

Integrating Traditional Culture to Optimize Emerging Education Model of Schools in Sichuan: Case Exemplars from Successful Stories in Chinese Developed Regions

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ABSTRACT: With the continuous development of new technology and the support of various local policies, emerging technologies have gradually entered every classroom. In Sichuan, a province that still has many backward and remote areas, although many primary and secondary schools in remote areas already have better facilities than big cities, many of them are still struggling with educational thinking traditions, insufficient teachers, and unclear goals. This qualitative study combines case analysis and thematic analysis, employing semi-structured interviews, classroom observations to collect empirical data from 16 participants in Sichuan's remote ethnic minority areas. Case studies from Bozi Primary School in Shandong and Shalang Ethnic Experimental School in Yunnan were selected based on regional comparability. Findings confirm serious shortcomings in curriculum innovation and localization. An educational model integrating traditional culture and emerging technology is proposed and validated through expert evaluation and stakeholder feedback. The discussion critically compares findings with existing research on culturally responsive teaching and digital education, highlighting practical implications for educators, and administrators.

Keywords: Traditional Culture, Emerging Education Model, Curriculum Localization, Culturally Responsive Teaching, Remote Ethnic Areas.

1. INTRODUCTION

1.1. Research Background

With the continuous development of new technology, it is reshaping the educational boundaries of traditional classrooms at an unprecedented speed. In China, thanks to the intensive introduction and policy support of national and local education digitalization strategies, digital equipment such as smart classrooms and interactive

electronic whiteboards has crossed geographical barriers and gradually become popular in primary and secondary schools in remote mountainous areas. In 2023, the Ministry of Education officially released the Strategic

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Action Plan for Education Digitalisation (Xinhua.com, 2023); the 2024 World Digital Education Conference will further push international cooperation in digital education to a new height (University of Electronic Science and Technology, 2024). However, Antoninis, M *et al.* (2023) "Global Education Monitoring Report" pointed out that there is still a serious lack of evidence of the impact of good and fair education technology worldwide. The sinking of science and technology seems to provide a perfect technological antidote to break the uneven distribution of educational resources. However, does the simple introduction of technology necessarily bring about a substantial leap in educational ecology? This is still a proposition to be scrutinized.

■ 1.2. Realistic Contradictions

In Sichuan, a province with vast backward and remote areas, the reality presents a sense of separation and contradiction. Many primary and secondary schools in remote areas have reached the standards or even ahead of some urban schools in terms of hardware facilities, but their educational core has fallen into a deep "digital divide". As pointed out by Nicolas and Santos (2026), the success of e-learning depends not only on the access of equipment, but also on students' self-regulated learning ability; without the corresponding learning and thinking guidance, no matter how advanced the equipment is, it is difficult to transform into an improvement in academic performance. Warschauer's (2004) research also reveals that the essence of the digital divide is not a simple "access gap", but a deeper "use gap" - that is, whether technology can be effectively integrated into teaching practice and can truly serve the cognitive development of learners.

■ 1.3. Research Problems

What's more serious is that in the face of the pressure of curriculum innovation, some schools in remote areas have fallen into the misunderstanding of "blind imitation" due to the lack of a deep examination of local culture and realism. They rigidly transfer the curriculum model of developed areas and fail to combine their own local conditions with the cultural characteristics of ethnic minorities, resulting in an extremely low degree of curriculum localization and inability to resonate with students. This kind of "suspended innovation" that is detached from the cultural soil not only causes a waste of educational resources, but also aggravates the weak education system.

■ 1.4. Significance of Research

In the face of the above difficulties, this study aims to explore how to deeply integrate the traditional culture of Sichuan's excellent ethnic minorities with modern education under the background of emerging science and technology empowerment through qualitative research methods and actual case analysis. During the research period, we hope to build an emerging educational model that takes into account cultural preservation and sustainable development of education, not only to let technology really take root, but also to pave a possible way for children deep in the mountains to "get out of the mountains" with cultural confidence.

■ 2. LITERATURE REVIEW

■ 2.1. The Integration of Traditional Culture and Modern Education

Under the wave of digitalization, the modernization of education is often misunderstood as mere technology, resulting in the lack of local cultural context. In the international academic world, Gay (2018) systematically expounded the theory of cultural response teaching, emphasizing the use of students' cultural knowledge and previous experience as teaching resources; Ladson-Billings (1995) proposed the "culture-related teaching method", pointing out that effective teaching should promote academic success, cultural competence and social critical awareness at the same time; Paris and Alim (2017) further put forward the "cultural continuous teaching method", emphasizing that education should not only respond to culture, but also continue to maintain and cultivate multicultural practices. From "cultural response" to "cultural relevance" to "cultural sustainability", the status of the cultural dimension in education is rising from "auxiliary consideration" to "core principle", which is highly consistent with the core proposition of this study of "repositioning the cultural dimension to the center of digital education".

■ 2.2. Experiential Learning and Technology Empowerment

Kolb's experiential learning theory emphasizes that learning is a cycle of "concrete experience, reflection and observation, abstract conceptualization, and active practice". Hamilton *et al.* (2021) show that immersive technologies such as VR can greatly enrich students' "specific experience" by creating high-fidelity interactive situations. However, Kirkwood and Price (2014) proposed three roles of technology-enhanced learning -

"alternative", "complementary" and "transformation", pointing out that many applications only stay at the "alternative" level, and what is really transformative is the application at the "transformation" level. Selwyn (2015) reminds from a critical perspective that the technical effect depends on the specific use situation and the power relationship, and simple introduction does not necessarily lead to educational equity. In terms of student dimensions, Zimmerman's (2002) three-stage model of self-adjustment learning and Broadbent (2017)'s study on the positive correlation between self-regulation strategies and academic performance in online learning jointly point to the premise of technical empowerment that learners have corresponding self-regulation ability.

■ 2.3. International Experience of Curriculum Localization and Digital Education

Course localization is a common challenge for a global multicultural society. Aikenhead and Ogawa (2007) pointed out that Aboriginal knowledge and Western scientific knowledge belong to different cognitive systems, and simple introduction may cause cultural distortion. The systematic review of da Silva *et al.* (2024) found that successful course localization needs to meet the three conditions of epistemological equality dialogue, in-depth community participation, and institutional policy guarantee at the same time. Anthony and Keating (2013) found that cultural bias in technical design is the main reason why Aboriginal students are at a disadvantage, which forms a cross-cultural comparability with the "sense of cultural distance from the curriculum" faced by Sichuan students.

■ 2.4. Theory of Educational Innovation

Fullan (2016) pointed out that educational reform is a systematic project involving the multi-level coordination of beliefs, policies and practices, and it is difficult for a single-level change to produce substantial effects. Rogers (2003)'s theory of innovation diffusion explains why some schools fall into "blind imitation" - when innovation adoption is driven by external pressure rather than internal demand, it often stays in the "formal

adoption" stage. Biesta (2010)'s criticism of "measurement-only theory" also applies to the field of educational technology - when evaluation only focusses on quantifiable indicators such as the frequency of technology use, the cultural dimension and humanistic value are systematically ignored.

■ 2.5. Research Methods

■ 2.5.1. Research and Design

This study adopts qualitative research design, and comprehensively applies case analysis and thematic analysis. The reason for choosing the qualitative method is that this study focusses on the exploratory questions of "how" and "why", rather than causal inference between variables (Creswell & Creswell, 2017). The study adopts multi-case embedded design (Yin, 2018), taking Shandong Bozi Primary School and Yunnan Shalang School as instrumental cases, and taking schools in remote ethnic areas in Liangshan Yi Autonomous Prefecture, Aba Tibetan Qiang Autonomous Prefecture and Ganzi Tibetan Autonomous Prefecture as field research objects.

■ 2.5.2. Participant Selection and Sample

The Sichuan field survey used purposeful sampling to select 4 teaching support teachers, 4 local teachers, 6 students, and 2 school administrators, a total of 16 people. The basic information of the participants is shown in Table 1.

■ 2.5.3. Data Collection Procedure

Data collection takes two ways: (1) Semi-structured interview: 1-2 times per participant, 20-30 minutes each time, mainly in Mandarin, supplemented by Sichuan dialect if necessary; (2) Classroom observation: a total of 12 times in 6 schools, close-up observation of the interaction mode between teachers and students offline;

■ 2.5.4. Interview Agreement

All interviews are conducted with informed consent, and the whole process is recorded and transcribed word by

Table 1: Basic information of field research participants

Participant	Status	Teaching age or age	Location	Interview time
T1-T4	Teaching support teachers	1/2/2/4	Liangshan / Liangshan / Aba / Ganzi	September 2025
L1-L4	Local teachers	20/16/4/7	Liangshan / Aba/Aba / Ganzi	September 2025
S1-S6	Students	Grades 4/4/5/5/6/6	Liangshan / Liangshan / Aba /Aba / Ganzi/Ganzi	September 2025
A1-A2	School administrators	/	Liangshan / Aba	September 2025

word. Participants are presented by numbers to ensure anonymity.

■ 2.5.5. Thematic Analysis Steps

Adopt Braun and Clarke (2006) six-step thematic analysis method and refer to its 2021 reflective framework (Braun & Clarke, 2021). The reason for choosing the topic analysis is its theoretical flexibility, which is suitable for the dual needs of "theoretical framework + field discovery" of this study. The confidence guarantee measures include: double-blind coding, member inspection (Birt *et al.*, 2016), the qualitative research credibility standard with reference to Lincoln and Guba (1985) and the evaluation method of Patton (2015).

■ 3. LEARN FROM THE EXPERIENCE OF SUCCESSFUL CASES IN DEVELOPED REGIONS

■ 3.1. Case Selection Criteria

Based on regional comparability, this study selected Shandong Bozi Primary School and Yunnan Shalang School as instrumental cases (Stake, 2013). Shandong represents the cultural context of the Han nationality in economically developed areas, and Yunnan represents the context of underdeveloped areas inhabited by many ethnic groups. The two correspond to the two strategic directions that Sichuan may adopt. The comparison of the key dimensions of the three places is shown in Table 2.

■ 3.2 Case I: Bozi Primary School, Gudi Street, Shandong Province

The success of Bozi Primary School lies in transforming Qilu culture into a field of "environmental education". Through the "Analects of Confucius Corridor" and other cultural landscapes and daily Chinese studies recitation,

the school has broken the boredom of traditional cultural textual teaching, so that students can find cultural roots in immersion, and realize the resonance of cultural scenes and teaching behaviors.

■ 3.3. Case 2: Shalang Ethnic Experimental School, Wuhua District, Yunnan Province

Shalang Ethnic Experimental School has adopted the dynamic "Rural Youth Palace" model. In the face of the shortage of teachers, the school introduced non-genetic inheritors to open tie-dyeing, embroidery and other clubs. Li (2021) emphasized that the rural youth palace must break through the dilemma of "emphasis on construction and light operation" and move towards normalized endoc development. By giving students, the right to choose courses independently, Shalang School has transformed the Youth Palace into an informal learning platform for exploratory growth.

■ 3.4. Experience Extraction and Migration Mechanism

The experience of the two places is static and dynamic, providing a multi-dimensional reference for Sichuan, see Table 3.

However, drawing on it is by no means "take-in principle". Ahmed and Saadat (2025) emphasize that cultural competencies are indispensable. Experience migration needs to be distinguished into three levels: what can be directly transferred is the concept of cultural field construction; what needs to be adaptively transformed is the youth palace model - Sichuan teachers are more scarce and must be combined with scientific and technological means to make up for the shortage of manpower; what cannot be migrated is the operation mode that relies on sufficient teachers - Sichuan must introduce emerging technology as a new variable.

Table 2: Comparison of key dimensions of Shandong, Yunnan and Sichuan

Contrast dimensions	Shandong (Bozi Primary School)	Yunnan (Shalang School)	Sichuan (Target Area)
Economic development level	Developed	Medium	Underdeveloped
Ethnic composition	Mainly Han (Qilu culture)	Multi-ethnic settlement	Multi-ethnic settlement (Yi, Qiang, Tibetan, etc.)
Educational infrastructure	Sufficient	Medium	Hardware meets standards but usage rate is low
Faculty strength	Relatively sufficient	Shortage but introduction of external intelligence	Severe shortage
Reference paths	Static cultural immersion	Dynamic practical exploration	It is necessary to balance both + technological empowerment

Table 3: Comparison and extraction of successful educational cases

Comparison Dimension	Shandong Bozi Primary School (Qilu Culture)	Yunnan Shalang Ethnic Experimental School (Multi-Ethnic)	Enlightenment to Remote Ethnic Minority Areas in Sichuan
Cultural carrier	Static environment infiltration: construction of explicit fields with architecture and daily etiquette	Dynamic practice exploration: relying on the youth palace to experience national skills	Taking into account "stillness and movement": spatial dominant expression and non-genetic dynamic inheritance are as important
Operation mechanism	Top-down system influence: school-led, teachers' daily penetration	Bottom-up resource integration: introduce external intelligence, students choose courses independently	Mechanism innovation: break through the bottleneck of teachers, integrate local and foreign aid forces
Core Logic	Finding Roots: Keep the Roots of Culture and Cultivate Identity	Breaking the Circle: Give Courage to Explore and Rebuild Self-Confidence	Finding Roots and Breaking the Circle are as important: The logical starting point of Sichuan Model "Science and Technology Empowerment, Cultural Rooting"

■ 4. SURVEY ON THE CURRENT SITUATION OF EDUCATION IN REMOTE ETHNIC MINORITY AREAS IN SICHUAN

■ 4.1. Survey Overview

In June 2024, this study carried out field research in Liangshan Prefecture, Aba Prefecture and Ganzi Prefecture, Sichuan Province. A total of 6 primary and secondary schools in remote ethnic areas were visited, with 16 research subjects (see Table 1 for details). The China Internet Development Foundation launched the "Network Excellent Education" project in 2023 (China Internet Development Foundation, 2023); Sichuan Education Media reported in 2024 that the use effect of the "last kilometer" of education digitalization in ethnic areas in Sichuan Province is still not optimistic (Sichuan Education Media, 2024).

■ 4.2. The Separation between Hardware Advance and Thinking Lag

With the advancement of education digitalization, interactive whiteboards and networks have become the standard for schools in mountainous areas. However, the hardware in place has not brought about an ecological leap. Li Guilin, a national model of teaching and educating people, pointed out when talking about the changes of Liangshan's "Cloud Primary School": "In the past, Erping Primary School was needed, but now, the historical period of Erping Primary School has passed, and the thinking has to keep pace with the times."

"There is an electronic whiteboard, but many old teachers who have been teaching for a long time are still used to turning it off and using chalk, because they don't know how to combine it with the text content." - Teaching support teacher T1, September 2025 interview.

The physical existence of equipment has not automatically transformed into the transformation of teaching practice. Teachers lack the methodological support of deeply integrating technology and teaching content, which is the concrete manifestation of the "use gap".

■ 4.3. Lack of Curriculum Localization and Lack of Cultural Resonance

When catching up with the curriculum wave in developed areas, remote areas often ignore cultural and soil differences, resulting in "water and soil resistance". The voices of Liangshan students in the survey were particularly stinging: "Although there is a big screen in the classroom, the stories in it are too far away from us. We want to know how to use these techniques to tell our own torch festival well."

"The examples on the screen are all in the city. We don't have subways or shopping malls here at all. We don't understand them." - Student S1, September 2025 Interview

"The teaching materials are unified, but the students' life experience and environment are completely different. If they don't do localization, students are listening to the book of heaven." - Teaching teacher T2, September 2025 Interview

Liangshan State's "Non-heritage Teaching Cultivation Program" (Liangshan Daily, 2023) has begun to try to integrate non-heritage projects into the school-based curriculum, but it is still in its infancy.

■ 4.4. Lack of Professional Skills and Integration Ability of Teachers

The difficulty of curriculum innovation is rooted in the lag of teachers. The Survey and Research on the Teaching

Ability of Rural Teachers in Ethnic Areas in Sichuan pointed out: "There is a serious lack of knowledge of teachers' local ethnic culture in the teaching ability of rural teachers in ethnic areas... The training is not very targeted, and it is difficult to effectively integrate emerging technologies with local culture." (Journal of Xichang College, 2021, p. 45) Santos and Santos (2026) also show that a single teacher strategy and unclear goals will seriously restrict the actual effectiveness of educational technology.

"I also want to teach children the history of Qiang embroidery, but I don't know much about it myself, and I don't dare to teach children." - Local teacher L2, September 2025 Interview

What teachers lack is not the will, but the operation path of "how to do it". Wang (2022)'s study on the multicultural ability of ethnic education teachers also pointed out that teachers generally lack systematic multicultural education and training.

■ 4.5. Target alienation and the Dilemma of "Innovating for Innovation"

Lack of systematic goal command, the above-mentioned shortcomings lead to target alienation. Many school curriculum reforms have fallen into the strange circle of "innovation for innovation": introducing technology does not change the teaching method, and adding courses does not dig deep into culture, resulting in a "two-layer skin" of technology and culture. As a result, remote students not only fail to realise their competitiveness, but also accelerate the loss of cultural identity, falling into the double dilemma of "not being able to walk out of the mountains and not being able to return to their hometown".

"The above requires innovation and also provides us with a lot of new equipment. We will start a new course, but

no one can say what goal to achieve." - School Manager A1, September 2025 Interview

This phenomenon is highly consistent with the description of "formal adoption" in Rogers (2003) theory of innovation diffusion - when innovative adoption is mainly driven by external pressure rather than internal demand, it is difficult to undergo deep restructuring at the practical level.

■ 4.6. Theme Coding Results

Based on the six-step thematic analysis method of Braun and Clarke (2006), three core themes are distilled, as shown in Table 4.

■ 5. CONSTRUCTING AN EDUCATIONAL MODEL BASED ON THE INTEGRATION OF TRADITIONAL CULTURE AND EMERGING TECHNOLOGY

■ 5.1. Model Construction

In response to the real dilemma of "hardware ahead and lagging thinking, curriculum suspension and cultural aphasia" in remote ethnic minority areas in Sichuan, this chapter builds a deep integration model of "traditional culture + emerging science and technology", which consists of four core components: cultural dimension, science and technology dimension, teacher dimension and student dimension to form a closed-loop system that supports each other, see Figure 1 and Table 5. The model emphasizes that technology can become a medium for telling local stories and reshaping cultural self-confidence under the logic of experiential learning.

■ 5.2. Cultural Dimension

To solve the pain points of the lack of curriculum localization, we must take the traditional culture of ethnic minorities as the logical starting point of education. This

Table 4: Field research topic coding results

Theme	Sub-theme	Typical Introduction Excerpt
Cultural Deficiencies	Curriculum culture and distance	"The story told is too far from us" (S1)
Traditional culture is missing	Teachers lack sufficient knowledge of traditional culture	"I don't know much myself either" (L2)
Technology is suspended	The equipment is used in shallow layering	"Or do I still prefer to turn it off with chalk?" (T1)
Technology is suspended	Training is disconnected from practice	"Come back but still don't know how to use it" (L1)
Target alienation	Innovating for the sake of innovation	Large screens are used to cope with inspections" (L3)
Target alienation	Unclear goals	"No one can say for sure" (A1)

The three themes - "cultural deficiency", "technology suspension" and "target alienation" - are interrelated and progressive, which together constitute the structural dilemma of the digitalization of education in remote ethnic minority areas in Sichuan.

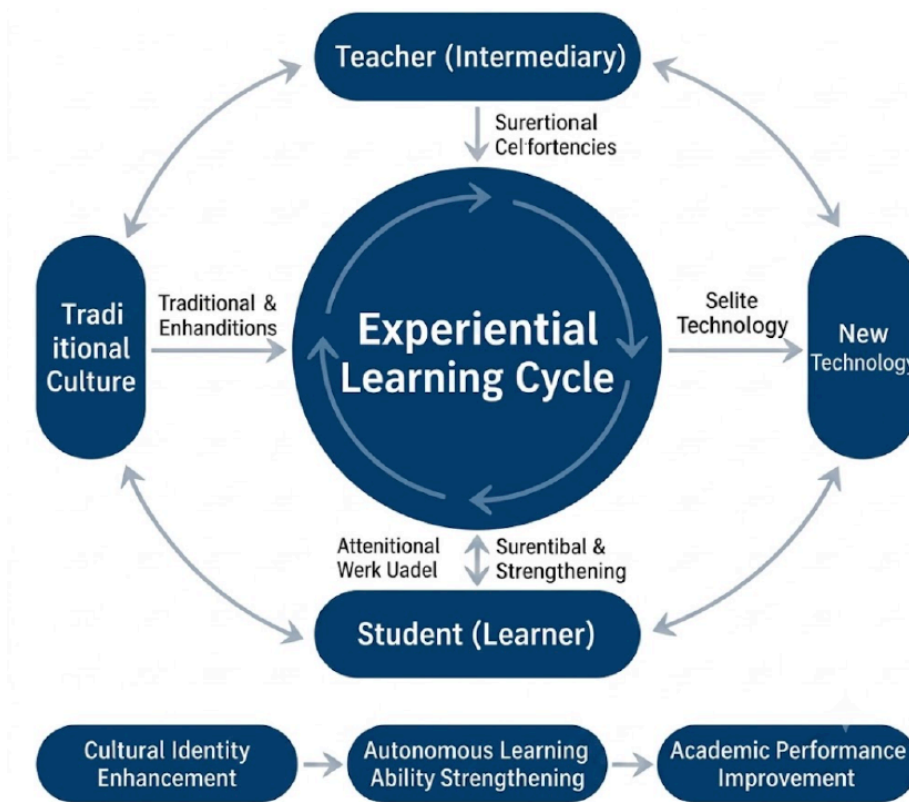


Figure 1: Conceptual framework of the integrated education model of traditional culture and emerging technology.

Table 5: Integrated education model of "traditional culture and emerging technology" in remote ethnic minority areas in Sichuan

Model dimension	Core goal	Specific implementation mechanism	Expected effectiveness
Cultural dimension	Cultural root search	Excavate local intangible cultural heritage and national epics, build a local digital curriculum library	Awaken cultural inner consciousness, and break the curriculum "water and soil resistance"
Scientific and technological dimension	Experience breaking the circle	Use VR/AR to create immersive situations, use AI to assist in independent exploration	Make up for the shortage of physical resources, and realize physical cognition
Teacher dimension	Ability reshaping	Introducing "double-teacher classroom" to reconstruct teacher training (reintegration and reflection)	Breaking through the bottleneck of teacher quantity and quality
Student dimension	Self-regulation	Cultivating goal setting and self-monitoring ability in the digital environment	From passive acceptance to active construction

model advocates the transformation of local cultural symbols such as the Yi Torch Festival and Qiang embroidery into the core materials of digital courses. Ahmed and Saadat (2025) emphasize that cultural competency is indispensable; Vygotsky (1978)'s socio-cultural theory reveals that cognitive development is rooted in the socio-cultural context, and the cultural dimension is the "faf" of the whole educational process. As Wenya (2025) embodied in the practice of "dual-track education" - let tradition and contemporary dialogue in the classroom, instead of cutting off from each other.

5.3. Teachers and Scientific and Technological Dimensions

Facing the shortcomings of teachers' lack of local cultural knowledge and insufficient integration ability, this model puts forward a dual-track path of "technical substitution + strategic upgrading". On the one hand, the "two-teacher classroom" model is introduced, and the knowledge is taught by remote non-genetic inheritors, and local teachers turn to learning guidance and emotional companionship. The empirical analysis of Sun *et al.*

(2025) shows that the cooperation between remote teachers and local teachers can optimize the teaching effect; Xu *et al.* (2025) further explores the model of AI-enabled dual-teacher classroom. On the other hand, use VR/AR to transform abstract national culture into interactive virtual scenes. Zhao *et al.* (2025) showed that VR has a significant advantage in cultural heritage education; Wu *et al.* (2025) applied VR to the cultural learning of Amei aborigines and found that immersive experience significantly improved the sense of cultural identity; Aguilar and Tafousse (2026) argued that VR technology can effectively support all stages of the Kolb experiential learning cycle. Sichuan Province's "Sichuan Cloud Education" platform has begun to explore the normal operation of dual-teacher classrooms (Sichuan Daily, 2022).

However, the introduction of technology must be accompanied by changes in the way of learning. Nicolas and Santos (2026) clearly pointed out that the success of e-learning depends more on students' "self-regulating learning ability". This model requires teachers to change from "knowledge transmitter" to "learning guide", set open tasks such as "reconstructing a Qiang epic with digital tools", and guide students to complete active construction in the integration of technology and culture.

■ 5.4. Implementation Path

■ 5.4.1. Curriculum Development Strategy

It is necessary to establish a resource library of "local culture + digital tools" so that students can see their lives on the big screen. The resource library is jointly built by ethnic culture experts, non-genetic inheritors and front-line teachers of colleges and universities to ensure cultural accuracy and teaching applicability. Liangshan Prefecture's "Non-heritage Teaching Cultivation Plan" (Liangshan Daily, 2023) can be used as a pilot.

■ 5.4.2. Teacher Training Mechanism

It needs to change from "equipment operation training" to "technical and cultural integration capability training". Referring to Desimone (2009) Five Characteristics Framework for Teacher Professional Development, the training cycle is not less than one semester, covering three modules of cultural literacy, technical tools and curriculum design, which are jointly taught by college experts, teaching and research staff and non-genetic inheritors. The "Sichuan Cloud Education" platform (Sichuan Daily, 2022) can be used as a carrier for training and implementation.

■ 5.4.3. Evaluation System Reform

The sense of cultural identity and independent exploration ability should be included in the assessment, and diversified evaluation tools such as the cultural identity scale, the learning participation observation table, and the digital learning portfolio should be introduced to seek a balance between the standardized examination and the goal of the local curriculum.

■ 5.4.4. Potential Challenges and Responses

The main challenges include: insufficient funds (seeking for provincial special funds and social donations), teacher resistance (peer demonstration and gradual introduction), parents' incomprehension (parent-teacher meeting and achievement display), technical maintenance difficulties (establishing remote technical support with colleges and universities or enterprises).

■ 5.4.5. Resource Demand and Long-Term Sustainability

Long-term sustainability depends on three conditions: institutional guarantee - integrating curriculum localization into local policies and assessment systems; local curriculum development capacity cultivation - from relying on external experts to cultivating local teachers' independent development ability; self-iteration improvement closed loop - establishing a continuous optimization mechanism for courses based on classroom practice feedback.

■ 5.5. Model Verification

This study designs a three-stage verification scheme. The first stage is expert evaluation: invite 3–5 experts in the fields of educational technology, ethnic education, curriculum and teaching theory, and use the Delphi method (Hasson *et al.*, 2000; Linstone & Turoff, 2002) to conduct multiple rounds of evaluation and revision of the model. The second stage is for stakeholder feedback: present the revised model to the teachers and managers involved in the research, and use the member inspection technique (Birt *et al.*, 2016) to collect feedback. The third stage is a pilot implementation plan: select 1-2 schools in remote ethnic areas in Sichuan to conduct small-scale experiments. The evaluation indicators include changes in students' cultural identity, the improvement of classroom participation, and the development of teachers' integration ability. It should be noted that the first and second stages of verification have been preliminarily completed, and the third stage is still under planning. This shortcoming will be explained as a research limitation in Section 7.3.

6. DISCUSSION

6.1. Comparison with Existing Research

In terms of cultural dimension, Gay (2018)'s cultural response teaching theory emphasizes the cultural background of students as a teaching resource. This study further places cultural response in the context of digital education, and puts forward that "the cultural dimension is not only a teaching resource, but also a prerequisite for technological empowerment". Cheng *et al.* (2021) found that technology can provide a new path for cultural response teaching, but the premise is that teachers have a methodological awareness of cultural integration, which is consistent with the discovery of the dimension of teachers in this study. Guo and Wan (2022) found that the differences between urban and rural online learning are related to family cultural capital and self-regulation ability, which is mutually confirmed with the view that emphasizes self-regulation learning in the student dimension of this study. The assessment of the urban-rural gap of the national smart education platform by Lyu *et al.* (2026) further supports the necessity of curriculum localization. Compared with the cultural competency framework of Ahmed and Saadat (2025), the promotion of this model is to increase the systematic integration of scientific and technological empowerment and the dimension of teachers, and answer the practical proposition of "how to achieve cultural competency cultivation under the condition of severe shortage of teachers".

6.2. Novelty of the Model

The novelty of this model is reflected in three levels. First, the difference from the simple technology empowerment model: technology is positioned as the "medium of cultural expression" rather than the purpose itself, and pursues the "transformation" function distinguished by Kirkwood and Price (2014). Second, the difference from the simple cultural inheritance model: emphasizing the dynamic reconstruction of culture in experiential learning, students do not passively "accept" culture, but actively "experience" and "restructure" culture in immersive situations. Third, the two-way integration of "culture + technology": culture provides a meaningful anchor for technology, and technology provides an expression carrier for culture. The breakthrough of the paradigm of "rooting and reconstructing" path relative to "photo relationism" is that it "grows" an educational model suitable for itself from the local cultural soil, instead of "transplanting" the external model to the local area.

6.3. Practical Significance

For policymakers: special policies should be formulated to support the localization of courses in ethnic areas, set up a traditional cultural digital curriculum development fund, and avoid measuring the effectiveness of educational digitalization by shallow indicators such as "equipment coverage". For school administrators: we should coordinate the resources inside and outside the school, establish a normalized operation mechanism for the double-teacher classroom, and provide teachers with an institutional space for curriculum localization exploration. For front-line teachers: it is necessary to change from "knowledge transmitter" to "learning guide" and develop the dual ability of cultural integration and technology application in peer collaboration. For students: Build self-confidence in cultural identity, broaden horizons in technological empowerment, and realize the dual goals of "getting out of the mountains" and "remembering homesickness". Zhang *et al.* (2024) pointed out that the core of inclusive education is to allow each student to obtain fair development opportunities and maintain cultural uniqueness, which is highly consistent with the practice of this study.

7. CONCLUSION AND PROSPECTS

7.1. Research Summary

Based on the actual dilemma of the digitalization of education in remote ethnic minority areas in Sichuan, this study reveals the deep rift between "hardware ahead and thinking lag" and "technology introduction and cultural aphasia". Through qualitative research and cross-regional case comparison, this article confirms that simple device access cannot cross the real "digital use gap". The key to solving this dilemma is to build a deep integration model of "traditional culture + emerging technology". The model takes cultural competency as the anchor point and self-regulation learning as the internal driving force. It makes up for the shortage of teachers through immersive technology and dual-teacher classes. It aims to make technology no longer a suspended shell, but awaken students' cultural inner consciousness and give them a bridge to modern society.

7.2. Author's Contribution

The core contribution of this study is to break the myth of "technology-only theory" and "causationism" in education reform in remote areas. Theoretically, re-placing the cultural dimension in the center of digital education expands the explanation framework of technology-

enabled rural education; integrating cultural competency and self-adjusting learning into a new analytical framework, Vygotsky's social and cultural theory (1978) provides a classic foundation for this framework. In practice, it provides a set of operable "rooting and reconstruction" paths for Sichuan and similar ethnic minority areas - that is, to realize the modernization of education under the premise of protecting the local cultural roots, so that students not only have the modern literacy of "going out of the mountains", but also retain the cultural consciousness of "remembering homesickness".

7.3. Research Limitations and Prospects

It is undeniable that this study has certain limitations. First of all, the research mainly adopts qualitative analysis methods. Although the structural causes are revealed through in-depth interviews and case analysis, they lack the support of large-scale quantitative data, and the effectiveness of the constructed model has not been strictly empirically tested. Secondly, the research sample is concentrated in specific ethnic minority areas in Sichuan, and the cross-regional universality of the model is still to be investigated. Third, the third phase of the pilot implementation of the model has not been completed. Although it has been preliminarily verified through expert

evaluation and stakeholder feedback, the actual intervention effect still needs to be confirmed through quantitative data after the pilot implementation.

Future research should introduce hybrid research design on this basis (Creswell & Plano Clark, 2017) to quantitatively evaluate the actual intervention effect of the "traditional culture + emerging technology" model through control group experiments and scale evaluation. At the same time, how to integrate generative AI into the adaptive generation of localized courses in ethnic areas will also be a very potential exploration direction. Secretariat, U. The global action plan of the "International Decade of Indigenous Languages" launched by N (2022) provides policy support at the international organization level for the protection of language and culture in ethnic areas. Future research can explore the policy path of deep integration of technology and cultural protection under this framework. Only by continuing to cultivate at the intersection of technology and humanities can education in remote ethnic areas truly realize the sustainable leap from "blood transfusion" to "blood production".

7.4. Conflicts of Interest

The author declared no conflicts of interest.

APPENDIX A: THE DIRECTION OF THE CORE ISSUES OF THE SEMI-STRUCTURED INTERVIEW OUTLINE

Interview outline of teaching support teachers

1. Please talk about your actual feelings and difficulties in teaching with digital equipment.
2. How well do you know about the cultural background of local students? Do these cultural elements appear in the classroom?
3. Have you ever tried to integrate local cultural content into digital teaching? What are the experiences and obstacles?
4. What do you think of the "double-teacher classroom" model? Is it feasible in the local area?

Outline of interview with local teachers

1. What is the actual gain after participating in the digital teaching training? Is the training content practical in daily teaching?
2. How much do you have knowledge of local national culture? Is it involved in the training?
3. Are you willing to integrate emerging technologies and local cultures into the classroom? What are the main obstacles?
4. Are you clear about the goal of the school's current curriculum innovation?

Student Interview Outline

1. How do you usually use the big screen or computer in class? Do you like to use these devices in class?

2. Does the content in class have anything to do with your life? Is there any class that makes you feel particularly intimate or unfamiliar?
3. Would you be interested if you could see your own festivals and handicrafts on the big screen?
4. Have you used your computer or tablet to learn anything?

Outline of interview with school administrators

1. What is the main goal of schools to promote the digitalization of education? How to be sure?
2. What is the biggest difficulty in promoting curriculum innovation?
3. Has the school tried to integrate local ethnic culture into the curriculum? How is the effect?
4. What do you think about the educational model of integrating "traditional culture + emerging technology"? What kind of support do you need?

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