A Study on the Construction of an Intelligent Broadcasting Teaching System Integrating a Cross-Cultural Perspective

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Abstract: *In the context of the deep integration of global communication and artificial intelligence, broadcasting pedagogy must shift towards cultivating cross-cultural intelligent communication competencies. This study aims to construct an intelligent broadcasting teaching system that integrates a cross-cultural perspective. By elucidating the evolution of intelligent technology from a tool of assistance to one of cognitive collaboration, and by reconstructing the pedagogical connotations through cross-cultural theory, the research proposes a pathway for transforming towards a human-machine collaborative paradigm. Furthermore, the study focuses on deconstructing cultural dimensions and achieving their parametric mapping onto intelligent speech features, constructing an adaptive training model based on dynamic context modeling and closed-loop feedback, and establishing teaching interaction principles oriented towards cross-cultural understanding. Ultimately, it designs a system architecture encompassing intelligent knowledge integration, multimodal context simulation and feedback system integration, as well as iterative evaluation based on multidimensional data, thereby providing a systematic framework for the intelligent and globalized transformation of broadcasting education.*

Keywords: *intelligent broadcasting teaching; cross-cultural perspective; teaching system construction; human-machine collaboration; context simulation; adaptive training*

Introduction

Broadcasting, as a symbolic practice embedded within cultural contexts, faces the challenges posed by the diversification of the global communication ecosystem. Traditional teaching models, which primarily emphasize phonetic standardization, are inadequate for cultivating effective communication competencies in cross-cultural situations. Artificial intelligence technology offers the potential to innovate pedagogical paradigms through speech analysis and situational simulation. This study aims to integrate cross-cultural communication theory with the capabilities of intelligent technology to construct a new teaching system. Its goal is to address the current disconnect between skills training and the cultivation of cultural literacy in pedagogy, clarify a reform pathway that utilizes technology to empower the development of cross-cultural competencies, and provide a theoretical framework and practical guidance for cultivating broadcasting talents equipped to navigate the future landscape of communication.

1. Theoretical Foundations of Cross-Cultural Perspective and Intelligent Broadcasting Pedagogy

1.1 The Evolution of Intelligent Broadcasting Technology and Its Potential for Pedagogical Application

The evolutionary trajectory of intelligent broadcasting technology demonstrates a profound shift from instrumental assistance to cognitive collaboration. Early technologies focused primarily on the digital processing and basic synthesis of speech signals, with their pedagogical applications largely confined to pronunciation calibration and voice fidelity training. Following the integration of deep learning and big data technologies, breakthroughs have been achieved in intelligent broadcasting systems concerning natural language processing, affective computing, and multimodal interaction. Speech synthesis has surpassed the mere imitation of human voice, enabling the stylistic modeling of timbre, prosody, rhythm, and specific cultural contexts; meanwhile, speech analysis technology allows

for the quantitative parsing of micro-elements within broadcasting expression. This provides pedagogy with unprecedented tools for fine-grained diagnostics and possibilities for personalized modeling. The core of its pedagogical potential lies in constructing a dynamic, feedback-enabled, and customizable training environment. This makes abstract broadcasting elements-which are difficult to visualize and train with precision in traditional teaching, such as intonation adaptation in cross-cultural contexts, the appropriateness of affective expression, and the coordination of paralinguistic information-perceivable, decomposable, and reconfigurable. Technology thus ceases to be merely a tool for imitation or evaluation and becomes an intermediary for understanding the complexity of expression and cultural specificity[1].

1.2 Interpretation of the Connotations of Cross-Cultural Communication Theory in Broadcasting Pedagogy

Introducing cross-cultural communication theory into broadcasting pedagogy essentially redefines the act of broadcasting. It shifts from being a mere linguistic skill to a symbolic social practice deeply rooted in cultural cognition. This perspective moves beyond the surface-level focus on linguistic accuracy and expressive fluency found in traditional teaching, turning instead towards a deeper concern for the processes of cultural encoding and decoding. Acculturation Theory suggests that a broadcaster's expressive habits are formed through long-term immersion in their dominant cultural environment; when facing an audience from a different culture, these habitual encodings may lead to unintended interpretations. Cultural Dimensions Theory provides an analytical framework for examining expressive preferences across different cultural backgrounds, such as differences in narrative perspective and emotional expressiveness between individualistic and collectivist cultures. Social Identity Theory concerns how broadcasters construct identity and group affinity through voice and expressive strategies in cross-cultural contexts. In pedagogical terms, this necessitates the systematic integration of cultural cognition modules into the curriculum. It aims to cultivate students' sensitivity to cultural differences, their ability to reflect on their own cultural expressive habits, and their strategic competence in making symbolic adjustments according to the target cultural context. Thus, broadcasting pedagogy becomes a process of cultivating cross-cultural communicators, rather than merely technical broadcasters.

1.3 The Transformation Pathway of Broadcasting Pedagogy Paradigm in the Context of Human-Machine Collaboration

The deep integration of intelligent technology has catalyzed a transformation in broadcasting pedagogy, shifting from the traditional "teacher-led, student-imitation" paradigm towards a new "human-machine collaboration, cognitive augmentation" paradigm. This transformative pathway does not involve a simple superimposition of technology onto teaching; rather, it entails a reconfiguration of pedagogical structural elements and a restructuring of relationships. The role of the teacher evolves from being the primary transmitter of knowledge and skills to becoming a designer of learning scenarios, a guide for human-machine interaction processes, and a facilitator who deepens cross-cultural interpretation. The intelligent system assumes tasks such as standardized skills training, procedural data collection and preliminary analysis, and providing multi-cultural contextual simulations. Consequently, the core pedagogical process transforms into one where students, under teacher guidance, engage in continuous interaction, trial-and-error, and adaptation with the diverse, cross-cultural simulated contexts constructed by the intelligent system. The key to human-machine collaboration lies in "bidirectional adaptation": the system must dynamically adjust the difficulty and cultural dimensions of training content based on the learner's cultural background and progress, while the learner must understand and learn to engage with the feedback logic of the intelligent system, transforming its data-driven feedback into deeper cultural-cognitive insights. This paradigm shifts the pedagogical focus from summative evaluation to process-oriented development, emphasizing the cultivation of a compound competency that integrates technical precision, cultural adaptability, and expressive creativity within dynamic human-machine interaction[2].

2. Core Dimensions and Framework Construction of Cross-Cultural Intelligent Broadcasting Pedagogy

2.1 The Cultural-Cognitive Dimension and Its Mapping Mechanism in Intelligent Speech Representation

2.1.1 Deconstruction and Operational Definition of Cultural-Cognitive Dimensions

The theoretical premise of cross-cultural intelligent broadcasting pedagogy lies in deconstructing abstract cultural influences into observable, trainable concrete dimensions. This process involves the translation and refinement of classic cultural dimension theories-such as high-/low-context, individualism/collectivism, and power distance-from the perspective of broadcasting studies. For example, the characteristics of a high-context culture can be deconstructed as a higher reliance on implied meaning within speech prosody, the functional use of silence and non-verbal fillers, and a preference for indirect narration. Through such deconstruction, the macro concept of culture is transformed into a series of micro-behavioral parameters and strategic choices directly related to speech production. This provides a clear cognitive and operational framework for setting pedagogical objectives and establishing assessment criteria.

2.1.2 Parametric Modeling and Mapping in Intelligent Speech Representation

Mapping the deconstructed cultural dimensions onto an intelligent speech representation system centers on constructing a multi-tiered parametric correlation model. The foundational tier of this model consists of basic acoustic parameters such as pitch, intensity, timbre, and rhythm. The intermediate tier integrates prosodic features like the segmentation of intonation units, stress distribution patterns, and the boundary tone shapes of prosodic phrases. The highest tier is linked to pragmatic functional labels, including emotional valence, politeness level, and speech act intention. Through machine learning based on large-scale cross-cultural speech corpora, the system can learn the statistical correlation patterns between different cultural dimension configurations and these multi-level clusters of acoustic-prosodic-pragmatic features. This enables the intelligent mapping and generation from descriptions of cultural traits to specific, synthesizable, and analyzable sets of speech features.

2.2 The Language Adaptive Training Model with Intelligent Technology Assistance

2.2.1 Dynamic Needs Modeling Based on Cultural Context Analysis

Language adaptive training begins with a refined analysis of the target communication context. Utilizing its built-in cultural knowledge graph and context analysis module, the intelligent system deconstructs the specific broadcasting task-such as international news reporting or cultural documentary narration-by analyzing the involved audience cultural background, communication purpose, and social situation. Based on this analysis, the system dynamically generates a multidimensional set of expectations for broadcasting expression within that specific context. This set encompasses not only requirements for linguistic accuracy but also indicators for cultural appropriateness. These include the suitable intensity of emotional expression, the manner of presenting narrative logic, and vocal strategies for constructing a sense of authority or affinity. Consequently, it provides a precise, situationalized target reference framework for subsequent training[3].

2.2.2 Closed-loop Diagnosis, Simulation, and Adaptation Training Mechanism

The core of the training model is an intelligent technology-driven "diagnosis-simulation-adaptation" closed loop. The system collects the learner's speech output in real time and, through multimodal analysis, diagnoses the multidimensional gaps between their expressive patterns and the expectations of the target cultural context. Subsequently, the system activates a high-fidelity context simulation engine, providing the learner with an immersive, targeted practice environment. During simulated interactions, the system offers immediate feedback and strategic guidance based on cultural-pragmatic interpretation, rather than simple judgments of right or wrong. Based on this, the learner engages in iterative adaptation. The system continuously tracks the formation process of their adaptive strategies, gradually transitioning from explicit guidance to autonomous exploration, ultimately internalizing stable cross-cultural expressive ability.

2.3 Principles of Broadcasting Pedagogy Interaction Design Oriented Towards Cross-Cultural Understanding

2.3.1 Designing Progressive Complexity for Situational Immersion

The primary principle in designing pedagogical interactions is to construct a sequence of situations characterized by cultural authenticity and progressively increasing complexity. Initial scenarios should focus on typical situations with pronounced cultural differences and clear communicative objectives, aiming to establish fundamental cultural awareness and a repertoire of strategies. As competency develops, the interactive situations must gradually introduce complex tasks involving subtle cultural differences and coexisting multiple demands, such as information delivery, emotional rapport maintenance, and identity negotiation. This progressive design aims to controllably increase the learner's cognitive load, guiding them from applying singular strategies towards the integrated use and flexible balancing of multiple cultural expression rules, thereby simulating the complexity of real-world cross-cultural communication[4].

2.3.2 Implicit Cognitive Scaffolding and Guidance for Metacognitive Reflection

Effective interaction design must integrate supportive tools as implicit cognitive scaffolds into the learning process. These scaffolds-such as parallel corpus comparison tools, cultural-pragmatic annotations, and strategy suggestion libraries-should be provided upon the learner's need rather than through forced intervention, thereby encouraging autonomous inquiry and problem-solving. Simultaneously, interaction nodes should be designed to incorporate prompts for metacognitive reflection. For example, they should guide learners to review the logic behind their expressive decisions, compare the effectiveness of different strategies, and explain the cultural considerations underlying their adjustments. This principle aims to assist learners in transitioning from experiential trial-and-error to conceptual understanding, systematically constructing metacognitive knowledge about the relationship between their own expressive behaviors and the cultural context. Consequently, it enhances the autonomy and transferability of their cross-cultural adaptation.

3. Architecture Design and Implementation Logic of the Integrated Teaching System

3.1 Integration of Intelligent Broadcasting Knowledge Modules Based on Cross-Cultural Competence

3.1.1 Deconstruction and Modular Encapsulation of Core Knowledge Domains

The knowledge foundation for cross-cultural broadcasting competence constitutes a composite structure requiring systematic deconstruction and reorganization. Its core knowledge domains encompass three interrelated levels: the cultural-theoretical cognitive domain (e.g., Cultural Dimensions Theory, Contextual Culture Theory), the broadcasting professional skills domain (including phonetics, expressive arts, and media narration), and the strategically applied domain derived from their intersection (e.g., culturally-adapted narrative strategies, regulation of emotional expression, cultural encoding of paralanguage). The primary step in constructing the teaching system architecture is to encapsulate these knowledge domains into modular forms, creating independent yet interoperable knowledge units. Each unit must clearly define its input (prerequisite knowledge), core content (concepts, rules, case studies), and output (expected acquired competency points), thereby laying the groundwork for subsequent dynamic combination and personalized delivery[5].

3.1.2 Generation of Adaptive Learning Pathways with Intelligent Navigation

A static accumulation of knowledge modules cannot meet the demands of personalized learning. The system must therefore incorporate an intelligent navigation engine based on learner modeling. This engine dynamically constructs a learner's "culture-skill" competency profile through initial assessment and continuous analysis of learning behaviors, identifying their mastery level and weaknesses across various knowledge modules. Following the predefined logic of cross-cultural competency cultivation-such as progressing from cultural awareness to strategic application, or from foundational phonetics to integrated narration-the engine combines the learner's real-time state and goals to automatically generate and dynamically adjust an optimized individual learning pathway. This enables the personalized and adaptive sequential delivery of knowledge modules.

3.1.3 Dynamic Coupling Mechanism Between Knowledge Modules and Training Scenarios

The effective internalization of knowledge depends on its application within specific scenarios. The teaching system must therefore design mechanisms to achieve precise coupling between encapsulated knowledge modules and the dynamic training scenarios generated by the intelligent system. For example, when the learning pathway directs a learner to the knowledge module on "Indirect Expression Strategies in High-Context Cultures," the system can simultaneously call upon or generate a series of matching simulated broadcasting task scenarios, such as hosting a transnational meeting that requires conveying critical opinions euphemistically. This enables learners to immediately apply, verify, and consolidate the knowledge from that module within a highly relevant and realistic context, thereby forming a tight closed loop of "knowledge learning, scenario application, and feedback reflection."

3.2 Technical Integration Pathways for Dynamic Context Simulation and Intelligent Feedback Systems

3.2.1 Multi-Source Data-Driven Context Modeling and Real-Time Rendering

The sense of realism and pedagogical value in dynamic context simulation originates from the integration and processing of multi-source heterogeneous data. The technical integration pathway necessitates the fusion of a cultural scenario knowledge base (encompassing social norms and communicative conventions), large-scale authentic corpora (text, audio, video), and real-time network information streams. By employing technologies such as Natural Language Processing, Computer Vision, and Speech Emotion Computing, the system can parse and extract features from these data sources to construct parameterized virtual cultural scenario models. During training, based on pedagogical objectives and the learner's status, the system calls upon and combines these parameters in real time to generate interactive, immersive broadcasting task scenarios. These scenarios incorporate specific cultural variables, such as audience identity, communicative purpose, and social context[6].

3.2.2 Multimodal Fusion Analysis and Diagnostic Feedback Generation

The effectiveness of intelligent feedback is founded upon in-depth, multidimensional analysis of speech behavior. Technical integration must achieve the synchronous collection and fusion analysis of multimodal data, including audio, text (such as the script for read broadcasting), and potentially facial expressions (in video-based training). The feedback generation engine must analyze not only the acoustic features and linguistic content of the speech but also, in conjunction with the cultural parameters of the training context, diagnose the multidimensional performance of the expressive behavior in terms of cultural appropriateness, pragmatic suitability, and communicative effectiveness. The generated feedback should evolve from simple correct/incorrect judgments into diagnostic reports containing specific deviation localization, explanations of cultural-pragmatic principles, and suggestions for targeted improvement strategies.

3.2.3 Closed-Loop Interactive Optimization via Feedback-Simulation Linkage

To achieve continuous deepening of training effectiveness, the feedback system must form a tight linkage with the context simulation engine. After a learner makes adjustments based on the feedback received, the system should be able to, based on their adjustment strategies, fine-tune or switch the parameters of subsequent simulated contexts to provide new exercises that are more challenging or targeted. For example, if a learner's emotional expression in a particular cultural scenario is assessed as "insufficient intensity," subsequent simulated scenarios could, while maintaining the core cultural variables, raise the required level of emotional expressiveness intensity or alter its mode of presentation. This closed loop of "feedback-driven context evolution" creates a dynamic training environment that continuously adapts to the learner's progressing level.

3.3 Effectiveness Evaluation and Iterative Optimization Standards for the Teaching System

3.3.1 Multidimensional Process-Oriented Evaluation Framework Based on a Competency Matrix

Traditional outcome-oriented evaluation methods are inadequate for measuring the complex development of cross-cultural broadcasting competence. This system requires the establishment of a process-oriented evaluation framework based on a multidimensional competency matrix encompassing "cultural cognition, skill application, and strategic innovation." This framework not only focuses on the quality of the final broadcasting product but also emphasizes tracking the learner's behavioral data throughout the entire training process. This data includes the depth of their analysis of different cultural

contexts, the diversity of their strategy choices, the speed and effectiveness of adjustments made based on feedback, and the decision-making logic employed in complex situations. A data dashboard is used to visually present the learner's growth trajectory across various dimensions of the competency matrix.

3.3.2 An Efficacy Evaluation Indicator System Combining Quantitative and Qualitative Measures

The efficacy of the system itself requires assessment through a set of comprehensive indicators. Quantitative metrics may include the growth rate across various dimensions of the learner's competency matrix, the completion rate and efficiency in specific complex contextual tasks, and the retention level of knowledge modules (assessed via delayed testing). Qualitative evaluation, on the other hand, necessitates the introduction of methods based on discourse analysis. This involves conducting in-depth textual and vocal analysis of learners' expressions during simulated tasks to assess the complexity, creativity, and flexibility of their cultural adaptation strategies. Simultaneously, content analysis of learners' metacognitive reflection journals can reveal the transformation process of their cross-cultural thinking patterns.

3.3.3 Data-Driven Adaptive Iterative Optimization Mechanism

The teaching system must possess the capability for self-evolution. The core of the optimization mechanism lies in establishing a data-driven feedback loop. Continuously collected data-including learner behavioral data, process and outcome evaluation data, as well as the system's own operational data (such as the efficiency with which various knowledge modules are invoked and mastered)-are fed into the system's analytical core. Through educational data mining and learning analytics techniques, bottlenecks in the pedagogical logic, deficiencies in knowledge module design, or failures in the feedback mechanism are identified. Based on these analytical results, the system can then automatically, or after confirmation by instructional designers, make targeted adjustments and optimizations to the content of knowledge modules, the learning path generation algorithms, the context simulation parameter database, and the feedback rule database. This ensures the system's continuous improvement and adaptability.

Conclusion

This study constructs a cross-cultural intelligent broadcasting teaching system, establishing the logical framework of "cultural cognition deconstruction-parametric modeling-dynamic context simulation-adaptive learning," thereby achieving the organic integration of cultural theory, broadcasting arts, and intelligent technology. By deconstructing abstract cultural dimensions and mapping them onto computable speech representation parameters, the system constructs a closed-loop training and diagnostic feedback mechanism driven by multimodal data, promoting a paradigm shift in broadcasting pedagogy towards human-machine collaboration, cultural context simulation, and personalization. Future research needs to deepen the perceptual modeling of dynamic cultural and non-verbal cues at the technical level, integrate communication studies and cognitive science to optimize interaction design at the theoretical level, and extend its underlying logic to application areas such as international communication and language education at the practical level. Ultimately, this will foster the co-evolution of technological tools, instructional design, and cultural insight through iterative refinement.

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