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Undergraduate EFL Students' Blended Communities of Inquiry Learning Experience

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Abstract

Despite the theoretical alignment between the Community of Inquiry (CoI) framework and blended EFL pedagogy, empirical research on how Chinese undergraduate EFL learners' perceptions of teaching presence (TP), social presence (SP), cognitive presence (CP), and their specific subdimensions evolve within such contexts remains notably limited. To address this gap, the present study adopted a quasi-experimental pretest-posttest design, beginning with a 6-week pilot phase to validate the cultural adaptability and reliability and validity of the Chinese version of the Community of Inquiry Survey, while also testing the operability of the blended CoI (BCoI) intervention process. Following necessary adjustments to instruments and procedures based on pilot results, an 11-week BCoI intervention was implemented, involving 37 Chinese first-year STEM undergraduate EFL learners. Data were collected using the validated Chinese CoI Survey and analyzed through Wilcoxon paired-tests, with effect sizes calculated using Cohen's *r*. Results revealed significant medium-to-large improvements across all primary dimensions: TP (r = 0.49), SP (r = 0.56), and CP (r = 0.65). Among subdimensions, the most prominent effects were observed in TP's Design & Organization (r = 0.50), SP's Group Cohesion (r = 0.53), and CP's Triggering Events (r = 0.68), with all CP subdimensions demonstrating large effect sizes. These findings indicate that the BCoI approach holds potential for enhancing students' presence perceptions in EFL blended learning contexts, though the study is limited by the absence of a control group and a relatively small sample size.

Keywords: Community of Inquiry (CoI), Blended Learning, EFL Undergraduates, Teaching Presence; Social Presence; Cognitive Presence

Introduction

In recent decades, the integration of blended learning approaches in higher education has reshaped teaching and learning practices, particularly in English as a Foreign Language (EFL) contexts (Al Bataineh et al., 2019; Altay & Altay, 2019; Rahim, 2019). Blended learning, which combines asynchronous online activities with synchronous in-person or virtual interactions, offers unique opportunities to foster student engagement, collaboration, and critical

thinking—elements increasingly recognized as essential for effective language acquisition (Graham, 2006; Halverson & Graham, 2019; Ellis et al., 2016; Hasanah & Malik, 2020). Within this landscape, the Community of Inquiry (CoI) framework has emerged as a valuable theoretical lens to understand how learning communities function in blended environments (Akyol et al., 2009; Vaughan et al., 2013; Cleveland-Innes, 2019; Martin et al., 2022). Developed by Garrison et al. (2000), the framework identifies three core dimensions of a meaningful educational experience: Teaching Presence (TP), Social Presence (SP), and Cognitive Presence (CP). These dimensions interact to support deep, inquiry-based learning (Shea et al., 2022), making them particularly relevant for EFL contexts where students must simultaneously develop language proficiency and higher-order thinking skills.

Teaching Presence refers to the design, facilitation, and direction of learning experiences to support cognitive and social processes (Garrison, 2007). In blended EFL settings, effective TP might involve structuring online pre-class tasks to prepare students for synchronous discussions, guiding collaborative activities, and providing targeted feedback, all of which help clarify learning goals and reduce anxiety in second language use. Social Presence, defined as the ability of learners to project themselves socially and emotionally in a community, is equally critical (Garrison, 2007). For EFL students, SP can mitigate feelings of isolation, encourage risk-taking in language production, and foster a supportive environment where peers learn from one another. Cognitive Presence, the heart of the CoI framework, encompasses the iterative process of constructing meaning through critical thinking and inquiry, from identifying problems to resolving them (Garrison, 2007)—skills that align with modern EFL curricula emphasizing communicative competence and real-world application.

While prior studies have explored individual dimensions of the CoI framework in blended settings (Zhang, 2020; Tabassum & Mohd Saad, 2024), few have systematically examined how each dimension and its subdimensions shift before and after the implementation of a blended CoI approach, leaving a gap in empirical support to inform implementation of BCoI among undergraduate EFL students.

This study addresses these gaps by investigating changes in undergraduate EFL students' blended CoI learning experiences before and after the implementation of an 11-week Blended Community of Inquiry (BCoI) intervention. The participants were 37 first-year Chinese undergraduate students enrolled in a compulsory EFL course at a private university in Shaanxi Province, drawn from an intact class for convenience to ensure accessibility and feasibility of data collection. By focusing on shifts in perceptions of TP, SP, CP, and their subdimensions, the research aims to contribute practical insights into designing blended learning environments that effectively support EFL learners. Specifically, the study seeks to answer the following research questions:

RQ1: What are the changes in undergraduate EFL students' blended CoI learning experiences before and after implementation in terms of Teaching Presence (TP) and its subdimensions?
RQ2: What are the changes in undergraduate EFL students' blended CoI learning experiences before and after implementation in terms of Social Presence (SP) and its subdimensions?
RQ3: What are the changes in undergraduate EFL students' blended CoI learning experiences before and after implementation in terms of Cognitive Presence (CP) and its subdimensions?

Methodology

Research Design

This study employed a single-group repeated-measures quasi-experimental design to track changes in EFL undergraduates' Blended Community of Inquiry (CoI) experiences following an 11-week intervention. The design prioritised ecological validity by implementing the blended CoI approach within intact classroom settings, where random assignment to control/treatment groups was precluded by institutional constraints on course enrollment. The temporal sequence comprised two integrated phases: a six-week baseline period (Weeks 1-6) of conventional instructor-led instruction (lectures and individual exercises), followed by an eleven-week intervention phase (Weeks 7-17) implementing the blended CoI framework through scaffolded asynchronous-synchronous activities. This within-subject comparison approach allowed for direct observation of CoI learning experience evolution while maintaining authentic pedagogical conditions.

Participants

A cohort of 37 Chinese undergraduate students enrolled in a compulsory College English course in a private university in Shaanxi Province, China participated in this quasi-experimental study (male = 17, 45.9%; female = 20, 54.1%). All participants were from an intact class of first-year students majoring in STEM disciplines: Computer Science and Technology (75.7%, n = 28), Data Science and Big Data Technology (18.9%, n = 7), and Internet of Things (5.4%, n = 2), with a mean age of 18.38 years (SD = 0.59). Participants demonstrated intermediate English proficiency, as reflected in standardized National College Entrance Examination (*Gaokao*) English scores (M = 112.08/150, SD = 6.84). Complete data sets were obtained from all participants (0% attrition). Ethical approval was obtained under protocol UTMREC-2024-102, with written informed consent acquired prior to data collection. Participant demographics are summarized in Table 1.

Table 1
Participant Demographics (N=37)

Variable	Measure	Value
Gender	Male	17 (45.95%)
	Female	20 (54.05%)
Age (years)	M ± SD	18.38 ± 0.59
	Range	18–20
Gaokao English	M ± SD	112.08 ± 6.84
(Max=150)	Range	105–134
Academic Major	Computer Science	28 (75.68%)
	Data Science	7 (18.91%)
	Internet of Things	2 (5.41%)
Retention Rate	Final N	37 (100%)

Instruments

This study utilized a Chinese Blended Community of Inquiry Learning Experiences Questionnaire, adapted from Arbaugh et al.'s (2008) 34-item Community of Inquiry Survey Instrument through a rigorous translation-validation process. Independent forward- and back-translation by one applied linguistics doctoral researchers, followed by reviewing from two CoI specialists and a TESOL professor, to ensure conceptual equivalence and contextual appropriateness for Chinese EFL undergraduates.

A pilot study with 30 first-year accounting undergraduate students from the same university validated the instrument, with the sample size meeting the minimum requirement for preliminary psychometric testing (Hair, Black, Babin, & Anderson, 2013). This sample showed key demographic alignment with the main study cohort: comparable age distribution (pilot: M=18.83±0.913; main: M=18.38±0.59) and statistically equivalent Gaokao English scores (pilot: M=111.57±6.372; main: M=112.08±6.84; Mann-Whitney U, p= .825), with gender distributions reflecting disciplinary differences: pilot class (males: 3 [10%]; females: 27 [90%]) vs. main study (males: 17 [45.95%]; females: 20 [54.05%]), consistent with typical gender composition in Accounting vs. Computer Science Programs. Pilot psychometric analysis confirmed robust reliability across all dimensions: Teaching Presence (TP, α=0.967), Social Presence (SP, α=0.911), and Cognitive Presence (CP, α=0.962), all closely aligning with Arbaugh et al.'s (2008) benchmarks.

The instrument retains the original 34-item structure, measuring three core presences via 5-point Likert scales (1 = *Strongly Disagree* to 5 = *Strongly Agree*): Teaching Presence (TP) includes 13 items across three subdimensions: Design and Organization (TP1, Items 1–4), Facilitation (TP2, Items 5–10), and Direct Instruction (TP3, Items 11–13); Social Presence (SP) comprises 9 items across three subdimensions: Affective Expression (SP1, Items 14–16), Open Communication (SP2, Items 17–19), and Group Cohesion (SP3, Items 20–22); and Cognitive Presence (CP) contains 12 items across four subdimensions: Triggering Event (CP1, Items 23–25), Exploration (CP2, Items 26–28), Integration (CP3, Items 29–31), and Resolution (CP4, Items 32–34).

Administered online via Wenjuanxing at Weeks 6 (pretest) and 17 (posttest), the survey employed anonymity protocols (automated masking, IP-based duplicate prevention) to mitigate bias, adhering to ethical standards approved by the Universiti Teknologi Malaysia Research Ethics Committee (Reference No. UTMREC-2024-102). Main study reliability analyses confirmed consistent internal consistency: TP (α=0.963 pre, 0.966 post), SP (α=0.919 pre, 0.954 post), and CP (α=0.967 pre, 0.964 post), all exceeding Nunnally's (1978) 0.70 threshold.

Procedure

Following a 6-week pilot study in a parallel class (Weeks 1–6), the main study was conducted over 11 weeks (Weeks 7–17) in Semester I of the 2024/2025 academic year. The Blended Community of Inquiry (BCoI) intervention was structured around a three-phase cyclical model, where each weekly unit unfolded as an interconnected loop: asynchronous pre-class preparation fed into synchronous in-class collaboration, which in turn informed asynchronous post-class consolidation—creating a continuous, iterative learning cycle (Figure 1).

Phase 1: Pre-class Asynchronous Foundation

Each weekly cycle initiated with asynchronous activities delivered via Tsinghua University's XuetangX LMS, intentionally designed to prime both cognitive and social presence for subsequent interaction. Students first engaged with assigned readings and instructional videos to build foundational knowledge, then completed self-assessment quizzes with automated feedback to address initial misconceptions. These individual preparations were extended into peer-moderated discussion forums (e.g., responding to prompts like "What tips would you share with peers about rational consumption?"), where early social connection was fostered through idea exchange. By the end of this phase, students had established baseline understanding and preliminary peer familiarity—critical prerequisites for the collaborative work ahead.

Phase 2: In-class Synchronous Collaboration

Building directly on the outputs of Phase 1, synchronous sessions transformed individual preparation into collective knowledge construction. Instructors used LMS analytics (e.g., identifying recurring gaps from pre-class quizzes) to tailor facilitation, guiding three interconnected activities: (a) small-group problem-solving (e.g., "Design a 3-day Xi'an itinerary for international students using newly learned language structures"), with real-time feedback to scaffold deeper inquiry; (b) peer-teaching presentations, evaluated through triadic assessment (teacher input, peer critique, self-reflection) to reinforce accountability; and (c) whole-class synthesis discussions, where diverse perspectives from small groups were integrated into shared understanding. This phase leveraged pre-class foundations to amplify cognitive engagement and social cohesion.

Phase 3: Post-class Asynchronous Consolidation

To complete the cycle, students collaborated on reflective notes that synthesized insights from Phase 2, focusing on their team-based mini-projects—analyzing contributions, outcomes, and areas for improvement. These notes were peer-reviewed using CoI-aligned criteria (e.g., depth of problem resolution, integration of diverse perspectives), ensuring that learning was both consolidated and refined. Importantly, this phase also served as a bridge to the next week's cycle: reflections highlighted lingering questions or needs, which informed the design of subsequent pre-class activities. In this way, each cycle closed with actionable insights that primed the next iteration of learning.

Participants completed the Chinese version of the CoI questionnaire before and after the 11-week intervention. Ethical approval was granted by Universiti Teknologi Malaysia Research Ethics Committee (Reference No. UTMREC-2024-102), and written informed consent forms were obtained from all participants prior to data collection.

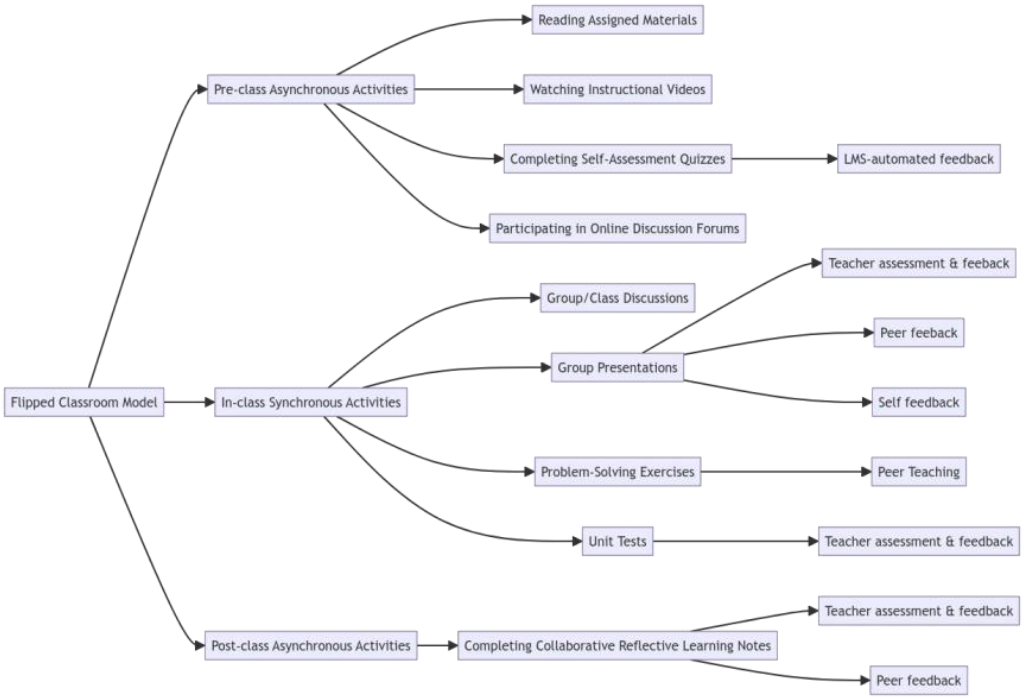

Figure 1 The BCoI Approach of College English Course

Data Analysis

Quantitative analysis progressed through three methodical stages to address the research question. The normality of the TP, SP, CP and their subdimensions data was assessed using both the Kolmogorov-Smirnov and Shapiro-Wilk tests, with all *p*-values less than 0.001, indicating that the data significantly deviate from a normal distribution across all measured variables. All CoI survey data violated normality assumptions (Shapiro-Wilk $p < .05$). We therefore report medians and interquartile ranges as robust centrality measures, with Wilcoxon signed-rank tests for pre-post comparisons Field (2017).

Subsequently, primary hypothesis testing employed Wilcoxon signed-rank tests to evaluate pre-post differences in the three core presence elements (TP, SP, CP) at $\alpha = .05$ (two-tailed). Subdimensional analyses of the original hypotheses—were also conducted for theoretically salient components: Teaching Presence subdimensions, including Design & Organisation (TP1), Facilitation (TP2), Direct Instruction (TP3); Social Presence subdimensions: Affective Expression (SP1), Open Communication (SP2), Group Cohesion (SP3); Cognitive Presence subdimensions: Triggering Event (CP1), Exploration (CP2), Integration (CP3), Resolution (CP4).

Effect sizes ($r = |z|/\sqrt{\mathrm{N}}$) were computed for significant outcomes using Cohen's (1988) benchmarks: .10 (small), .30 (medium), .50 (large). All data points were available for analysis, ensuring the integrity of the results.

Results

Changes in Teaching Presence and Its Subdimensions

Wilcoxon signed-rank tests revealed improvements in Teaching Presence (TP) after the blended CoI intervention. As presented in Table 2, the median score for overall TP increased substantially from 4.00 (IQR = 4.00-4.70) to 4.70 (IQR = 4.10-5.00), with statistical significance ($Z = 3.007$, $p = .003$). This shift yielded a large effect size ($r = 0.49$), indicating meaningful

pedagogical enhancement. Crucially, the 75th percentile reached the maximum scale score (5.00) post-intervention, a threshold unattained in pre-intervention.

Table 2
Teaching Presence Changes (N = 37)

Dimension	Pre-test Mdn [IQR]	Post-test Mdn [IQR]	ΔMdn	*Z*	*p*	*r*
TP Total	4.00 [4.00–4.70]	4.70 [4.10–5.00]	+0.70	3.007	.003**	0.49
TP1 Design & Organization	4.00 [4.00–4.80]	4.80 [4.00–5.00]	+0.80	3.062	.002**	0.50
TP2 Facilitation	4.00 [4.00–4.85]	4.70 [4.00–5.00]	+0.70	2.587	.010*	0.43
TP3 Direct Instruction	4.00 [4.00–4.70]	4.70 [4.00–5.00]	+0.70	2.732	.006**	0.45

Notes. 1) Mdn = Median, IQR = Inter-quartile Range [25th–75th percentile]. 2) Effect size $r = |z|/\sqrt{\mathrm{N}}$. 3) ** $p < .01$, * $p < .05$.

Analysis of subdimensions showed consistent median elevation. Design & Organization (TP1) exhibited the most pronounced improvement (ΔMdn = +0.80, $r = .50$), with its IQR expanding from 0.80 to 1.00 units. Facilitation (TP2) increased significantly (ΔMdn = +0.70, $r = .43$), while Direct Instruction (TP3) showed parallel growth (ΔMdn = +0.70, $r = .45$). Notably, all subdimensions achieved maximum scores at the 75th percentile (5.00), suggesting potential ceiling breakthrough across TP subdimensions. Moreover, the IQR expansion in TP3 (0.70 → 1.00) suggests greater BCoI performance differentiation after intervention.

Changes in Social Presence and Its Subdimensions

Wilcoxon signed-rank tests indicated significant enhancements in Social Presence (SP) dimensions post-intervention. As consolidated in Table 3, the overall SP median rose from 4.00 (IQR = 3.85-4.05) to 4.10 (IQR = 4.00-5.00), marking a significant elevation at the distribution midpoint ($Z = 3.386$, $p < .001$). This improvement demonstrated a large effect size ($r = 0.56$), with the 75th percentile reaching the maximum scale score (5.00), a threshold absent in pre-intervention.

Table 3
Social Presence Pre-Post Analysis (N = 37)

Dimension	Pre-test Mdn [IQR]	Post-test Mdn [IQR]	ΔMdn	*Z*	*p*	*r*
SP Total	4.00 [3.85–4.05]	4.10 [4.00–5.00]	+0.10	3.386	< .001***	0.56
SP1 Affective Expression	4.00 [4.00–4.00]	4.00 [4.00–5.00]	0.00	2.068	.039*	0.34
SP2 Open Communication	4.00 [4.00–4.00]	4.00 [4.00–5.00]	0.00	2.745	.006**	0.45
SP3 Group Cohesion	4.00 [3.70–4.00]	4.00 [4.00–5.00]	0.00	3.197	.001**	0.53

Notes. 1) Mdn = Median, IQR = Inter-quartile Range [25th–75th percentile]. 2) Effect size $r = |z|/\sqrt{\mathrm{N}}$. 3) *** $p < .001$, ** $p < .01$, * $p < .05$.

Subdimensional analysis revealed distinct patterns. Group Cohesion (SP3) showed the most substantial increase despite stable median (ΔMdn = 0.00, $r = 0.53$), with its IQR expanding from 0.30 to 1.00 units - the largest dispersion shift among subdimensions. Open Communication (SP2) also improved significantly ($r = 0.45$), while Affective Expression (SP1) exhibited moderate gains ($r = 0.34$). Crucially, all subdimensions achieved maximum scores at the 75th percentile (5.00), suggesting ceiling-level perception for the upper quartile subgroup.

Changes in Cognitive Presence and Its Subdimensions

Wilcoxon signed-rank tests also revealed significant improvements in Cognitive Presence (CP) after the 11-week blended CoI intervention. As Table 4 indicates, the median for overall CP advanced from 4.00 (IQR = 3.95–4.00) to 4.20 (IQR = 4.00–5.00), with a statistically significant increase ($Z = 3.945$, $p < .001$). The effect size was large ($r = 0.65$), likely suggesting a substantive shift in learners' inquiry engagement. For post-intervention, the 75th percentile reached the scale maximum (5.00) compared with their pre-intervention level, a threshold absent in pre-intervention.

Table 4
Cognitive Presence Pre-Post Analysis (N = 37)

Dimension	Pre-test Mdn [IQR]	Post-test Mdn [IQR]	ΔMdn	*Z*	*p*	*r*
CP Total	4.00 [3.95–4.00]	4.20 [4.00–5.00]	+0.20	3.945	< .001***	0.65
CP1 Triggering Event	4.00 [4.00–4.00]	4.00 [4.00–5.00]	0.00	4.134	< .001***	0.68
CP2 Exploration	4.00 [4.00–4.00]	4.30 [4.00–5.00]	+0.30	3.786	< .001***	0.62
CP3 Integration	4.00 [4.00–4.00]	4.00 [4.00–5.00]	0.00	3.267	.001**	0.54
CP4 Resolution	4.00 [4.00–4.00]	4.30 [4.00–5.00]	+0.30	3.765	< .001***	0.62

Notes. 1) Mdn = Median, IQR = Inter-quartile Range [25th–75th percentile]. 2) Effect size $r = |z|/\sqrt{\mathrm{N}}$. 3) *** $p < .001$, ** $p < .01$.

All subdimension analysis of CP showed positive changes. Exploration (CP2) and Resolution (CP4) each gained 0.30 median points, with large effect sizes ($r = 0.62$). Although the median for Triggering Event (CP1) and Integration (CP3) remained at 4.00, the 75th percentile rose to 5.00 for both, indicating that upper quartile subgroup now consistently reached the top of the scale. The IQR widened across all four indicators, reflecting increased variation in the post-intervention.

Discussion

Discussion on Changes in Teaching Presence and Its Subdimensions

The Wilcoxon paired - test results indicate a significant enhancement in undergraduate EFL students' perception of overall Teaching Presence (TP) following the implementation of the Blended Community of Inquiry (BCoI) approach (Median: 4.00 [4.00–4.70]→ 4.70 [4.10–5.00], $Z = 3.007$, $p = .003$, $r = 0.49$). Within the quasi - experimental pretest - posttest design, this change aligns with Garrison et al.'s (2000) CoI framework, where teaching presence serves as a cornerstone for guiding the educational experience. The BCoI approach, encompassing pre - class asynchronous activities (e.g., reading assigned materials, watching instructional videos), in - class synchronous interactions (e.g., group discussions, problem - solving exercises), and post - class asynchronous tasks (e.g., completing collaborative reflective learning notes), creates a structured learning journey. This structure resonates with Vaughan et al. 's (2023) Seven Principles of Blended Learning, particularly "Design for open communication and trust that will create a learning community" and "Ensure that assessment is aligned with learning outcomes and growth for all students"(p.23). Meanwhile, the the improved perception of overall TP and the moderate effect size ($r = 0.49$) provide empirical support to echo Tabassum and Saad's (2024) systematic review finding of Community of Inquiry (CoI) and blended learning in EFL/ESL education, which highlights that effective teaching presence encompasses deliberate planning and facilitation of learning activities.

For the Design & Organization subdimension (TP1), notable changes were observed (Median: 4.00 [4.00–4.80]→ 4.80 [4.00–5.00], $Z = 3.062$, $p = .002$, $r = 0.50$) . Garrison et al.'s (2000) CoI framework emphasizes the role of teaching presence in setting the climate via clear goals an directions, and the BCoI approach operationalizes this through its three - phase structure (pre

- class, in - class, post - class). Pre - class asynchronous activities, such as reading materials and watching videos, establish clear cognitive scaffolding, setting explicit expectations for knowledge acquisition — a key aspect of Vaughan et al. 's (2023, p.23) principle of "Design for critical reflection and discourse that will support inquiry". In - class synchronous sessions, including group discussions and problem - solving exercises, build on this pre - work, transforming individual preparation into collaborative, goal - oriented interaction. Post - class reflective learning notes further reinforce alignment with learning outcomes, closing the loop on the learning cycle. This sequential design, which embeds clarity and purpose into the instructional process, has potentially operationalized Garrison's highlight of effective teaching presence and Vaughan's principles of intentional design, as suggested by the substantial increase in the median and the large effect size (r = 0.50). The significant improvement in Design & Organization and large effect size also echoes Zhang's (2020) finding: our BCoI's intentional alignment of asynchronous pre-class activities with synchronous discussions mirrored the "ongoing instructor participation" highlighted by Zhang (2020), reinforcing that purposeful teaching design and consistent guidance are pivotal to enhancing students' perceptions.

The Facilitation subdimension (TP2) also exhibited significant changes (median 4.00 [4.00–4.85]→ 4.70 [4.00–5.00], Z = 2.587, p = .010, r = 0.43). Garrison et al.'s (2000) CoI framework underscores the importance of facilitation within the learning community. The BCoI approach, highlights interactive and collaborative in - class activities (e.g., group discussions, group presentations, problem - solving exercises), to provide ample opportunities for teachers to fulfill this facilitative role. These activities require teachers to manage discourse, guide peer feedback, and keep the learning process on track, in line with Vaughan et al. 's (2023) principle of "Sustain respect and responsibility for collaboration"(p.23). For instance, during our group presentations, teachers facilitate interactions between presenters and the class, and in peer - teaching scenarios within problem - solving exercises, they maintain a productive learning environment. The observed improvements in Facilitation seem to support Zhang's (2020) finding that EFL students value ongoing facilitation even as learning communities form to reinforce group identity and sustain engaging interactions.

Direct Instruction subdimension (TP3) likewise showed significance rise (4.00 [4.00–4.70] → 4.70 [4.00–5.00], Z = 2.732, p = .006, r = 0.45). Even within the BCoI approach, which emphasizes blended and collaborative learning, direct instruction remains integral, as posited by Garrison et al.'s (2000) CoI framework. In - class activities like unit tests and teacher assessments, as well as teacher interventions during problem - solving exercises (e.g., providing direct explanations when students face difficulties) and feedback during group presentations, exemplify this direct instructional role. This aligns with Vaughan et al. 's (2023) principle of "Design for critical reflection and discourse" (p.23), where direct instruction complements collaborative learning to ensure conceptual clarity. The observed enhancement in TP3 (Direct Instruction) aligns with Chen (2022) who emphasizes that deliberate feedback integration within direct instructional scaffolding, such as the consistent provision of corrective guidance for unified practice tasks, serves as a critical bridge between face-to-face and online learning contexts, amplifying students' perceived coherence of instructional support.

Discussion on Changes in Social Presence and Its Subdimensions

The Wilcoxon paired - test results show a significant enhancement in undergraduate EFL students' perception of overall Social Presence (SP) after the implementation (Median: 4.00 [3.85–4.05] → 4.10 [4.00–5.00], $Z = 3.386$, $p < .001$, $r = 0.56$). Within the quasi - experimental pretest - posttest design, this change is consistent with Garrison et al.'s (2000) CoI framework, where Social Presence contributes to engagement of and with participants in the educational experience. The BCoI approach, featuring pre - class asynchronous activities (e.g., online discussion forums), in - class synchronous activities (such as group discussions and presentations), and post - class asynchronous activities (collaborative reflective learning notes), provides multiple interaction channels. Aligning with Vaughan et al.'s (2023) principles of establishing community and cohesion and maintaining respect for collaboration, these structured interactions likely fostered a stronger sense of social presence. The large effect size ($r = 0.56$) further indicates a potential large impact of the intervention on students' SP perceptions.

For Affective Expression (SP1), the median remained 4.00, but the post-test IQR expanded to [4.00–5.00] (pre-test: [4.00–4.00]), with a significant p-value ($p = .039$) and a moderate effect size ($r = 0.34$)—the smallest among the three subdimensions. In the CoI framework (Garrison, 2017), Affective Expression supports a positive learning climate, but its moderate effect size here may reflect the nature of EFL contexts: students may be more reserved in expressing emotions (e.g., uncertainty or enthusiasm) in a second language, even within structured activities like pre-class forums or in-class discussions. While the BCoI approach aligned with Vaughan et al.'s (2023, p.23) "Design for open communication" principle, Affective Expression's limited effect size ($r = 0.34$) seems to contradict Guo et al. (2021) who identifies affectiveness as the most prominent subdimension of social presence in online discussions (accounting for 49% of students' posts). Meanwhile, however, Guo et al. (2021) situates affectiveness as the foundational layer of online community development, preceding open communication and group cohesion. This hierarchical model may help explain why affective exression exhibited the smallest effect size: as a baseline component, affective expression may show more modest growth once a basic level of emotional interaction is established (evidenced by the stable median of 4.00), while later-stage subdimensions like SP3 (group cohesion) undergo more pronounced changes as the community matures.

For Open Communication (SP2), the median stayed at 4.00, with a post-test IQR of [4.00–5.00], compared with pre-test IQR of [4.00–4.00]) ($p = .006$, $r = 0.45$), reflecting a moderate positive effect size, larger than SP1 but smaller than SP3. As noted in the CoI framework (Garrison, 2017), Open Communication is central to Social Presence, and its moderate effect size aligns with the BCoI design: pre-class forums (for asynchronous idea exchange) and in-class discussions (for synchronous dialogue) directly facilitated open interaction, consistent with Vaughan et al.'s (2023, p.23) "Design for open communication and trust" principle. Ng (2022) notes that platforms enabling free interaction and expression—such as metaverse environments with collaborative tasks—strengthen social presence. This echos the improvement in SP2 herein: the design of interactive forums and unconstrained dialogue spaces based on LMS (XuetangX Platform) in the current study likely fostered open communication. Guo et al. (2021) reported that Open Communication in online discussions was predominantly structured around "asking questions" (50.3%) and "responding to peers" (38.3%)—behaviors inherently tied to task-driven interactions rather than fully spontaneous

dialogue. This sheds light to the findings of Open Communication in our study: Its effect size, while meaningful, may be constrained by the balance of structure and spontaneity in BCoI activities: structured tasks (e.g., guided discussion prompts) encouraged participation but may have limited fully unscripted communication, leading to a less pronounced, moderate effect than SP3.

For Group Cohesion (SP3), the median remained 4.00, while post-test IQR expanded from [3.70–4.00] to [4.00–5.00](p = .001), with a large effect size (r = 0.53)—the largest among the subdimensions. In the CoI framework (Garrison, 2017), Group Cohesion strengthens community unity, and its largest effect size likely stems from the BCoI's emphasis on collaborative tasks: group presentations, peer teaching, and problem-solving exercises required interdependence, potentially operationalizing Vaughan et al.'s (2023, p.23) "Establish community and cohesion" principle. Unlike affective expression (subjective) or open communication (individual-focused), group cohesion emerges from sustained collective effort, which the BCoI's multi-phase design (pre-class preparation → in-class collaboration → post-class reflection) purposely nurtured. The significant enhancement in Group Cohesion aligns closely with the qualitative findings of Waddington and Porter (2021) whose content and thematic analysis revealed that focused social discourse fostered by intentional design of online learning spaces help strengthen learners' sense of realness and cultivates a collective sense of belonging. Similarly, Ng (2022) also highlights that collaborative processes facilitate learners, including introverted ones, to develop sense of belonging to a group, a potential mechanism relevant to the large effect of Group Cohesion enhancement in this study.

Discussion on Changes in Cognitive Presence and Its Subdimensions

The Wilcoxon paired - test results show a significant enhancement in undergraduate EFL students' perception of overall Cognitive Presence (CP) after the implementation (Median: 4.00 [3.95–4.00] → 4.20 [4.00–5.00], Z = 3.945, p < .001, r = 0.65). Within the quasi - experimental pretest - posttest design, this change aligns with the Community of Inquiry (CoI) framework (Garrison et al., 2000), which positions Cognitive Presence as central to the educational experience, involving knowledge construction processes. The BCoI approach, featuring a sequence of pre-class asynchronous activities (e.g., reading materials, watching videos to initiate thinking), in-class synchronous tasks (e.g., problem-solving, group discussions for exploration and integration), and post-class asynchronous work (e.g., collaborative reflective notes for resolution), creates a structured path for cognitive engagement. These activities are consistent with Vaughan et al.'s (2023, p.23) Seven Principles of Blended Learning, such as "Design for critical reflection and discourse that will support inquiry". Moreover, the overall CP yielded a large effect size (r = 0.65), despite the varied magnitude across its four subdimensions. This pattern echoes Moore and Miller (2022) who highlight that while individual phases may vary in prominence, their collective advancement strengthens CP, highlighting the multi-phase coherence rather than isolated stage development.

The Triggering Event subdimension (CP1) experienced a significant increase (Z = 4.134, p < .001). While the median remained stable at 4.00, the IQR widened from [4.00–4.00] to [4.00–5.00], with a large effect size (r = 0.68) . This indicates a shift in response distribution: more students moved from 4.00 to 5.00, reflecting higher perceptions of Triggering Event post-intervention. Within the CoI framework (Akyol & Garrison, 2011), the Triggering Event

initiates cognitive presence by prompting students to identify problems or questions. Our BCoI approach leverages pre-class activities (e.g., reading materials, videos) to spark such cognitive interest—consistent with this mechanism. Even with a stable median, the expanded IQR and significant p-value confirm the intervention's impact, aligning with Vaughan et al.'s (2023, p.23) "Design for critical reflection and discourse" principle: our BCoI design (e.g., pre-class reflection prompts) fostered a more effective environment for initiating cognitive engagement. Rolim et al. (2019) further noted that Open Communication (SP2) is closely linked to students' perceptions of Triggering Events (CP1). Our widened IQR for CP1, reflecting more diverse perceptions of triggering events, such as pre-class readings, videos, forums and real-time in-class discussions where students freely exchanged ideas and questions, shaping varied understandings of how triggering events unfold. This significant effect ($r = 0.68$, $p < .001$) further reinforces this link.

The Exploration subdimension (CP2) showed a significant increase ($Z = 3.786$, $p < .001$), with the median rising from 4.00 [4.00–4.00] to 4.30 [4.00–5.00] and a large effect size ($r = 0.62$). This indicates not only overall improved exploration experiences (median increase) but also greater diversity in engagement—more students reached higher levels of exploration, widening the IQR. Within the CoI framework (Akyol & Garrison, 2011), Exploration involves students actively investigating problems/ questions from the Triggering Event. Our BCoI approach fosters this via in-class activities (e.g., problem-solving tasks, group discussions) where students explore diverse views and test solutions—consistent with this mechanism. These results align with Cui et al.'s (2024) emphasis on teacher-guided collaboration and learner autonomy: in our context, teachers steered discussions by prompting critical questions, while learner autonomy (nurtured via mini projects) encouraged proactive exploration of resources. Such dynamics likely deepened students' exploration experiences, as reflected in the significant median increase and large effect size. They also resonate with Vaughan et al.'s (2023, p.23) "Design for critical reflection and discourse" principle: BCoI's structured interactions and reflection activities (e.g., group presentations followed by teacher/peer feedback, writing collaborative reflective journals) explicitly prioritize critical reflection and discourse, may be related to the enhanced CP2 perception. This large effect ($r = 0.62$) further reinforces this link.

The Integration subdimension (CP3), similar to CP1, showed a significant increase ($Z = 3.267$, $p = .001$). While the median remained stable at 4.00, the IQR expanded from [4.00–4.00] to [4.00–5.00], with a large effect size ($r = 0.54$). This indicates a response shift: more students moved from 4.00 to 5.00, reflecting increased agreement with knowledge integration post-intervention. Within the CoI framework (Akyol & Garrison, 2011), Integration occurs when students synthesize explored knowledge into new understanding. Our BCoI approach supports this via activities like group discussions (to consolidate diverse perspectives), and group presentations with grading/rating rubrics (to formalize synthesis). This aligns with Vaughan et al.'s (2023, p.23) "Design for critical reflection and discourse" principle: BCoI's structured environment (e.g., guided discussion prompts and grading/rating rubrics) fosters the deliberate thinking needed for integration. Furthermore, Aslan and Turgut's (2021) find CP thrives through linked and complementary stages in their study on a course-level CoI intervention in Turkey. Following this, our CP3 gains may be related to the staged and integrated CP progression design: CP1's problem triggers provided focus, while CP2's

exploration accumulated diverse insights, which creates a foundation for integration. The large effect (r = 0.54) in our study seem to further suggest this link.

The Resolution subdimension (CP4), similar to CP2, showed significant enhancement (Z = 3.765, p < .001). The median increased from 4.00 to 4.30, with the IQR widening from [4.00–4.00] to [4.00–5.00], and a large effect size (r = 0.62). This reflects both overall improved resolution experiences (median increase) and greater diversity in engagement—more students reached higher levels of problem-solving. Within the CoI framework (Akyol & Garrison, 2011), Resolution is the final cognitive presence phase, where students reach conclusions to problems/solutions. Our BCoI approach supports this via in-class activities (e.g., problem-solving exercises, mini projects) and post-class tasks (e.g., collaborative reflective notes) that guide students to apply integrated knowledge to concrete solutions. This aligns with Vaughan et al.'s (2023, p.23) principle of "Sustain inquiry that moves to resolution and shared metacognitive development": BCoI's post-class collaborative reflections, for example, encourage students to jointly reflect upon their problem-solving process, fostering shared metacognition. Fiock (2020) further emphasizes that Resolution thrives on phase-linked design and collaborative, feedback-rich activities—consistent with our findings. In our study, CP4 gains are likely related to continuity across phases: CP1's triggers set problem goals, CP2's exploration and CP3's integration built solution foundations, while in-class mini projects (with teacher/peer feedback) drove application to resolution. Our findings in the large effect (r = 0.62) seem to further highlight that CoI-aligned continuity and feedback may be related to higher resolution experiences (Garrison et al., 2010).

Practical Implications

The findings of this study, which exmained the impact of the Blended Community of Inquiry (BCoI) approach on Cognitive Presence (CP), Social Presence (SP), and Teaching Presence (TP) in undergraduate EFL contexts, offer actionable insights for educators designing and implementing blended learning environments. These implications are derived directly from the observed changes in each dimension and their associated effect sizes, with alignment to the principles of the CoI framework (Garrison et al., 2017) and blended learning (Vaughan et al., 2023).

Strengthening Teaching Presence (TP) is associated with intentional facilitation, as indicated by the observed improvements in TP subdimensions—with notable effects for Design & Organization (r = 0.50, large), Facilitation (r = 0.43, medium) and Direct Instruction (r = 0.45, medium) —which suggest the teacher's role in structuring and guiding blended learning experiences. In terms of Design & Organization, teachers might explicitly map pre-class, in-class, and post-class activities to learning objectives, ensuring clarity in task sequencing; for example, linking pre-class video tutorials to in-class practice tasks and post-class reflection notes creates a cohesive learning journey, with support from Garrison's (2017) emphasis on goal-directed engagement. For Facilitation and Direct Instruction, teachers could balance guidance and autonomy in synchronous sessions: facilitating peer interactions during group work in a way that aligns with enhanced facilitation, while providing targeted direct instruction (e.g., clarifying language or structure misconceptions during problem-solving) when students demonstrate confusion as efforts of Direct Instruction. This approach has alignment with Vaughan et al.'s (2023, p.23) principle of "Sustain respect and responsibility for collaboration."

Fostering Social Presence (SP) may require targeted interaction strategies, considering the significant shifts in SP subdimensions, with the largest effect size for Group Cohesion (r = 0.53, exceeding the large effect benchmark of Field (2017)), suggesting the potential value of activities that nurture community and collaboration. Given its observed response to the BCoI approach, Group Cohesion could be supported by incorporating sustained group tasks such as long-term project collaborations and peer teaching roles that require interdependence; Collaborative reflective journal after a group project might further enhance a sense of shared responsibility, with alignment to Vaughan et al.'s (2023, p.23) principle of "Establish community and cohesion." For Open Communication and Affective Expression, which showed smaller effect sizes (SP2: r = 0.45, medium; SP1: r = 0.34, medium), purposeful prompts posted via the real-time bullet chatting, poll, automated quiz, word cloud features, asynchronous Online Discussion Forums features of LMS (e.g., Rain Classroom), could create safer spaces for expression and fun, particularly in EFL contexts where students may be hesitant to communicate emotionally in a second language.

To enhance Cognitive Presence (CP), educators may prioritize structured, sequential tasks that guide students through the cognitive inquiry cycle, given the significant improvements in overall CP and its subdimensions—with large effect sizes for Triggering Events (r = 0.68), Exploration (r = 0.62), Integration (r = 0.54) and Resolution (r = 0.62) as defined by Field's (2017) benchmarks. Pre-class asynchronous activities, such as curated reading materials and short instructional videos, might explicitly pose thought-provoking questions or real-world language tasks to activate initial cognitive engagement. An example could be assigning a brief article on a controversial topic with guided prompts like "Are universities becoming a thing of the past?". In-class synchronous sessions, meanwhile, might focus on collaborative problem-solving activities like mini projects, communication tasks, role-plays that build on pre-class preparation, while post-class tasks such as collaborative reflective notes could encourage students to synthesize and apply new knowledge. This multi-phase design, as observed in the BCoI approach, is associated with supporting the progression from exploration to resolution, leveraging the large effect sizes for these stages.

Adapting to differential effects across dimensions is also relevant, as the varying effect sizes across subdimensions (e.g., Design & Organization (TP1, r = 0.50, large) > Direct Instruction (TP3, r = 0.45, medium) > Facilitation (TP2, r = 0.43, medium), Group Cohesion (SP3, r = 0.53, large) > Open Communication (SP2, r = 0.45, medium) > Affective Expression (SP1, r = 0.34, medium); Triggering Events (CP1, r = 0.68, large) > Exploration (CP2, r = 0.62, large) = Resolution (CP4, r = 0.62, large) > Integration (CP3, r = 0.54, large) suggest that educators might tailor interventions to address dimensions with weaker responses. For instance, to enhance Affective Expression (SP1), incorporating low-stakes personal reflection tasks such as journaling about language learning challenges could complement the BCoI's existing activities, with potential to amplify emotional engagement in EFL contexts. For TP3 (Direct Instruction), given its relatively smaller effect size, teachers might integrate more targeted, just-in-time instruction modules, such as short video clips addressing common linguistic errors identified in pre-class tasks, to reinforce direct guidance while maintaining the balance between autonomy and support.

Limitations

This study has several limitations that should be noted to contextualize its findings. First, the quasi-experimental pretest-posttest design lacks a control group, which limits the ability to definitively attribute observed improvements to the BCoI approach alone. Confounding variables—such as concurrent changes in students' language proficiency or external learning experiences—may have influenced outcomes, and without a comparison group exposed to traditional teaching methods, isolating the specific impact of the blended intervention remains challenging. Second, the narrow sample, consisting of undergraduate EFL students from a single institution, constrains generalizability. Student characteristics (e.g., language proficiency, prior blended learning experience) and institutional resources (e.g., technology access, class size) vary across contexts, meaning observed effect sizes might differ in more diverse or larger settings where fostering affective expression could prove more difficult. Third, reliance on self-reported questionnaires introduces potential response biases, as students' perceptions of engagement or cohesion may not align with objective indicators (e.g., actual participation frequency, quality of collaborative outputs). Complementary data sources, such as classroom observations or analyses of discussion transcripts, which could have provided a more holistic view, were not integrated. Fourth, the focus on short-term (single-semester) changes limits understanding of the BCoI approach's long-term sustainability, leaving unclear whether enhancements (e.g., CP1's large effect size, $r = 0.68$) would persist or require ongoing adjustments. Finally, the BCoI approach examined here represents a specific configuration of asynchronous and synchronous activities, and variations in task design (e.g., frequency of collaborative tasks) or teacher facilitation styles, which could yield different outcomes, were not explored. These limitations collectively underscore the need for future research to address design gaps, expand sampling, and employ mixed methods to strengthen findings on blended communities of inquiry in EFL contexts.

Conclusion

This study responds directly to the limited empirical research on how undergraduate students' Teaching Presence (TP), Social Presence (SP), and Cognitive Presence (CP) and subdimensional experiences evolve in blended EFL contexts, a critical gap despite the CoI framework's theoretical alignment with blended pedagogy. The findings reveal that the BCoI approach was associated with meaningful shifts across all three dimensions, with a large effect size observed in TP's Design & Organization ($r = 0.50$, large) based on Field's (2017) benchmarks. Additionally, SP's Group Cohesion showed a large effect size ($r = 0.53$), and all CP subdimensions demonstrated large effect sizes (Triggering Events, $r = 0.68$; Exploration, $r = 0.62$; Integration, $r = 0.54$; Resolution, $r = 0.62$). These results align with the CoI framework (Garrison et al., 2017) and Vaughan et al.'s (2023) blended learning principles, highlighting that structured integration of asynchronous and synchronous activities can foster purposeful inquiry and community in EFL contexts. By documenting significant changes in CoI perceptions, especially nuanced changnes in the subdimensions, we provide further empirical support for designing targeted blended EFL instruction, such as prioritizing TP's Design & Organization to structure learning pathways, fostering SP's Group Cohesion through collaborative tasks, and activating CP's Triggering Events via problem-driven activities, to enhance students' holistic presence experiences, along with implications for the educators to tailor interventions to address dimensions with weaker responses.

Practically, the study underscores the value of intentional teaching facilitation, sustained collaborative activities, and sequential cognitive tasks in enhancing presence dimensions. While limitations—including the lack of a control group, narrow sampling, and reliance on self-reported data—constrain generalizability, the core findings offer actionable insights for designing blended learning environments that prioritize student engagement.

Future research could address these limitations by incorporating control groups, expanding samples across diverse institutional and linguistic contexts, and using mixed methods (e.g., classroom observations alongside surveys) to explore long-term effects of BCoI variations. Ultimately, this study contributes to understanding how blended inquiry-based approaches can enrich EFL learning, emphasizing the potential of purposeful design to cultivate meaningful educational communities.

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