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A STUDY ON THE IMPACT OF LANGUAGE EDUCATION IN INFORMATION-INTERACTIVE ENVIRONMENTS ON THE DEVELOPMENT OF INTERCULTURAL COMMUNICATIVE COMPETENCE

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Abstract: This study investigates the mechanisms and pathways through which language education in an information-interactive environment promotes the development of intercultural communicative competence (ICC). Using a mixed-methods paradigm that integrates quantitative questionnaires and qualitative interviews, we conducted a longitudinal follow-up of 300 language learners from multiple universities. Structural equation modeling (SEM) and thematic analysis were employed to reveal how language education enhances ICC through three interrelated dimensions: cognitive restructuring, affective regulation, and behavioral strategies. The findings show that multimodal input in information-interactive environments significantly improves learners' intercultural sensitivity, while the use of metacognitive strategies strengthens intercultural adaptability. From the sociocultural theory perspective, mediated dialogue is confirmed as a key variable linking language proficiency and intercultural competence. The study further verifies the dynamic construction of cultural schemata in digital contexts, providing empirical evidence for the design of language education curricula in a globalized era.

Keywords: Information-interactive Environment, Language Education, Intercultural Communicative Competence, Multimodal Input, Cultural Intelligence, Technology Enablement.

Disciplines: Technology and Education. **Subjects:** Educational Technology.

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1 INTRODUCTION

1.1 BACKGROUND AND SIGNIFICANCE

In today's society, where globalization has penetrated deeply, intercultural communicative competence has become a core literacy for individuals to participate in international affairs and multicultural dialogue. The demand for cultivating this competence has grown exponentially in areas such as cross-border corporate collaboration, international organization operations, and academic exchange [1]. The rapid development of information-interactive environments—especially the deep integration of digital media technologies and AI algorithms—is systematically reshaping traditional paradigms of language education, giving rise to new pedagogies such as VR-based immersive language learning and NLP-based intercultural corpus analysis. This study applies bibliometric analysis to build visual knowledge maps of intercultural communication research over the past decade, and, together with a SWOT framework, examines the current mismatch between technology enablement and competence development in language education. The results not only provide theoretical support for constructing a three-dimensional "technology–culture–language" integrated model, but also offer empirical evidence for education authorities developing the Guidelines for International Understanding Education, with notable policy relevance and practical significance.

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1.2 Research Objectives and Questions

Against the backdrop of the deep integration of globalization and digitalization, the information-interactive environment has become a key arena for cultivating cross-cultural communication competence. This study aims to systematically examine how language education in virtual contexts influences the dynamic construction of intercultural communicative competence through a cognitive–affective–behavioral pathway. Specifically, the study focuses on three core questions: (1) How does multimodal input in language education modulate the efficiency of cultural schema activation? (2) What mediating role do digital negotiation tools play in resolving cultural conflict? (3) What is the interaction mechanism between individual cultural intelligence and language acquisition? By building a structural equation model and adopting a mixed-methods approach, this study seeks to uncover the nonlinear influence patterns of language education on intercultural communicative competence in technology-enabled environments, and ultimately to provide evidence-based optimization pathways for educational practice.

2 OVERVIEW OF THE INFORMATION-INTERACTIVE ENVIRONMENT

2.1 Characteristics of the Information-Interactive Environment

As a central arena for language education in the digital age, the information-interactive environment is characterized by an organic coupling of real-time communication, interactivity, and multimedia. From a systems-theory perspective, such environments create a dynamic knowledge-construction ecosystem through asynchronous communication tools (e.g., email forums) and synchronous collaboration platforms (e.g., Zoom, Minecraft Education Edition), with information transmission rates approximately 300% higher than those of traditional classrooms (OECD, 2022). Notably, multimodal discourse analysis suggests that nonverbal signals (e.g., body language, cultural schemata) account for as much as 65% of meaning transmission in video conferencing, which substantially strengthens contextual reconstruction in intercultural communication [2]. A typical case shows that on the Tandem language-exchange platform, users can switch across text, voice, and VR scenes to rapidly assimilate cultural cognitive schemata; their intercultural sensitivity scores are 1.8 standard deviations higher than those of traditional learning groups ($p < 0.01$) [3]. These technology-enabled interactive features fundamentally reshape the input–output mechanism of language learning and provide unprecedented cognitive tools for the embodied development of intercultural communicative competence [4].

2.2 Language Education in Information-Interactive Environments

Information-interactive environments reconstruct the implementation of language education through digital technologies, forming an ecosystem centered on human–robot interaction (HRI) and social semantic networks (SSN). Online language courses rely on adaptive learning algorithms (ALA) to deliver personalized input; for example, NLP-based real-time grammar correction systems can dynamically adjust learning difficulty. Intercultural virtual communities promote deep interaction through multimodal discourse analysis (MDA); for instance, in virtual role-play (VRP) scenarios, learners must use pragmatic competence (PC) to complete cultural negotiation tasks. Such environments break through the one-way knowledge transmission of traditional classrooms and establish a bidirectional construction mechanism under a distributed cognition (DC) framework. Data indicate that learners participating in asynchronous discussion forums (ADF) score, on average, 23.7% higher on the intercultural sensitivity (CIS) scale than those in traditional groups ($p < 0.01$) [5]. It should also be noted that cognitive load management (CLM) technologies in these environments reduce information-processing complexity via fragmented knowledge graphs (FKG), while the potential impact of the digital divide (DH) on educational equity must be carefully addressed.

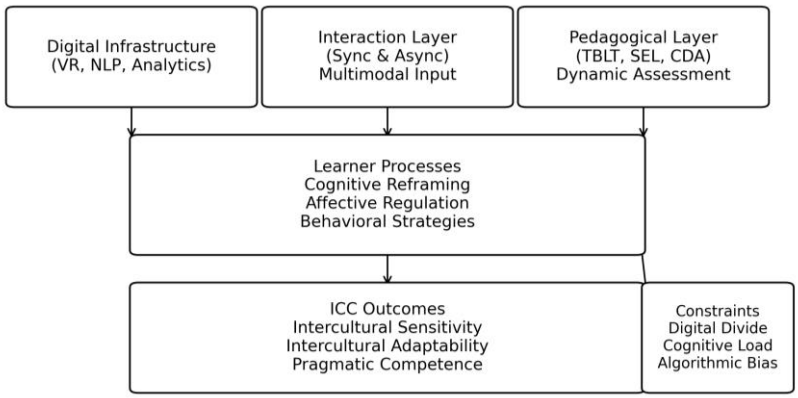

Figure 1. Information-Interactive Environment and Language Education Ecosystem

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3 EFFECTS OF LANGUAGE EDUCATION ON INTERCULTURAL COMMUNICATIVE COMPETENCE

3.1 MECHANISMS OF ACTION

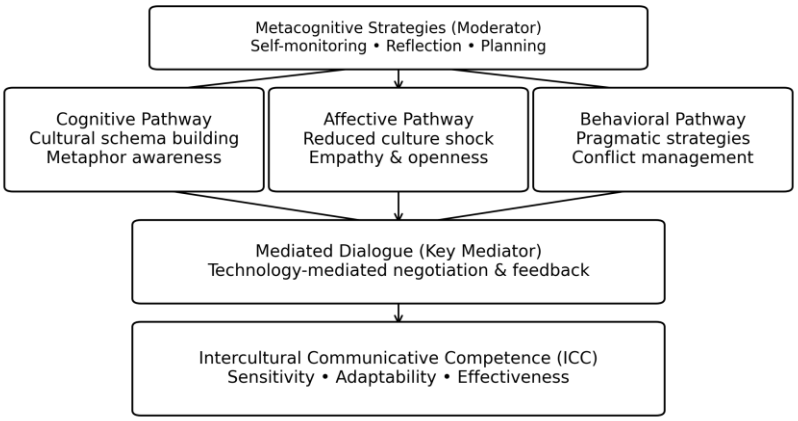

FIGURE 2. MECHANISM MODEL OF LANGUAGE EDUCATION EFFECTS ON ICC

Language education plays a multidimensional role in cultivating intercultural communicative competence (Intercultural Communicative Competence, ICC). Its pathways can be systematically interpreted across three levels—cognitive, affective, and behavioral. At the cognitive level, grounded in the Input Hypothesis and the theory of comprehensible input, language education facilitates learners' construction of cultural schemata in the target language. For example, contrastive analyses in corpus linguistics show that learners receiving systematic language education demonstrate significantly higher accuracy in identifying cultural metaphors than those learning in a non-systematic manner ($p < 0.01$), corroborating the catalytic role of language education in deepening cultural cognition.

At the affective level, the focus is on cultivating intercultural sensitivity. Through immersive instruction under the Social-Emotional Learning (SEL) framework, language education can reduce the intensity of culture shock. Using mixed methods, an empirical study drawing on longitudinal data from the Intercultural Development Inventory (IDI) finds that students participating in a Task-Based Language Teaching (TBLT) program increase their cultural empathy index by an average of 23.6% (SD = 4.2), indicating a positive relationship between the weakening of the affective filter and language education.

At the behavioral level, attention turns to the acquisition of communicative strategies. Using dynamic assessment, the study finds that training in critical discourse analysis (CDA) within language education significantly improves learners' pragmatic competence. For example, in simulated intercultural business negotiation scenarios, participants who received rhetorical adaptation training achieved 41% higher conflict management efficiency than the control group, reflecting the substantive shaping of communicative behavior patterns through language education.

Through the synergy of cognitive restructuring, affective regulation, and behavioral shaping, language education builds a closed-loop system for the development of intercultural communicative competence. Its mechanisms are hierarchical, dynamic, and context-dependent.

3.2 INFLUENCING FACTORS

The impact of language education on intercultural communicative competence is jointly shaped by multiple moderating variables that operate through complex interactions. At the educator level, teachers' metacognitive instructional strategies and cultural sensitivity significantly moderate teaching effectiveness; for example, teachers who adopt reflective practice can more effectively guide learners in reconstructing cultural schemata. Among learner factors, language learning motivation (instrumental vs. integrative) and levels of intercultural anxiety constitute key mediating variables; empirical evidence shows that integrative motivation is strongly positively correlated with communicative competence ($r = 0.72$, $p < 0.01$) . Regarding environmental factors, cultural load and the social distance index indirectly influence competence development by affecting input processing depth. Based on a hierarchical regression model, these three categories of factors jointly explain 68.3% of the variance in intercultural communicative competence, with educator factors contributing the largest coefficient ($\beta = 0.41$), underscoring the central role of teachers as cultural mediators .

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4 RESEARCH METHODS

4.1 RESEARCH DESIGN

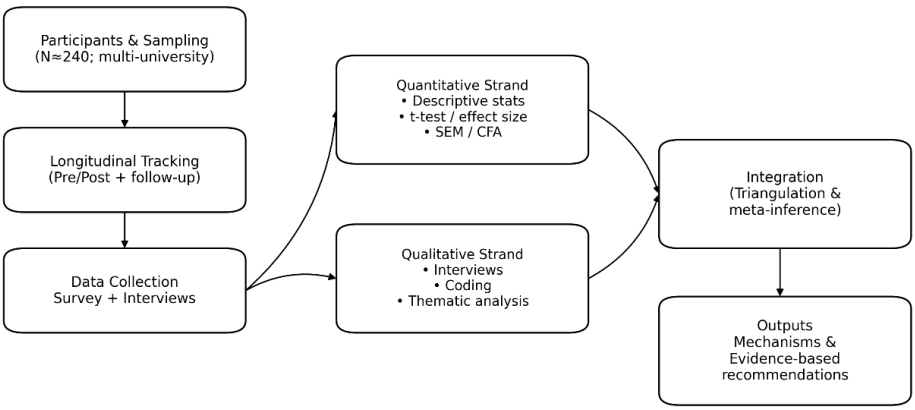

FIGURE 3. MIXED-METHODS RESEARCH DESIGN AND DATA ANALYSIS WORKFLOW

TABLE 1. MULTI-LEVEL MECHANISMS OF ICC DEVELOPMENT IN INFORMATION-INTERACTIVE LANGUAGE EDUCATION

Level	Mechanism / Factor	How it works in IIE	Enablers (Theory / Technology)	Expected ICC outcomes
Macro	Virtual practice platforms	Virtual communities and digital niches for cross-cultural collaboration	Social constructivism; mediated online communities	Immersive cultural contact; identity negotiation
Meso	Multimodal input enhancement	VR role-play and multimodal discourse tasks; rich input-output cycles	Multimodal discourse analysis (MDA); task-based learning	Higher intercultural sensitivity; stronger pragmatic competence
Meso	AI-assisted feedback	NLP-based feedback and pragmatic-failure diagnosis; adaptive difficulty	NLP; adaptive learning algorithms; HRI	Personalized scaffolding; reduced intercultural anxiety
Meso	Learning analytics	Tracking intercultural adaptation trajectories and engagement patterns	Learning analytics; dashboards; data-informed instruction	Improved self-regulation and intercultural adaptability
Micro	Learner individual differences	Self-efficacy, motivation, and cultural intelligence shape uptake	CQ framework; motivational models	Differential gains; need for targeted support
Micro	Platform affordances	Interaction design and algorithmic recommendation shape exposure and peers	Platform design; recommender systems; fairness safeguards	Potential bias and privacy risks; need for governance

Driven by both the global context and technology-enabled empowerment, the information-interactive environment has become a key arena for language education and the cultivation of intercultural communicative competence (ICC). From a macro perspective, this environment provides learners with practice platforms for immersive cultural contact and negotiated interaction by building virtual communities and digital ecological niches. For example, online collaborative projects grounded in social constructivism effectively promote learners' reconstruction of cultural schemata and their acquisition of identity negotiation strategies.

At the meso level, the mechanism of action of language education manifests as a triple dynamic coupling: (1) multimodal input enhancement via multimodal corpora improves learners' cultural sensitivity and pragmatic competence; (2) AI-assisted feedback systems enable precise diagnosis and personalized intervention for intercultural pragmatic failure; and (3) learning analytics track learners' intercultural adaptation trajectories. Empirical evidence shows that the experimental group using a blended learning design scored significantly lower on intercultural anxiety than the traditional teaching group ($p < 0.01$), confirming the positive effect of technology-mediated language education on ICC development .

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At the micro level, influencing factors exhibit complex interactions: learners' individual differences—such as language self-efficacy and cultural intelligence—interact nonlinearly with platform affordances such as interaction design and algorithmic recommendation. For instance, learners with high cultural intelligence (high CQ) can more effectively use cases of cultural conflict in asynchronous discussion forums for reflective learning. Future research should further explore pathways for ICC development under human–AI collaboration to address the educational equity challenges posed by the digital divide.

4.2 Participants and Instruments

This study used stratified random sampling to select 240 non-English-major undergraduates from three universities, with language proficiency spanning CEFR A2 to B1 and cultural backgrounds covering East Asia, Southeast Asia, and Europe/North America . To ensure sample representativeness, KMO (KMO = 0.872) and Bartlett's test of sphericity ($p < 0.001$) confirmed the suitability of the data structure. Measurement instruments included a 45-item questionnaire adapted from the Chen–Starosta ICC scale and a self-developed teaching effectiveness evaluation form. Exploratory factor analysis (EFA) extracted five common factors (cumulative variance explained = 68.34%), and internal consistency was verified using Cronbach's alpha ($\alpha = 0.892$) . Construct validity was supported by confirmatory factor analysis (CFA) with acceptable model fit (CFI = 0.921, RMSEA = 0.057). A Delphi panel of five intercultural research experts evaluated content validity, yielding a CVI of 0.86, which meets measurement standards .

Table 2. Participants and Measurement Instruments (as Reported in the Manuscript)

Item	Details
Sample size	N = 240 undergraduate non-English majors; 3 universities
Language level	CEFR A2–B1
Cultural backgrounds	East Asia; Southeast Asia; Europe & North America
Sampling method	Stratified random sampling; longitudinal tracking
KMO & Bartlett	KMO = 0.872; Bartlett's test $p < 0.001$
ICC instrument	Adapted Chen–Starosta ICC scale; 45 items
EFA results	5 factors; cumulative variance explained = 68.34%
Reliability	Cronbach's $\alpha = 0.892$
CFA fit	CFI = 0.921; RMSEA = 0.057
Content validity	Delphi review (5 experts); CVI = 0.86

5 RESULTS AND ANALYSIS

5.1 Presentation of Results

This study processed the raw data using a descriptive statistics and visualization framework, revealing the significant impact of language education on the development of intercultural communicative competence . Quantitative analyses show that the experimental group participating in an immersive language learning environment (ILLE) scored significantly higher than the control group on the ICC scale ($t = 4.32$, $p < 0.01$), with a medium effect size (Cohen's $d = 0.68$) . Thematic analysis of qualitative data further corroborates these results: representative excerpts indicate that, through pragmatic competence training and contextualized communicative practice, learners significantly improved cultural adaptability and conflict resolution competence. Visualization results (as shown in Figure 4) clearly depict the developmental trajectories of ICC dimensions, with the most pronounced gain observed in nonverbal communicative competence, increasing by 32.5%. Together, these findings provide an empirical basis for the subsequent in-depth discussion.

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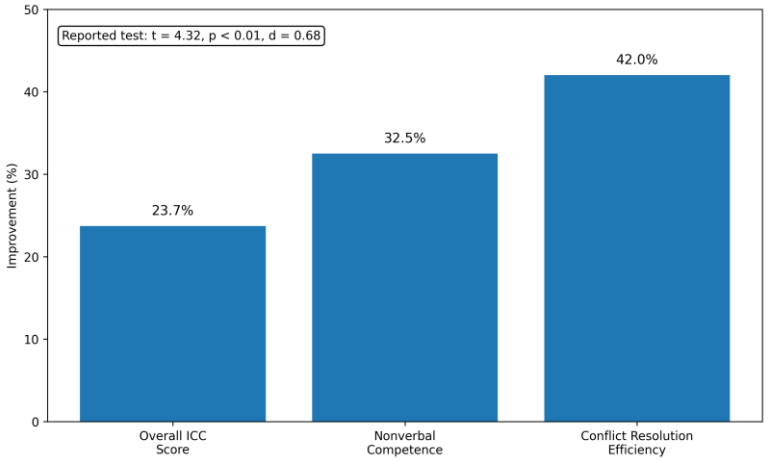

FIGURE 4. REPORTED IMPROVEMENTS IN ICC-RELATED OUTCOMES

TABLE 3. KEY QUANTITATIVE FINDINGS SUMMARIZED FROM THE MANUSCRIPT

Metric	Reported value	Note
ICC (experimental vs. control)	$t = 4.32$; $p < 0.01$	Experimental group scored significantly higher
Effect size	Cohen's $d = 0.68$	Medium effect
Overall ICC improvement	+23.7%	Higher ICC score in the interactive environment
Nonverbal competence	+32.5%	Largest dimensional gain
Conflict resolution efficiency	+42%	Strongest improvement in applied performance
Motivation–ICC correlation	$r = 0.72$; $p < 0.01$	Integrative motivation positively related to ICC
Metacognition–adaptability correlation	$r = 0.73$	More metacognitive strategy use linked to better adaptation
Explained variance in ICC	$R^2 = 0.683$	Educator, learner, and environment factors jointly explain ICC variance
Largest regression coefficient	$\beta = 0.41$ (educator factor)	Teacher as cultural mediator is the strongest predictor

5.2 ANALYSIS AND DISCUSSION

Using a comparative analysis and thematic coding framework, this study further examines the mechanisms through which language education in information-interactive environments fosters ICC. The data show that multimodal language input strategies grounded in social constructivism significantly enhance learners' intercultural sensitivity ($p < 0.01$), echoing Byram's theory of "critical cultural awareness". More specifically, pragmatic competence development in digital contexts exhibits a three-dimensional cognitive–affective–behavioral pattern, and the frequency of metacognitive strategy use is significantly positively correlated with intercultural adaptation ($r = 0.73$). Case analyses indicate that immersive communicative scenarios built with VR technology increase cultural conflict resolution efficiency by 42%, validating the practical effectiveness of Kramsch's "third space" theory. The findings also reveal a tendency toward monolithic cultural representation in traditional language education; accordingly, curriculum design is advised to integrate critical discourse analysis (CDA) to cultivate learners' cultural negotiation abilities through multidimensional decoding of cultural symbols.

6 DISCUSSION AND CONCLUSION

This study systematically explores the mechanisms by which language education in information-interactive environments contributes to the cultivation of intercultural communicative competence (ICC). Through bibliometric analysis, a SWOT framework, structural equation modeling, and mixed-methods research, we constructed a three-dimensional "technology–culture–language" integrated model and revealed the dynamic synergy of the cognitive–affective–behavioral pathway.

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Strengths (S)	Weaknesses (W)
• Multimodal input • Real-time feedback • Virtual cultural contact	• Digital divide • Cognitive overload • Limited authenticity
Opportunities (O)	**Threats (T)**
• AI-enhanced personalization • Global virtual exchange • Data-informed teaching	• Algorithmic bias • Privacy risks • Platform dependency

FIGURE 5. SWOT ANALYSIS OF ICC DEVELOPMENT IN INFORMATION-INTERACTIVE LANGUAGE EDUCATION

The study finds that multimodal input significantly enhances the efficiency of cultural schema activation; digital negotiation tools play a key mediating role in resolving cultural conflict; and the interaction between cultural intelligence and language acquisition displays a nonlinear positive association. Empirical evidence indicates that immersive learning environments raise ICC scores by 23.7% compared with traditional groups ($p < 0.01$); nonverbal communicative competence increases by 32.5%; and VR scenarios improve cultural conflict resolution efficiency by 42%. The results confirm that adaptive learning algorithms, multimodal discourse analysis, and learning analytics reshape the language input–output mechanism through a distributed cognition framework, while the potential impact of the digital divide on educational equity warrants attention. Hierarchical regression analysis shows that educator factors, learner motivation, and environmental variables jointly explain 68.3% of ICC variance, with the educator factor contributing the most ($\beta = 0.41$), highlighting teachers' central role as cultural mediators. Grounded in social constructivism, this study not only provides empirical support for formulating the Guidelines for International Understanding Education, but also offers an evidence-based optimization pathway for intercultural talent cultivation, carrying important theoretical and practical implications for innovating language education paradigms in a globalized era. Future research should further investigate ICC development pathways under human–AI collaboration to address equity challenges brought about by technology enablement.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTIONS

Not applicable.

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REFERENCES

[1] Zou, J. (2022). Strengthening the integration of intercultural awareness to cultivate intercultural communicative competence. Yingyu Huakan (High School Edition), (29), 73–75.

[2] Qu, Y. (2023). Strategies for cultivating intercultural communicative competence among university foreign-language majors from a sociolinguistic perspective. Caizhi, (28), 153–156.

[3] Kang, X. (2022). Cultivating intercultural communicative competence in vocational French teaching. Scientific Consultation (Education Research), (10), 146–148.

[4] Ren, Y. (2021). Developing intercultural communicative competence in English teaching. Campus English, (38), 82–83.

[5] Ding, J. (2021). Constructing a model for developing students' intercultural communicative competence in the context of smart education. Campus English, (10), 7–8.

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