

A Study on Digital-Intelligent Pathways for Ethnic Unity Education Among Generation Z Vocational College Students

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Abstract: Technology is driving the digital transformation of education toward digital-intelligent integration, which brings both opportunities and challenges to ethnic unity education targeting Generation Z college students. Adopting the four-dimensional Technology-Content-Participant-Environment (TCPE) analytical framework, this paper systematically examines the cognitive traits of Generation Z college students as digital natives and the current status of ethnic unity education. It further dissects the functional mechanisms through which digital-intelligent technologies empower ethnic unity education, and develops innovative digital-intelligent integration pathways covering four dimensions: resource systems, teaching models, evaluation mechanisms, and ecological construction. The research provides theoretical support and practical references for educational practices dedicated to fostering a strong sense of community for the Chinese nation.

Keywords: Generation Z; Ethnic unity education; Digital-intelligent transformation

Online publication: August 31, 2026

1. Research foundation

1.1. Research background

Currently, China's higher education is undergoing dual transformations toward high-quality development and digital upgrading. After the release of the *Outline of the Plan for Building China into an Education Powerhouse (2024–2035)* in 2024, the Ministry of Education, together with eight other authorities, jointly issued the *Opinions on Accelerating the Digital Transformation of Education* in April 2025, which specifies full-cycle implementation rules for digital transformation from 2024 to 2035^[1–3]. This marks the full rollout of China's national strategic initiative for educational digitization.

Generation Z, defined as people born between 1995 and 2009, is gradually forming the majority of college students. As digital natives growing up in the internet era, Generation Z college students possess distinctive generational characteristics: visual-centric cognition, a preference for gamified learning, socialized knowledge construction, and heavy reliance on instant feedback. Their unique digital lifestyles pose new challenges to the delivery modes of ethnic unity education.

From a national policy perspective, fostering a strong sense of community for the Chinese nation serves as the core guideline for the Party's ethnic work in the new era and all undertakings in ethnic regions. The 2021 Central Conference on Ethnic Affairs clearly stated that the awareness of the Chinese national community should be integrated into the entire education process of schools at all levels and of all types. Therefore, exploring digital-intelligent educational pathways compatible with Generation Z's cognitive traits has become an urgent practical task.

1.2. Concept definition

In this paper, Generation Z specifically refers to young people born between 1995 and 2009 who are currently enrolled in Chinese universities. Raised amid the popularization of mobile internet, widespread social media, and ubiquitous smart devices, this cohort has formed unique digital cognitive and social interaction patterns.

Ethnic unity education for college students refers to educational practices implemented in Chinese higher education institutions. Centered on fostering a strong sense of community for the Chinese nation, it guides students to establish correct views on the country, history, ethnic groups, culture, and religion through curriculum teaching, practical activities, and cultural immersion.

Digital-intelligent transformation represents the deep integration and advanced evolution of digitalization and smart technologies. It covers not only the deployment of information technology infrastructure, but also data-driven intelligent decision-making, AI-enabled personalized services, and the reconstruction of human-machine collaborative educational ecosystems.

2. Theoretical basis and analytical framework

2.1. Core theoretical support

This study constructs its analytical foundation by integrating multidisciplinary theories. Connectivism argues that learning hinges on individuals' capacity to connect with, retrieve, and update information, laying a theoretical basis for analyzing knowledge network construction in digital-intelligent contexts ^[4]. For Generation Z, learning is essentially a process of building connections between information nodes, and digital-intelligent platforms can expand the scope and density of knowledge networks.

The Multicultural Integrated Education Theory advocates consolidating national identity and the sense of community for the Chinese nation on the premise of acknowledging cultural diversity, offering a theoretical framework for research on ethnic unity education ^[5]. Media Situational Theory illustrates how electronic media restructure social behavioral environments, and this theory is adopted to analyze how digital-intelligent media reshape Generation Z's ethnic cognition ^[6]. The Generation Theory provides a sociological perspective to interpret the formation mechanism of Generation Z's unique social characteristics ^[7].

2.2. The TCPE analytical framework

Based on the above theories, this paper establishes a four-dimensional analytical framework named

Technology-Content-Participant-Environment (TCPE).

The technology dimension focuses on the educational adaptability of digital-intelligent infrastructure and tools;

The content dimension centers on the quality of digital transformation of ethnic unity education resources;

The participant dimension examines the matching degree of digital-intelligent literacy between educators and learners;

The environment dimension investigates the structural impacts of algorithm-driven information ecosystems on ethnic unity education.

The four dimensions are interlocked and dynamically coupled, jointly forming the basic framework for analyzing digital-intelligent pathways.

3. Current situation of ethnic unity education in Chinese universities

3.1. Cognitive traits of Generation Z and mismatches with traditional education

Generation Z's digital existence has cultivated unique cognitive modes, creating profound incompatibilities with the traditional models of ethnic unity education.

At the cognitive level, Generation Z is prone to superficial knowledge acquisition. Easy access to information allows them to quickly encounter a large number of ethnic cultural symbols, yet fragmented reading pushed by algorithmic recommendations results in unsystematic knowledge without complete historical narratives. Surveys show that most Generation Z students in Chinese universities can name all 56 ethnic groups, but few grasp the complete historical evolution behind the Chinese nation's pattern of diversity in unity^[8]. Their visual-centric cognition makes them sensitive to superficial cultural symbols such as ethnic costumes and festivals, while their understanding of the profound historical evolution of ethnic communication, exchange and integration remains superficial.

At the emotional level, an emotional distance exists between online symbols and real-life experience. Ethnic cultural symbols spread widely on social media in the form of ethnic-themed filters and minority costume short videos, yet such symbolic dissemination is far from authentic cross-ethnic communication, exchange and integration. Excessive reliance on social media weakens the in-person communication mechanism formed by multi-ethnic students living together on campus, eroding the emotional foundation required for ethnic unity education.

At the behavioral level, Generation Z tends to form performative online identities. Expressions of ethnic identity on social media are mostly display-oriented, dominated by superficial interactions such as likes and shares, with few profound identifications that translate into real practical actions. If ethnic unity education merely stays at online interaction, it cannot achieve the transition from performative online expression to conscious real-life practice.

3.2. Dilemmas in digital-intelligent application

The current digital-intelligent practices of ethnic unity education in Chinese universities face structural constraints across four dimensions.

Technology Dimension: University teaching platforms suffer from poor compatibility and inconsistent data standards. Restricted underlying algorithms overly rely on superficial behavioral data, making it difficult

to accurately identify students' genuine learning demands. The integration of digital-intelligent technologies into courses remains in the experimental stage, and the reconstruction of teaching paradigms is in urgent need of progress.

Content Dimension: Distortions exist in the digital transformation of educational content. Some digital resources reduce ethnic unity education to encyclopedic displays of ethnic knowledge with insufficient in-depth value guidance; others are overly entertainment-oriented, presenting ethnic cultural differences from a sensational perspective while neglecting shared characteristics of all ethnic groups.

Participant Dimension: Mismatched digital-intelligent literacy is prominent. Ideological and political teachers in universities are digital immigrants. Their technological application is limited to basic tools such as PPT replacing blackboards and recorded videos replacing lectures. They lack a thorough understanding of Generation Z digital natives' learning habits and the ability to adjust discourse expression modes. Although Generation Z students master basic digital operations, their advanced digital literacy, including information screening and critical thinking, needs systematic cultivation.

Environment Dimension: Commercial algorithms bring potential risks. Algorithms of commercial platforms prioritize user stay duration as the core optimization target, which readily creates information cocoons. If Generation Z's ethnic cognition is mainly shaped by algorithm-filtered information, cognitive biases may be reinforced, narrowing their holistic understanding of the Chinese nation's pattern of diversity in unity. Worse still, extreme content may spread widely via algorithmic chain reactions, posing hidden threats to ethnic unity education.

4. Digital-intelligent empowerment mechanisms of ethnic unity education

4.1. Cognitive reconstruction mechanism enabled by digital-intelligent technology

Digital-intelligent technologies reconstruct Generation Z's cognitive processes through multiple approaches. Extended Reality (XR) realizes embodied cognition: when students interact with virtual merchants of all ethnic groups as digital avatars in the historical scenes of the Ancient Tea-Horse Road, the mirror neuron system is activated to generate immersive neural simulation effects, converting abstract historical narratives into embodied emotional memories.

Big data technology enables personalized learning paths through precise student profiling. By analyzing learning behavior data, the system accurately pinpoints students' knowledge gaps in ethnic knowledge frameworks and delivers customized learning resources, realizing large-scale individualized teaching tailored to students' aptitudes.

AI-powered intelligent dialogues strengthen critical thinking training. Large language models can simulate debates from diverse historical perspectives, guiding students to identify the complexity of ethnic issues in multi-dimensional conversations and fostering rational cognitive abilities.

4.2. Precision matching engagement mechanism

Precise adaptation to Generation Z's cognitive characteristics is the core of effective digital-intelligent ethnic unity education.

To meet their visual preference, visual storytelling resources recording the history of ethnic communication, exchange, and integration can be developed, such as interactive spatiotemporal maps of the

Digital Silk Road that visualize ethnic migration and cultural integration.

To cater to their gamified learning tendency, narrative games like *Retracing the Paths of Ethnic Migration* can be designed, allowing players to experience the shared weal and woe of all ethnic groups through resource coordination and collaborative tasks.

To fit their socialized knowledge construction habits, cross-regional collaborative learning communities can be built, organizing long-distance joint projects between local students and students from ethnic regions to build cross-ethnic peer bonds.

To satisfy their demand for instant feedback, learning data dashboards and achievement incentive systems can be established to visualize the progress of ethnic unity literacy and boost learning motivation.

4.3. Risk prevention and boundary protection mechanism

Clear risk prevention boundaries should be set for digital-intelligent empowerment.

Against algorithmic bias: Avoid solidifying ethnic labels in recommendation systems and refrain from taking ethnic identity as the primary screening standard, ensuring the holistic narrative of the Chinese national community will not be filtered out.

For data ethics: The collection and utilization of ethnic identity information must strictly comply with the *Personal Information Protection Law of the People's Republic of China*. Tiered and classified data governance standards shall be formulated to prevent the abuse and leakage of sensitive personal information.

For technical application limits: Virtual experience cannot replace offline real communication. An offline activity quota for digital-intelligent courses shall be stipulated to guarantee a basic proportion of face-to-face cross-ethnic interaction in total class hours.

To bridge the digital divide: Address unequal technological access within Generation Z by providing special support including equipment and network traffic subsidies for students from remote ethnic regions with limited conditions.

5. Innovative practical pathways for digital-intelligent integration

5.1. Construct a supply-side structural reform system for educational resources

Building a multi-dimensional, classified, and collaborative digital resource supply system is the core foundation for advancing digital-intelligent transformation and optimizing educational resource allocation. Guided by supply-side reform, this system integrates four major modules: authoritative core resources, immersive experiential content, AI-generated materials, and student co-creation works. Combined with cloud-based resource aggregation, algorithmic personalized distribution, and digital literacy training, it forms an ethnic unity education resource ecosystem that matches Generation Z's cognitive features with high authority and practical value.

Develop authoritative core resource libraries. Focus on building archives of Chinese national community historical materials and typical cases of ethnic communication, exchange and integration. Relying on the National Smart Education Platform, integrate multi-modal resources such as red digital collections, documentaries of outstanding craftsmen, ethnic cultural archives and virtual museums to construct an open, shared knowledge infrastructure and a multi-dimensional digital-intelligent resource cloud that supports daily teaching.

Create immersive experiential forms to revitalize cultural heritage. Drawing on the mature experience of Digital Dunhuang and Digital Palace Museum, promote the digital reproduction of ethnic cultural heritage and develop shared VR experience projects, enabling Generation Z students to foster a strong sense of community for the Chinese nation through immersive exploration.

Implement dual-layer content review to guarantee information security. Standardize the application of generative large models and establish a dual auditing mechanism combining AI preliminary screening and expert manual review. Large models support personalized content creation while ideological security and historical accuracy are strictly guarded to ensure all educational resources conform to historical facts.

Stimulate student co-creation and realize two-way role transformation. Launch incentive programs such as the short video contest *Stories of Ethnic Unity Around Me*, and formulate mechanisms for certifying, disseminating, and granting academic credits to student creators, encouraging Generation Z students to shift from content consumers to content producers and enrich resource supply with youthful perspectives.

Optimize supply efficiency via precise algorithm matching. Leverage big data profiling to accurately diagnose students' learning status and interest preferences, transforming education supply from standardized mass delivery to personalized push of mainstream value content, and comprehensively improving the effectiveness of ethnic unity education.

5.2. Build a three-stage progressive teaching model

A three-stage progressive teaching model of “Perception – Exploration – Practice” is designed to fit Generation Z's cognitive rules.

Perception Stage: XR technology restores key historical scenes including Zhang Qian's mission to the Western Regions, Princess Wencheng's journey to Tibet, and the eastward migration of the Torghut Tribe. A multi-sensory immersive experience builds emotional recognition of ethnic unity.

Exploration Stage: AI-assisted hybrid teaching is adopted. Centered on realistic topics such as innovation boundaries in intangible cultural heritage inheritance and cultural protection in rural revitalization of ethnic regions, cross-regional and multi-ethnic online debates are organized. Large language models supplement multi-perspective arguments and logical inspection to cultivate students' value recognition of ethnic unity.

Practice Stage: Blockchain technology is applied to build a digital file preservation system for ethnic unity volunteer services and social practice. It converts tangible ethnic unity practices into tamper-proof, traceable, and verifiable competency archives to sustain the long-term effectiveness of ethnic unity education.

5.3. Establish a data-driven literacy development evaluation system

Digital-intelligent technologies support an integrated evaluation system covering learning processes, developmental tracking, and early warning of risks. Multi-modal data, including platform click logs, video viewing records, forum interaction frequency, and VR exploration paths, are collected and integrated to draw personalized learning portraits. A three-tier evaluation model from ethnic knowledge mastery to ethnic unity value recognition and conscious practice is formulated to track the dynamic development of students' ethnic unity literacy^[9].

Supported by natural language processing and affective computing, the system detects extreme ideological tendencies in online remarks and forms a closed-loop intervention process of “monitoring – early warning – intervention – reorientation,” realizing the paradigm shift from passive response to active

prevention.

5.4. Develop a collaborative educational digital-intelligent ecosystem

A collaborative digital-intelligent education ecosystem linking universities, enterprises, communities and families shall be constructed ^[10].

Universities build smart ideological and political platforms integrating curriculum learning, activity management and literacy assessment to realize data connectivity and intelligent scheduling for ethnic unity education.

University-enterprise cooperation develops digital management systems for industry-education integration scenarios, embedding ethnic unity education tracking modules into internships to track students' real-time cross-cultural adaptability and deliver timely tutoring.

University-community collaboration establishes joint education mechanisms with mainstream media and commercial platforms, promoting high-quality ethnic unity education content to be included in algorithm recommendation pools.

University-family cooperation develops micro-courses on ethnic unity digital literacy for parents to improve the capacity of joint digital-intelligent home-school education.

6. Case verification of typical models

Four types of representative vocational colleges are selected for empirical verification.

Bayingolin Vocational and Technical College in Xinjiang built a smart teaching platform integrating national standard language learning and ethnic unity education. AI speech evaluation and VR situational dialogues effectively improve students' language proficiency and cultural identity, verifying the feasible path of technological empowerment for vocational colleges in ethnic regions.

Shenzhen Institute of Information Technology developed the hybrid Cloud Hometown program for inland ethnic minority classes. Tibetan and Han students cooperate to create digital stories recording hometown changes, rebuilding emotional bonds across geographical distances and exploring innovative cross-regional ethnic unity education mechanisms.

Shaanxi Railway Engineering Vocational and Technical College built the Dao-Casting Cultural Digital Platform relying on its industry strengths. It converts ethnic unity narratives in railway construction history into immersive learning resources, realizing value integration between industry spirit and ethnic unity education.

Shenzhen Polytechnic explores metaverse teaching spaces. Though still in the early experimental phase, its reflective practice on the applicable boundaries of educational technology provides important references for future development.

The common experience of the four cases indicates that taking the fostering of a strong sense of community for the Chinese nation as the core guideline provides typical references for exploring digital-intelligent pathways of ethnic unity education.

7. Conclusion

Based on the TCPE analytical framework, this paper conducts in-depth research on digital-intelligent

pathways for ethnic unity education targeting Generation Z vocational college students, and systematically elaborates corresponding strategies from educational philosophy, teaching models, evaluation systems, and governance mechanisms.

Funding

This work was supported by the Fundamental Research Funds for Directly Affiliated Universities of Inner Mongolia Autonomous Region (Grant No. JBYWF2025004), Research on Digital-Intelligent Pathways of Education Forging a Strong Sense of Community for the Chinese Nation Among Vocational College Students.

Disclosure statement

The author declares no conflict of interest.

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