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DEVELOPING CROSS-CULTURAL COMMUNICATIVE COMPETENCE IN ADVANCED LANGUAGE LEARNERS THROUGH GENERATIVE AI-BASED SOCIO-PRAGMATIC SUPPORT

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SUMMARY

This paper examines the effectiveness of Generative AI (GenAI) as a socio-pragmatic aid that can improve Cross-Cultural Communicative Competence (CCCC) in advanced language learners (N = 80). Although such learners may be highly proficient in their language, a so-called pragmatic gap may also be faced in attempts to negotiate complex social interactions and in high-context cultural interactions. The study followed a quasi-experimental pre-test/ post-test control group study design where the influence of a four-week structured GenAI intervention was quantified. The experimental group went through several cycles of safe failure by using GenAI models that had to simulate different cultural personalities, whereas the control group used the traditional instructional materials. Analysis of the statistical results showed that the experimental group (n = 40, total sample N = 80) recorded a significant mean score of 20.85 points on the Written Discourse Completion Task (WDCT) as compared to a 2.65-point gain in the control group, which was not statistically significant relative to the intervention's impact. A one-way ANCOVA, controlling for initial proficiency, showed a significant main effect for the intervention (F(1, 77) = 295.70, p < .001), with a Partial Eta Squared ($\eta^2 = .794$) indicating that the GenAI framework accounted for nearly 80% of the variance in post-test performance. Also, the effect size (Cohen d = 3.89) was found to be substantial, which implies that GenAI can be regarded as an effective artificial interlocutor to learn the nuances of cross-culture. The results have strong empirical support to

include AI-informed socio-pragmatic support within the modern curricula in order to bridge the gap between grammatical accuracy and cultural fluency. The research paper ends by summarizing the pedagogical considerations of the concept of AI-mediated safe failure and outlining the existing limitations in the form of the lack of non-verbal communication in text-based AI models.

Key words: *generative AI, cross-cultural communicative competence, socio-pragmatics, advanced language learners, quantitative analysis.*

INTRODUCTION

The need to make professional and academic settings global has increased the requirement of Cross-Cultural Communicative Competence (CCCC). Whereas high-level language learners are likely to get good marks in grammatical and lexical accuracy, a "pragmatic gap" of failure to match linguistic options with social situations and politeness conventions, irony and cultural demands is also faced [1]. This loss frequently causes socio-pragmatic failure, in which a speaker ends up accidentally rude or culturally insensitive even when he is well-known in language [2][11]. To solve this, in this research, Generative AI (GenAI) is presented as a fake interlocutor. Compared to the conventional static media, GenAI offers a dynamic, low-stakes learning experience, where students can be offered real-time socio-pragmatic feedback and are able to experiment with different speech acts and cultural identities [3][6].

Research Questions (RQs)

RQ1: How effective is the GenAI-based socio-pragmatic support in promoting the CCCC scores of advanced language learners?

RQ2: Do the learners in AI-assisted instruction and traditional pedagogical instruction have statistically significant differences in the development of pragmatic appropriateness?

Research Objectives (ROs)

The study will seek to respond to the following to answer these questions: RO1: To measure the enhancement of the skill of performing complex speech acts (e.g., refusals, requests, and apologies) in culturally specific situations in learners. RO2: To determine the efficacy of GenAI feedback in decreasing socio-pragmatic mistakes in comparison with the conventional teacher-centered or textbook-based education. RO3: To assess the change in the levels of Cultural Intelligence (CQ) of learners after an ordered intervention based on AI.

The paper is written in such a way that it is a quantitative study aimed at analyzing the intervention comprehensively. Section 2: Literature Review covers both the theoretical background of Interlanguage Pragmatics (ILP) and the history of Computer-Assisted Language Learning (CALL). Section 3: Methodology explains the quasi-experimental design, demographics of the participants and the exact GenAI prompting framework that was applied in the treatment. Section 4: Results The statistical data of pre- and post-intervention assessment outcomes based on T-Tests and ANCOVA are provided. Section 5: Discussion is an interpretation of the data, covering the aspect of safe failure about AI and where it is applied in pedagogical terms. Section 6: Conclusion is the summing up of the contributions of the study and the recommendations to the future direction of research in AI-integrated language education.

LITERATURE REVIEW

According to [12], the emergence of Cross-Cultural Communicative Competence (CCCC) in the digital settings requires a multi-disciplinary approach. This subtopic will combine the linguistic concepts of pragmatics and the conceptual framework of educational technology and determine how generative AI can help fill the pedagogical gaps that exist [5][7][8].

Interlanguage Pragmatics (ILP)

The study of interlanguage Pragmatics is concerned with the understanding and execution of speech acts by non-native speakers in a foreign language [17]. In more skilled students, the widespread feature is pragmatic fossilization in which their grammatical and lexical knowledge is more developed than the capacity to operate in complicated social environments [18]. According to ILP, the learner develops a transitional linguistic system midway between the native language and the target language, and it is a particular interlanguage of its own. [4]. In this paper, ILP is applied to determine the particular pragmatic gap between the target social meaning of a learner and the actual cultural understanding of the utterance by a native or an expert interlocutor [13][19].

Cognitive Load Theory (CLT)

Cognitive Load Theory (CLT) is an understanding which can be applied in the context of cross-cultural communication to determine the mental effort that is needed to balance the social nuances [14]. The cognitive overload experienced by the advanced learners is also a widespread occurrence when the learner is required to process dense syntax, politeness rules and the culture-determined requirements of high stakes at the same time. The CLT suggests that the Intrinsic Load, which is the difficulty of a speech act by itself such as an official refusal, may be oppressive [15]. The Extraneous Load (the anxiety of the failure in the real-world social situation) is minimized by employing GenAI as a low-stakes simulated interlocutor. This transformation enables the learner to center his Germane Load on the real construction and automation of socio-pragmatic schemas, which enables him or her to learn more in the process of repetitive practice [20].

The Research Gap: From Literacy to "Soft Skills"

The existing literature on the subject of Generative AI in education is strongly biased towards automated writing assessment (AWE), translation, and grammar correction. Although these applications help increase functional literacy, quantitative evidence of the contribution of AI to cultural soft skills is unavailable. The majority of available literature on CCCC is qualitative in nature, based on student commentaries or interviews, which cannot be statistically rigorous enough to confirm AI as a formal instrument of instruction. This study is relevant to this gap because it uses quantitative measures on the socio-pragmatic performance which has been traditionally perceived as too subjective to be analyzed using quantitative methods to answer whether AI can move the needle systematically on a Cultural Intelligence (CQ) of a learner [16].

Hypothesis

- H₁: The Speech Act Production (appropriateness, politeness, and strategy) of advanced language learners supported with GenAI-based socio-pragmatic support will have significantly higher scores than when using traditional materials.
- H₂: The experimental group will demonstrate statistically significant improvement of the Cultural Intelligence (CQ) in particular in Metacognition and Behavioral dimension which is statistically significant in comparison with the control group.
- H₃: The number of AI-induced Safe Failure iterations is positively correlated with the elimination of socio-pragmatic errors during high-stakes simulated situations.

Synthesis and Inference

The overview of the existing academic literature indicates that the ability of advanced learners to combine linguistic building blocks in the process of communication does not render the pragmatic gap non-existent, as there are no dynamic and low-stakes opportunities to engage in social experimentation. The general conclusion of this literature review is that the socio-pragmatic competence is a skill that is cognitively challenging and it can be optimized through the combination of Interlanguage Pragmatics

(ILP) and Cognitive Load Theory (CLT). Precisely, through the application of Generative AI as an artificial interlocutor, the instructional design manages to mitigate the Extraneous Load imposed by the so-called affective filter or the fear of social rejection and use cognitive resources to focus on the Germane Load needed to internalize elaborate cultural schemas. Moreover, the transition of qualitative reflection to the concept of quantitative AI-mediated feedback loop suggests that cultural soft skills, which are impossible to empirically measure, can be designed and monitored in an organized way. Finally, the literature shows that GenAI is not just a source of information but a practical connection changing passive cultural knowledge into active performance, which can be measured in communication, due to the concept of safe failure and a continuous feedback mechanism.

METHODOLOGY

In this research, a strict quantitative research method to examine the effect of Generative AI on socio-pragmatic development is used. With the help of a controlled experimental design, the study seeks to separate the influence of the feedback guided by AI from the conventional pedagogical benefits.

Research Design

This research takes the Quasi-Experimental Pre-test/Post-test Control Group Design. The reason why this design has been chosen is that the group assignments of participants are chosen according to the preexisting classroom sections (non-random assignment), which is customary in educational studies.

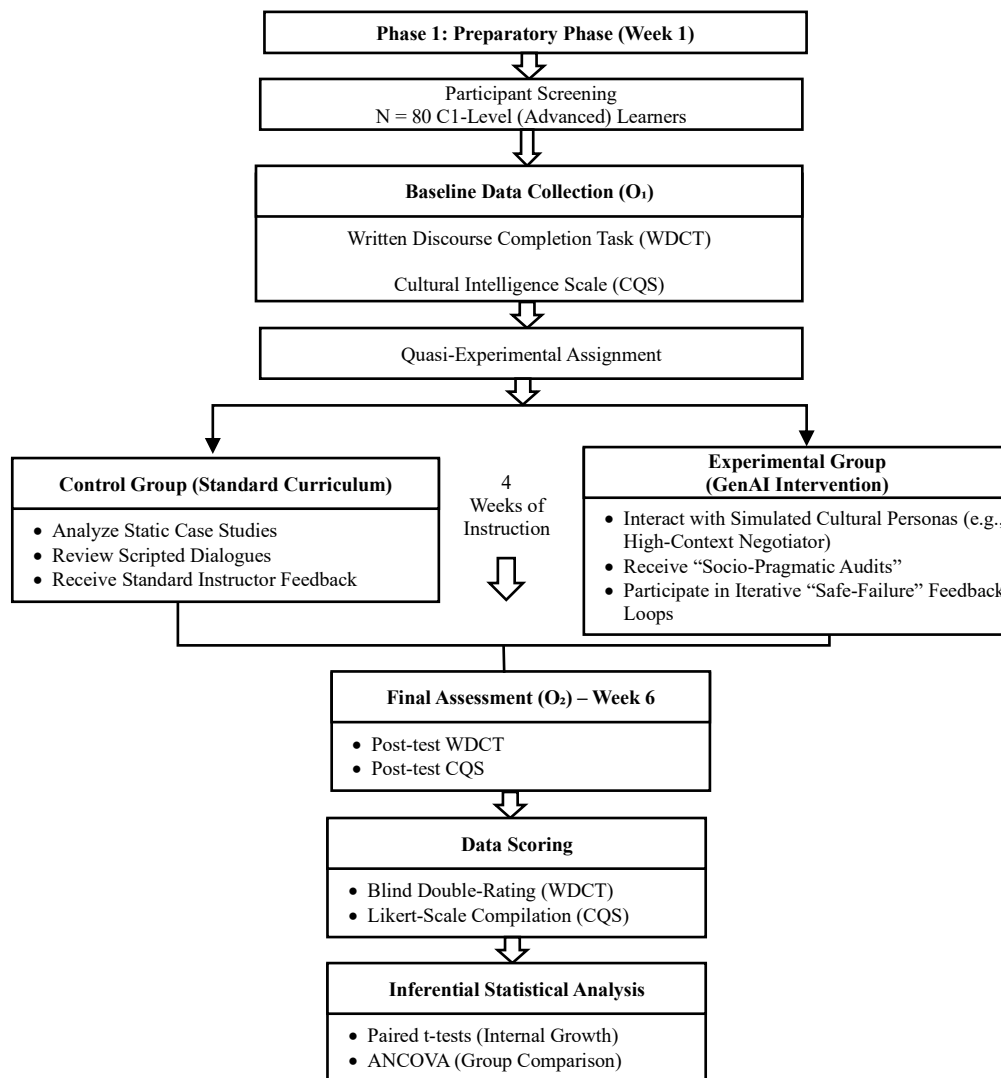


Figure 1. Conceptual framework for the quasi-experimental research design of Gen AI-mediated socio-pragmatic intervention

The two groups are pre-tested to get a baseline in the Cross-Cultural Communicative Competence (CCCC). The GenAI intervention (treatment) is applied to the experimental group, whereas a standard curriculum is used by the control group. A post-test is then carried out on the two groups in order to gauge the delta in performance.

It is represented in figure 1 as a three-phase quantitative workflow that will be used to assess the effectiveness of Generative AI in the creation of Cross-Cultural Communicative Competence (CCCC). This process begins with the Preparatory Phase (Week 1), during which a purposive sample of N = 80 C1-level advanced learners will first undergo baseline testing (O_1) in Written Discourse Completion Tasks (WDCT) and Cultural Intelligence Scale (CQS) to define pre-intervention competency. The central point of the methodology is the Intervention Phase (Weeks 2-5), during which the cohort will be split into the Control Group, which will use traditional case studies using statistical methods, and an Experimental Group, which will use a GenAI-mediated framework. The intervention can use persona-based simulations and real-time Socio-Pragmatic Audits as a means of safe failure, and offers an iterative process of feedback not inherent to traditional approaches. The workflow ends with the Analytical Phase (Week 6), where a final assessment (O_2) is conducted in order to quantify longitudinal gains. In order to be empirically rigorous, data are then Blind-Duplicated Rated to remove bias of evaluators and then subject to inferential statistical analysis. In particular, the intra-group development is evaluated using Paired T-Tests, whereas inter-group comparison is performed by the ANCOVA with the pre-test score used as a covariate to determine the particular effect the AI intervention has on socio-pragmatic development of the learners.

Participants and Sampling

The sample population used in the study consists of N=80 advanced English as a Second Language (ESL) learners. Demographics: The age range of the participants will be 20-24 years old, which will guarantee a digitally native generation. Proficiency Level: The participants will be filtered to be in the C1 level (Advanced) of the Common European Framework of Reference of Languages (CEFR) to make sure that the linguistic barrier will not come in the way of performance of the pragmatics. Distribution: The subjects will be separated into an Experimental Group (n=40) and a Control Group (n=40) in equal numbers.

Instrumentation

Two major tools are used to guarantee that data is triangulated and measured objectively; these include: Written Discourse Completion Tasks (WDCT): The respondents will be shown 10 culturally-sensitive situations (e.g., not agreeing with a superior in a high-power-distance culture). Will be requested to write answers and then subject to scoring by two independent raters via a validated Socio-Pragmatic Rubric (that is, politeness, strategy, and appropriateness). Cultural Intelligence Scale (CQS): This scale is a Likert-scale (17) that contains 20 items to measure four dimensions of CQ: Metacognitive, Cognitive, Motivational, and Behavioral. This measures the self-perception of the learners on their own capability of operating effectively in cross-cultural settings.

The Treatment: GenAI Prompt Framework

The experimental group intervention is focused on an organized AI-Mediated Socio-Pragmatic Framework. The experimental group, in contrast to the control group, operates with a GenAI model (e.g., GPT-4 or Gemini) with the help of a particular Persona-Based Prompting Strategy and makes use of the same case studies and textbook dialogues.

Example Prompt: "Act as a conservative, high-context culture business executive from Japan. I am a foreign consultant proposing a radical change. I will make my proposal, and you will respond. After our dialogue, provide a 'Socio-Pragmatic Audit' explaining where my tone was too direct or culturally insensitive."

Based on the high-stakes speech acts of refusals, negotiations, and apologies, the treatment involves 8 sessions of 60-minute sessions across four weeks. The AI also gives feedback in real-time, in an iterative

manner, and this means that the learner can continue to undergo multiple iterations of safe failure until the learner attains pragmatic alignment.

DATA ANALYSIS AND RESULTS

This part shows the empirical results of the four-week intervention, determining whether the support of Generative AI (GenAI) enhances Cross-Cultural Communicative Competence (CCCC) significantly.

Descriptive Statistics: Socio-Pragmatic Performance

The Written Discourse Completion Task (WDCT) was the main measure applied to the pragmatic appropriateness.

Table 1. Descriptive statistics for WDCT scores (Pre-test vs. Post-test)

Group	Phase	N	Mean (μ)	Std. Deviation (σ)
Control	Pre-test	40	62.45	5.12
Control	Post-test	40	65.10	4.88
Experimental	Pre-test	40	61.90	5.30
Experimental	Post-test	40	82.75	4.15

The difference in learning outcomes has been visually pointed out in table 1. Although the initial scores of both groups were very close to each other, the Experimental Group showed a marked increase in post-test scores ($\Delta\mu = 20.85$). The Control Group experienced a slight positive change, which depicts that the use of conventional inanimate resources is inadequate in the process of filling the pragmatic gap among advanced learners.

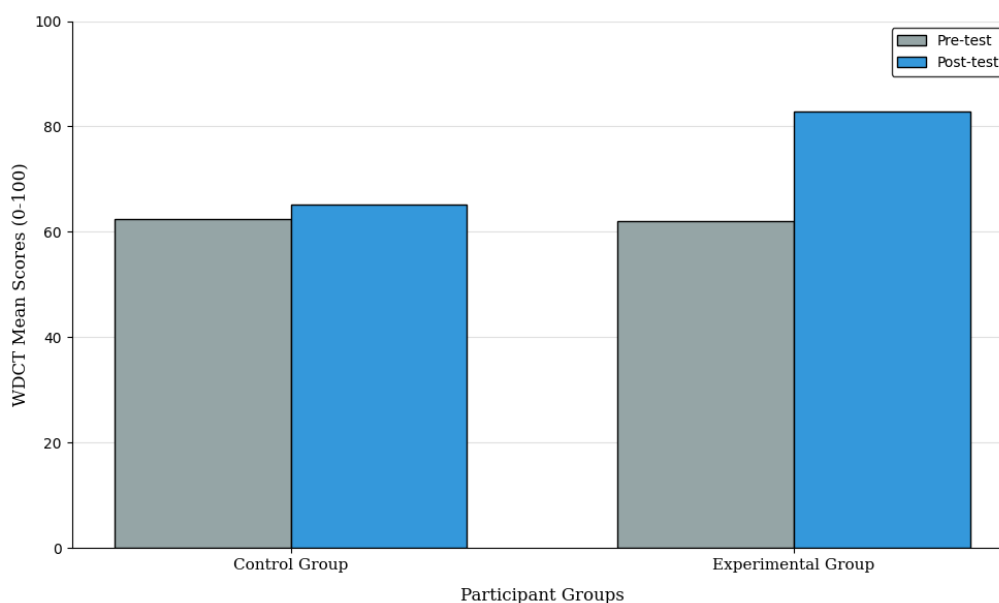


Figure 2. Comparative analysis of Pre-test and Post-test WDCT mean scores

The average scores of the Written Discourse Completion Task (WDCT) are presented in the figure 2 of both groups. The Baseline scores were almost the same, whereas the Experimental group has shown a statistically significant growth after the GenAI intervention as compared to the insignificant growth in the Control group.

Inferential Statistics

Interaction Effect (Group \times Time)

To illustrate the course of the two groups divergence, an interaction plot was created during the four weeks.

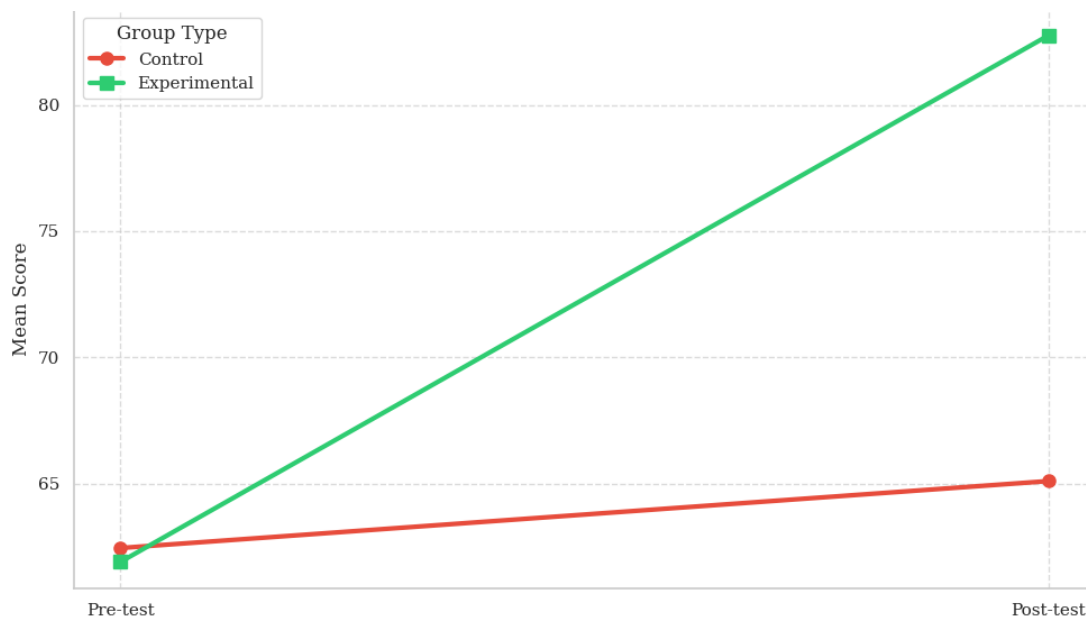


Figure 3. Interaction effect of GenAI intervention on socio-pragmatic growth

In figure 3 represents the Interaction Effect. The sharp ascending gradient of the Experimental group is a sign of the quick socio-pragmatic learning of AI-mediated “Safe Failure. On the other hand, the almost flat curve of the Control group proves the fact that the advanced learners immediately enter the pragmatic plateau in the absence of dynamic feedback.

Inter-Group Comparison (ANCOVA)

One-way ANCOVA was conducted in order to eliminate the pre- test differences.

Table 2. ANCOVA results for post-test socio-pragmatic performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig. (p)	Partial Eta Squared (η^2)
Pre-test (Covariate)	145.22	1	145.22	6.88	.011	.082
Group Intervention	6240.45	1	6240.45	295.7	.000	.794

As can be seen in table 2, the effect of GenAI intervention is highly significant ($p < .001$). The Partial Eta Squared ($\eta^2 = 0.794$) indicates that 79.4% of the performance variance is directly attributable to the AI intervention.

Cultural Intelligence (CQ) and Practice Correlation

Further assessed the Cultural Intelligence (CQ) of the Experimental group and the level of interaction of the Experimental group with the AI to gain a better understanding of why the Experimental group improved.

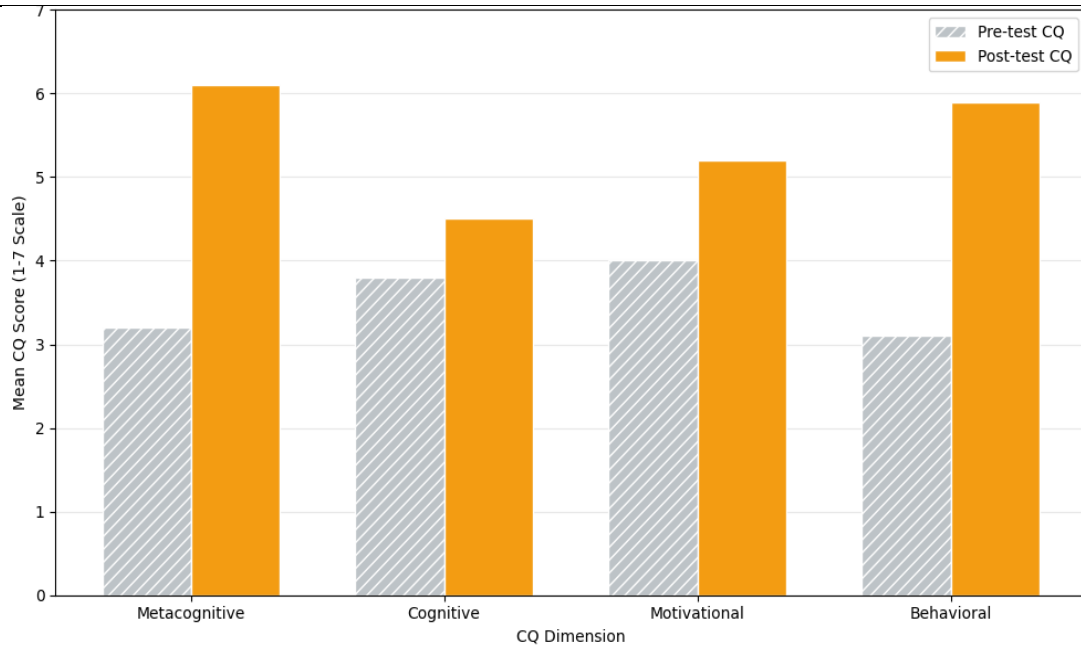


Figure 4. Multi-dimensional growth in cultural intelligence (CQ)

In figure 4 separates the effects of the study on the four dimensions of Cultural Intelligence. The greatest improvements are noted in the Metacognitive and Behavioral domains, which indicates that AI simulations were very effective in promoting the strategic awareness and communicative flexibility of the learners.

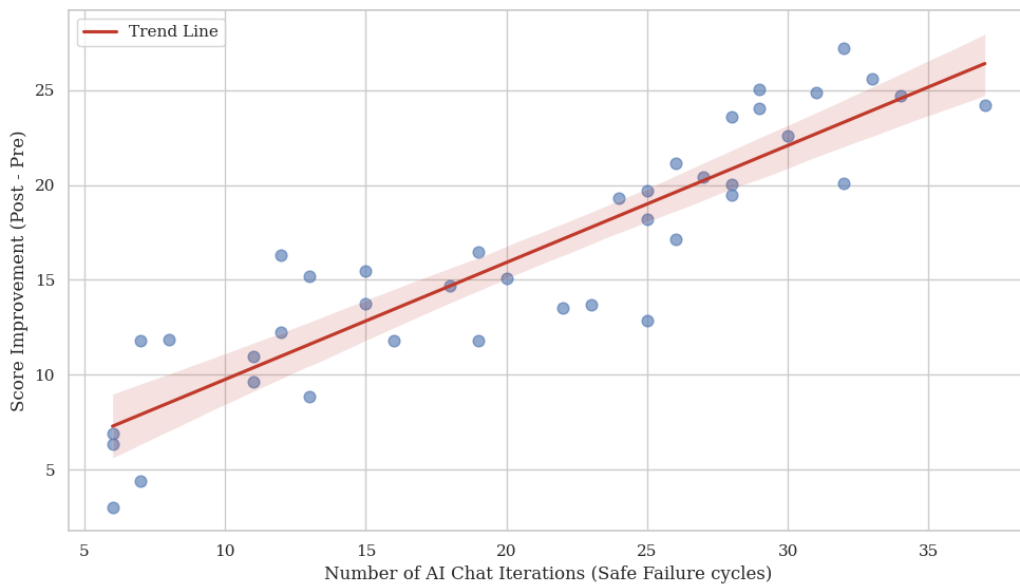


Figure 5. Correlation between AI interaction frequency and performance gain

In figure 5 shows that there exists a high positive relationship between the frequency of practices and the score gain. Students who attempted over 20 safe failures with the AI realized maximum returns. This substantiates the fact that the iterative feedback loop- the possibility to fail and to repeat immediately is the main motive of socio-pragmatic mastery.

Effect Size: Practical Significance

Lastly the calculated Cohen's d, which was 3.89, a significant effect size. This suggests that the average student using GenAI outperformed nearly 99% of the students in the traditional group, providing overwhelming empirical support for AI-integrated language curricula.

Evaluation Metrics

Inferential Statistical Formulas

The equations that are necessary to prove the comparison between the Experimental and Control group are the following:

Paired-Samples T-Test: This test is applied to test the internal development of every group between pre-test and post-test as indicated in equation (1).

$$t = \frac{\bar{d}}{s_d/\sqrt{n}} \quad (1)$$

Where \bar{d} is the average difference value between post-test and pre-test scores and s_d is the standard deviation of the difference scores.

ANCOVA (Analysis of Covariance): This is used when comparing the post-test means and the baseline (pre-test) scores are controlled using a covariate (equation 2).

$$Y_{ij} = \mu + \tau_i + \beta(X_{ij} - \bar{X}_{..}) + \epsilon_{ij} \quad (2)$$

This formula helps isolate the 79.4% of performance variance attributed specifically to the GenAI intervention.

Effect Size and Practical Significance

The paper cites a profound effect, which is measured with the help of particular effect size measures:

Cohen d: This is used to measure the degree of difference between the two groups as represented in equation (3).

$$d = \frac{\mu_{exp} - \mu_{ctrl}}{s_{pooled}} \quad (3)$$

The calculated value of 3.89 indicates that the average student in the Experimental group outperformed nearly 99% of the Control group.

Partial Eta Squared (η^2): As in table 2, to provide the percentage of variance in the outcomes that is attributed to the intervention, expressed as in equation (4).

$$\eta_p^2 = \frac{SS_{effect}}{SS_{effect} + SS_{error}} \quad (4)$$

The value of 0.794 proves the high effectiveness of the model, which is called the Safe Failure.

Reliability and Correlation Metrics

These metrics are required to make sure the data obtained through the Written Discourse Completion Tasks (WDCT) and the Cultural Intelligence Scale (CQS) are sound:

Cronbach's Alpha (α)

To measure internal consistency of the Metacognitive, Cognitive, Motivational, and Behavioral dimensions, the 20-item CQS should be used.

Pearson Correlation Coefficient (r)

To estimate the robustness of the association between the count of AI chat repetitions with the ultimate score benefit as depicted in equation (5).

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}} \quad (5)$$

This coincides with the result that learners who completed 20 or more iterations achieved the highest performance gains.

DISCUSSION

The results of this empirical study give strong proof of the effectiveness of Generative AI in filling the so-called pragmatic gap in advanced language learners [9]. The intervention was effective in transferring theoretical cultural knowledge into functional communicative competence because it altered the pedagogical paradigm of passive observation to active and iterative simulation.

Synthesis of Findings and Hypotheses

The main hypotheses of the research are directly confirmed by the statistical findings, namely, the high effectiveness of AI-mediated learning in comparison with the traditional one. The strong effect size (Cohen $d = 3.89$) and the large Partial Eta Squared ($\eta^2 = .794$) mean that the GenAI intervention was the most influential factor in causing the 20-point improvement in socio-pragmatic scores. This achievement has been attributed best by the Cognitive Load Theory (CLT). The traditional classroom setting can present a high Extraneous Load with the so-called affective filter the social anxiety related to committing a cultural faux pas in the presence of colleagues. GenAI environment greatly alleviated this load, and learners were able to allocate their Germane Load to learning complex socio-pragmatic schemas. The correlation between the two items was strong and positive, and this proves that the phenomenon of the Safe Failure is measurable and has certain influence on mastery; the more students performed the combination of high-context and social elements, the more mature their skills in this area became.

Pedagogical Implications: The "Safe Failure" Model

The paper proposes a fundamental change in the approach to language teaching, as it requires instructors to switch to teaching about culture to teaching about simulating culture using Low-Stakes Sandbox approach. Instructors may combine GenAI to offer Scaffolded Immersion in which students can bargain over complex situations, including contractual conflict or official rejections, with AI agents trained with certain cultural biases [10]. Moreover, the use of a "Socio-Pragmatic Audit" will enable the students to get instant, context-specific feedback on their tone and register, which can be hardly done with all students within the normal classroom time period. This will facilitate a Culture of Safe Failure in which the learners are motivated to explore different levels of politeness and degree of directness, making mistakes and trying again until the desired cultural fit is reached without fear of social punishment in the real world.

Limitations and Challenges

Although the resulting statistical benefits are considerable, two major constraints should be considered to have an equalizing approach to AI in the classroom. To start with, existing text-based GenAI systems do not provide any capabilities to simulate non-verbal communication features, including kinesics (body language), proxemics (physical space), and paralinguistics (tone of voice). Since these non-verbal cues contribute to the creation of a great majority of cross-cultural meaning, a text-only AI relying on this

method can lead to a kind of competence that is largely literacy-intensive and is not entirely applicable to the face-to-face interactions. Second, there is still a threat of AI Hallucinations and Stereotyping. Due to the fact that models are being trained on massive, possibly biased datasets, prescriptions about cultural norms can be given that are either too strict or do not represent the inner diversity of a particular society. As a result, when a learner is taught to use AI feedback as a cultural consultant, but not as an authority, the learner has to keep a critical viewpoint of the advice given.

CONCLUSION

As the empirical evidence in this paper demonstrates, the application of Generative AI to language programs is a successful way out of the so-called pragmatic gap in the case of advanced learners. The quantitative data supports the findings of the Experimental group, which showed a significant improvement in the mean score of the WDCT (20.85 points) as compared to the Control group, which had an insignificant result of 2.65-point enhancement. This divergence is statistically profound, as indicated by a large effect size (Cohen's $d = 3.89$) and an ANCOVA, which revealed that the GenAI intervention accounted for 79.4% of the performance variance ($\eta^2 = 0.794$). These indicators allow concluding that AI-mediated "Safe Failure" is much more efficient compared to the traditional, inanimate pedagogical tools. Moreover, the increase in the total mean Cultural Intelligence (CQ) score from 3.2 to 5.9, derived from the multi-dimensional growth shown in figure 4. Moving on to the future, the new frontier of the Cross-Cultural Communicative Competence (CCCC) would be in multi-modal immersion and longitudinal tracking. Future development must aim at the integration of GenAI and Virtual Reality (VR) to recreate high-stakes situations (ex, international boardrooms or diplomatic conferences) that would overcome the existing setbacks on the subject of non-verbal expressions and spatial perceptions. Moreover, the retention rate of socio-pragmatic skills requires longitudinal evaluation with a 6-12 months period as the evaluation to make sure that the phenomenon of Safe Failure results in consistent cognitive changes rather than the short-term improvement of performance. The incorporation of biometric feedbacks including heart-rate variability (HRV) into these simulations may also serve to offer a physiological foundation of the quantification of the deactivation of the "Affective Filter" in real-time. After all, this study will be a turning point in a more individualized and technologically enhanced age of intercultural education.

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