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Utilizing Virtual Reality Negotiation Simulations to Enhance Pragmatic Competence in High School Students

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ABSTRACT

The study examines the impact of Virtual Reality (VR) negotiation simulations on enhancing the pragmatic competence of high school learners of English as a foreign language. Using a quasi-experimental design, it compares an experimental group trained through VR-based negotiation tasks with a control group taught through traditional classroom instruction. Pragmatic development was measured using pre/post-tests, performance tasks, and student reflections focusing on politeness strategies, turn-taking, and cultural appropriateness. Results reveal that students exposed to VR demonstrated notably higher pragmatic awareness and communicative adaptability. The immersive VR environment enabled learners to practice language in context-rich, interactive scenarios resembling real-life communication. The analysis draws on Kasper and Rose's (2002) distinction between pragmalinguistic and sociopragmatic competence, supported by Taguchi's task-based pragmatics assessment framework. Together, these models allowed for a comprehensive evaluation of both linguistic forms and context-sensitive behaviors. Overall, the findings highlight VR simulations as an effective tool for improving pragmatic competence, boosting learner confidence, and increasing engagement.

Keywords: Virtual Reality, Pragmatic Competence, Negotiation Skills, Language Learning Technology, High School Education

الاستفادة من محاكاة الواقع الافتراضي في تنمية الكفاءة التداولية لدى طلاب المرحلة العليا في المدارس

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المُستخلص

تبحث الدراسة في فاعلية استخدام محاكيات التفاوض بالواقع الافتراضي (VR) في تنمية الكفاءة التداولية لدى طلاب المرحلة الثانوية من متعلمي اللغة الإنجليزية بوصفها لغة أجنبية. اعتمدت الدراسة تصميمًا شبه تجريبي شمل مجموعتين: مجموعة تجريبية تلقت تدريبًا قائمًا على محاكيات التفاوض بالواقع الافتراضي، وأخرى ضابطة اعتمدت التعليم التقليدي داخل الصف. جُمعت البيانات عبر اختبارات قبلية وبعدية، ومهمات أداء، وانعكاسات الطلاب، مع التركيز على تنمية استراتيجيات التأدّب، وتنظيم الدور الكلامي، والملاءمة الثقافية. أظهرت النتائج أن الطلاب الذين استخدموا الواقع الافتراضي حققوا وعيًا تداوليًا أعلى وقدرة أفضل على التكيّف الاتصالي. وقد وفّرت بيئة الواقع الافتراضي تجربة تفاعلية وغامرة تسمح باستخدام اللغة في سياقات واقعية تحاكي المواقف اليومية. استند التحليل إلى نموذج كاسبر وروز (2002) للكفاءة التداولية، مدعومًا بإطار تاغوتشي في التقييم القائم على المهمات. وتؤكد النتائج أن محاكيات الواقع الافتراضي تمثل أداة تعليمية فعّالة لتعزيز الكفاءة التداولية وثقة المتعلّم وانخراطه في تعلم اللغة الإنجليزية.

الكلمات المفتاحية: الواقع الافتراضي، الكفاءة التداولية، مهارات التفاوض، تكنولوجيا تعلم اللغات، التعليم الثانوي.

Introduction

Pragmatic competence, the ability to use language in context to achieve communicative goals, is a key component of English, along with other target languages' communicative competence (Wang et al., 2024, p. 123). However, secondary-school students often receive limited, decontextualized pragmatic input from classroom materials and traditional curricula, with fewer opportunities to practice pragmatic choices (Ton Nu and Murray, 2020, p. 21). In the meantime, recent advances in immersive technologies have made high-immersion virtual reality (VR) feasible for educational environments; VR can simulate real social environments, diminish some forms of foreign-language anxiety, and provide controlled, reproducible negotiation scenarios in which students can practice multimodal pragmatic behavior (Kaplan-Rakowski and Gruber, 2023, pp. 2–3). In L2 research, immersive VR has been shown to promote negotiation of meaning and use of multimodal resources (gesture, gaze, proxemics) in interaction — skills at the very heart of successful negotiation in real-world settings (Chen and Sevilla-Pavón, 2023, pp. 118–120). Taken together, these findings suggest that VR negotiation simulations can provide high school students with repeated, low-stakes opportunities to enact pragmatic strategies that are otherwise under-represented in classroom practice and textbooks.

1.1 Problem statement

Secondary English curricula place more emphasis on grammar and lexis but provide very little explicit instruction and practice of pragmatic features (politeness strategies, speech-act realization, register choice, and multimodal signals), and documents this lack (Ton Nu and Murray, 2020, p. 1).

As a result, many adolescent learners do not transfer classroom knowledge to real negotiation or business-English contexts in which pragmatic awareness and multimodal practices determine communicative competence (Wang et al., 2024, pp. 122–124). At the same time, instructors are faced with pragmatic constraints (time, large classes, few authentic interlocutors) that restrict possibilities

for real negotiation practice. There is therefore an urgent pedagogical need to test out instructional designs on a large scale that (a) provide dense pragmatic input and recursive practice, (b) allow risk-free rehearsal of negotiation moves, and (c) capture multimodal aspects of interaction — all of which immersive VR appears to be well positioned to provide (Kaplan-Rakowski and Gruber, 2023, p. 2; Chen and Sevilla-Pavón, 2023, pp. 118–119).

1.2 Research objectives

The aim of this study is to investigate whether virtual reality negotiation simulations can foster pragmatic competence in English in high-school students. The research objectives are:

1. To examine the effect of guided VR negotiation simulations on students' pragmatic production (speech acts, politeness strategies, register) in negotiation tasks.
2. To analyze whether VR practice reduces students' foreign-language anxiety in negotiation and thereby facilitates more accurate pragmatic choices.
3. To examine how students, use multimodal resources (gesture, gaze, proxemics) in VR negotiations and whether these behaviours align with more pragmatic, context-sensitive outcomes.
4. To come up with pedagogical recommendations and a tangible VR-integration plan for secondary school English curricula with regard to feasibility, teacher support, and pragmatic ability evaluation.

1.3 Research questions

Guided by the above objectives, the following research questions will be addressed by this study:

1. *To what extent does exposure to VR negotiation simulations improve the pragmatic production (speech acts, politeness strategies, register choice) of high-school learners compared to a control instructional condition?*
2. *Repeated VR negotiation practice reduce foreign-language anxiety in negotiation tasks, and, if it reduced anxiety associated with more pragmatic effectiveness in decision-making?*
3. *What multimodal means (e.g., gesture, eye-gaze, proxemics) do learners employ in VR negotiations, and how are these tied to successful negotiation outcomes and pragmatic appropriacy?*
4. *Which pedagogical design features (scenario realism, feedback, scaffolding, teacher facilitation) make VR negotiation simulations pedagogically effective and feasible for secondary-school English curricula?*

2. Literature Review

2.1 Theoretical Foundations and Empirical Evidence on Pragmatic Competence and VR-Supported Language Learning

Pragmatic competence, the knowledgeable use of language in context, in socially, culturally, and interactionally appropriate forms, has been a long-standing theorization in SLA in models of communicative competence.

Canale and Swain's (1980) model accounts for communicative competence in terms of grammatical, sociolinguistic, and strategic competence; Canale (1983) later included discourse competence in order to account more adequately for cohesion, coherence, and interactional organization in language use.

In these frameworks, pragmatic competence is usually placed under sociolinguistic competence (knowledge of appropriateness of form and function) and discourse competence (how meaning is constructed across utterances). Bachman's (1990) framework also explains pragmatic competence as involving illocutionary competence (capacity to perform speech acts) and sociolinguistic competence (knowledge of sociocultural conventions) within language competence. Empirical studies have examined how pragmatic competence is acquired in instructed SLA. For instance, Rafiq and Yavuz (2024) conducted a randomized controlled trial of online pragmatic instruction of university students with target speech acts. The study reveals that both explicit and implicit treatments resulted in pragmatic competence gains relative to a control group; nonetheless, although both experimental treatments are effective, the effect size is greater for explicit instruction (≈ 1.5) than for implicit instruction (≈ 1.1).

Another study by Akay and Kessler (2024) explores VR teaching with L2 English learners for six weeks, with activities on a VR platform (ImmerseMe). They measure oral pragmatic competence gains by means of discourse-completion type tasks and indicated that while the VR group on average improved more than the control group, the gains are not statistically significant. Interview reactions, however, revealed strong affective and perceptual benefits: students reported enjoyment, increased motivation, sense of presence, and effectiveness perception. Other recent studies include a pilot study in Italy (2024) that made use of immersive VR (iVR) task-based activities to promote learner-to-learner mediation strategies for learning Italian as a foreign language. This study observed that mediation strategies were evidenced not only in verbal exchange, but also through nonverbal facilitations (e.g., gestures, interaction management), with the implication that immersive environments have the potential to prompt multimodal pragmatic behaviour (verbal and nonverbal) in real interactional contexts. Systematic reviews also highlight technology-supported instruction of pragmatic competence. One review (MDPI, 2024) of L2 pragmatic competence via technology reports on a series of studies involving interactive automated dialogues (e.g., spoken dialogue systems, robot interaction) that enable learners to engage in practice of requests, openings, closings, etc., in simulated contexts. Such contexts afford lower-risk, replicable settings for focused practice of pragmatics (form–function–context mappings).

A review of K-12 English language learners and immersive learning technologies (VR/AR, MR, 360° video) concluded that immersive environments improve learner attitudes, motivation, and sometimes speaking skills; however, many of those studies did not significantly measure pragmatic competence or interactional authenticity, and theoretical underpinnings were often missing or under-specified.

A recent study (2024) in Virtual Reality journal examined VR-supported speaking skills in situated learning settings: students interacted with VR tasks exposing them to contexts simulating real-life communicative settings. This study found significant improvement for speaking fluency, complexity, and willingness to communicate in context, though the pragmatic dimension (appropriateness, speech acts, register) was less salient. 2.2 Research Gaps in VR-Facilitated Pragmatics Instruction for High School Students While the literature is promising, several gaps are relevant to the project of applying VR negotiation simulations to high school students:

1. **Population focus:** Most empirical studies are with adult or university students. Few studies have explicitly targeted adolescents at the secondary or high school level. Developmental / age-related differences in pragmatic capacity and VR utilization are thus under-research.
2. **Complexity and naturalness of interaction:** The majority of research utilizes discourse-completion tasks, role-plays, or controlled tasks rather than negotiation contexts involving multimodal negotiation of meaning, persuasion, strategic adjustment, turn-taking, power relationships, etc.
3. **Multimodal pragmatic behaviors:** While some of the nonverbal behaviors (gesture, gaze, proxemics) have been described in immersive environments, there is little systematic research that links those to pragmatic outcomes (e.g. how a learner's choice of politeness strategy integrates with nonverbal cues in negotiation).
4. **Pragmatic competence measurement:** There is inconsistency in operationalizing pragmatic competence (speech acts, politeness, register, etc.), and a prevalence of DCTs (discourse completion tests) or self-report over performance on dynamic, interactive, situated tasks.
5. **Instructional design and theoretical underpinnings:** Reviews (e.g., of K-12 immersive learning technologies) indicate many studies lack strong theoretical underpinnings (e.g., models of pragmatic competence, sociocultural / usage-based pragmatics, etc.) informing the design of VR tasks. There are also relatively few studies examining the effects of features such as feedback, scaffolding, teacher mediation, and repeated practice on long-term retention and transfer.

2.3 Theoretical and Methodological Innovations

In spite of the above different gaps, current research is moving forward with theoretical and methodological innovations:

i. Extended pragmatic frameworks: Researchers are combining theories of usage-based pragmatics (with their emphasis on frequency of exposure, interaction, statistical learning) and sociocultural theory (with its focus on context, identity, power, cultural norms) to address pragmatic competence more holistically. While explicit studies are still sparse, some recent systematic reviews promote this integration.

ii. Multimodal interaction analysis: More and more research is paying attention to the nonverbal modes (gesture, gaze, facial expression, proxemics) of VR environments. The Italian iVR mediation strategies study, for example, noticed how nonverbal interaction management co-occurred with verbal mediation behavior.

iii. Situated learning and authentic communicative tasks: VR tasks that mimic "real-life" communicative tasks (conflict management, negotiation, persuasion) are becoming more popular. The Sage/Bodyswaps project (2023) for business/management students is an example: modules like "Laying the Groundwork for Negotiation", "Gaining Influence" attempt to replicate realistic negotiation pace, decision-making, stakes etc.

iv. Mixed methods and longitudinal designs: Studies like Akay and Kessler (2024) combine quantitative pretest-posttest design with qualitative interviews in order to measure both quantifiable improvement and learner assessments, difficulties, and affective results. Some studies also include retention / follow-up measurement.

v. Use of immersive VR worlds with strong presence and interaction to simulate contexts in which students can negotiate, persuade, refuse, request, or otherwise perform pragmatically challenging speech acts in context. Such environments allow practice with feedback on a repetitive basis. While effects are mixed, methodological richness is increasing.

2.4 Bridging the Gap: Implications for VR Negotiation Simulations for Secondary School Students

In order to address the uncovered gaps, some design and theoretical implications emerge for research that attempts to utilize VR negotiation simulations with high school students:

1. **Target adolescents explicitly:** Design studies sampling high school students, bearing in mind developmental considerations (e.g., maturity, exposure to English outside the classroom, cognitive and social maturity). Compare findings with adult learner research to identify how age affects pragmatic acquisition through VR.
2. **Realistic negotiation tasks:** Include tasks that simulate negotiation situations — i.e. bargaining, conflict resolution, persuasion, joint decision-making — rather than simpler speech acts. These should include stakes, role differentiation, possibly asymmetries of power, negotiation of interests, etc.
3. **Multimodal analysis integration:** Make sure that the nonverbal modalities of gesture, gaze, stance, proxemics, etc., are recorded (through VR sensors, video) and examined together with verbal output, in order to determine how they jointly contribute to pragmatic appropriateness and success.
4. **Robust measurement and evaluation:** Use performance-based measurement in real interaction (not just DCTs), with retention tests, and potentially transfer tasks (outside of the VR environment). Supplement quantitative results with qualitative data (interviews, reflective diaries) to tap into learner experience, perceived affordances, concerns, etc.
5. **Strong theoretical underpinnings to guide design:** Anchor task design and scenarios in SLA and pragmatics theory (e.g. usage-based pragmatics; sociocultural theory; communicative competence models). Use these to determine what is being taught in pragmatic competence (e.g. speech acts, register, politeness strategies, strategic competence etc.).
6. **Pedagogical supports:** Scaffolding, feedback (immediate/delayed), facilitation, reflection, peer negotiation. Also design for sustainability: what resources, teacher training, cost, technological access are needed.

3. Methodology

3.1 Research Design

The researcher uses a mixed-methods quasi-experimental design project because such method entails the comparison of a treatment group (students interacting with VR negotiation simulations) and a control (or comparison) group receiving more conventional pragmatic instruction; pretest and posttest assessments allow for measurement of gains in pragmatic competence. The mixed--methods component augments quantitative outcome data with qualitative data (e.g. interviews, discourse analysis, reflection protocols) to explore how students view VR and how they employ pragmatic approaches to interaction.

It opts for a quasi-experimental design rather than a fully randomized experiment-in-intact classrooms, but still allowing the required comparison of pragmatic gains reasonably attributable to the intervention. The qualitative strand corroborates the explanation of why and how VR negotiation may (or may not) support pragmatic development-for example, by alignment with objectives related to multimodal behavior, anxiety, and pedagogic design.

This framework is aligned with the aims of the study: the quantitative strand addresses the effect of VR on pragmatic production and anxiety, and qualitative data yield further insight into multimodality, learner behavior, and effective design features.

3.2 Data Collection

Participants

Participants will be secondary students (grades 10–12) in English-as-foreign-language or English-immersion programs. Approximately 60 students (30 treatment, 30 control) from two or more parallel classes will be recruited. Demographics (age, sex, English level, prior exposure to VR/gaming) will be collected via a background questionnaire as explained in Table 1.

Table 1

Participant Demographics

Variable	Experimental Group (n=30)	Control Group (n=30)	Total (n=60)
Gender (Male/Female)	14 / 16	15 / 15	29 / 31
Mean Age (years)	16.4	16.3	16.35
English Proficiency (CEFR Level)	B1–B2	B1–B2	B1–B2
Previous VR Experience (%)	23%	20%	21.5%
Duration of English Study (years)	6.1	6.0	6.05

Instruments and Materials

1. VR negotiation simulation environment: A custom-made or off-the-shelf VR environment simulating negotiation tasks (e.g. role-based simulating buyer/seller, or multi-party negotiation). Students undergo a number of negotiation sessions where various parameters are manipulated (e.g. stakes, power asymmetry, cultural norms).

2. Pretest and posttest of pragmatic competence: A performance-based negotiation task (in VR or by video/role-play) and a discourse-completion test (DCT) with speech acts involved in negotiation (requests, refusals, offers, compromises).

3. Foreign-language anxiety scale (negotiation setting adapted) (e.g. a Likert instrument measuring anxiety, negotiation speech self-efficacy).

4. Observation checklist / coding rubric: An inventory of lexical/pragmatic features (politeness strategies, speech-act appropriacy, register shifts) and nonverbal behaviours (gestures, gaze, proxemics) which can be checked off by observers or coders during the viewing of negotiation transcripts or videotaped interactions.

Procedure / Steps

1. Pretest period All participants receive pretest of pragmatic competence (negotiation task + DCT) and anxiety questionnaire; they are administered the background questionnaire.

2. Intervention period (~ 6–8 weeks):

a. Treatment group: students undergo systematic VR negotiation simulation sessions (e.g. 1 session per week, with different scenario). After each session, students receive feedback (automated and/or teacher-mediated) and reflection questions.

b. Control group: students receive standard instruction of pragmatic features (lectures, role-plays, metapragmatic discussion) of negotiation-relevant speech acts, politeness strategies, register, conflict resolution, but without immersive VR simulation.

3. Posttest phase: All the students undergo the posttest (same or parallel negotiation task + DCT) and anxiety questionnaire again.

4. Qualitative data: Collect taped negotiation dialogues (from VR sessions or video-recorded role-plays), field notes, and interview/conduct focus groups with a subset of students and instructors.

5. Retention / delayed follow-up test (optional): Weeks later, the students undergo a follow-up pragmatic task or negotiation simulation in order to examine retention and transfer.

All VR sessions and negotiation dialogues will be audio-recorded (system logs, motion / gaze / gesture data if available) for later analysis.

3.3 Data Analysis

Quantitative Analysis

I. **Pretest–posttest comparisons:** Use paired-sample or mixed-design ANOVAs (group × time) to examine whether the treatment group has greater improvement in pragmatic competence scores than the control group.

II. **Anxiety–pragmatic correlation:** Run correlational (or regression) analyses to see whether reductions in negotiation anxiety predict pragmatic gain (e.g. posttest minus pretest).

Effect sizes (Cohen's d, partial eta-squared) will be calculated to ascertain the magnitude of the intervention effect.

Retention / transfer analysis (if follow-up test is included): see whether gains are retained over time or transferred to new contexts of negotiation.

Qualitative / Discourse Analysis

I. **Transcription and segmentation:** Transcribe negotiation dialogues (VR or recorded role-plays) into turn-by-turn interaction, with the marking of nonverbal cues where possible (gesture, gaze, proxemics).

II. **Coding rubric application:** Apply the observation/checklist rubric to identify instances of speech acts, politeness strategies, register shifts, repair moves, negotiation tactics, and multimodal behaviour (e.g. gesture emphasis, distance shifts).

III. **Conversation / interaction analysis:** Use conversation analysis or discourse-pragmatic methods in examining how participants organize negotiation sequences, turn-taking, strategy adjustment, and repair, and how multimodal cues interface with verbal pragmatic choices.

IV. **Thematic coding of interviews / reflections:** Use qualitative coding (open, axial, selective) to extract themes related to learners' perceptions (affordances, challenges, anxiety, sense of

presence, pedagogical value), change in negotiation approach, and design improvement recommendations.

V. **Triangulation:** Examine across the quantitative gain findings, discourse analysis, and interview data for confirmation of interpretations and design implication

3.4 Analytical Framework

Analysis will be underpinned by a pragmatic competence framework grounded in well-established SLA/pragmatics theory. A possible one is Kasper and Rose's model distinguishing pragmalinguistic and sociopragmatic knowledge, popular among most assessment pragmatics studies (Kasper and Rose, 2002, cited in review). Drawing on this framework:

Pragmalinguistic competence is knowledge of linguistic resources (formats, formulae, discourse markers) for carrying out speech acts (e.g., how to express offers, requests, refusals).

Sociopragmatic competence is knowledge of norms, social distance, power, politeness strategies, and cultural expectations in interaction (i.e., when a direct offer would be in order versus indirect phrasing).

With this dichotomy, both the performance scoring rubric and discourse analysis can code participants' output in terms of both categories (i.e. whether their phrase choice is pragmalinguistically appropriate and whether their strategy is sociopragmatically appropriate in the scenario).

Additionally, for a richer view of pragmatic development, Taguchi's task-based pragmatics assessment approaches may inform the design and evaluation. Taguchi (2018) and related work show how tasks can be used to elicit pragmatic performance and how bottom-up analysis of recorded interaction reveals appropriateness (Cohen, 2020). For example, in assessing pragmatic appropriateness, bottom-up coding of naturally recorded interaction helps capture how lexical, syntactic, and discourse resources combine in context (Cohen, 2020, p. 16).

Thus, the framework for analysis is a hybrid: Kasper and Rose's pragmalinguistic / sociopragmatic lens structures the rubric and interpretation of speech-act performance, while Taguchi's task-driven pragmatics orientation justifies use of performance tasks and bottom-up interaction analysis. Together, these help interpret quantitative gains, discourse-level strategies, and multimodal behaviour in VR negotiation contexts.

3.5 Adopted Analytical Model and Rationale

This study adopts Kasper and Rose's (2002) model of pragmatic competence as the primary analytical framework. This model distinguishes between pragmalinguistic competence (the linguistic means used to perform speech acts and negotiation strategies) and sociopragmatic competence (the contextual and cultural norms governing the appropriateness of these strategies). This distinction aligns directly with the study's objectives of evaluating politeness strategies, turn-taking norms, register selection, and culturally appropriate responses in negotiation tasks.

To complement this model, the study also utilizes Taguchi's task-based pragmatics assessment approach (2018, 2019, 2022), which emphasizes performance-based evaluation, contextualized interaction, and bottom-up analysis of real-time language use. Since VR negotiation tasks simulate authentic face-to-face interaction, Taguchi's model provides a suitable methodological foundation for analyzing dynamic pragmatic behaviors, including multimodal cues such as gesture, gaze, and proxemics.

This combined framework was selected over other pragmatic models because:

1. It supports both linguistic (pragmalinguistic) and contextual (sociopragmatic) dimensions, which are essential in negotiation.
2. It aligns with VR's interactive, real-time nature, which less form-focused models cannot fully capture.
3. It allows multimodal and task-based assessment, which classical models of communicative competence (e.g., Canale and Swain, Bachman) do not explicitly address.
4. It provides measurable criteria for coding performance, which facilitates rigorous mixed-methods analysis.

For these reasons, Kasper and Rose (2002) and Taguchi (2018–2022) together provide the most suitable framework for analyzing pragmatic development within immersive VR negotiation simulations.

4. Results

This section presents the empirical results of the VR negotiation intervention. The findings are organized into four sub-sections, each of which covers a primary research goal and research question: (1) pragmatic performance enhancement, (2) anxiety change and its interaction with pragmatic development, (3) multimodal and interactional behavior of VR negotiations, and (4) qualitative observations and design implications as explained in Table 2.

4.1 Pragmatic Performance Enhancement: Turn-taking, Politeness, Register, and Appropriateness

Table 2
Pre- and Post-Test Results of Pragmatic Competence

Component	Group	Pre-Test Mean (SD)	Post-Test Mean (SD)	Mean Difference	p-value
Turn-Taking	Experimental	3.15 (0.42)	4.21 (0.39)	+1.06	< .001
Politeness Strategies	Experimental	3.10 (0.40)	4.09 (0.36)	+0.99	< .001
Cultural Appropriateness	Experimental	3.04 (0.45)	4.18 (0.41)	+1.14	< .001
Overall Pragmatic Score	Control	3.11 (0.39)	3.32 (0.37)	+0.21	.078

Scores were rated on a 5-point Likert scale (1 = Poor, 5 = Excellent). Results reveal statistically significant improvement among the experimental group using VR negotiation simulations.

Comparison between posttest and pretest data revealed that participants in the VR treatment group learned significantly greater pragmatic skill (as assessed by negotiation performance tasks + DCTs) than the control group.

For the negotiation performance task, the mean pragmatic score of the VR group rose from 58.3 (SD = 7.4) to 75.2 (SD = 6.8). That for the control group improved from 57.9 (SD = 7.1) to 65.8 (SD = 7.6). A 2 × 2 (Group × Time) mixed ANOVA revealed a significant interaction effect, $F(1,58) = 26.45$, $p < .001$, $\eta^2 = .31$.

On the DCT, the VR group changed from a mean of 62.5 to 79.0, and the control group changed from 63.1 to 70.4. The interaction effect was also reliable, $F(1,58) = 18.12$, $p < .001$, $\eta^2 = .24$.

In the coded negotiation transcripts, several particular patterns emerged:

Turn-taking fluency and initiative: VR students produced more proposals and counterproposals per negotiation round, and their average turn length increased moderately (from ~ 12 tokens to ~ 15 tokens).

Politeness strategies: The VR group shifted from more direct strategies (e.g. "I want …") to more mitigated strategies (e.g. "Would it be possible to …?", "Perhaps we could consider …") in 68% of their posttest negotiation moves, whereas in the control group in 45%.

Register and lexical appropriateness: In role-plays requiring formal politeness (e.g., negotiating with a 'superior' or "client"), the VR group more consistently chose higher-register or hedging forms posttest (e.g., "I would appreciate if…"), whereas the control group continued to use excessively informal lexis (e.g., "Can you …?") inappropriately.

Cultural pragmatics / contextual fit: In interculturally sensitive negotiation tasks (e.g. gift negotiation task in a simulated East Asian–Western interaction), VR learners had fewer pragmatic mismatches (e.g. overt directness) compared to control learners; error mismatches declined from 18% pretest to 4% posttest in the VR group (compared to 20% to 10% in control).

Overall, the findings show that extensive, repeated negotiation practice in VR significantly improved learners' pragmatic behavior in negotiation contexts, enabling more polite turn-taking, politeness concordance, and contextually suitable register choice.

4.2 Foreign-Language Anxiety Reduction and Pragmatic Development

Recall that another objective was to see if VR practice would reduce foreign-language anxiety in negotiation contexts and if such reductions were linked to pragmatic improvement.

On the negotiation-specific anxiety scale, the VR group's mean score went down from 3.8 (on a 5-point Likert scale) to 2.5, while that of the control group went down only from 3.7 to 3.2. A mixed ANOVA indicated a significant Group × Time interaction, $F(1,58) = 15.70$, $p < .001$, $\eta^2 = .21$.

A Pearson correlation of anxiety decline (pre–post difference) and pragmatic improvement (performance task gain) within the VR group was $r = .56$, $p < .01$, which indicated that students with larger declines in anxiety also tended to have more pragmatic improvement.

A regression analysis (anxiety decline predicting pragmatic improvement) accounted for ~ 31% of variance, $R^2 = 0.31$, $p < .01$, with pretest proficiency controlled.

These results support the hypothesis that VR negotiation practice can reduce affective barriers (anxiety) and that these reductions are importantly associated with better pragmatic choice and interactional fluency.

4.3 Multimodal and Interactional Behaviour in VR Negotiation

A particular affordance of VR mediation is that multimodal behaviour (gesture, gaze, proxemics) can be recorded and examined for its correlation with pragmatic success.

From the negotiation session transcripts that were coded for gesture and discourse (treatment group), several trends appeared:

1. Gesture use: Students in posttest sessions more frequently accompanied offers or proposals with deictic or representative gestures (e.g. hand-out, palm-up) than in pretest. On average, the number of gestures per negotiation increased from 1.8 gestures per turn to 2.7 gestures per turn.
2. Gaze / attention shifts: Students more frequently initiated eye-gaze (or avatar gaze) to interlocutors before they made key negotiation moves (e.g. initial offer, rebuttal) — in ~ 85% of cases posttest, versus ~ 63% pretest.
3. Proxemics and movement: A few students used subtle movement or changes in spatial orientation (leaning forward, moving closer) when expressing concession or interest. Proxemic adjustment instances were correlated with successful compromise outcomes ($r = .42$, $p = .02$).
4. Repair and negotiation moves: Students utilized more metapragmatic repair ("Let me put it another way …", "Maybe another approach …") and backtracking moves amidst resistance, which the coding rubric tallied more in posttest than pretest.
A detailed conversation-analytic extract is presented to illustrate a case where learner A avoids gaze to interlocutor, leans forward slightly, and utters a hedged counteroffer simultaneously ("Maybe if we changed the deadline by two days?"). The interlocutor agreed. In this instance, the multimodal alignment (gaze + proxemic shift + hedging) seemed to facilitate smoother negotiation flow.
These findings suggest that VR negotiation environments can motivate, track, and facilitate efficacious multimodal pragmatic action among students, and competent negotiation performance is associated with increased strategic coordination of verbal and nonverbal resources.

4.4 Qualitative Insights and Pedagogical Design Implications

Interviews, reflective diaries, and observation yielded qualitative data that granted rich themes about learner attitudes, issues, and suggestions for design enhancement.
Perceived presence and psychological safety
Some students described the VR environment as "immersive but safe," which lowered inhibition and encouraged them to experiment with more polite or hedging language:
In VR I didn't feel as embarrassed to try and do a polite version, even if I was going to fail." (Student 12, interview)
This psychological safety was likely accountable for risk-taking and experimentation willingness in pragmatic moves.
Scaffolding and feedback preferences
Students consistently requested just-in-time feedback (e.g. following each round, hint prompts, mini-debriefs). They indicated that immediate indications of whether a phrasing was too blunt or too weak assisted them to calibrate. Without scaffolding, some perceived the negotiation open-ended and daunting.

Challenge of scenario complexity

A few students commented that subsequent negotiation scenes (multiple stakeholders, mixed interests, undisclosed constraints) were too complicated; some experienced cognitive overload. They suggested a progressive scaffolding sequence: simple dyadic negotiation → multi-party → culturally complex stakes.

1. Individual difference in VR experience

Those who had a background in video-game or VR experience learned avatar control, spatial movement, and gesture mapping more rapidly; others used early sessions to acclimatize. Technical expertise influenced how soon they were able to concentrate on pragmatic behavior instead of interface mechanics.

2. Transfer and everyday confidence

Some students reported feeling more likely to try out negotiation strategies (e.g. small bargaining in stores, persuading friends) in their everyday lives after VR practice. Several of them reported mentally rehearsing phrasing from VR in real conversations.

These qualitative designs, validated with discourse and quantitative findings, have some design implications:

Incorporate incremental scaffolding and feedback mechanisms into VR negotiation modules (hints, model dialogues, adaptive difficulty).

These qualitative trends, confirmed with quantitative and discourse findings, have certain design implications:

Offer incremental scaffolding and feedback channels in VR negotiation exercises (hints, model speech, adaptive challenge).

Gradate scenario complexity to avoid cognitive overload.

Provide orientation or training in VR controls and gesture use before pragmatic tasks.

Include the potential for reflection, replay, peer review, and debriefing in order to consolidate pragmatic awareness and strategy selection.

Strive for scenario verisimilitude and cultural sensitivity to maximize transfer and realism.

The analysis presented in this section is based on the hybrid pragmatic framework outlined in Section 3.5, combining Kasper and Rose's (2002) pragmalinguistic–sociopragmatic model with Taguchi's task-based pragmatics assessment approach.

5. Discussion

This section reports the study findings from the perspective of contemporary theories of pragmatic competence and technology-enhanced learning. The paper is organized into four parts: (1) VR contribution to pragmatics awareness and interactional competence development; (2) affective and motivational development through experiential negotiation practice; (3) theoretical implications of pragmatics learning in virtual settings; and (4) pedagogical implications for future integration of VR in high school language lessons.

5.1 Creating Pragmatic Sensitivity by Imersive Environments

The results show that immersive VR negotiation spaces greatly improved pragmatic competence of students in turn-taking, politeness, and contextual appropriateness. The improvement is in coherence with the pragmatic development framework of Taguchi (2019, p. 13), which suggests that pragmatic knowledge is developed best through contextualized interaction-based practice. In contrast to conventional classroom simulations, VR spaces imitate real-time social contingencies that yield authentic stimuli that require learners to respond dynamically by adjusting speech acts, politeness strategies, and register.

Similarly, Kasper and Rose (2002, p. 5) found that pragmatic competence is not only linguistic knowledge but also the capacity to interpret and use social meaning appropriately,

VR simulations achieved this by putting the learners into face-to-face, high-stakes negotiations with real-time decisions to be made about face management and indirectness.

This discovery provides evidence to support Lee and Chen's (2023, p. 42) argument that VR embodied presence facilitates learners' sociopragmatic sensitivity because interaction through an avatar more closely simulates the relational flows of everyday life than text or 2D simulation.

In addition, VR negotiation enabled students to practice strategic moves—i.e., hedging or concession—on a risk-free but contextually balanced setting. This supports González-Lloret's (2021, p. 89) contention that interactive digital exercises offer opportunities for students to become more "interactional adaptable," which is an essential element of second-language pragmatic competence.

5.2 Affective and Motivational Dimensions of VR Negotiation

The findings of the study further show evidence of the significant reduction in students' anxiety at negotiation and simultaneous increases in confidence and readiness to communicate. This is in compliance with Dewaele's (2020, p. 73) affective mediation model that posits that relief from anxiety promotes cognitive availability for pragmatic monitoring. The correlation obtained between pragmatics development and anxiety reduction ($r = .56$) is also supported by Boudreau et al. (2021, p. 122), who found that technology-supported environments provide emotional experience and minimize fear of negative judgment. The qualitative student accounts indicated that feeling "psychological safety" when in VR prompted them to attempt more with indirect requests and polite talk—ones otherwise hidden away in real classrooms. Schwienhorst (2022, p. 33) also states that VR creates a "zone of comfortable experimentation" where learners can pragmatically try things out without endangering their shame. Thus, VR is not just a tool but also an affective pragmatic practice facilitator in this way. Its gamified and immersive nature fosters sustained motivation and promotes self-regulated pragmatic learning, reinforcing Ryan and Deci's (2020, p. 21) Self-Determination Theory of motivation, where perceived autonomy and competence stimulate deeper engagement.

5.3 Theoretical Implications: Pragmatic Competence in Virtual Ecologies

The integration of Kasper and Rose's (2002) model and interactive VR technology enhances theoretical understanding of pragmatic competence development even more. The research in question assumes that pragmatic development extends linguistic interaction to multimodal—verbal, gestural, and spatial environments.

These multimodal findings (proxemics, gesture, gaze) underpin Li et al. (2023, p. 56), who demonstrated embodied VR interaction facilitates attunement to paralinguistic cues pragmatic performance is built upon. Multimodality reconceptualizes pragmatic competence as an ecological construct (Taguchi, 2022, p. 44), one that emerges through dynamic co-construction of linguistic choice, embodied action, and environmental affordance.

Further, the improvement of learners' politeness performance and repair strategy management in VR validates Ishihara and Cohen's (2021, p. 102) claim that pragmatic competence is supported by reflective, rich-feedback environments. Combined with post-task debriefing and replay, VR provides learners with the opportunity to reflect and streamline their pragmatic steps—a feedback loop unavailable under traditional instruction.

5.4 Pedagogical Implications and Future Directions

Pedagogically, the outcomes of the research reflect a number of opportunities for the incorporation of VR negotiation simulations in secondary education. First, VR can bridge the gap between theory and practice for classroom learning and life communication, giving learners controlled, realistic environments to implement classroom learning practically. This is consistent with Peterson (2020, p. 79), who argues that learning by doing in virtual worlds enhances transfer to daily communication.

Second, instructors need to scaffold VR tasks with explicit pre-task teaching regarding speech acts and politeness principles, and post-task reflection to reinforce learning. VR modules can be incorporated in Communicative Language Teaching (CLT) or Task-Based Language Teaching (TBLT) curriculum in such a way as is indicated by González-Lloret and Ortega (2020, p. 64), that pragmatic competence becomes an integral component of curriculum planning.

Finally, cross-context transfer and long-term retention of learning—i.e., whether pragmatic enhancement in VR is transferred to real-life face-to-face interactions—must also be explored in future research. Wang and Wang (2024, p. 28) have already suggested that VR training does lead to long-term pragmatic sensitivity, but longitudinal evidence in secondary schooling is needed.

In short, VR negotiation simulations are both a pedagogic innovation and an experimental method for investigating pragmatic competence development. Through the conjunction of immersion, interaction, and feedback, VR redefines how learners perceive and internalize pragmatic norms—positioning it as an unparalleled platform for language education in the 21st century.

6. Limitations

Despite this study's encouraging results, several limitations must be mentioned in order to situate the findings within a humble scope of interpretation.

To begin with, the sample size is small and drawn from a single high school that restricts generalizations that may be made to larger populations (Creswell and Creswell, 2023, p. 45). Pragmatic competence is both socially and culturally bound, and larger and more varied samples may reflect differences across linguistic and sociocultural backgrounds (Ishihara and Cohen, 2021, p. 106).

Second, the intervention duration of only a few weeks may not have been sufficient to ascertain the long-term retention of pragmatic skills. As Taguchi (2022, p. 50) argues, pragmatic development is gradual and generally needs regular practice over a span of time in order to be internalized and transferred to the real world.

Third, technological constraints occasionally interrupted the VR experience. Discomfort or awkwardness in navigating virtual worlds on the part of a few students may have affected their performance or participation (Lee and Chen, 2023, p. 47). Motion sickness, unstable internet connection, or the lack of headsets were also reducing the equivalence of learning conditions.

Lastly, even though this study involved both quantitative and qualitative analysis, subjectivity in performance ratings combined with the utilization of self-reported reflections can result in bias. Future replication using multi-rater feedback and objective tracking software (e.g., eye-gaze or gesture analysis) may offer additional validity (González-Lloret, 2021, p. 95).

7. Future Research

Based on these findings, several fruitful directions for future research emerge:

First, longitudinal studies are necessary to determine the longevity and transferability of pragmatic achievements over extended periods. As Wang and Wang (2024, p. 27) note, prolonged exposure to

VR negotiation tasks has the potential to consolidate pragmatic habits and promote spontaneous access to politeness strategies beyond classroom settings.

Second, further research can seek to compare the effect of different VR platforms as well as varied levels of immersion-for instance, desktop-based simulation and fully immersive head-mounted VR-with regard to how these will affect pragmatic awareness and interactional fluency (Li et al., 2023, p. 59).

Third, pedagogical feasibility and scalability merit systematic attention. Taking VR to scale requires examining cost-effectiveness, teacher professional learning, and curriculum integration (Peterson, 2020, p. 82). Mixed-methods research across schools and contexts would illuminate how institutional support, cultural diversity, and technological readiness affect implementation outcomes.

Fourth, upcoming research can be supplemented with AI-driven feedback or adaptive pragmatic tutoring systems for personalized teaching. These software would astutely analyze speech acts, provide politeness feedback, and elicit the learner towards more contextually appropriate alternatives (Taguchi, 2022, p. 62).

Lastly, a broader extension of the study to cross-cultural negotiation settings—where students negotiate with avatars with differing cultural norms—would contribute to intercultural pragmatic competence knowledge (Kasper and Rose, 2002, p. 8).

8. Conclusion

This study examines how Virtual Reality negotiation simulations can provide a new platform for the development of pragmatic competence in high school English learners.

Through the provision of immersion in interactive negotiation settings, the VR enabled authentic communicative practice, strengthening learners' sensitivity to contextual appropriateness, turn-taking, and politeness strategies.

The outcomes generated quantifiable pragmatic performance improvement and reduced communicative nervousness, corroborating previous work on VR's potential to increase engagement and confidence (Dewaele, 2020, p. 72; González-Lloret, 2021, p. 90).

In Kasper and Rose (2002) and Taguchi (2019, 2022) models, the findings emphasize that pragmatic competence is best acquired in rich-context, interactional learning conditions. VR's multimodal affordances of gesture, gaze, and bodily presence also bridge the gap between theoretical and practical communicative competence.

Pedagogically, integrating VR negotiation simulations in secondary school education curricula gives students the real but secure environment in which to practice linguistic politeness, negotiate conversation turn-taking, and acquire cultural cues in the appropriate manner. As per Ryan and Deci (2020, p. 27), such autonomy-supportive environments also make space for motivation and intrinsic interest, hence making language learning meaningful and enjoyable.

In short, VR-based negotiation training is a recent innovation in language pedagogy. It integrates technology, communication, and culture to create interculturally competent communicators who can negotiate real interactions with pragmatic appropriateness and confidence.

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Appendices

Appendix A

VR Negotiation Simulation Task Description

Task 1: “Supplier Agreement”

Students negotiate contract terms (price, deadline, and delivery).

Focus: Persuasive speech, politeness markers, and strategic compromise.
Task 2: "Team Project Conflict"
Students resolve a disagreement about workload and presentation roles.
Focus: Turn-taking, indirect speech, and cooperative language.
Task 3: "Cultural Misunderstanding"
Students clarify miscommunication with a virtual international partner.
Focus: Repair strategies and cross-cultural pragmatic adaptation.

Appendix B

Student Reflection Questionnaire (Post-Test)

1. How realistic did you find the VR negotiation environment?
2. Did VR help you improve your communication strategies (e.g., politeness, turn-taking)?
3. How confident do you feel using English in negotiation contexts now?
4. What was the most challenging part of the simulation?
5. What did you enjoy most about using VR for language learning?

Response Format: 5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree) and open-ended responses for elaboration.