactional analysis. The first author and a trained colleague, familiar with classroom discourse analysis, independently coded it. Cohen's kappa was used to determine inter-coder reliability, yielding a coefficient of $\kappa = .87$, indicating a high degree of agreement. The differences were addressed by discussing and re-examining the data.

Results

This result presents the investigation in response to the dual inquiries posed. Following conventional practices in mixed-methods reporting, the numerical outcomes are presented first, followed by qualitative interaction analyses that enrich understanding with detailed explanations. Quantitative results are based on descriptive statistics and Wilcoxon signed-rank tests comparing pre-test and post-test interactional data, while qualitative findings are derived from interactional discourse analysis of Problem-Based Learning (PBL) interactions.

Quantitative Results

Repair Strategies and Clarification Requests

To address the first research question, quantitative analysis examined changes in the frequency of repair strategies and clarification requests between the pre-test and post-test interaction tasks. To control for variation in interaction length, all frequencies were normalised as rates per minute of interaction. Table 2 presents descriptive statistics for repair strategies and clarification requests across the two phases.

Table 2

Descriptive Statistics for Repair Strategies and Clarification Requests (Rates per minute)

Interactional Feature	Phase	Mean	SD	Median	Range
Repair strategies	Pre-test	1.42	0.51	1.38	0.62–2.31
	Post-test	2.67	0.74	2.61	1.54–3.98
Clarification requests	Pre-test	0.88	0.39	0.84	0.31–1.72
	Post-test	1.94	0.63	1.88	0.92–3.11

Source. Own research.

As shown in Table 2, mean rates of both repair strategies and clarification requests were higher in the post-test phase than in the pre-test phase. To determine whether these differences were statistically significant, Wilcoxon signed-rank tests were conducted.

Table 3

Wilcoxon Signed-Rank Test Results for Repair Strategies and Clarification Requests

Feature	Z	p	Effect size (r)
Repair strategies	−4.12	< .001	0.69
Clarification requests	−3.87	< .001	0.65

Source. Own research.

The Wilcoxon signed-rank test results indicated statistically significant increases in both repair strategies and clarification requests from pre-test to post-test. The effect sizes were large, suggesting substantial differences in the use of these interactional resources across the two phases.

Silence and Pausing

Quantitative analysis was also conducted to examine changes in silence and pausing across the pre-test and post-test interaction tasks. Two measures were considered: pause frequency per minute of interaction and mean pause duration in seconds. Table 4 summarises the descriptive statistics for silence and pausing across the two phases.

Table 4

Descriptive Statistics for Silence and Pausing

Measure	Phase	Mean	SD	Median	Range
Pause frequency (per minute)	Pre-test	2.31	0.68	2.24	1.12–3.74
	Post-test	1.56	0.47	1.49	0.84–2.41
Mean pause duration (seconds)	Pre-test	1.92	0.53	1.88	1.03–3.04

Measure	Phase	Mean	SD	Median	Range
	Post-test	1.21	0.36	1.18	0.64–1.97

Source. Own research.

As indicated in Table 4, both the frequency and duration of pauses decreased in the post-test phase. Wilcoxon signed-rank tests revealed statistically significant reductions in pause frequency ($Z = -3.54$, $p < .001$, $r = 0.59$) and mean pause duration ($Z = -3.76$, $p < .001$, $r = 0.63$). These results indicate systematic differences in the use of silence and pausing between the two phases.

Qualitative Results

Repair Strategies and Clarification Requests

It was carried out using qualitative interaction analysis to investigate how the quantitative change in the strategies of repair and clarification requests were realised in classroom discourse. The number of repair sequences was relatively few and limited mainly to short self-corrections at the lexical or grammatical level during the interactions that took place prior to the test. There were a few requests to clarify the requests, occasionally restricted to mere confirmation checks, which did not necessarily lead to protracted negotiations. Otherwise, there were no clarifications of potential confusions or a shift in topics. On the other hand, higher and elaborate repair patterns characterised the interaction during the post-tests. It was discovered that participants used more proactive self-repair, which was more likely to precede other-initiation. Other-initiated repair was also better managed, and responses were more elaborate, explanatory, or rephrased rather than repetitive. In the post-test stage, participants made more varied clarification requests, which were interactionally consequential, resulting in lengthy responses and guaranteeing a lengthy interaction. These trends indicate an increase in mutual orientation and mutual meaning-making.

Silence and Pausing

Pausing and silence, as qualitatively analysed data, provided an additional understanding of the quantitative results. During pre-test interactions, there were frequent instances of extended silences at turn-taking points, often due to hesitation, uncertainty, or interactional breakdown. These silences sometimes led to failure to respond in time, to the development of other topics, or to the instructor's intervention.

Silence and pausing were applied more interactionally effectively in the post-test interactions. Breaks were less frequent and more frequently internalised in the turns and served as a planning and formulation resource. Turn-taking and alignment were

often handled by silence at turn boundaries, leading to repair or clarification sequences. Instead of preventing interaction, silence during the post-test was revealed to aid in organising and the flow of discourse.

The quantitative and qualitative findings are consistent, revealing several changes in the interactional practices of pre-service EFL teachers after the PBL intervention. Statistically significant positive changes in repair strategies and clarification requests and significant decreases in the frequency and duration of pauses were found through quantitative analysis of the data. Qualitative analysis revealed that such changes related to better management of misunderstandings, increased participation in negotiating meaning, and the more strategic use of silence and pausing in the interaction. Collectively, the results provide answers to the research questions and create a distinct empirical foundation for further discourse.

Discussion

This research paper contributes to the existing literature on Problem-Based Learning (PBL) in EFL teacher education by analysing how this method can be used to build interpersonal communication skills through fine-grained classroom interaction. Using a mixed-methods approach, the study employed both quantitative and qualitative analyses of interactional features and classroom interactional discourse, respectively. The quantitative results of the statistically significant pre-post change were the frequency of repair strategies, clarification requests, silence, and pausing. Interactionally, it was realised that these changes occurred in moment-by-moment discourse during collaborative problem-solving, as revealed through qualitative analysis. On the whole, the results suggest that the continued use of PBL was associated with improved management of mutual understanding and interactional flow among pre-service EFL teachers. The fact that quantitative and qualitative analyses have yielded similar outcomes underscores the pedagogical possibilities of PBL for developing the interactional aspects of communicative competence, and thus warrants discussion.

First of all, the quantitative results indicate that PBL positively influenced the use of repair techniques and clarification requests, which are widely recognised as central resources for interaction to reach mutual understanding (Schegloff et al., 1977; Seedhouse, 2024). The huge improvements in both pre-test and post-test interactions in the features indicate that the participants became more active in monitoring their comprehension and in communicating when they had trouble. The findings are consistent with the interactional competence theory, which theorises communicative ability as the capacity to handle interactional contingencies as collaborative, rather than as personal linguistic knowledge (Galaczi & Taylor, 2018; Hall & Pekarek Doehler, 2011). In this sense, the observed quantitative changes indicate that participants became more sensitive to the interactional norms governing repair and clarification (Sert, 2015).

The findings therefore empirically confirm the supposition that learning methodologies that focus on collaborative problem-solving can increase learners' engagement in interactional processes that are critical to communicative proficiency (Alam et al., 2026).

The current results are also seen within a sociocultural theoretical framework, which focuses on learning as a socially mediated process created through engagement in significant activity (Vygotsky, 1978; Lantolf & Thorne, 2007). Within the context of PBL, which was followed in this work, participants were repeatedly asked to talk, address peers, and negotiate solutions to ill-structured educational issues (Hmelo-Silver et al., 2025). These circumstances seem to have favoured the internalisation of interactional practices, as demonstrated by the growth of post-test interactions characterised by self-initiated repair requests and elaborated clarification requests (Bukari et al., 2025; Dingemanse & Enfield, 2024; Tandoc, 2025). These results follow up on earlier studies showing that collaborative activities support meaning negotiation in EFL settings (Stivers, 2022) by demonstrating how this process becomes more advanced over time. Instead of just adding more talk, PBL seems to influence how participants structure and take charge of the interaction itself (Pekarek Doehler & Eskildsen, 2022; Walsh, 2013).

Nonetheless, the results associated with silence and pausing give a more specific insight into the development of the interaction. Regarding the frequency and duration of pauses, both decreased significantly during post-test interactions, which, at first, could be viewed as improved fluency (Marzuki, 2025; Tavakoli, 2025). However, the qualitative analysis showed that silence did not just subside, but it was employed more strategically. Heavy silence during pre-test interactions was accompanied by hesitation, uncertainty, or disruptions, aligning with previous reports of silence as a possible barrier to EFL classroom interactions (Sert et al., 2025). Conversely, post-test interactions exhibited fewer and more resourceful pauses, including planned pauses to manage turns and alignment (Torreira & Bögels, 2022). These results dispute deficit-based conceptualizations of silence and support Walsh's (2006) emphasis that silence can play significant organisational roles, provided learners have the interactional competence to make it work (Sert & Lind, 2025). It can be concluded, therefore, that PBL is not only less interactionally challenging, but it also redefines the functional role of silence in classroom conversation.

Compared to earlier empirical studies, both the findings and the work presented here inform current research on PBL and collaborative learning and contribute to its expansion. Previous research has shown that PBL can increase learners' engagement, interactions, and communication in EFL settings (Hmelo-Silver, 2004; Jeong et al., 2017; Zhong, Ismail & Lin., 2025). Nevertheless, a significant portion of these studies has been based on performance results, self-reported perceptions, or general speaking scales (Amir et al., 2025b; Sadeghi, 2022). In comparison, the current paper presents interactional data of the development of certain discourse practices during participation in PBL. The result of the increased number of clarification requests

can be compared to the results of interactionist research indicating the importance of meaning negotiation in language development (Long, 2022), and the more successful management of repair makes sense in conversation-analytic conceptualizations of interactional competence (Doehler & Th Thorle, 2024; Dingemanse, 2024; Galaczi & Taylor, 2018). Simultaneously, the research results can be used to investigate classroom conversations and beyond by showing that pedagogical design can affect learners' use of silence and pausing, an area that has received relatively little empirical evidence to date (Nguyen, 2024; Rahmi, 2024).

Lastly, the study has several pedagogical and methodological implications. Pedagogically, the results imply that PBL can be a valuable learning experience for acquiring interactional skills that are especially applicable to pre-service EFL teachers who will have to understand, participate in, and engage with learners in the future (Doehler, 2021; Walsh & Matsumura, 2025). Instead of providing direct instruction on communication strategies, PBL allows learners to acquire these skills as they engage in real interactional situations over an extended period (Lantolf & Poehner, 2023). The mixed-methods design enhanced the study methodologically by enabling the quantitative patterns to be explained through the interactional qualitative evidence (Creswell & Plano Clark, 2023). However, the pre-experimental and one-group design restricts the scope of causal statements that can be made. In future studies, comparative designs or longitudinal research designs may be used to investigate the persistence and generalizability of interactional gains (Galaczi & Taylor, 2018). Combined, the results highlight the importance of including interaction-oriented analysis in EFL pedagogy studies and emphasise the potential of PBL to promote interpersonal communication skills at the discourse level (Seedhouse, 2005; Walsh, 2013).

Conclusions

The present study has discussed problem-based learning (PBL) as a pedagogical tool to help pre-service EFL teachers develop interpersonal communication skills through a mixed-methods approach to classroom interaction. Based on quantitative and qualitative data, the results reveal that continued participation in PBL was associated with a systemic alteration in participants' interactional practices, including more frequent use of repair strategies and requests for clarification, and a more strategic use of silence and pausing in collaborative discourse. These findings indicate that PBL creates an interactive learning environment that fosters mutual understanding, interactional coherence, and collaborative alignment. Theoretically, the study can contribute to the field of interactional competence and sociocultural frameworks by showing that interactional design mediates the development and refinement of interactional resources through repeated participation in meaningful social activity. Pedagogically, the results identify the importance of incorporating PBL into EFL teacher education programmes because

PBL seems to enhance interactional skills inherently applicable to future classroom practice, including, but not limited to, dealing with misunderstandings, managing participation, and maintaining the flow of communication. At the same time, the study has some limitations, such as a pre-experimental, one-group design, and a sample dependent on the given context, which limit the generalisability of the results and make it impossible to make strong causal assumptions. Future studies can overcome these limitations by adopting comparative or longitudinal research designs to assess the viability and externalisability of interactional development through PBL across various educational settings. Altogether, the research highlights the significance of interaction-based pedagogies in the education of EFL teachers and demonstrates that PBL can be useful for developing interpersonal communication skills at the discourse level.

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