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AIGC-ENABLED SMART INSTRUCTIONAL DESIGN FOR INTERCULTURAL COMMUNICATION COMPETENCE DEVELOPMENT: A TRIADIC HUMAN–AI COLLABORATION MODEL

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Abstract: The rapid proliferation of Artificial Intelligence Generated Content (AIGC) has introduced transformative pedagogical affordances for Intercultural Communicative Competence (ICC) instruction. However, current applications remain predominantly siloed in linguistic proficiency training, often marginalizing cultural competence development and falling short of providing systematic, end-to-end instructional frameworks. Addressing persistent limitations in traditional ICC pedagogy—such as static case studies, situational authenticity deficits, and rigid interaction patterns—this research, which is a Design-Based Research (DBR), integrates experiential learning, situated learning, and sociocultural theories to propose a theory-driven AIGC-enabled instructional design model. The model develops an integrated framework spanning resources, processes, and evaluation, utilizing *New Coursebook of Intercultural Communication* as an example, and leverages AIGC to dynamically generate multimodal cultural conflict scenarios, facilitating an instructional cycle of "Concrete Experience–Reflective Observation–Abstract Conceptualization–Active Experimentation," while establishing a synergistic Teacher-Learner-AI Triad. As a prospective design-based study, this paper prioritizes the operationalization of AIGC integration, providing replicable implementation schemes including thematic analysis matrices and technical guidelines. By establishing this comprehensive framework, the study provides a testable foundation for future empirical validation of its impact on students' intercultural cognition, affective attitudes, and behavioral competencies.
Keywords: AIGC; ICC; Smart instructional design; Instructional design; Human-AI collaboration

1 INTRODUCTION

Against the backdrop of accelerating globalization, Intercultural Communicative Competence (ICC) has been positioned as a cornerstone of talent cultivation in higher education. This imperative is underscored by pivotal policy initiatives: the Guidelines on College English Teaching identify ICC development as a primary instructional objective, while the Planning Outline for Building a Leading Country in Education (2024–2035) advocates for the integration of artificial intelligence to catalyze pedagogical transformation. Driven by this dual impetus, exploring the synergistic integration of Artificial Intelligence Generated Content (AIGC) into intercultural education has become a critical research frontier. However, despite this heightened institutional focus, current ICC curricula are fraught with systemic bottlenecks. A primary concern lies in instructional resources, which remain predominantly tethered to static, text-based case studies, creating a profound deficit of the dynamic, multimodal scenarios necessary to represent authentic cultural conflicts. Furthermore, pedagogical workflows are largely characterized by unidirectional, teacher-centered lectures, which fail to facilitate differentiated interaction or higher-order critical reflection. Assessment frameworks also disproportionately privilege summative knowledge acquisition, effectively marginalizing process-oriented competencies such as cultural sensitivity and strategic adaptability. Consequently, while learners may acquire foundational cultural knowledge, they frequently demonstrate limited capacity to navigate the nuanced and complex communicative demands of authentic intercultural encounters.

To address these pedagogical limitations, the integration of AIGC into language education has undergone rapid expansion in recent years. Within the realm of linguistic proficiency, international scholarship has substantiated the efficacy of AI in enhancing language skills; for instance, Kohnke et al. demonstrated that ChatGPT significantly improves learners' writing coherence and lexical diversity [1], while Dizon validated the potential of AI-driven conversational agents in bolstering oral fluency [2]. Concurrent with the advancement of generative AI and multimodal technologies, its pedagogical applications have increasingly extended beyond instrumental language training to address cultural-affective dimensions and the cultivation of ICC. As noted by Xuan and Yang, AI-driven platforms facilitate the real-time parsing of cultural expressions through dynamic materials [3], thereby pointing toward a synergistic integration of linguistic learning and cultural understanding. Building on this line of inquiry, Xia et al. developed the Cross-Cultural Intelligent Language Learning System (CILS), which leverages AI to construct intercultural instructional scenarios [4], markedly improving learner engagement and communicative skills. Nonetheless, these scenarios often gravitate toward standardized or stereotypical representations, failing to capture the intrinsic diversity of cultures, subcultural dynamics, and the real-time evolution of cultural contexts. More recently, Dovhaniuk et al. utilized Large Language Models (LLMs) to simulate intercultural personas for assessing student adaptability [5]; however, their

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approach was primarily constrained by algorithmic modeling, which arguably oversimplified the multidimensional and dynamic psychological and social processes inherent in cultural adaptation. Taken together, these studies suggest that AI is catalyzing a pedagogical shift from linear knowledge transmission toward multimodal and immersive cultural simulations, while simultaneously underscoring the critical need for more systematic instructional designs capable of generating authentic cultural scenarios and rigorously evaluating individual ICC.

In contrast to the aforementioned international progress, domestic research in China—while actively responding to the "AI-enabled language teaching" trend [6,7]—remains in its nascent stages within the ICC domain. Existing scholarship is primarily concentrated on macro-level conceptualizations or technical feasibility analyses, yet falls short of operationalizing the reconstruction of ICC instructional workflows via AIGC. Critically, there is a lack of systematic integration between AIGC and foundational pedagogical theories (e.g., Kolb's Experiential Learning, Vygotsky's Sociocultural Theory) or intercultural frameworks (e.g., Hall's High/Low Context, Burgoon's Nonverbal Communication). Although some practical attempts have utilized virtual agents for intercultural dialogue [8], these scenarios often suffer from rigid pre-programming and lack dynamic generative capabilities. Furthermore, while recent analyses have explored the mechanism of LLMs across Byram's ICC dimensions, such efforts have predominantly targeted primary education and fail to align with the sophisticated requirements of higher education ICC instruction [9].

Synthesizing the existing literature, it becomes evident that current research is constrained by two salient gaps. First, a notable gap persists in the utilization of AI tools to generate multimodal, multilingual, and real-time interactive cultural scenarios that approximate the complexity of authentic intercultural encounters. Second, there remains a lack of a cohesive model that systematically synthesizes theoretical foundations, technical implementation, and instructional practice, alongside an absence of operationalized cultivation pathways and scientifically grounded evaluation schemes for implicit ICC-related competencies.

To bridge these identified gaps, and given that AIGC-enabled ICC instruction is still in its early stages of development, this research adopts a prospective design approach, prioritizing the fundamental question of “how to design” over immediate outcome evaluation. Positioned as a theory-driven instructional design study, the present research seeks to bridge the identified gaps by constructing a systematic AIGC-enabled instructional model and implementation framework, providing a testable and extensible foundation for future empirical validation and iterative design refinement.

2 THEORETICAL FOUNDATIONS AND PRACTICAL RATIONALE OF THE INSTRUCTIONAL DESIGN

The AIGC-enabled smart instructional design for ICC proposed in this study synthesizes multiple classical pedagogical theories while strategically accounting for prevailing curricular frameworks, technical constraints, and faculty competencies in higher education contexts. Rather than treating technology as an isolated intervention, the design seeks to translate AIGC's technical affordances into pedagogical efficacy through systematic instructional planning.

2.1 Core Theoretical Support

The human-AI collaborative Teacher-Learner-AI Triadic ICC instructional model developed in this research is grounded in Experiential Learning Theory, Situated Learning Theory, Social Constructivism, and Communicative Language Teaching (CLT). These foundations are further complemented by Sociocultural Theory and principles of Human–AI synergy, forming an integrated theoretical loop that connects contextualized experience, social mediation, and knowledge application, see Figure 1.

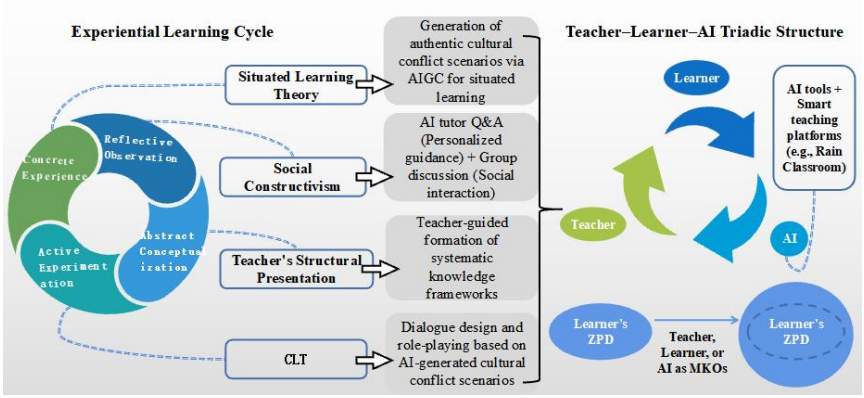

Figure 1 Theoretical Model of Teacher–Learner–AI Triadic ICC Instruction

Note: The figure shows the logical relationship among Experiential Learning Cycle, Situated Learning Theory, Social Constructivism, CLT and Teacher-Learner-AI Triadic Structure, with AIGC providing authentic cultural conflict scenarios for situated learning; learners complete concrete experience and reflective observation through AI tutors and group discussion; teachers guide abstract conceptualization; students carry out active experimentation through role-play; Teacher, Learner and AI jointly act as MKOs to support learners’ ZPD.

This study adopts the learning cycle proposed in Kolb's Experiential Learning Theory as the foundational architecture

of the instructional model [10]. By integrating complementary theoretical perspectives, the model constructs a multimodal ICC instructional cycle comprising: AIGC-mediated situational experience (Concrete Experience) → collaborative reflective observation (Reflective Observation) → teacher-guided conceptual synthesis (Abstract Conceptualization) → scenario-based active experimentation (Active Experimentation). The following sections elaborate on this AIGC-enabled instructional workflow in alignment with the New Coursebook of Intercultural Communication.

2.1.1 Concrete experience

In the first stage, grounded in Situated Learning Theory [11], learning is conceptualized as inherently context-dependent. The model utilizes AIGC tools to generate authentic cultural conflict scenarios derived from textbook cases. For instance, scripts can be developed to simulate scheduling conflicts between Monochronic time (M-time) U.S. business representatives and Polychronic time (P-time) Greek partners, or misunderstandings in refusal expressions between high-context Chinese employees and low-context American managers. Such immersive participation transforms students from passive recipients into active learners, providing a foundational basis for subsequent deep reflection.

2.1.2 Reflective observation

In the second stage, the design aligns with Social Constructivism [12], emphasizing that knowledge is actively constructed through interaction with the environment. Two parallel paths are designed: first, the Rain Classroom AI tutor provides personalized, real-time guidance by deconstructing nonverbal details based on Burgoon's seven-dimensional theory of nonverbal communication; second, collaborative group discussions serve as a platform for social interaction. Through these multi-dimensional interactions with scenarios, peers, and intelligent agents, students construct their own ICC knowledge systems and complete the critical transition from situational experience to conceptual abstraction.

2.1.3 Abstract conceptualization

In the third stage, the teacher provides structural knowledge presentation by synthesizing, supplementing, and refining the viewpoints generated by students. For example, after analyzing business negotiation scenarios, the teacher systematically outlines the core characteristics of high/low-context cultures and their respective verbal behavior strategies. This teacher-student interaction reinforces key learning points, corrects misconceptions, and establishes a systematic ICC framework, thereby facilitating a cognitive leap in students' understanding of cultural phenomena.

2.1.4 Active experimentation

In the final stage, the workflow is consistent with CLT [13], which posits that the ultimate goal of learning is effective application in authentic communication. Students design original dialogues and engage in role-plays based on AIGC-generated cultural conflict scenarios. For instance, in a scenario involving communication barriers and time pressure within an intercultural team, students must negotiate project progress while navigating P-time cultural norms. This process facilitates the internalization and transfer of ICC knowledge and competencies, completing the pedagogical loop while providing a new starting point for the next cycle of experience.

Consequently, the Teacher-Learner-AI Triad established in this model represents a fundamental redefinition of instructional subjectivities rather than a mere technological overlay. According to Vygotsky's Sociocultural Theory, learning is inherently a social and collaborative endeavor, and the transition across the Zone of Proximal Development (ZPD) depends on the mediation of a More Knowledgeable Other (MKO). Within this framework, AIGC functions as a novel "Silicon MKO" characterized by two distinctive attributes:

1.Precise construction of cultural contexts: By integrating various AI tools, the model can generate cultural scenarios ranging from "single-dimensional conflicts" to "multi-dimensional composite conflicts," precisely calibrated to the specific ZPD of diverse learners.

2.Simulation of multicultural perspectives: AI agents can simulate interlocutors from diverse cultural backgrounds—such as an American manager elucidating low-context communication norms—thereby facilitating the comprehension of heterocultural logics and effectively expanding the boundaries of the learner's ZPD [6].

This structure embodies a new "Human-AI Synergy" paradigm in education: teachers focus on high-order guidance in theoretical framing and strategic extraction, while students concentrate on the meaning-making processes involved in conflict analysis and strategic application. AIGC fulfills the functions of situational provision, cognitive scaffolding, and multi-perspective simulation, enabling the three entities to form a functionally complementary instructional community.

2.2 Practical Rationale

Under the aforementioned theoretical framework, the proposed design fully considers technical adaptability and implementation feasibility. Although a single AIGC technology cannot automate the entire production chain of instructional resources, the combined application of various AI tools enables the low-cost and efficient creation of diversified cultural conflict scenarios involving video, audio, and text. This precisely meets the intrinsic demands of intercultural teaching for situational authenticity and interactive diversity.

Currently, smart instructional platforms such as Rain Classroom provide a stable carrier for pedagogical delivery. Meanwhile, LLMs like DeepSeek and ERNIE Bot can generate high-quality scripts through prompt engineering, incorporating classic intercultural theories proposed by scholars such as Hall and Hofstede, along with core concepts like P-time and M-time. Tools such as Jimeng AI and NoizAI enable dynamic scene generation and multi-role, multilingual voiceovers, simulating the phonetic features of various cultural backgrounds. Furthermore, Doubao agents

and the digital humans within CapCut serve as AI learning partners; by role-playing interlocutors from different cultures, they assist students in further elucidating core concepts and understanding intercultural conflicts. These instruments are primarily free or low-cost generative tools, significantly reducing the financial threshold for technological adoption. In addition, the design provides standardized operation guides and prompt templates, simplifying technical integration into clear steps to ensure that teachers can implement the scheme effectively with basic information literacy, thereby ensuring the scalability of the proposal.

3 DESIGN OF THE AIGC-ENABLED SMART ICC CLASSROOM

Translating the theoretical framework into an operational pedagogical model is the core objective of this study. This chapter details the comprehensive design of the AIGC-enabled smart ICC classroom, encompassing the generative mechanism for multimodal resources, the "pre-, in-, and post-class" instructional workflow, and the multidimensional evaluation system.

3.1 Generative Mechanism for Multimodal ICC Resources

The prerequisite for an immersive ICC learning environment lies in the continuous supply of authentic, context-rich instructional materials. To this end, this section delineates how to synergistically employ various AIGC tools to operationalize textbook concepts into dynamic cultural scenarios.

3.1.1 The four-step generation workflow

This study proposes a systematic four-step generative mechanism, as illustrated in Figure 2.

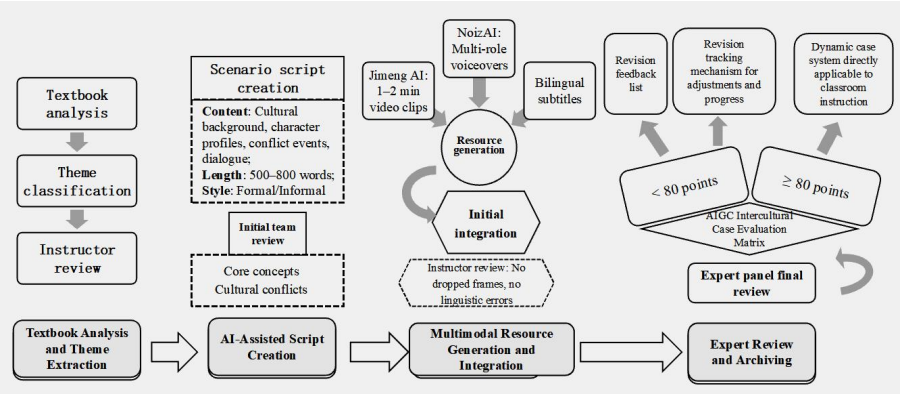

Figure 2 Flowchart of AIGC-enabled ICC Resource Generation

Note: The flowchart illustrates the five-stage process from textbook analysis to expert review. AI-assisted tools (NoizAI for voiceovers, Jimeng AI for video clips) support script creation and multimodal resource integration. Cases scoring below 80 points undergo iterative optimization via the AIGC Intercultural Case Evaluation Matrix.

1.Textbook Analysis and Theme Extraction. The design utilizes the New Coursebook of Intercultural Communication as the foundational blueprint to extract core cultural conflicts across themes such as "verbal differences" and "nonverbal differences". Selected textbook cases are mapped to specific intercultural theories, forming a structural matrix that specifies corresponding textbook pages and theoretical anchors, see Table 1.

Table 1 Mapping Core Cultural Conflicts to Textbook Themes (Excerpt)

Thematic Unit	Core Conflict	Case Content	Theoretical Anchors	Textbook Page
Unit 5: Verbal differences	Differences in conversational styles and content	Communication style conflicts between American and Italian parties over public healthcare topics.	High involvement vs. high considerateness	p. 165
Unit 5: Verbal differences	Conflict in business communication styles	Expressive style differences (rapid response vs. silent reflection) in US-Japan business meetings.	Ping-pong game vs. long silence	p. 168
Unit 5: Verbal differences	Conflict in intercultural workplace communication	Information transmission differences between Chinese and American professionals during work negotiations.	High context vs. low context	p. 170

2.AI-Assisted Script Creation. Utilizing LLMs such as DeepSeek and ERNIE Bot, the model generates 500-800 word scripts tailored to specific cultural characteristics. These scripts strictly adhere to predefined criteria: explicit cultural

affiliations, tight alignment with intercultural theories, and evident cultural conflicts. The structure encompasses four components: cultural background, character profiles, conflict events, and dialogue content, alongside annotations for cinematic shots (e.g., medium/close-up shots), nonverbal cues reflecting Burgoon's theory, and theoretical anchors. An excerpt illustrating a high/low-context cultural conflict is presented below.

Cultural Background: Conflict between Chinese (High-context) and American (Low-context) communication styles.
Character Profiles:
(1) Harvey Smith (Production Manager, American):
- Physical Profile: 42 years old, Caucasian, short and slightly wavy brown hair with touches of gray, slight stubble, approximately 180 cm tall.
- Attire: Light blue Oxford shirt (sleeves rolled up to the forearms), khaki trousers, dark brown belt, company ID badge on the chest (white background, blue text reading "Production Manager").
- Props and Nonverbal Cues: Holding a stainless steel thermos (black lid) in his left hand and a black ballpoint pen in his right; occasionally crosses his arms over his chest.

(2) Chen (Front-line Employee, Chinese) [...]
Conflict Event and Dialogue:
(1) Shot 1: Opening
- Camera [Aerial Shot]: Exterior of a medium-sized manufacturing plant at dusk. The roar of machinery fades as workers leave in small groups.
- Subtitle: Friday, 5:00 p.m.

(2) Shot 2: Introduction [...]
(3) Shot 3: Communication
- Setting: The two enter the office.
- Camera [Reverse Angle]: Harvey is seated behind the desk, hands crossed on his lap; Chen stands in front of the desk, still holding a gift bag.
- Harvey (Mildly):

Subtitle: "It looks like we will have to keep the production line running on Saturday."
- Chen (Nods politely):

Subtitle: "I see."
- Camera [Close-up]: Harvey raises his eyebrows, probing.

Subtitle: "Can you come in on Saturday?"
- Camera [Close-up]: Chen's eyes flicker. He presses his lips together, takes a shallow breath, and maintains a polite smile. He pauses slightly before speaking.

Subtitle: "Em, yes... I think so."
- Harvey sighs in relief, leans back in his chair, and steeples his fingers.

Subtitle: "That will be a great help."
- Chen's gaze drifts to the gift bag in his hand. After 1–2 seconds, he seems to make a decision. He takes a deep breath, looks up, and speaks in a soft yet solemn tone.

Subtitle: "Sir, you know, Saturday is a special day."
- Harvey puts down his documents, blinks, looking curious.

Subtitle: "What do you mean?"
- Chen's smile widens. He gently shakes the gift bag in his hand without explicitly stating his request (reflecting high-context indirectness).

Subtitle: "It's my son's birthday. We've planned a space-themed party."
- Harvey looks surprised, then smiles. His tone is slightly dismissive, interpreting the words literally without grasping the underlying implication (reflecting low-context directness).

Subtitle: "Oh... How nice. Enjoy it."
- Chen's eyes light up. Relieved, he lowers the hand holding the gift bag and speaks with genuine gratitude.

Subtitle: "Thank you. I appreciate your understanding."
- Chen turns and exits the office. Harvey looks slightly puzzled by Chen's solemn tone, shakes his head, and lowers his head to focus on the documents. [Fade to black]

[...]

3.Multimodal Resource Generation. The text-based scripts are subsequently transformed into multimodal assets. Jimeng AI is employed to generate culturally congruent scene images and 1080P dynamic videos. For instance, visual cues are differentiated: characters from low-context cultures exhibit vivid expressions and direct speech, whereas those from high-context cultures maintain placid facial features and indirect demeanors. Following this, NoizAI synthesizes multilingual, multi-role voiceovers simulating authentic phonetic features, such as the brisk rhythm of Spanish or the casual drawl of American English. Finally, CapCut is utilized to composite the video, integrating bilingual subtitles and theoretical anchor annotations.
4.Expert Review and Archiving. A final review panel, comprising ICC domain experts and frontline instructors,

evaluates the generated resources for both theoretical fidelity and pedagogical utility. Resources are scored against the AIGC Intercultural Case Evaluation Matrix. Approved cases are archived in a dynamic repository and tagged by "cultural dimension," "conflict type," and "difficulty level". Substandard cases undergo targeted revisions based on expert feedback, such as supplementing nonverbal details or modulating conflict intensity.

3.1.2 Operational guidelines for core technological tools

To minimize operational barriers, this study provides standardized prompt templates. Using a U.S.-Japan business negotiation scenario as an exemplar, the following guidelines delineate the requirements for embedding intercultural theories and cultural nuances into AIGC tools.

First, for text-to-image generation using Jimeng AI, the prompt is formulated based on Edward T. Hall's theory of proxemics and incorporates culturally specific attire:

Prompt Template 1 Text-to-Image Generation (Jimeng AI)

Scene: Opening of a U.S.-Japan business negotiation, medium shot.
Characters: U.S. representative (Male, 35 years old, dark suit, neat tie, holding a schedule book); Japanese manager (Male, 40 years old, dark suit, no tie, hands folded on the desk).
Interaction: The U.S. representative approaches proactively, maintaining a distance of approximately 60 cm from the Japanese manager *[reflecting the personal distance typical of low-context cultures]*, and reaches out for a handshake. The Japanese manager stands up and bows, with his body turned slightly sideways *[reflecting the spatial etiquette of high-context cultures]*.
Background and Style: San Francisco conference room (minimalist and modern); Realistic, 1080P resolution.

Second, for voiceover synthesis using NoizAI, the instructions are formulated based on the concept of vocalics and cultural phonetic features by modulating specific intonation parameters:

Prompt Template 2 Voiceover Synthesis (NoizAI)

Character 1 (U.S. Representative):
- Emotion: Anxious.
- Vocalic Parameters: Fast speaking rate (approx. 160 words/min), flat intonation.
- Line: "Come on, just give me a ballpark... this silence is killing me!"

Character 2 (Japanese Manager):
- Emotion: Composed.
- Vocalic Parameters: Slow speaking rate (approx. 120 words/min), steady pace, even volume, falling intonation at the end of sentences, slight Japanese accent.
- Line: "Considering our long relationship, $320 per unit is our limit."

Finally, the CapCut Integration Workflow involves opening the CapCut application, importing the generated video and audio tracks, and adding bilingual subtitles. The instructor adjusts the playback speed to reflect the speech rate differences between the two cultures and incorporates contextually appropriate background audio (e.g., keyboard typing, clock ticking) before exporting the final video.

This integrated workflow requires no professional video editing expertise. By adhering to these guidelines, instructors can efficiently generate theoretically precise, culturally authentic, and highly interactive multimodal ICC cases.

3.2 The "Pre-, In-, and Post-Class" Smart Instructional Workflow

Based on a standard 40-minute class session, this workflow leverages the Rain Classroom platform and AIGC-generated intercultural cases to achieve precision teaching, as illustrated in Figure 3.

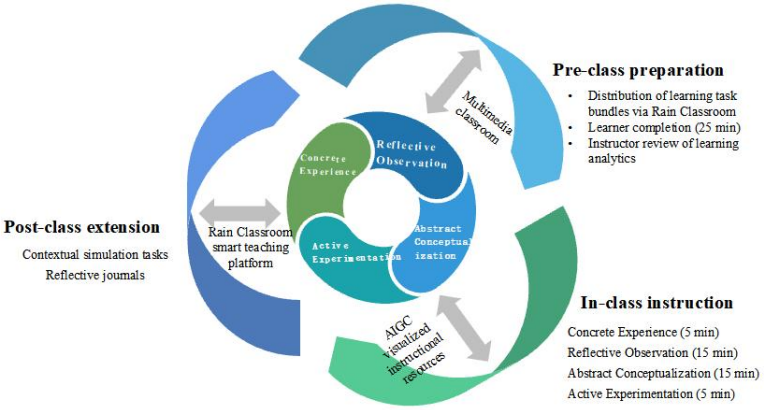

Figure 3 The AIGC-enabled Smart Instructional Workflow for ICC

Note: The workflow integrates Kolb's experiential learning cycle with AIGC tools across three stages: pre-class preparation, in-class instruction, and post-class extension. AIGC visualization resources support the Abstract Conceptualization phase.

The model adopts a dual-loop architecture: the inner loop is driven by Kolb's experiential learning cycle as the pedagogical core, while the outer loop maps onto the pre-, in-, and post-class chronological sequence. AIGC technologies permeate the entire continuum—from resource generation to personalized interaction and dynamic evaluation—distinctly embodying two core characteristics: "intercultural theory-driven instruction" and "human-AI collaborative dynamic adaptation".

3.2.1 Pre-class: diagnostic assessment and theoretical scaffolding

Drawing upon initial learning analytics provided by the Rain Classroom platform regarding students' theoretical grasp, the instructor selects level-appropriate case bundles from the dynamic repository. These are distributed via the platform alongside a 5-minute theoretical micro-lesson focusing on core concepts (e.g., "M-time versus P-time") and guiding questions (e.g., "In what specific behaviors do the differing time orientations of the two parties manifest?").

Upon students' completion of the video lectures and associated tasks, the platform automatically calculates accuracy rates and extracts high-frequency query keywords. This data-mining process generates a "Classroom Cultural Theory Mastery Heatmap," empowering the instructor to precisely pinpoint cognitive vulnerabilities—such as a deficient understanding of indirect expressions in high-context cultures—thereby facilitating data-driven, precision interventions during the in-class phase.

3.2.2 In-class implementation (40 minutes): deep integration of theory, context, and strategy

1.Concrete Experience (5 min): The instructor screens key segments of the AIGC-generated cases, directing students' attention toward specific cultural nuances. Following the viewing, real-time prompts are issued via Rain Classroom (e.g., "Observe the behavioral styles to identify the roles corresponding to P-time and M-time cultures," or "Observe the proxemic shifts—which concept from Burgoon's nonverbal dimensions does this illustrate?"). This initiates an immersive analytical state, anchoring theoretical concepts in observable behaviors.

2.Reflective Observation (15 min): This stage employs the AI tutor to guide multidimensional deconstruction through a two-step collaborative process:

(1)Collaborative Group Discussion (10 min): Students analyze the conflict across three dimensions: theoretical manifestation (what), cultural roots (why), and actionable solutions (how).

(2)Targeted AI Scaffolding (5 min): Students engage in real-time dialogue with the AI tutor regarding specific dilemmas (e.g., "How do we balance efficiency and relational harmony when navigating P-time procrastination?"). The AI tutor instantly generates supplementary analogous cases (e.g., a U.S. team managing software development in Southeast Asia) to provide theoretical explanations and strategic references. Concurrently, it logs high-frequency queries to synchronize with the instructor's dashboard.

3.Abstract Conceptualization (15 min): The instructor delivers a targeted synthesis based on Rain Classroom learning analytics and the high-frequency queries flagged by the AI tutor. This pedagogical intervention encompasses three steps:

(1)Theoretical Mapping: Systematically linking the observed conflicts to overarching intercultural theories (e.g., attributing time-orientation conflicts to the foundational dichotomy between individualism and collectivism).

(2)Strategic Frameworking: Outlining universal coping mechanisms (e.g., a three-step strategy for time conflicts: cognitive differentiation → flexible adaptation → boundary setting).

(3)Misconception Rectification: Clarifying common cognitive errors, such as the misconception that indirectness in high-context cultures equates to insincerity. This structured synthesis assists students in constructing a robust knowledge graph and cultivating systematic ICC reasoning.

4.Active Experimentation (5 min): Based on real-time formative assessment, the instructor utilizes AIGC to instantly generate "tiered micro-scenarios." Foundational learners address single-dimensional conflicts (e.g., time orientation), while advanced learners tackle multidimensional composite conflicts. Groups rapidly formulate strategies and execute micro-role-plays (1–2 minutes). For instance, an advanced scenario might involve a U.S.-Japan business negotiation requiring the simultaneous application of time adaptation strategies and spatial etiquette. Post-performance, the AI tutor provides immediate, concise feedback (e.g., "Accurate strategic application, but oversight of the bowing etiquette specific to Japanese culture"), thereby laying the empirical groundwork for post-class extension.

3.2.3 Post-class: personalized transfer and iterative reflection

1.Personalized Task Distribution: Based on students' in-class performance data (e.g., learning bottlenecks logged by the AI tutor and feedback from role-plays), the Rain Classroom platform automatically pushes adaptive extension tasks:

(1)Theoretical consolidation: For students exhibiting theoretical weaknesses, the system provides supplementary cases and exercises related to the target theories.

(2)Strategic application: For students lacking practical proficiency, the system assigns authentic workplace intercultural cases (e.g., communication conflicts between cross-border e-commerce customer service and clients from different cultures), requiring them to design corresponding coping strategies.

(3)High-order innovation: For advanced learners, the platform grants access to AIGC script-generation tools, encouraging them to autonomously design case scripts embedding specific intercultural conflicts.

2.Reflective Journals and AI Feedback: Students submit reflective journals utilizing a template provided via Rain Classroom, which encompasses three dimensions: theoretical application insights, directions for strategic optimization, and takeaways in cultural cognition. Subsequently, the AI tool automatically analyzes keywords within the journals to generate personalized reflection reports. These reports highlight students' strengths and weaknesses while

recommending tailored resources. For instance, the AI might generate an evaluation such as: "Keywords: 'M-time,' 'high-context,' 'proxemics'; Strength: Accurately applies time-orientation theories to conflict analysis; Weakness: Lacks strategic application of nonverbal behaviors," followed by the provision of matching case videos and theoretical articles. Finally, the instructor conducts targeted grading informed by the AI-generated reports. This workflow establishes a Teacher–Learner–AI Triadic Reflection System (student self-reflection → precise AI feedback → high-order teacher guidance), thereby completing the pedagogical loop.

3.3 The Multidimensional ICC Evaluation Framework

This study constructs a comprehensive evaluation framework integrating formative assessment (60%) and summative assessment (40%). The core breakthrough lies in operationalizing implicit competencies—such as cultural sensitivity and pragmatic strategy adaptability—into observable and quantifiable metrics, thereby achieving a scientific and precise evaluation system (see Figure 4).

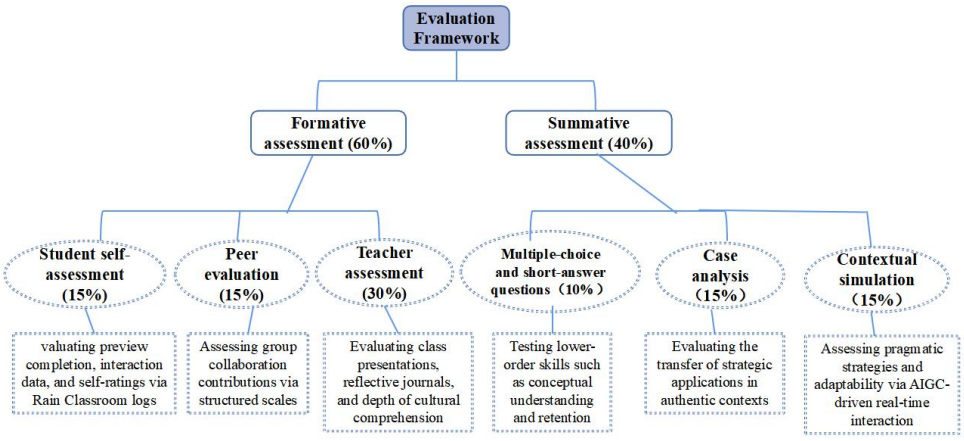

Figure 4 The Smart ICC Classroom Evaluation System

3.3.1 Formative assessment: process-oriented and multi-agent (60%)

Formative assessment employs multi-agent collaboration and dynamic AIGC monitoring, encompassing student self-assessment, peer evaluation, and teacher assessment.

1.Student Self-Assessment (15%): Students rate themselves utilizing the researcher-designed Intercultural Communicative Competence Self-Assessment Scale (encompassing three dimensions: cultural cognition, strategic application, and affective attitudes). By integrating their in-class performance, reflective journals, and AI feedback reports, this process reinforces learners' autonomous reflective awareness.

2.Peer Evaluation (15%): Following group activities, students evaluate their peers based on the Peer Evaluation Scale for Group Collaboration and Performance. This assesses three dimensions: accuracy of conflict analysis, adaptability of strategic application, and degree of collaborative engagement, strictly prioritizing actual performance in ICC over theoretical memorization.

3.Teacher Assessment (30%): The instructor calculates a composite score by synthesizing three data streams: (1) Rain Classroom learning analytics (e.g., pre-class completion rates, quiz accuracy); (2) in-class performance logs (e.g., group discussion contributions, role-play execution); and (3) the quality of reflective journals and extension tasks. Concurrently, AIGC serves as an evaluation scaffolding tool, providing the instructor with learning heatmaps and transcripts of student-AI dialogues to offer quantitative scoring and pedagogical improvement suggestions.

3.3.2 Summative assessment: outcome-oriented and contextualized (40%)

Summative assessment is fundamentally oriented toward evaluating students' overarching ICC, emphasizing knowledge transfer within authentic contexts across both knowledge and competence dimensions.

1.Knowledge Dimension (10%): Assessed via multiple-choice and short-answer questions, this component evaluates the comprehension and retention of core intercultural concepts (e.g., high-context, P-time, and M-time), ensuring a robust foundational knowledge base.

2.Competence Dimension (30%): This is bifurcated into two sections:

(1)Case Analysis (15%): Students are presented with complex, AIGC-generated intercultural conflict cases (including multimodal videos) and are required to analyze the cultural roots of the conflicts and propose coping strategies.

(2)Contextual Simulation (15%): Students randomly draw an AIGC-generated authentic intercultural scenario (e.g., a communication conflict during a cross-border team video conference) and engage in real-time interaction with an AI-simulated counterpart from a different cultural background within a stipulated timeframe. The AIGC system automatically tracks linguistic expressions, pragmatic strategies, and nonverbal behaviors during the interaction, synthesizing these metrics with the instructor's rubric to yield a comprehensive score.

Both formative and summative evaluation data are subsequently aggregated via Rain Classroom to generate individual competence development reports and holistic class analysis reports. Individual reports enable students to identify cognitive gaps and clarify areas for improvement, whereas class reports supply the instructor with evidence-based

insights for pedagogical refinement (e.g., "The majority of students exhibit deficiencies in applying nonverbal behavioral strategies; supplementary case studies are required"). This mechanism establishes a continuous "feedback–optimization–feedback" evaluation loop.

3.4 Comparative Analysis with Typical Smart Instructional Models

Although various smart instructional models have emerged in recent years—such as the inquiry-based 5E Model (Engage, Explore, Explain, Elaborate, Evaluate), the systematic ADDIE Model (Analysis, Design, Development, Implementation, Evaluation), and their AI-integrated variants (e.g., AI-5E, Smart ADDIE)—they continue to exhibit salient limitations when applied to the cultivation of ICC. This specific pedagogical domain is fundamentally characterized by high context dependency, intensive interaction demands, and a profound emphasis on implicit competencies. In contrast, the AIGC-enabled smart instructional model proposed in this study achieves differentiated breakthroughs across multiple dimensions, including core objectives, theoretical integration, technological application, and interaction depth (see Table 2).

Table 2 Comparison between the AIGC-enabled ICC Instructional Model and Typical Smart Instructional Models

Dimension	AI-integrated 5E model	AI-integrated ADDIE model	The Proposed Model
Core objective	Scientific inquiry skills and disciplinary concept construction	Systematic curriculum development and knowledge transmission	Comprehensive ICC (cognition, affect, and behavior)
Theoretical support	Inquiry-based learning theory	Systematic instructional design theory	Experiential learning theory, intercultural theories, and sociocultural theory
Scenario generation	Pre-set experimental scenarios and generic cases	Teacher-designed standardized cases	Real-time, multimodal, and theory-anchored cultural conflict scenarios generated via AIGC
AI role positioning	Automated assessment tool and resource recommendation assistant	Workflow optimization tool and standardized content generator	Creator of cultural contexts, simulator of intercultural perspectives, provider of cognitive scaffolding, and participant in multimodal evaluation
Cultural dimension support	Weak (generic disciplinary scenarios without targeted cultural design)	Weak (focusing on curriculum development workflows while neglecting cultural specificity)	Strong (focusing on core intercultural dimensions such as nonverbal behaviors, value differences, and pragmatic strategies, covering classical intercultural theories)
Interaction depth	Primarily teacher–student and student–student interactions focusing on problem-solving	Primarily unidirectional teacher–student interactions focusing on knowledge transmission	Teacher–Learner–AI triadic real-time interaction covering the entire continuum from theory to strategy
Implicit competence support	Limited to logical thinking and inquiry skills	Lacking targeted support for implicit competencies	Targeted support and quantitative evaluation for implicit competencies such as cultural sensitivity, intercultural empathy, and pragmatic adaptability
Adaptability	Natural sciences and generic disciplinary instruction	Systematic development of various curricula	ICC instruction characterized by high context dependency and intensive cultural interaction demands

4 INNOVATIVE VALUE AND PEDAGOGICAL IMPLICATIONS

The proposed AIGC-enabled smart instructional model transcends the traditional technology-as-tool paradigm, offering theoretical and practical breakthroughs in four core dimensions: resource generation, instructional workflow reconstruction, evaluation system innovation, and the evolution of the human-AI collaborative paradigm.

4.1 Multidimensional Innovative Value

First, the model innovates the resource generation mechanism by constructing a comprehensive intercultural case production chain. This chain encompasses the entire workflow—from theoretical grounding and multimodal prompt templates to rigorous review procedures—thereby achieving a unification of "cultural authenticity" and "pedagogical applicability." While existing studies predominantly rely on generalized dynamic cases, this model embeds classical intercultural theories (e.g., those proposed by Hall and Hofstede) throughout the generation process. This ensures that

the generated conflict scenarios precisely align with pedagogical foci, such as M-time versus P-time orientations or high- versus low-context cultural conflicts. Concurrently, by leveraging multimodal presentations (video, audio, and text) and reinforcing cultural details, the model resolves the persistent issue of "contextual distortion" inherent in traditional static cases. This enables students to intuitively perceive the tangible manifestations of intercultural conflicts, providing a robust medium for the cultivation of implicit competencies.

Second, it reconstructs the instructional workflow by actualizing data-driven, personalized adaptation. The core innovation lies in synchronizing the dynamic adaptive capabilities of AIGC with the progressive development of learners' ICC, thereby overcoming the traditional disconnect between theory and practice. By distributing tiered cases pre-class, facilitating multidimensional analysis via the AI tutor in-class, and assigning adaptive extension tasks post-class, the framework establishes a continuous "diagnosis–instruction–practice–reflection" continuum. Furthermore, utilizing AIGC as a simulator of diverse cultural perspectives helps students deconstruct ethnocentric biases and internalize the logic of foreign cultures, significantly deepening intercultural empathy.

Third, the study achieves a methodological breakthrough in evaluation by quantifying implicit competencies through multimodal data analytics. While conventional assessments predominantly measure declarative knowledge and explicit language skills, this model leverages AIGC to analyze students' text, speech, and kinesics (body language). This multimodal tracking successfully operationalizes elusive traits—such as cultural sensitivity and pragmatic strategy adaptability—into observable and quantifiable metrics. Coupled with a multi-agent collaborative assessment matrix, this approach provides a rigorous, scientific pathway for evaluating holistic ICC.

Finally, the framework innovates the human-AI collaborative paradigm by redefining AIGC as a novel MKO. Departing from the conventional view of AI as a mere functional tool, this research expands the theoretical boundaries of the teacher–learner–AI triad. As an MKO specific to intercultural education, AIGC precisely constructs cultural contexts and simulates diverse perspectives, effectively extending learners' ZPD. By delineating clear functional divisions among the instructor, students, and AI throughout the teaching and assessment phases, the model fosters a synergistic pedagogical community, offering a robust theoretical reference for the deep integration of AI in language education.

4.2 Pedagogical Implications

To ensure the effective translation of the aforementioned theoretical innovations into pedagogical practice, this study proposes the following implementation guidelines:

First, upgrading infrastructure and establishing centralized resource repositories are fundamental prerequisites. To effectively implement this model, institutions must ensure a minimum classroom network bandwidth of 100 Mbps and achieve universal access to smart teaching platforms such as Rain Classroom. Furthermore, instructors should be equipped with fundamental audio-visual capture devices (e.g., microphones and webcams) to support the recording and subsequent analysis of post-class contextual simulations. Concurrently, it is highly recommended to construct an institution-level AIGC intercultural instructional resource repository. By aggregating high-quality cases and updating them regularly, institutions can significantly reduce the redundant development costs borne by individual instructors.

Second, enhancing teachers' AI literacy and intercultural pedagogical competence is critical. Institutions should systematically elevate instructors' core competencies in integrating intercultural teaching with technological applications through targeted pedagogical research activities. This includes organizing specialized training sessions on "Intercultural Case Review and Prompt Engineering" and establishing regular teacher exchange mechanisms. These initiatives will empower instructors to accurately grasp the design principles of cultural conflict scenarios, thereby driving continuous improvement in pedagogical practice.

Third, ensuring the continuous iteration and contextual optimization of resources is essential for sustained relevance. Instructors should routinely collect student feedback to phase out cases with poor pedagogical fit. It is vital to continuously supplement the repository with novel cases reflecting emerging intercultural scenarios driven by globalization (e.g., cross-border e-commerce, remote collaboration, and international sports events) to ensure the curriculum remains cutting-edge. Moreover, instructors are encouraged to generate customized, industry-specific intercultural cases tailored to students' academic majors (e.g., Business English, International Trade, or International Education), thereby enhancing the targeted efficacy of the instruction.

Finally, safeguarding intercultural inclusivity and ethical AI use must remain a pedagogical priority. During the generation of cases and the execution of instruction, it is imperative to avoid cultural stereotypes and emphasize both cultural diversity and individual differences. All AIGC-generated cases must undergo rigorous review by intercultural experts to ensure the accuracy and objectivity of cultural representations. Ultimately, instructors must guide students to perceive cultural differences through the lens of "cultural empathy" rather than "cultural judgment," thereby cultivating values rooted in the profound respect for multiculturalism.

5 CONCLUSION

Addressing the persistent pedagogical bottlenecks in higher education ICC instruction—namely, static case materials, monotonous interaction modes, and superficial evaluation metrics—this study proposes an AIGC-enabled smart instructional framework. The core contributions of this research are threefold. First, it constructs a triadic model integrating "intercultural theory, technological tools, and pedagogical practice," thereby achieving a deep integration rather than a mere superficial superimposition of AIGC in intercultural education. Second, it designs a replicable case

generation mechanism and instructional workflow, significantly lowering the technical threshold for educators and ensuring the model's scalability. Third, it establishes an evaluation system capable of quantifying implicit competencies, providing a novel and rigorous pathway for the scientific assessment of overarching ICC.

Acknowledging that the current research is predominantly focused on conceptualizing the model and designing implementation pathways, large-scale pedagogical experiments have yet to be conducted. Consequently, subsequent research will deploy a semester-long quasi-experimental study based on this model. Utilizing a mixed-methods approach that integrates quantitative and qualitative data (e.g., pre- and post-test comparisons, interviews, and reflective journal analysis), future studies will systematically examine the model's actual impact on students' intercultural cognition, affective attitudes, and behavioral competencies. Concurrently, further optimization of the model's differentiated support mechanisms will be pursued to enhance its adaptability for students with varying English proficiencies and disciplinary backgrounds, ultimately perfecting the human-AI synergistic ICC pedagogical system.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

[1] Kohnke L, Moorhouse B L, Zhai K. ChatGPT for language teaching and learning. RELC Journal. Advance online publication, 2023.

[2] Dizon G. Evaluating intelligent personal assistants for L2 listening and speaking development. Language Learning & Technology, 2020, 24(1): 16-26.

[3] Xuan Q, Yang Y. New developments in English teaching and translation methods in the converged media environment: An AI-based analysis. International Journal of Intelligent Systems and Robotics Mechanical Engineering, 2024, 1-14.

[4] Xia Y, Shin S Y, Kim J C. Cross-cultural intelligent language learning system (CILS): Leveraging AI to facilitate language learning strategies in cross-cultural communication. Applied Sciences, 2024, 14(13): 5651. DOI: 10.3390/app14135651.

[5] Dovhaniuk E, Piwowar A, Oliynyk N. Multimodal and cognitive approaches to academic discourse in AI-supported learning. Cognition and Discourse Studies, 2025, 20(3): 79-83.

[6] Li H J, Huang Q R, Chen W, et al. Research on the human-AI collaborative iterative symbiotic teaching model: Integration of AIGC and its practical effect analysis. Modern Educational Technology, 2025, 35(1): 81-88.

[7] Wang L, Zhang M, Li J. Practical pathways and reflections on AI-empowered foreign language teaching. Technology Enhanced Foreign Language Education, 2024(2): 34-40.

[8] Huang R, Wang S. Virtual intercultural agents in language learning: A review. Language Learning & Technology, 2022, 26(3): 45-67.

[9] Guo H, Jiang, W, Ke H L. Analysis of the mechanism and teaching application of AI large language models in cultivating intercultural communication competence. Modern Educational Technology, 2025, 34(2): 5-12.

[10] Kolb D A. Experiential learning: Experience as the source of learning and development (2nd ed.). Pearson, 2014.

[11] Lave J, Wenger E. Situated learning: Legitimate peripheral participation. Cambridge University Press, 1991.

[12] Vygotsky L S. Mind in society: The development of higher psychological processes. Harvard University Press, 1978.

[13] Richards J C, Rodgers T S. Approaches and methods in language teaching (2nd ed.). Cambridge University Press, 2001.