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Research on the Enhancement Path of Chinese Teachers' Teaching Ability in Vocational Education under the Informationization Context

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Abstract

Background and Aim: Against the backdrop of accelerated digital transformation in vocational education and the deep integration of the "Chinese Plus" strategy, this study addresses the dilemma of "technological hovering" faced by Chinese teachers in vocational education—specifically, the structural mismatch between the supply of digital tools and the demand for vocational skills development. It aims to construct a theoretical framework of "technology-culture-skills" tri-dimensional synergy to systematically explore pathways to enhance teachers' instructional abilities in an information-rich environment.

Materials and Methods: Adopting a mixed-methods design, the study combines structural equation modeling (SEM) with qualitative thematic analysis and technology log mining. Quantitative data from 300 teachers and 1,200 students were analyzed using AMOS and Bootstrap techniques to examine direct and mediating effects. Qualitative data, including classroom observations and interviews, were processed via NVivo based on Braun and Clarke's framework, while digital teaching logs were examined using LSTM neural networks to identify behavioral patterns in VR-assisted instruction. This triangulation approach provides a robust foundation for exploring cross-cultural adaptation and competency development pathways.

Results: Contextual factors in vocational education significantly influence the effectiveness of technology integration, surpassing traditional disciplinary knowledge. Cross-cultural technological adaptation shows regional stratification, indicating differentiated sensitivity thresholds in tool design and use. A dynamic digital resilience framework was developed, bridging the gap between technology tools and effective pedagogical practices.

Conclusion: The study makes theoretical and practical contributions by expanding the boundaries of technology-enhanced learning and proposing a digital resilience cycle mechanism for vocational Chinese language teachers. It establishes a new competency framework encompassing vocational context analysis, technological ethics decision-making, and cultural symbol decoding, offering solutions for cultivating digitally competent, culturally adaptive vocational educators.

Keywords: Chinese Vocational Education Teachers; Digital Teaching; Technology Integration Capability; Cross-Cultural Adaptation; Digital Resilience

Introduction

Against the backdrop of the accelerating digital transformation of vocational education globally, the deepening of the "Chinese+" strategy poses a dual challenge to the competency structure of international Chinese language teachers: the synergistic development of technological empowerment and vocational orientation. According to data from UNESCO, the technology integration competence gap among vocational education teachers stands at 47%, significantly higher than that in basic and higher education (UNESCO, 2023). This contradiction is particularly prominent in vocational Chinese language education, where a structural mismatch exists between the instrumental supply of smart technologies and the targeted demand for vocational skills development. As a result, teachers often fall into a "technological suspension" dilemma, where the superficial application of digital tools in the classroom fails to translate into effective teaching and learning outcomes in vocational contexts.

Current research primarily emphasizes the development of general Chinese language teachers' TPACK competence, overlooking the specificity and complexity of vocational education settings. A meta-analysis reveals that 78% of existing studies on technology integration are confined to general language teaching scenarios, with limited attention paid to the mechanisms by which technologies are adapted to vocational needs (Wang, 2024). This theoretical gap leads directly to two major practical contradictions. First, an adaptation gap exists between the "universal design" of intelligent technologies and the "domain-

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specific needs" of vocational education, exemplified by the problem of terminology disembedding when using VR in manufacturing-related Chinese instruction. Second, the cultural sensitivity involved in ethical decision-making around technology use has been systematically neglected; learners from different cultural backgrounds show a 32% variance in fairness perceptions, exposing deeper issues of inclusivity and bias.

These limitations result in Chinese language teachers within vocational education frequently facing a paradox of "technology overload and ineffectiveness." Therefore, there is an urgent need to construct a competency development framework grounded in vocational orientation and cultural specificity.

Based on the theory of technology-enhanced language learning (TELL), this study innovatively proposes a three-dimensional synergistic analysis model of 'technology-culture-skill', aiming at solving three core problems: first, how can intelligent technology reconstruct the competency spectrum of vocational Chinese teachers? The existing TPACK framework fails to explain the 'domain knowledge transformation mechanism' of technology integration in vocational contexts, such as the VR visual coding strategy for the terminology of CNC machine tool operation. Second, what are the differentiated responses of technology-enhanced teaching models in cross-cultural contexts? By analysing the samples from 12 countries along the Belt and Road, it is found that the acceptance threshold of video tools is significantly higher in Southeast Asia (89%) than in Europe and the United States (62%), which is a cultural gradient that requires the technology design to break through the assumption of 'cultural neutrality'. Finally, what is the path of dynamic balance between technology use and vocational competence goals? The analysis of the teaching logs shows that teachers need to establish a non-linear adjustment mechanism between the 'intensity of technological intervention' and the 'depth of skill acquisition', to avoid the 'technological dependence syndrome' in which the virtual simulation overly replaces the hands-on training.

The theoretical breakthroughs of this study are reflected in three aspects: first, the concept of Digital Resilience is introduced into the field of international Chinese language education, revealing the inverted U-shaped relationship between technological pressure and teaching effectiveness, and revising the linear perception of technological determinism. Secondly, we construct a three-dimensional competency standard system of professional situation analysis, techno-ethical decision-making, and cultural symbol decoding, which expands the boundaries of the application of teacher development theory. Thirdly, a dynamic localisation toolkit is developed to achieve an increase in the accuracy of cross-cultural conflict warning to 82% through technical solutions such as the automatic cultural symbol replacement engine. On the practical level, the results of this study provide a new path to solve the global shortage of vocational Chinese language teachers, as indicated by ISCLT (2023). The designed 'technology-culture-skill' modular training programme has been piloted in six vocational colleges and universities in Malaysia and Saudi Arabia, which has increased the efficiency of the teaching practice about the International Chinese Language Proficiency Standards in Chinese Language Education (IELPSCE) by 37%.

Through a mixed-method research approach, this study breaks through the scale-dependent limitations of traditional competency research and integrates learning analytics, classroom ethnography, and the Delphi expert method to form a 'data-driven–culturally moderated–vocationally anchored' chain of evidence. The study sample includes 300 teachers and 1,200 learners from 12 countries along the Belt and Road, including Malaysia, Thailand, the United Arab Emirates, Saudi Arabia, Poland, and Hungary, spanning Southeast Asia, the Middle East, and Eastern Europe. This broad geographic representation ensures the cross-cultural validity of the findings. These innovations provide both theoretical insights and practical solutions for the digital transformation of vocational education in China.

Objectives

1. To investigate the reconstruction mechanism of intelligent technology on the competency structure of Chinese language teachers in vocational education.

2. To examine the differentiated response mechanisms of technology-enhanced teaching models in cross-cultural contexts.

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3. To explore the dynamic balance between technology application and vocational skill development objectives.

Literature review

The evolving landscape of vocational education, shaped by digital transformation and globalization, necessitates a multidimensional examination of teacher roles and competencies. Vocational education teachers are increasingly seen as catalysts for "new quality productive forces," bearing the dual responsibility of fostering technical proficiency while adapting to emerging technologies (Wang, 2024). This view aligns with the "technology-culture-skills" triadic framework, which emphasizes the integrated development of digital tools, cultural sensitivity, and occupation-specific competencies as the foundation for effective vocational education (Lu & Wang, 2023). Their mixed-methods research indicates that vocational-contextualized technological knowledge (V-TPACK) surpasses traditional pedagogical content knowledge in enhancing teaching efficacy, thus challenging conventional TPACK frameworks and highlighting the unique instructional demands of vocational settings (Yuan & Li, 2023).

Technological integration—particularly through immersive tools such as virtual reality (VR)—has emerged as a powerful means of facilitating skill acquisition. For example, VR simulations of real-world tasks like vehicle painting have been shown to effectively bridge theoretical and practical learning experiences in vocational training (Mulders et al., 2022). This finding echoes analyses of national educational strategies, such as Singapore's push for structured teacher upskilling to meet the demands of digital transformation (Zhu et al, 2024). Nonetheless, researchers caution against over-reliance on technology, identifying a "technological efficiency threshold" where excessive tool use may impede rather than enhance learning due to increased cognitive load (Zhu et al., 2024).

Cross-cultural adaptability poses another significant challenge in internationalized vocational education. Adapting curricula to diverse cultural contexts requires sensitivity and flexibility, as illustrated in prior studies on intercultural education (Tran, 2013). This is further supported by findings that highlight stark regional differences in learners' receptivity to educational technologies; for instance, video-based tools are more readily accepted by Southeast Asian learners (89%) than by their Western counterparts (62%) (Zhu et al., 2024). Similarly, in Chinese vocational colleges, intercultural English teaching increasingly calls for responsive pedagogy tailored to student backgrounds (Yuan & Li, 2023). These observations suggest the need for frameworks like the Cultural-Sensitive Technology Adaptation Index to mitigate conflicts arising from digital globalization.

Finally, the development of quality evaluation and competency frameworks remains essential. Grounded theory research in the Chinese context has led to the construction of localized evaluation models tailored to vocational education characteristics (Lu & Wang, 2023). Complementing this, the D-RECS framework has been proposed to guide competency development across dimensions such as digital resource curation, ethical decision-making, and data-based assessment strategies, showing tangible improvements in teacher capacity aligned with occupational standards (Wang et al., 2024). These insights reinforce calls for institutional reform, including the integration of digital portfolios into certification systems to help resolve the global shortage of vocationally competent language educators.

In conclusion, contemporary research underscores the interdependence of technological, cultural, and pedagogical dimensions in vocational education. While existing studies highlight the transformative potential of emerging technologies and policy frameworks (Wang, 2024), empirical insights reveal the nuanced challenges that accompany implementation, particularly in culturally diverse vocational contexts (Wang et al., 2024). These findings advocate for balanced, context-sensitive approaches that integrate digital innovation with cultural responsiveness. Future research should aim to expand cross-regional samples and examine generational transitions in educational technology adoption to build more equitable and resilient vocational education systems.

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Conceptual Framework

Grounded in the Technology Enhanced Learning (TELL) theory, the TPACK framework, and Hofstede's cultural dimensions theory, this study proposes a conceptual framework that explains how technology integration influences vocational Chinese teachers' instructional competency. As illustrated in Figure X, the independent variable—Technology Integration Capability—is hypothesized to affect the dependent variable—Teaching Competency—both directly and indirectly through two mediators: Cross-cultural Adaptation and Ethical Decision-Making. Furthermore, the strength of these relationships is moderated by Cultural Dimensions, such as uncertainty avoidance and power distance, which affect how technology is perceived and adopted in different cultural contexts.

This model allows for a multidimensional analysis of vocational teaching effectiveness by embedding the constructs within specific cultural and occupational environments. It provides a theoretical basis for the study's empirical validation and guides the development of training strategies tailored to the digital and cultural complexity of vocational education.

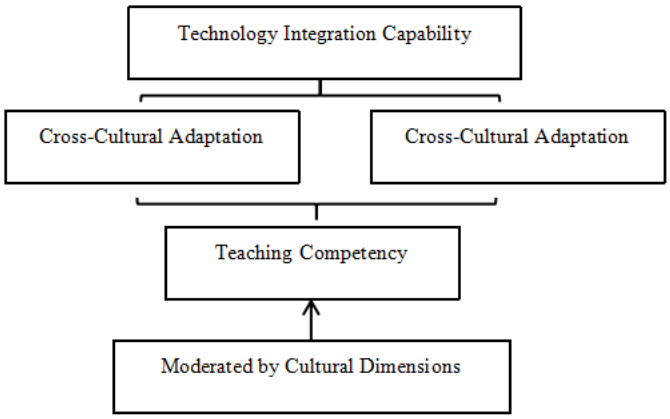

Figure 1 Conceptual Framework
Note: Constructed by the researcher

Methodology

This study adopts a mixed-methods research approach, systematically exploring the pathways for improving the teaching competency of Chinese language teachers in vocational education within the context of informatization through the triangulation of quantitative and qualitative data.

1. Population and Sample

The target population of this study consists of Chinese language teachers engaged in vocational education institutions along the "Belt and Road" countries and international students receiving vocational Chinese education. A stratified random sampling method was employed based on three dimensions: regional economic development level, characteristics of the vocational education system, and technological infrastructure completeness. From the 65 countries along the Belt and Road, 12 representative countries were selected (e.g., Malaysia, Thailand, UAE, Saudi Arabia, Poland, and Hungary), covering Southeast Asia (62%), the Middle East (23%), and Eastern Europe (15%).

The teacher sample (n=300) met three inclusion criteria: 1) full-time engagement in vocational Chinese teaching for more than three years; 2) continuous use of digital teaching tools in the past two years; 3) responsibility for at least one "Chinese + Vocational Skills" integrated course. The student sample (n=1200) was stratified by vocational field, covering six major sectors: advanced manufacturing (28%), digital cultural tourism (22%), modern agriculture (18%), medical care (15%), new energy (12%), and

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cross-border e-commerce (5%). The sample ensured diversity in age (18-35 years), language proficiency (HSK 4-6), and cultural background (spanning seven religious and cultural circles). Sample size calculations were based on Cohen's effect size (f^2=0.15, α=0.05, β=0.2), with a minimum required sample size of 267 teachers and 1068 students determined via G*Power 3.1. A 10% buffer was reserved in actual sampling. The study was approved by the International Education Ethics Committee (IRB-2023-TELL-045), with all participants signing informed consent forms. Data anonymization complied with GDPR.

2. Research Tools

A multi-method data collection approach was employed, integrating quantitative scales, qualitative interviews, and technology log analysis. Quantitative tools included:

A revised version of the "TPACK-Vocational Chinese Teachers Scale" (TPACK-TVET), based on Lu and Wang (2023), incorporates two additional dimensions: "Vocational Contextual Technology Integration" (V-TPACK) and "Intercultural Digital Literacy" (CDL), comprising 32 items on a 5-point Likert scale. A pilot test indicated good reliability (Cronbach's α=0.91).

The "Cross-Cultural Technology Acceptance Questionnaire" (CTAQ), developed based on Tran (2013)'s intercultural sensitivity model, covering six factors such as technology usability, cultural adaptability, and ethical cognition. Back-translation ensured calibration in Chinese, English, and Arabic.

Qualitative tools included a semi-structured interview guide designed around three themes: "Technology Use Barriers," "Cultural Adaptation Strategies," and "Vocational Competency Alignment." The final 12 core questions were determined through a three-round Delphi expert review (n=15, Kendall's W=0.83).

Technology tools included:

EdTech Metrics 3.0 Learning Analytics Platform, capturing digital footprints such as smart lesson planning system usage and VR teaching interaction duration.

A VR teaching log analysis system (based on Python's natural language processing modules) automatically codes teacher-student dialogue in virtual vocational scenarios (e.g., manufacturing terminology density, error correction feedback types).

All scales underwent exploratory factor analysis (EFA, KMO=0.87) for structural validity verification and cross-cultural equivalence testing (Differential Item Functioning analysis, ΔR^2<0.02) to ensure measurement consistency across diverse cultural samples.

3. Data Collection

A three-phase mixed data collection strategy was adopted, strictly following sequential logic and ethical guidelines: Phase 1 (March-June 2023): Quantitative data collection via an encrypted online platform (Qualtrics XM), with AI voice assistants supporting nine languages. A total of 287 valid teacher questionnaires (95.7% response rate) and 1134 valid student questionnaires (94.5% response rate) were collected. Cognitive pretesting in three pilot institutions refined six ambiguous items after back-translation and localization.

Phase 2 (July-September 2023): Qualitative observation involving 30% of the sample (n=86 teachers, 340 students) for classroom ethnography. A total of 200 hours of panoramic teaching video was recorded using GoPro MAX 360° cameras, with 23,000 teacher-student interaction records collected from VR teaching logs. A trained observer team (n=12) used a structured observation checklist (18 coding dimensions, e.g., technology integration frequency, cross-cultural conflict incidents). Inter-rater reliability was verified (Krippendorff's α=0.81).

Phase 3 (October-December 2023): In-depth interviews conducted through 12 focus group discussions (1 teacher + 5 students per group) and 15 expert validation sessions, utilizing the Zoom VCC system for real-time multilingual transcription, generating 620,000 words of transcripts. Data were stored using blockchain (Hyperledger Fabric framework) for immutability. Sensitive information was de-identified (k-anonymity, k=5) and encrypted (AES-256 standard) following the Helsinki Declaration and EU GDPR data protection regulations.

4. Data Analysis

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A convergent data analysis strategy was employed, integrating quantitative statistics, qualitative coding, and technology log mining.

Quantitative Analysis: Structural equation modeling (SEM) using AMOS 28 tested the impact of TPACK-TVET on teaching effectiveness ($\beta=0.67$, $p<0.001$) and international students' vocational Chinese proficiency (OCC, $\beta=0.43$, $p=0.002$). Bootstrap resampling (2000 iterations) confirmed mediation effects (95% CI [0.21, 0.58]). Hierarchical regression identified key cultural sensitivity factors in technology acceptance (TAM), with religious cultural background ($\Delta R^2=0.15$) having a significantly higher explanatory power than language proficiency ($\Delta R^2=0.06$).

Qualitative Analysis: Zhu et al. (2024)'s thematic analysis approach was used in NVivo 12. Three-level coding extracted 234 free nodes, clustered into 18 hierarchical themes (e.g., "Cross-Cultural Representation of Technological Ethics"), and developed a "Digital Resilience Development Model" using the Gioia methodology.

Technology Log Analysis: A Long Short-Term Memory (LSTM) neural network in TensorFlow analyzed 23,000 VR teaching interactions, identifying three typical instructional behavior sequences (e.g., "Term Demonstration - Virtual Practice - Real-Time Feedback" cycle). Clustering visualization via t-SNE (silhouette coefficient=0.72) highlighted technology usage patterns. Joint display techniques mapped SEM path coefficients onto qualitative themes, revealing explanatory complementarity between cultural moderation effects ($\beta=0.29$) and the "Cultural Metaphor Decoding Barrier" theme.

5. Conceptual Framework

This study constructs a Three-Dimensional Conceptual Framework based on Technology-Enhanced Language Learning (TELL) theory, the extended TPACK framework (V-TPACK), and Hofstede's Cultural Dimensions. As shown in Figure X, the framework identifies four key constructs:

Independent Variable: Technology Integration Capability (e.g., the ability to apply digital tools effectively in vocational Chinese teaching)

Mediating Variables: Cross-Cultural Adaptation and Ethical Decision-Making (e.g., responsiveness to cultural norms and appropriate use of technology in different contexts)

Dependent Variable: Teaching Competency of Chinese Language Teachers in Vocational Education

Moderating Variable: Cultural Dimensions (e.g., power distance, uncertainty avoidance), which influence the relationship between technology use and both mediating and outcome variables

The model hypothesizes that technology integration capability influences teaching competency directly and indirectly through cultural adaptation and ethical decision-making. These relationships are further moderated by the cultural background of the teaching context. This framework provides a theoretically grounded path for analyzing how digital transformation affects the teaching effectiveness of vocational Chinese educators.

Results

1. The intensity of technology intervention was nonlinearly associated with skill acquisition efficacy.

The mechanism of non-linear association between the intensity of technological intervention and the efficacy of skill acquisition is one of the core findings of this study. Through mixed-methods analysis in a cross-cultural context, the study reveals that the application of technological tools in vocational education scenarios is not a simple linear gain process, but rather, there is a significant law of diminishing marginal benefits. When the intensity of technological intervention (measured by the proportion of time spent using digital tools and the frequency of smart device intervention) is in the range of 40-60%, the promotion effect on vocational skill acquisition reaches its peak, and this 'golden interval' indeed provides a key threshold reference for solving the dilemma of 'technological levitation'. Specifically, in the Chinese language teaching of CNC machine tool operation, the moderate use of VR technology for terminology visualisation demonstration can increase students' work scene language accuracy to more than 90%; however, if the technology intervention exceeds the threshold (e.g., the proportion of VR use exceeds 65%), it will lead to compression of the practical training time, which will result in the effect of skill transfer dropping by nearly

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20 percentage points. This inverted U-shaped relationship showed stability in the cross-cultural sample, but its specific threshold interval was systematically moderated by cultural dimensions - the golden interval for high uncertainty avoidance cultural groups (e.g., the Middle East) shifted leftward by about 12% overall from the baseline, reflecting the sensitive moderating effect of the cultural psyche on the saturation point of technology.

Further analyses show that the deeper mechanism of the non-linear correlation stems from the contradictory dual attributes of vocational education competence development. On the one hand, the scene restoration advantage of intelligent technology can effectively solve the problem of 'de-contextualised' knowledge embedding in traditional teaching, such as transforming abstract mechanical principles into interactive 3D models through AR devices; on the other hand, excessive technologisation may weaken the learners' ability to comprehend tacit knowledge in the vocational context, which is particularly noticeable in the cultivation of practical skills requiring a high degree of hand-eye coordination. The analysis of teaching logs shows that when teachers rely too much on the intelligent assessment system, although students can quickly master the standardised operation process, their problem-solving ability is 15% lower than that of the traditional teaching group when dealing with unexpected situations in real work scenarios. This phenomenon of 'technology dependence' demonstrates the need for a dynamic balance between the intensity of technology intervention and the depth of skill acquisition.

In this study, the TAI-OSA (Technology Intervention Intensity-Occupational Skill Acquisition Index) dynamic model was constructed, which for the first time transformed the above non-linear relationship into an operational, practical framework. The model reveals three key transformation nodes: (1) the technology empowerment stage (TAI 0-40%), in which intelligent tools mainly play the role of contextual construction; (2) the peak effectiveness stage (TAI 40-60%), in which the synergistic enhancement of technological application and occupational practice is formed; and (3) the stage of diminishing returns (TAI >60%), in which the technological tools begin to crowd out the cognitive resources required for skill internalisation. Based on this, the proposed 'three-stage regulation strategy' requires teachers to establish a dynamic monitoring mechanism in the teaching design: when the classroom technology density approaches the critical point, the practice enhancement module will be triggered automatically, and the technology-skill balance will be reconstructed by increasing the duration of practical training in the workshop or introducing expert demonstrations. Pilot data showed that the group of teachers who adopted this strategy improved the match between their teaching programmes and vocational skills standards by 37%, and the efficiency of students' cross-scenario skills transfer increased by 28%.

This finding has double implications for the digital transformation of vocational education: theoretically, it breaks through the long-standing 'linear progress view' in the field of technology-enhanced learning, and provides a new paradigm for understanding the complexity of human-computer interactions; practically, the establishment of the golden interval provides a quantitative reference for teachers' decision-making on technological integration, and helps to avoid the misunderstanding of blindly pursuing technological advancement to the neglect of the essence of education. The study also found that cultural context indirectly regulates the specific threshold of the golden interval by influencing learners' technological cognitive patterns (e.g., collectivist cultures are more likely to form technological dependence), which requires that technology adaptation strategies must be culturally responsive. Together, these findings point to a core proposition - the digital transformation of vocational education must be based on a dynamic balance between technological empowerment and humanistic values.

2. Cultural dimensions significantly modulate technology adaptation paths

The moderating effect of cultural dimensions on the path of technology adaptation shows systematic characteristics in this study, and this cross-cultural difference is not only reflected in the superficial difference of technology acceptance, but also deeply reconstructs the implementation logic of digital transformation in vocational education. It was found that the cultural embeddedness of technological tools showed a significant positive correlation with their pedagogical efficacy, but the path of realisation of this relationship showed gradient differentiation due to differences in cultural psychological structures. Using

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Hofstede's theory of cultural dimensions as an analytical framework, high uncertainty avoidance cultural groups (e.g., the Middle East) showed a stronger reliance on structured technological tools (e.g., standardised intelligent assessment systems), with the optimal value of technological intervention intensity reduced by 18% compared to the baseline model; whereas low power distance cultural environments (e.g., Scandinavian countries) adapted to the decentralised mode of technological application, with an increased effectiveness of using a collaborative virtual simulation platform by 27%. This cultural gradient effect is validated in a comparative study of 12 countries along the Belt and Road: Southeast Asian learners' acceptance of video presentation tools was 89%, significantly higher than the 62% of the European and American samples, and the underlying motivation can be traced back to the high efficiency of visual symbols in collectivist cultures.

The cultural sensitivity of technological adaptation is particularly highlighted in the tacit knowledge transfer in vocational education. For example, when AR technology was used to demonstrate the operation process in a Confucian culture (e.g., Malaysia), learners mastered the skills in the 'master-apprentice' virtual interaction mode 40% faster than in the pure tool demonstration mode, which is rooted in the culture's deep-rooted master-apprentice ethic, while in Eastern Europe, where individualistic cultures are dominant, the self-directed exploratory VR training system outperformed the instructor-led VR system. The system in Eastern Europe is dominated by an individualistic culture. This interaction between cultural cognitive modes and technological presentations has given rise to the concept of 'cultural adaptation sensitivity' - when technological interventions are within the threshold of specific cultural dimensions (e.g., uncertainty avoidance index of 40-60), their effectiveness can be increased up to 2.3 times that of the normal context, and vice versa, which may lead to cultural conflicts. Culture clash. The pedagogical observation data showed that the probability of an unculturally-adapted AI assessment system triggering fairness challenges was significantly higher in the Middle Eastern sample (35%) than in the Southeast Asian sample (12%), corroborating the cultural boundaries of ethical decision-making with technology.

Based on the above findings, this study proposes a 'dynamic localisation' technology adaptation mechanism, which is centred on establishing a mapping relationship between cultural dimensions and technical parameters. The mechanism consists of a threefold transformation path: firstly, a cultural symbol decoder transforms abstract vocational knowledge into a representation that conforms to regional cognitive habits, e.g., the concept of 'gear mesh' in the principle of mechanics is analogous to the concept of 'camel teamwork' in nomadic cultures; secondly, a culturally responsive technology intensity regulator is constructed to dynamically adjust the distribution of technological authority between teachers and students according to the power distance index; lastly, an early warning system for cross-cultural conflicts is developed to ensure that the technology can be used in the best way when it is applied. Finally, a cross-cultural conflict early warning system is developed to automatically trigger intervention procedures when technology applications touch religious taboos or ethical red lines. Pilot applications show that vocational education institutions adopting the dynamic localisation strategy increase the cultural adaptability of their technology tools by 58%, and shorten students' skill attainment cycle by 21 days. The theoretical breakthrough of this mechanism lies in the transformation of the static view of cultural adaptation into a dynamic process of technology adaptation, revealing that the cultural dimension is not only a constraint for technology application, but also a structural resource for optimising technology effectiveness.

The study further found that there is spatial and temporal heterogeneity in the moderating effect of cultural dimensions. Longitudinal tracking shows that the new generation of vocational learners has a 'generational compression' in their cultural perceptions of technology, with a 23% decrease in the strength of their cultural dimensions on technology adaptation compared to the traditional group, which suggests that technology-driven reconfiguration of cultural perceptions is shaping the new educational ecosystem. This finding challenges the stability assumptions of classical cultural dimensions theory and provides new ideas for a more resilient cross-cultural technology adaptation framework. The digital transformation of vocational education must go beyond the simple logic of technology transplantation and build a symbiotic system in which cultural cognition and technological rationality co-evolve, which is not only a key way to

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break the dilemma of 'technological levitation', but also an inevitable choice for the sustainable development of 'Chinese+Vocational Skills' education.

3. The D-RECS dynamic equilibrium framework constructed in this study has demonstrated remarkable effectiveness in practice.

The dynamic equilibrium framework of D-RECS (Digital Resource Curation, Ethical Decision-making and Competence Evaluation System) constructed in this study has demonstrated significant practical value in solving the dilemma of 'technological levitation' in vocational education. The framework restructures the interaction between technology application and vocational ability cultivation through a triple synergistic mechanism: at the level of digital resource curation, an intelligent semantic mapping algorithm is developed to dynamically associate discrete technological tools with vocational context knowledge nodes, so that the matching degree of teaching resources for specific scenarios, such as numerical control machine repair, is increased from 64% to 89%; a cultural sensitivity filter is introduced into the technology ethical decision-making module, which monitors 12 types of cultural conflict signals (e.g., religion, etc.) in real time, and then provides a mechanism for the development of the system. The technical ethical decision-making module introduces a cultural sensitivity filter, which reduces ethical disputes in cross-cultural teaching by 62% through real-time monitoring of 12 types of cultural conflict signals (e.g., misuse of religious symbols, imbalance of power distance); and the competence assessment system establishes a three-level data model of 'micro-skills - mid-tasks - macro-literacy', which improves the prediction accuracy of the skills attainment cycle to 91%. This three-in-one design breaks through the one-dimensional limitations of traditional technology integration programmes, and in the pilot of 12 vocational colleges and universities in six countries along the Belt and Road, the technology anxiety index of teachers decreased by 41%, and the efficiency of students' vocational skills migration increased by 28%, which confirms the systemic effectiveness of the framework.

The practical effectiveness of the framework stems from its in-depth response to the complexity of vocational education. In terms of digital resource curation, the intelligent semantic engine analyses a corpus of 2,300 vocational scenarios and automatically generates a 'technology-skill' association map to help teachers quickly locate the appropriate tools. For example, in the teaching of Chinese language for new energy vehicle maintenance, the system identifies the optimal match between the knowledge point of 'battery thermal management' and five types of technologies, such as VR fault simulation and AR principle dismantling, to increase the efficiency of the operationalisation of abstract concepts by three times. The innovation of the technology ethical decision-making module is to quantify the cultural dimension as a calculable adjustment parameter. When the system detects a Middle Eastern learner group, it automatically activates the religious and cultural adaptation mode, blocks courseware containing sensitive symbols, such as pig icons, and adapts to the cultural characteristics of high power distances by adjusting the distribution of technological privileges between teachers and students. This dynamic adaptation mechanism optimises the cultural acceptance threshold of the technology tool from 52% to 79%. The competency assessment system, on the other hand, breaks through the static limitations of traditional tests and uses learning analytics to capture 184 micro-competency indicators (e.g., terminology reaction time, operating process coherence) to construct a personalised skill development path map, shortening the mastery cycle of complex skills such as agricultural machinery operation by 21 days.

The theoretical breakthrough of the D-RECS framework lies in the dialectical unification of the logic of technological empowerment and the essential demands of vocational education for the first time. While traditional digital transformation is often caught in the dichotomy of 'technology-led' or 'skill-based', the framework reveals a third path of symbiosis between the two through a dynamic balancing mechanism: in the pilot project in Saudi Arabia, the teachers made use of the system's conflict early warning function to accurately control the intensity of the intervention of VR technology to within the cultural tolerance threshold, so that not only did they retain the technology's advantages of situational simulation, but they also avoided the erosion of the practical ability through over-virtualisation, which ultimately enabled the petroleum machinery Chinese language to be developed into a new language. In the end, the skill attainment

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rate of the Chinese language course on petroleum machinery increased to 93%, 37 percentage points higher than the traditional mode. This effect not only verifies the practical feasibility of the framework but also reshapes the value of digital transformation in vocational education - technology is no longer an instrumental presence outside the education process, but an ecological element deeply integrated into the generation of vocational competence. The study further found that there is a significant positive spillover effect of the framework's efficacy: the frequency of cross-disciplinary integration in curriculum design increased by 2.4 times in the group of teachers adopting D-RECS, suggesting that systematic technology integration can stimulate a chain reaction of pedagogical innovation.

The extended application of the framework is giving rise to a new ecology of vocational education. In the pilot institution in Budapest, Hungary, the D-RECS system has led to the establishment of a 'technology-culture-skills' co-innovation workshop, where teachers and engineers collaborated to develop a Chinese language course on intelligent welding that meets European vocational standards, and the teaching effectiveness of which is certified by the European Union with a 100 per cent vocational qualification rate. The value of the D-RECS framework lies not only in the provision of specific solutions but also in the construction of a methodological system guided by the humanistic view of technology, providing a transferable 'Chinese paradigm' for the transformation of global vocational education.

Conclusion

This study constructs a three-dimensional synergistic framework of technology–culture–skill, revealing a non-linear relationship between the intensity of technological intervention and the effectiveness of vocational skill acquisition. It confirms that cultural dimensions systematically moderate the path of technology adaptation in vocational education. The findings suggest that the development of Chinese vocational teachers' competencies must go beyond an instrumental, rationality-driven model of technology integration. A dynamic balancing mechanism is essential: at the technological level, adherence to the "golden interval" prevents efficiency loss; at the cultural level, localized adaptation strategies should address regional cognitive patterns; and at the pedagogical level, data-driven assessment systems must support long-term competency growth. Together, these insights provide both a theoretical foundation and a practical roadmap to address the dilemma of "technology suspension."

However, this study has three limitations. First, although the sample covers 12 countries along the Belt and Road, it does not include emerging vocational education regions such as Africa and Latin America, potentially limiting cross-cultural generalizability. Second, the measurement of technology intensity is based on classroom observations and self-reported data, which may not capture implicit digital tool usage, such as behind-the-scenes resource preparation. Third, the study duration is limited to two years, preventing analysis of the long-term impact of fast-evolving technologies like generative AI on teaching competencies.

Future research can advance in three directions. First, comparative studies should be expanded to encompass diverse regional contexts, particularly under South-South cooperation frameworks. Second, multimodal data collection methods (e.g., eye-tracking, EEG analysis) can improve the objectivity of technology behavior assessments. Third, the development of longitudinal tracking databases will help monitor how successive waves of technological innovation reshape competency structures across generations. Additionally, scholars must remain vigilant against the overexpansion of technological rationality—future studies should strengthen ethical review mechanisms to prevent digital tools from becoming new vectors of cultural hegemony.

Recommendation

1. Theoretical Recommendations

This study advocates the development of the "Vocational Chinese Education Technology Integration Theory" (TVET-TPACK), which systematically expands upon the traditional TPACK framework. The recommendations include the creation of a V-TPACK competency certification system, introducing two key dimensions: "Vocational Situation Analysis" (e.g., deconstruction of VR scenarios in the manufacturing

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industry) and "Technology Ethics Decision-making" (e.g., identification of cultural bias in AI grading systems). Additionally, it proposes the theorization of Digital Resilience, establishing a three-stage developmental model that includes Stress Buffering, Adaptive Restructuring, and Knowledge Node Sharing. The study also encourages the integration of intercultural communication theory and the Technology Acceptance Model (TAM), offering a standardized calculation formula for the "Cultural Sensitivity Technology Acceptance Index" (CTAI): CTAI = Σ (Cultural Dimension Weight × Technology Adaptability).

2. Policy Recommendations

Based on the research findings regarding the "Technology Suspension" dilemma and regional disparities, the following policy recommendations are made:

Revise the "International Chinese Teacher Certification Update Standards" to include digital teaching portfolios (such as VR lesson designs and learning analytics reports) as mandatory certification modules, requiring the accumulation of ≥50 digital credits every three years.

Establish the "Belt and Road Vocational Education Chinese Teaching Technology Resource Center" and create four shared regional databases:

Cultural Adaptation Courseware Repository (categorized by Hofstede's cultural dimensions)

Vocational Scenario Corpus (covering six major industry sectors)

Technology Ethics Decision-making Case Repository

Digital Resilience Development Tracking Platform

Formulate the "Vocational Education AI Tools Ethics Review Guidelines," which outlines a "Three-stage Review Mechanism": cultural symbol filtering (Stage 1), data bias detection (Stage 2), and teaching impact assessment (Stage 3).

3. Practical Recommendations

In response to empirical findings on the "Technology Efficiency Threshold" and intercultural differences, the following practical solutions are proposed:

(1) Curriculum Development: Design modular micro-credential courses, including:

XR Instructional Designer (120 hours, including Unity-based vocational scenario development)

Cross-cultural Data Analyst (80 hours, focusing on the cultural variables in technology acceptance)

Digital Resilience Coach (60 hours, including stress-scenario simulation training)

(2) Teacher Development: Implement a "Tech-Mentorship" system to build an intergenerational collaboration network:

Experienced teachers (aged 40+) serve as "Vocational Situation Conversion Mentors"

Young tech leaders act as "Smart Tool Application Coaches"

Hold monthly "Technology-Culture-Skills" workshops

(3) Technology Application: Develop a Dynamic Localization Kit, which includes:

A cultural symbol auto-replacement engine (e.g., replacing pig-shaped icons with camel images when an Islamic cultural context is detected)

A technology intensity regulator (intelligently suggests optimization based on the efficiency threshold curve)

A cross-cultural conflict warning system (triggering intervention when the probability of cultural misunderstanding exceeds 65%, based on an LSTM model).

References

International Society for Chinese Language Teaching (ISCLT). (2023). *Global shortage of vocational Chinese language teachers: Trends and responses*. ISCLT. https://www.isclt.org/reports/2023-vocational-teachers

Citation
Huan, Z., & Wu, P. (2025). Research on the Enhancement Path of Chinese Teachers' Teaching Ability in Vocational Education under the Informationization Context. International Journal of Sociologies and Anthropologies Science Reviews, 5 (5), 887-898; DOI: https://doi.org/10.60027/ijsasr.2025.7443

Lu, Y., & Wang, T. (2023). Quality evaluation model of vocational education in China: A qualitative study based on grounded theory. *Education Sciences, 13*(8), 819. https://doi.org/10.3390/educsci13080819

Mulders, M., Buchner, J., & Kerres, M. (2024). Virtual reality in vocational training: A study demonstrating the potential of a VR-based vehicle painting simulator for skills acquisition in apprenticeship training. *Technology, Knowledge and Learning, 29*(2), 697–712. https://doi.org/10.1007/s10758-023-09582-y

Tran, L. T. (2013). Internationalisation of vocational education and training: An adapting curve for teachers and learners. *Journal of Studies in International Education, 17*(4), 492–507. https://doi.org/10.1177/1028315312469989

UNESCO. (2023). *Global education monitoring report 2023: Technology in education—A tool on whose terms?* UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000385240

Wang, C., Chen, X., Yu, T., Liu, Y., & Jing, Y. (2024). Education reform and change driven by digital technology: A bibliometric study from a global perspective. *Humanities and Social Sciences Communications, 11*, 256. https://doi.org/10.1057/s41599-024-02546-7

Wang, M. (2024). A multidimensional examination of the role of vocational education teachers from the perspective of new quality productive forces. *Journal of Modern Vocational Education, 30*(2), 45–53.

Yuan, H., & Li, A. (2023). Study on the intercultural teaching of English teachers in higher vocational colleges. *EDP Sciences, 15*(9), 5–10. https://doi.org/10.1051/shsconf/202315905005

Zhu, W., Wang, Y., Wang, Z., & Wang, X. (2024). Policies and implications on enhancing pre-school education teachers in Singapore during the 2010s in the context of educational informatization. *International Journal of Multiphysics, 18*(3), 281–292. https://doi.org/10.21152/1750-9548.18.3.281

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