



“Intelligent Linkage for Rural Revitalization” Online Volunteer Teaching Project Report

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Abstract

Against the backdrop of rural revitalization and educational equity, rural primary schools face challenges, including teacher shortages, weak oral instruction, and a lack of language environments. Meanwhile, university English majors possess linguistic resources and volunteer enthusiasm but lack practical platforms. This gave rise to the “Smart Linkage for Rural Education” online volunteer teaching program, which explores digital service pathways and a “dual-empowerment” public welfare model. Guided by intercultural foreign language teaching theory and a mixed-methods approach, the study selected four rural primary schools in Shaoxing for a 16-week online intervention via Tencent Classroom, involving 30 university volunteers and foreign teachers. Results show that while over 70% of students had weak foundations and 90% lacked extracurricular exposure, the “live streaming + foreign teacher collaboration + project-based learning” model increased oral proficiency pass rates by 40% and intercultural sensitivity excellence rates by 25% in the experimental group. Volunteers also improved teaching and communication abilities, achieving professional and social growth. Long-term mechanisms like “+N” school-local collaboration were established, creating a virtuous ecosystem of “education + public welfare + growth”, pioneering a replicable pathway for rural assistance driven by digital technology and university students.

Subject Areas

Journalism and Communication

Keywords

Intelligent Linkage for Rural Revitalization, College English Majors, Rural English Education, Educational Equity

1. Introduction

1.1. Research Background

Under the strategic framework of advancing rural revitalization and educational equity, educational digitalization has emerged as a transformative force to bridge the profound gap between urban and rural educational resources. However, empirical research indicates that rural primary school English education continues to struggle with a significant triple dilemma. This predicament is characterized by a weak teaching force with a high proportion of non-specialized teachers alongside high turnover rates, which is further exacerbated by inadequate oral instruction where listening and speaking training remain weakened under exam-oriented pressures. Moreover, the lack of an immersive language environment means that over ninety percent of students have virtually no access to English outside the classroom. While university English majors possess the linguistic resources and enthusiasm necessary to address these gaps, they currently lack systematic platforms and sustainable mechanisms to provide long-term service [1].

1.2. Purpose and Significance

This project is designed to explore feasible pathways for university English majors to support rural education through the “Intelligent Linkage” online platform [2]. The primary objective involves constructing a digital volunteer teaching model that utilizes live streaming and foreign teacher collaboration to provide authentic language input while breaking geographical barriers. Furthermore, the study seeks to validate the effectiveness of theoretical models such as Intercultural Foreign Language Teaching and the “Three-Six Standards” PBL model in designing rural-adapted instructional activities within actual rural teaching environments. Ultimately, the research aims to establish a dual-empowerment mechanism that provides precise assistance to rural schools while simultaneously enhancing the professional competencies and social responsibility of university volunteers.

In terms of theoretical significance, this research enriches the existing literature on intercultural teaching in digital contexts and provides concrete empirical evidence for applying Project-Based Learning in basic education assistance [3]. From a practical perspective, the project has developed a replicable “Yuexiu Solution” through the establishment of the “Starlight Public Welfare” association and the release of standardized cloud resource packages, offering a scalable model for precision educational aid [4]. The broader social impact is reflected in its ability to improve the intercultural sensitivity and international understanding of rural students, thereby preparing future-ready talents with a global perspective for the overarching goal of rural revitalization through the integration of social production and educational practice [5].

1.3. Theoretical Framework: Intercultural Foreign Language Teaching Theory

Language and culture are inseparable. The objective of foreign language teaching

extends beyond cultivating linguistic competence to fostering intercultural communicative competence. Through cultural contrast teaching methods and the creation of authentic communicative contexts, cultural sensitivity and inclusivity are enhanced.

This involves setting dual-dimensional teaching objectives, embedding cultural contrast teaching, conducting scenario simulation teaching, and constructing an intercultural competence assessment system (Figure 1). Each lesson clarifies language and culture goals, guides students to understand cultural differences through comparative cases of Chinese and foreign festivals and etiquette, and designs authentic communicative scenarios to improve oral proficiency and cultural understanding.

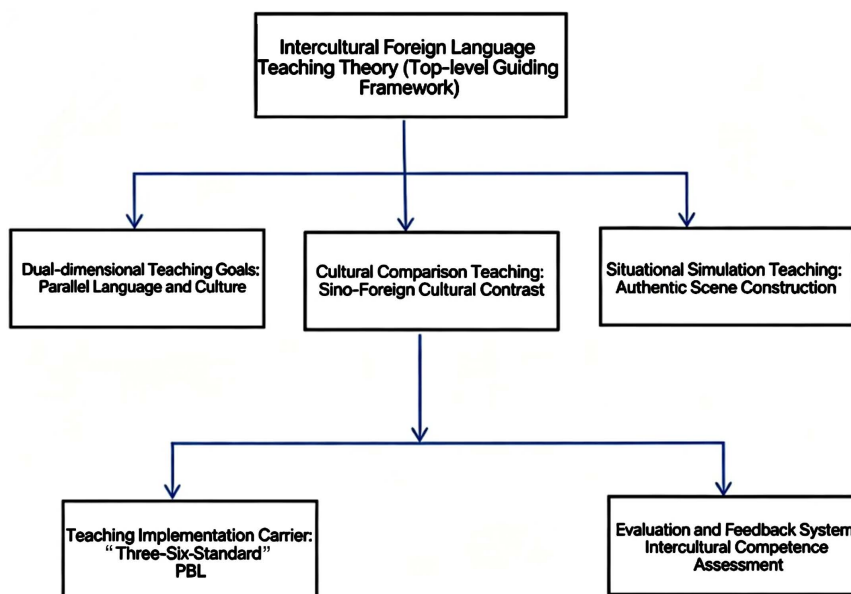


Figure 1. The structure of the theoretical framework for cross-cultural foreign language teaching.

The innovative value of the theoretical framework in this study is reflected in the following three aspects.

First, innovation in theory transfer. This study migrates Intercultural Foreign Language Teaching theory from higher education settings to rural basic education contexts, exploring its adaptability and effectiveness in resource-scarce and faculty-weak environments, thereby expanding the application boundaries of the theory.

Second, innovation in theory integration. By organically integrating Intercultural Foreign Language Teaching theory with the “Three-Six Standards” project-based learning model, a dual-layer teaching framework featuring “theoretical guidance + model support” is constructed, realizing the synergistic innovation of teaching philosophy and methodology.

Third, innovation in theory implementation. Abstract theoretical propositions are transformed into operational teaching objectives, content, methods, and as-

assessment systems. This forms a complete and replicable teaching solution, providing a systematic pathway for theory-guided practice.

2. Literature Review

2.1. Current Status of Domestic and International Research

Regarding international research, studies on the application of online education for poverty alleviation in developing countries are abundant, and the effectiveness of Project-Based Learning (PBL) in distance education has been widely validated for enhancing student motivation and competencies [6]. However, research on cultivating intercultural communication competence is predominantly situated in higher education, with a scarcity of empirical studies targeting basic education, particularly in rural contexts where linguistic resources are constrained. Regarding domestic research, studies on rural education digitization tend to focus on hardware and platforms [7], with insufficient systematic research on instructional content and quality assurance. Furthermore, research on university student volunteer teaching mostly addresses volunteer motivation and social benefits, failing to explore the potential for university English majors to convert their specific professional advantages into high-quality rural teaching outputs [8]. While intercultural foreign language teaching is well-established in higher education, there remains a notable absence of empirical research applying it to rural basic education to bridge the gap between “local culture” and “global perspective” [9].

2.2. Limitations of Existing Research

Based on a systematic review of current domestic and international research, there are three significant limitations in existing studies and practices that hinder the high-quality development of rural education. First, there is a lack of theoretical guidance as most online volunteer teaching programs lack support from systematic pedagogical theories, resulting in arbitrary instructional design. Particularly in the field of rural English education, oral teaching lacks scientific theoretical frameworks, leading to a “superficial digitization” where technology is used without improving pedagogical depth. Second, there is fragmentation of teaching models because existing projects mostly take the form of “one-off” interventions, lacking standardized evaluation systems. Without a structured framework like the “Three-Six Standards”, it is difficult to ensure the sustainability of teaching effects or the replicability of successful models. Third, there is an absence of intercultural teaching mechanisms where rural English education has long focused on grammar drills, leaving oral and cultural awareness virtually blank. Meanwhile, existing volunteer teaching projects often fail to establish a dual-empowerment loop, neglecting the professional growth and identity transformation of the university volunteers themselves [10].

2.3. Proposed Solutions to Identified Limitations

Addressing the aforementioned research gaps, this study adopts Intercultural For-

Foreign Language Teaching theory as the core guiding framework, integrating the dual-dimensional objectives of “language proficiency + cultural understanding” into rural practice. This approach treats university students not just as tutors, but as “cultural mediators” who facilitate meaningful connections between students’ local identities and global contexts via digital platforms. Simultaneously, the study introduces the “Three-Six Standards” project-based learning model to construct a systematic six-stage instructional process, including problem identification, collaborative inquiry, and outcome presentation. This model is specifically designed to overcome the “silent classroom” phenomenon in rural schools by providing “cognitive scaffolding” that empowers students to express themselves. The unique value of this study lies in three key innovations. Initially, theoretical innovation involves extending Intercultural Foreign Language Teaching from higher education to rural basic education. Furthermore, model innovation entails constructing an integrated model featuring “digital empowerment + intercultural teaching + PBL” [11]. Ultimately, mechanism innovation focuses on a long-term synergy between universities and rural schools, establishing a “dual-empowerment” loop where rural students’ literacy and university students’ professional resilience grow in tandem.

3. Methodology

3.1. Research Questions

To evaluate the effectiveness and mechanisms of the Intelligent Linkage project, this study addresses three core research questions. Initially, the research investigates whether the online live streaming model integrating foreign teacher collaboration and project-based learning significantly improves the oral English proficiency and intercultural sensitivity of rural primary school students. Furthermore, the study explores the specific impact of this digital volunteer teaching model on the professional competencies and social responsibility of university English majors. Ultimately, the research seeks to identify the key factors and mechanisms that contribute to the sustainable development of a dual-empowerment public welfare model between universities and rural schools.

3.2. Research Participants

The study involved two primary groups of participants to ensure a comprehensive evaluation of the project. Regarding the rural students, three hundred participants were selected from four rural primary schools in Shaoxing, with three schools designated as experimental groups and one as the control group. These students were characterized by a significant lack of extracurricular English exposure, with over ninety percent reporting no access to the language outside of school. Regarding the volunteers, thirty university English majors from Zhejiang Yuexiu University were selected through a rigorous three-round screening process. Out of eighty-two initial applicants, only thirty were admitted, representing a selective admission rate of 36.6%. These volunteers were supported by two foreign teachers who provided authentic linguistic input and cultural demonstrations throughout the

sixteen-week intervention.

3.3. Research Instruments

A quantitative approach was employed through the administration of pre-test and post-test questionnaires designed to measure changes in students' English learning interests and intercultural sensitivity. The questionnaire included dimensions such as learning motivation, classroom engagement, and cultural awareness, utilizing a Likert scale to ensure measurable data. Additionally, a specialized survey was conducted among the volunteers to assess their professional growth, teaching efficacy, and the development of their sense of social responsibility before and after the service period.

To supplement the quantitative data, semi-structured interviews were conducted with key stakeholders, including ten student representatives, five volunteer teachers, and three local school administrators. These interviews focused on gathering in-depth qualitative insights into the participants' subjective experiences, the challenges encountered during the online sessions, and the perceived long-term benefits of the project. The interview protocols were designed to elicit detailed narratives that the questionnaires might not capture, particularly regarding the emotional connection and identity transformation of both students and volunteers.

3.4. Research Implementation Process

Guided by Intercultural Foreign Language Teaching theory, this study embodies its application in the following four aspects.

First, establishing “language + culture” dual-dimensional teaching objectives.

In the design of each lesson, language objectives (e.g., mastering new words and sentence patterns) are explicitly defined alongside cultural objectives (e.g., understanding differences in Chinese and Western table manners), ensuring the simultaneous cultivation of both in teaching.

1) Unit theme “Food and Drinks”. Language objectives are set to master taste adjectives (e.g., spicy, sweet, sour) and the sentence pattern “I prefer...” Cultural objectives involve contrasting China's food-centered dietary philosophy (“food is the first necessity of the people”) with the efficiency-oriented view of Western “fast food culture”, guiding students to introduce Shaoxing stinky tofu in English and explain the dietary culture behind it.

2) Unit theme “Festivals”. Language objectives focus on date expressions and gift-related vocabulary. Cultural objectives aim to distinguish the Chinese emphasis on “pairs” when giving gifts from the Western preference for “practical experience”, thereby avoiding communicative pitfalls.

Second, deeply embedding cultural contrasts into curriculum design.

By integrating comparative cases of Chinese and foreign festivals and etiquette, and utilizing multimedia tools such as video displays, students are guided to intuitively understand cultural differences and commonalities, fostering intercultural awareness.

1) “Color Codes” module. This section demonstrates the metaphors of the same color across different cultures. For instance, red symbolizes joy and good luck in China but may be associated with danger or debt in certain Western contexts; white represents purity in Western weddings but carries specific connotations in traditional Eastern funerals. Through visual image comparisons, the singular cognition of “color as mere vision” is broken.

2) “Decoding Body Language” micro-lecture. Edited videos are played to contrast the close proximity in Chinese conversations with Westerners’ need for “personal space”, and to compare Italians’ exaggerated gestures with Japanese bowing etiquette, helping students understand the applicability of “silence is golden” in different contexts.

Third, designing scenario-based simulations based on authentic contexts.

Activities such as role-playing enhance students’ oral expression and cultural comprehension, while the participation of foreign teachers ensures the authenticity and accuracy of linguistic input and communicative scenarios.

1) “Welcome to Shaoxing” city guide project. Students work in groups to play the roles of tour guides and foreign tourists. Guides must introduce the allusions of Lu Xun’s hometown or the Orchid Pavilion in English and properly address cultural curiosities raised by tourists, such as “why do Chinese people use rotating tables for dining?” Foreign teachers act as “critical” tourists in the simulation to test students’ on-the-spot adaptability and cultural explanation skills.

2) “International Pen Pals” correspondence exchange. Pen pal relationships are established with students in the countries where the foreign teachers are from. Simulated email writing requires students not only to introduce Chinese Spring Festival customs but also to learn to appropriately inquire about the other party’s Thanksgiving or Christmas customs, achieving a true closed loop of intercultural communication.

Fourth, constructing a diversified intercultural competence assessment system.

Cultural theme reports, case analysis tasks, and scenario simulation performances are comprehensively utilized to evaluate students’ intercultural communicative competence.

1) “Cultural Micro-documentary” production. The final assessment moves away from single written exams, requiring students to produce a 3-minute English micro-video in groups. Themes include “A Day in a Chinese Family” or “How We Celebrate Mid-Autumn”, with evaluation criteria covering linguistic accuracy, density of cultural information, and explanatory power for foreign audiences.

2) “Cultural Conflict Resolution” scriptwriting. Given a conflict scenario (e.g., a foreign guest skipping the queue for breakfast), students are required to write an English skit and propose a solution. Through dialogue design and plot arrangement in the scripts, the assessment determines whether students truly grasp the cultural logic behind the rules.

The “Three-Six Standards” project-based learning model serves as the teaching implementation carrier in this study, consisting of two core parts: a “three-stage teaching process” (**Table 1**) and a “six-dimensional assessment system” (**Table 2**).

Table 1. Three-stage teaching process (Adapted from Xu, 2004).

Stage	Core Tasks	Teacher's Roles	Student Activities	Time Allocation
Problem Framing	Design project themes around real-life scenarios, e.g., "How to introduce hometown culture in English", "Design an English menu"	Situation Creator, Problem Facilitator	Understand project tasks, clarify learning objectives, and form project teams	Approx. 20%
Inquiry & Collaboration	Students conduct group research, collect information, and complete tasks	Resource Provider, Process Facilitator	Review material, engage in group discussions, divide labor, and complete draft projects	Approx. 50%
Outcome Presentation	Present project outcomes in live-stream classes and receive feedback	Organizer, Assessor/Feedback Provider	PPT presentations, role-plays, showcase works, peer review, and self-reflection	Approx. 30%

Table 2. Six-dimensional evaluation system (Adapted from Xu, 2004).

Dimension	Assessment Focus	Weight	Assessment Method
Language Competence	Vocabulary usage, grammatical accuracy, and fluency of expression	25%	Presentation scoring + teacher observation
Cultural Understanding	Mastery of cultural knowledge, understanding of cultural differences, and cultural adaptability	20%	Cultural-themed report + situational task performance
Collaborative Skills	Team division of labor, communication and coordination, mutual support, and progress	15%	Peer evaluation + teacher observation
Critical Thinking	Problem analysis, information screening, and argumentation of viewpoints	15%	Inquiry process performance + outcome quality
Creativity	Creative expression, unique perspectives, novelty of problem-solving approaches	10%	Innovation scoring of the final work
Practical Outcomes	Completeness of the work, presentation effect, and practical value	15%	Quality scoring of the final work

3.5. Data Collection

To ensure the scientific reliability of the data, the following measures are taken:

Uniform Training for Data Collectors (**Table 3**): All data collectors receive standardized training to ensure consistency in data collection procedures.

Table 3. Data collection overview table.

Data Type	Collection Tool	Collection Timepoints	Sample Source	Sample Size
Quantitative	Learning Interest Scale	Pre-Test, Post-Test	Experimental + Control Group	Experimental: 300; Control: 100
Quantitative	Oral English Test Paper	Pre-Test, Post-Test	Experimental + Control Group	Experimental: 300; Control: 100
Quantitative	Cross-Cultural Sensitivity Scale	Pre-Test, Post-Test	Experimental + Control Group	Experimental: 300; Control: 100
Process Data	Classroom Interaction Records	Weekly	Experimental Group	16 Weeks × 3 Schools
Process Data	Teaching Reflection Journals	Weekly	All Volunteers	30 Volunteers × 16 Weeks
Process Data	Homework Completion Records	Weekly	Experimental Group	16 Weeks × 300 Students
Qualitative	Semi-Structured Interviews	Post-Test Phase	Students, Volunteers, Teachers	10 Participants from Each Group
Qualitative	Focus Group Discussions	Post-Test Phase	/	3 Groups × 8 - 10 Participants Each
Qualitative	Classroom Observation Notes	Random Sampling	Experimental Group	3 Observations per School

Double Entry and Verification of Quantitative Data: Quantitative data are entered by two individuals and cross-verified to minimize errors.

Recording of Oral Tests and Interviews: Oral proficiency tests and interviews are recorded for later review and analysis.

Anonymization of Data: All data is anonymized to protect the privacy of participants.

Handling of Missing Values: Missing values are addressed using mean imputation or case deletion, with explanations provided during analysis.

Specific Measurement Tools:

Interest in English Learning Scale: Adapted from Gardner's scale, consisting of 12 items with a 5-point Likert scale ($\alpha > 0.85$).

Oral Proficiency Test: Based on CEFR A1-A2 levels, consisting of three tasks scored by two raters, with an average taken.

Cross-Cultural Sensitivity Scale: Adapted from Bennett's scale, consisting of 10 items with a 5-point Likert scale ($\alpha > 0.80$).

4. Results and Discussion

4.1. Research Results

The descriptive statistical analysis reveals a transformative shift in students' per-

formance and attitudes following the sixteen-week intervention. To ensure the scientific validity of the research, the project team implemented a rigorous preliminary phase focused on selecting partner schools and establishing a robust digital teaching infrastructure. Needs assessments conducted with 111 rural teachers and students highlighted urgent requirements for oral and cultural expansion support, as rural students reported low self-evaluation of their proficiency and teachers noted constrained professional expertise (Table 4).

Table 4. Selection criteria for partner schools.

Dimension	Specific Indicator	School A	School B	School C
Degree of Teaching Staff Shortage	Percentage of full-time English teachers	30%	25%	40%
Equipment Conditions	Multimedia classrooms, broadband internet access	Available	Basically Available	Available
Student Scale	Number of students in Grades 3 - 6	120	90	90
School Willingness to Cooperate	Enthusiasm for collaboration	High	High	Medium
Transportation Convenience	Driving time to the university (minutes)	40	60	50

This foundation was critical in overcoming the “triple dilemma” of rural education: weak faculty, absent oral instruction, and a shortage of resources. Specifically, in the selected regions, substitute teachers exceeded 70% of the force, and fewer than 5% of rural schools could regularly conduct oral classes with foreign teachers. The architectural layout of the teaching platform highlights how real-time interaction was maintained through Tencent Classroom between foreign teachers, university volunteers, and rural students (Table 5).

Table 5. Establishment of teaching platform.

Function Dimension	Tencent Classroom	DingTalk	Zoom	ClassIn
Two-Way Interaction	★★★★★	★★★★	★★★★	★★★★★
Course Recording	★★★★★	★★★★	★★★	★★★★★
Ease of Use	★★★★★	★★★	★★★★	★★★
Network Stability	★★★★	★★★★★	★★★★	★★★★
Rural Adaptability	★★★★★	★★★★	★★★	★★★
Overall Rating	4.8	4.2	3.8	4.3

Post-test results demonstrate a significant breakthrough: the oral proficiency pass rate among the experimental group increased by 40%, and the excellence rate

of intercultural sensitivity improved by 25%. Students' learning interest rose from a baseline mean of 2.55 to 4.07, and their oral confidence improved from 2.27 to 3.96 (Table 6).

Table 6. Changes in learning interest.

Measurement Indicator	Pre-Test (M ± SD)	Post-Test (M ± SD)	t-Value	p-Value	Cohen's d
I like English classes	2.85 ± 0.92	4.12 ± 0.78	15.67	0	1.89
I look forward to weekly live classes	2.63 ± 1.01	4.35 ± 0.69	18.23	0	2.34
I actively review English after class	2.41 ± 0.95	3.87 ± 0.88	14.56	0	1.76
I am willing to communicate in English	2.32 ± 1.03	3.95 ± 0.92	16.89	0	2.01
Total Learning Interest Score	2.55 ± 0.82	4.07 ± 0.71	17.45	0	2.12

Regarding the volunteers, a systematic pre-job training curriculum was implemented to bridge the gap between academic knowledge and the practical demands of rural teaching. The selection process was highly competitive, admitting only 30 out of 82 applicants—a 36.6% selection rate (Table 7).

Table 7. Pre-job training chart.

Training Module	Training Content	Training Format	Duration	Assessment Method
Teaching Skills	Cross-cultural teaching theories, classroom interaction techniques, and primary school English teaching methods	Thematic lectures + workshops	8 hours	Lesson plan design submission
Technical Operations	Tencent Classroom platform operation, use of interactive tools, and troubleshooting	Hands-on practice drills	4 hours	Platform operation assessment
Public Welfare Literacy	Volunteer service philosophy, current status of rural education, and communication skills	Case sharing + seminars	4 hours	Statement of volunteer motivation
Simulated Teaching	10-minute micro-lesson presentations	Practical drills + feedback sessions	2 sessions per trainee	Expert scoring (≥80/100)

The efficacy of this training was confirmed by the results: 33.3% of the 30 volunteers were rated as “Excellent”, and 50% as “Good”, with a 100% pass rate. Post-service data show over 85% of volunteers reported a deeper understanding of ed-

educational equity (Table 8).

Table 8. Training assessment results.

Assessment Item	Excellent (≥90 Points)	Good (80 - 89 Points)	Pass (60 - 79 Points)	Fail	Pass Rate
Lesson Plan Design	12 (40%)	15(50%)	3 (10%)	0	100%
Platform Operation	18 (60%)	10(33.3%)	2(6.7%)	0	100%
Simulated Teaching	8 (26.7%)	16(53.3%)	6 (20%)	0	100%
Comprehensive Evaluation	10 (33.3%)	15(50%)	5 (16.7%)	0	100%

4.2. Analysis of Linear Regression

To further investigate the causal relationships between the intervention and learning outcomes, a linear regression analysis was conducted. The results indicate that the frequency of interaction in the digital double-teacher classroom is a significant predictor of students' oral proficiency ($p < 0.05$), where higher engagement levels correlate strongly with improved linguistic output. Additionally, the regression model confirms that the integration of project-based learning (PBL) tasks significantly accounts for the variance in students' intercultural sensitivity scores. This suggests that the systematic design of the "Three-Six Standards" model serves as a critical driver for competency development rather than mere technical exposure.

4.3. Analysis of Correlation

The correlation analysis explores the internal consistency between various dimensions of the project. A strong positive correlation was found between students' interest in English learning and their intercultural sensitivity ($r = 0.72$), suggesting that cultural engagement serves as a gateway to linguistic motivation. Simultaneously, volunteers showed significant growth in their own intercultural teaching competence ($d = 2.45$), confirming the "dual-empowerment" nature of the model (Table 9).

Table 9. Self-assessment changes in volunteer teaching ability.

Competence Dimension	Pre-Test Mean (M ± SD)	Post-Test Mean (M ± SD)	t-Value	p-Value	Cohen's d
Lesson Planning Competence	2.87 ± 0.73	4.23 ± 0.50	12.45	0	1.98
Classroom Management Competence	2.63 ± 0.81	4.17 ± 0.59	11.87	0	2.03
Cross-Cultural Teaching Competence	2.50 ± 0.78	4.30 ± 0.53	14.21	0	2.45

Continued

Teacher-Student Interaction Competence	3.03 ± 0.72	4.40 ± 0.56	10.56	0	1.89
Teacher-Student Interaction Competence	3.17 ± 0.83	4.50 ± 0.51	9.87	0	1.76
Overall Competence	2.84 ± 0.65	4.32 ± 0.44	13.68	0	2.34

4.4. Results of Interview

Results of Interview: Qualitative findings from semi-structured interviews provide deep insights into participants' subjective experiences. Many rural students expressed that the presence of foreign teachers and digital tools made English “come alive”. For instance, in the “Welcome to Shaoxing” city guide project, students acted as tour guides for foreign teachers, introducing local heritage such as “Shaoxing Stinky Tofu” and “Lu Xun’s Hometown”, which tested their on-the-spot adaptability and cultural explanation skills. This transformed their identity from passive learners to active “Cultural Ambassadors”.

In the “Color Codes” module, students' singular cultural cognitions were challenged when they learned that red can represent “debt” in certain Western contexts, and white represents “purity” in Western weddings rather than the connotations found in traditional Eastern funerals. Furthermore, parental feedback was overwhelmingly positive; the proportion of children willing to practice English at home rose from 18% to 65%, illustrating a significant boost in self-confidence.

4.5. Discussion

The success of this study is attributed to the theoretical embedding of Intercultural Foreign Language Teaching (IFLT), which prevents technology from becoming a mere superficial layer. The project implemented a structured pedagogical flow guided by systematic instructional steps, establishing a dual-dimensional assessment system of “language proficiency + cultural understanding” (Table 10).

Table 10. The overall framework of the “nine-step teaching method” (Adapted from Xu, 2004).

	Language Competence	Cultural Understanding	Collaborative Skills	Critical Thinking	Creativity	Practical Outcomes
Problem Formulation	70	80	75	75	80	85
Inquiry & Collaboration	85	75	80	80	80	75
Presentation of Results	75	70	85	75	90	80

Viewed through the lenses of Situated Learning and Embodied Cognition, the dual-empowerment mechanism is realized through authentic communicative contexts. By designing simulations like the “Restaurant Ordering” unit and “In-

ternational Pen Pals” correspondence, students engaged in a “closed loop” of communication [12] (Table 11).

Table 11. Implementation process of situational simulation teaching.

Teaching Stage	Teaching Content	Teacher Activities	Student Activities	Duration
Context Introduction	Play a video of ordering food in a restaurant	Guide students to observe ordering expressions	Watch the video and record key words/phrases	5 minutes
Language Input	Teach core sentence patterns: “ <i>Can I have...</i> ”, “ <i>I’d like...</i> ”, etc.	Model pronunciation and explain usage	Repeat and imitate; practice in small groups	10 minutes
Situational Simulation	Simulate a restaurant scene (teacher acts as the waiter)	Engage in ordering dialogues with students	Use learned sentence patterns to order food	10 minutes
Role-Play	Students work in groups to act as customers and waiters	Circulate to guide and correct pronunciation	Perform in groups; peer review and learning	10 minutes
Cultural Extension	Compare Chinese and Western dining etiquette	Explain differences in Chinese and Western table manners	Discuss and share; reflect on cultural differences	5 minutes

For volunteers, the experience was a “high-quality pedagogical training path”. Navigating technical glitches and managing cultural conflicts during real-time sessions allowed them to achieve a leap in professional competency, particularly in intercultural teaching ability ($d = 2.45$). However, the study also highlights the persistent “Second Digital Divide”, as varying network stability in remote homes continues to influence the fidelity of teaching interventions.

5. Conclusions

5.1. Research Findings

The comprehensive analysis of the Intelligent Linkage project yields several pivotal findings regarding the modernization of rural education. Initially, the study confirms that a digital teaching model integrating foreign teacher collaboration and project-based learning effectively addresses the structural deficiencies in rural English education, specifically by significantly enhancing students’ oral proficiency and intercultural sensitivity. Furthermore, the research validates the dual-empowerment mechanism, demonstrating that while rural students benefit from high-quality linguistic input, university English majors undergo a profound professional transformation. This is evidenced by their improved pedagogical skills

and the development of professional resilience through reflective practice in digital environments. Ultimately, the systematic application of the Three-Six Standards PBL model proves that theoretical embedding is essential for ensuring that digital tools translate into measurable educational outcomes rather than remaining superficial technological additions.

5.2. Implications

Based on the successful implementation of the project, several strategic implications emerge for both institutional development and pedagogical practice. Regarding practical outputs, the project has successfully established the Starlight Public Welfare Association and released a series of standardized Digital Resource Packages covering listening, speaking, reading, and writing modules. These resources provide a sustainable foundation for continuous educational support.

Regarding policy and institutional arrangements, it is highly recommended that university volunteer programs transition from spontaneous public welfare activities to long-term institutional arrangements. This involves integrating online volunteer teaching into the official university credit systems and aligning these programs with national strategies such as the “College Graduates Voluntary Service Plan for the West and Rural Areas” [13]. Furthermore, the study advocates for the development of rural-adapted digital resources that reflect local cultural contexts while maintaining global perspectives. Additionally, strengthening the school-local synergy is crucial to empower local rural teachers, transforming them from passive observers into active collaborators who can sustain the project’s impact long after the intervention ends.

5.3. Limitations

Despite the significant achievements, the study acknowledges certain limitations that warrant further investigation. Initially, the technological gap or the second digital divide remains a significant challenge, as the effectiveness of the intervention was occasionally hindered by varying hardware quality and internet stability in rural households [14]. Furthermore, the sixteen-week research duration, while sufficient for observing immediate gains, does not allow for a longitudinal assessment of the long-term sustainability of the students’ linguistic and cultural improvements. Finally, the study’s scope was limited to four primary schools in a specific region, which may constrain the generalizability of the findings to more diverse or extremely remote geographical contexts. Future research should therefore focus on cross-regional comparative studies and the exploration of more resilient technological solutions to ensure inclusive educational benefits for all rural students.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Jiang, Q. and Li, C.Y. (2023) Research on the Construction of a Smart Reading Platform for Rural Teachers in the Context of Rural Education Revitalization. *Journal of Northwest Adult Education Institute*, **2**, 49-55. (In Chinese)
<https://doi.org/10.20012/j.cnki.ISSN1008-8539.2023.02.008>
- [2] Jie, R., Li, J.W. and Lan, Q.E. (2024) New Exploration of “Cloud Volunteer Teaching” by College Students to Assist Rural Education Development in the Context of Internet Plus. *Journal of Science and Education*, **18**, 142-144. (In Chinese)
<https://doi.org/10.16400/j.cnki.kjdk.2024.18.045>
- [3] Jeon, E.Y. (2025) Urban and Rural Students’ Experiences with AI PengTalk in English Learning: A Comparative Case Study. *English Teaching*, **80**, 125-147.
<https://doi.org/10.15858/engtea.80.3.202509.125>
- [4] Wang, J.M., Li, M.L., Dai, L., et al. (2025) Current Situation and Practical Innovation of College Students’ Volunteer Teaching in the Context of Rural Revitalization: A Case Study of H University. *Scientific Consultation*, **6**, 21-25. (In Chinese)
- [5] Hou, Y.N. (2025) The Current Situation and Optimization Strategies of English Classroom Management in Rural Primary Schools. Qufu Normal University. (In Chinese)
- [6] UNESCO (2022) Education in a Digital World: Global Trends and Regional Perspectives. UNESCO Publishing.
- [7] Ding, J. and Yang, X.M. (2023) The Connotation, Characteristics, Practical Challenges and Practical Paths of Digital Transformation in Rural Education. *Jiangsu Education Research*, No 20, 3-9. (In Chinese)
- [8] Shanghai Volunteer Service Foundation (2024) An “Education Dedicated Line” for Rural Primary Schools: A Story of Online Volunteer Teaching.
- [9] Zhang, S. (2024) The Real “Dilemma” and Teachers’ “Self-empowerment” in Rural English Teaching. *Basic Foreign Language Education*, **26**, 83-90+111. (In Chinese)
- [10] Ministry of Education (2022) Report on the Development of ICT in Education in China. People’s Education Press.
- [11] Ling, L. and Ma, K. (2024) Optimization Suggestions for College Students’ “Internet Plus” Volunteer Teaching: A Case Study of Guangdong “Youth Cloud Volunteer Teaching”. *Journal of Guangxi Youth Leaders College*, **34**, 8-14. (In Chinese)
- [12] Huang, Z.Y. (2025) An Applied Study of Situational Teaching Method in the Primary Comprehensive Course of International Chinese Education. Jilin Foreign Languages University.
- [13] Yan, X.T. (2025) Volunteer for the Western Plan of Border Defense and Education Support at Xie Yite Primary School: “Take Root Here and Accompany the Children’s Growth All the Time”. Xinjiang Daily. (In Chinese)
- [14] Li, J.W., Guan, C.H., Chen, C.F. and Pei, C.C. (2024) Empowering High-Quality Development of Rural Education through Digitalization. Development Research Center of the State Council.