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An Innovative Path for Digital-Intelligent Empowerment of Red Culture Education in Universities—A Dialectical Perspective Based on "Technological Rationality" and "Value Rationality"

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Abstract: ***The empowerment of university red culture education by digital-intelligent technologies is currently confronted with the practical tension of an excessively "technological rationality" and a gradually diminishing "value rationality," leading to educational practices becoming formalized, data-driven, and emotionally hollow. The key to resolving this dilemma lies in transcending mere technical application and achieving the organic integration of technological instrumentality and educational value through effective path innovation. Through theoretical analysis and observation of typical cases, this study deeply examines three paradoxes in the process of digital-intelligent empowerment: the contradiction between content standardization and narrative personalization, the tension between emotional resonance and technological detachment, and the conflict between data precision and educational ambiguity. It reveals that the root cause lies in the encroachment of instrumental rationality upon value guidance, and proposes a reconstructed scheme for innovative pathways dominated by "value rationality."***

Keywords: Digital-intelligent empowerment; Red culture education; Technological rationality; Value rationality; Path adaptation.

1. INTRODUCTION

The digital-intelligent era refers to the combined digital and intelligent age, representing an advanced developmental stage of the network and information epoch [1]. With the deepening implementation of the "Digital China" strategy and the urgent requirements for the connotative development of ideological and political work in universities in the new era, the integration of digital-intelligent technologies with red culture education has become a significant issue. However, behind the clamor of technological "empowerment," there lurks a profound risk of the "displacement" of the educational essence in practice. Currently, although explorations in many universities feature novel forms, they commonly exhibit phenomena such as "having technology but lacking soul," "having form but lacking substance," and "having data but lacking warmth." As Marcuse pointed out, technological development not only enhances productivity but also fundamentally alters social structures and human's thinking styles. The rationality of technology has transformed into political rationality, leaving people swept up by technological force and losing their capacity for critiquing reality [2]. Beneath the dazzling appearance of technological application, the value core and spiritual appeal inherent in red culture itself tend to be weakened. This series of phenomena compels us to confront a core research question: Why does digital-intelligent empowerment easily deviate from its original "educational" purpose in practice, resulting in the dilemma of an ever-expanding "technological rationality" and an increasingly diminishing "value rationality"? What is the underlying operational mechanism behind this? How should we construct more effective pathways to ensure that technology truly serves the fundamental goal centered on education?

2. THE INTERNAL TENSIONS IN DIGITAL-INTELLIGENT EMPOWERMENT OF RED CULTURE EDUCATION

Digital-intelligent empowerment is far from a neutral technological process; its operational logic constitutes a structural tension with the authentic purpose of red culture education. Without discerning these internal contradictions, so-called "empowerment" may prove counterproductive, even leading to the loss of the educational essence as technology usurps the host's role. This demands that academic research not stop at the clamor of the

application level but should strive to reveal its internal three paradoxes and ultimately trace them back to their common theoretical root and generative mechanism.

2.1 Tension One: Content Standardization and Narrative Personalization

The operational logic of digital-intelligent technologies, especially when processing massive information, is inherently based on the principle of "calculability." Whether constructing knowledge graphs or enabling precise push of content, it intrinsically requires red culture resources to undergo a standardized, structured data transformation. Specifically, heroic deeds need to be decomposed into structured fields like time and characters, and their spiritual connotations summarized into a series of keyword tags such as "firm belief" and "selfless dedication." This process is undoubtedly efficient for building red resource databases and achieving rapid retrieval and association of content. However, the most moving power of red culture lies precisely in its vivid, complex, and even tragically nuanced personalized narratives. The resoluteness of Liu Hulan, the fortitude of Sister Jiang, every tiny moment on the Long March – their infectivity stems from the unique choices and emotional outbursts of individual lives in specific contexts, a form of existence full of details, contradictions, and tensions, i.e., "storytelling." When technological logic attempts to "discipline" all this into standardized data frameworks, the richness, ambiguity, and emotional warmth of the narrative face the risk of being diminished. The result is that the narrative integrity of historical stories is replaced by logical structures, the fluidity and richness of spirit are solidified by deterministic conceptual labels, ultimately rendering a history full of flesh and blood into a withered form.

The paradox thus becomes apparent: technological empowerment seeks widespread dissemination through standardization, while educational effectiveness relies precisely on narrative personalization to achieve value internalization. Knowledge graphs can tell us "what happened," but they struggle to convey the inner struggles and faith strength of the individuals at that moment. Algorithms can push content based on tags, but they cannot guarantee that the pushed stories will resonate with the specific life experiences of an individual student. When technological systems tend to push narratives that best fit their data models and are most "typical," a multitude of atypical yet equally profound, marginal yet equally important historical details and character stories are silently filtered out. This is essentially an invisible "disciplining" of narrative diversity by technology. Ultimately, we might obtain a vast and precise "red knowledge base," but lose the educational charm of touching hearts with ever-changing stories.

2.2 Tension Two: Emotional Resonance and Technological Detachment

Immersive technologies like Virtual Reality (VR) and Augmented Reality (AR) are highly expected to solve the problem of lacking situational awareness in traditional educational models. These technological practices, through battlefield simulations, scene restorations, and the construction of historical situations, attempt to achieve students' "embodied presence," providing them with immersive perceptions beyond traditional texts. On the phenomenal level, this seems to greatly bridge the spatiotemporal gap between students and historical relics. But upon deeper analysis, another paradox emerges: extreme sensory immersion does not automatically translate into deep emotional resonance and may even create a new form of "technological detachment." The "alienation effect" proposed by the German playwright Bertolt Brecht is suggestion here. He argued that excessive pursuit of illusory stage effects would make the audience indulge in the plot and lose critical thinking. When students enter that algorithmically preinstall, sensorially heightened virtual space as "users," what they experience is essentially a "digital spectacle" orchestrated by technological logic. In this process, the student's status as the "subject" of historical cognition and spiritual transmission is subtly suspended, and their "resonant" relationship with history may be compressed into a one-dimensional sensory "experience." The spectacular nature of the technology itself becomes the focus – "This technical effect is truly stunning!" – while the gravity and tragedy of history itself are obscured by the technological medium.

Authentic red culture education aims to evoke a subjective emotional resonance based on value identification and spiritual admiration. Through the simulation of the battlefield, the reconstruction of the scene and the construction of the historical context, these techniques attempt to achieve the "embodied presence" of the students, providing them with an immersive perception beyond the traditional text. However, over-reliance on technological rendering leads to perceptual overload, encroaching upon the mental space where students complete meaning construction and critical internalization through autonomous imagination. History thus becomes a preinstall, "consumable" experience. In this process, a cognitive barrier, seemingly invisible yet tangible, constructed by technology, stands between students and historical figures. They can see everything clearly but find it difficult to touch and integrate.

Emotion transforms from an internal, active generation into a passive, external stimulus-response. After this "bustling" technological experience, what may remain is an emotional "emptiness," with the spiritual core under the dazzling packaging of technology.

2.3 Tension Three: Data Precision and Educational Ambiguity

Another major advantage of digital-intelligent empowerment lies in its "data-driven" capability. Through multimodal data such as learning duration, click-through rates, interaction frequency, test scores, and even facial expression recognition, the system attempts to conduct fine-grained monitoring and effect evaluation of the educational process. This reflects the relentless pursuit of scientization and precision in educational work. However, a fundamental paradox exists between this logic and the essential attributes of educational work: data pursues extreme "precision," while the core of education – the internalization of values, the shaping of the spiritual world, the establishment of beliefs – is inherently an "ambiguous," long-term, and complex process. The highest manifestation of the effectiveness of red culture education is not how many knowledge points students answer correctly in exams, but whether they can demonstrate firm ideals and beliefs, correct value judgments, and conscious moral behavior when facing real-life temptations of interest and challenges of difficulties. How can these internal, spiritual developments be accurately quantified into immediate data indicators?

The excessive reverence for data precision is, in fact, an encroachment of instrumental rationality, narrowing the practice of education, rich in value rationality, into a quantifiable technical process. The erosion of academic autonomy by algorithmic decision-making stems from technological rationality weakening scholars' subjective judgment [3]. This leads us into a "measurement paradox": those superficial indicators easily quantified are pursued, while the core dimensions related to character formation and value guidance, which are difficult to measure, are systematically neglected. This can trap educational practice in the "Goodhart's law" dilemma – in pursuit of impressive evaluation data, educators might deliberately design activities that generate "good" data, ignoring whether these activities truly touch students' souls. When "click-through rates" become the primary criterion for measuring the success of a red website, and "correct answer rates" become the core indicator for evaluating spiritual internalization, educational work potentially degenerates from a lofty cause of "fostering virtue and cultivating talents" into a technical operation of "data management." Those silent, spiritual growth processes that cannot be captured by data are systematically overlooked in this evaluation system.

2.4 Theoretical Root: The Encroachment of "Technological Rationality" upon "Value Rationality"

The aforementioned three tensions are not isolated phenomena; they collectively point to a deep theoretical root – namely, the systematic encroachment of "technological rationality" upon "value rationality" at the socio-intellectual level. "Technological rationality" originates from Max Weber's dichotomy of rationality. It is a mode of thinking oriented towards effectively achieving specific goals, focusing on calculation, control, efficiency, and predictability. It concerns "how to do" rather than "why to do." Digital-intelligent technology itself is the ultimate embodiment of technological rationality; its algorithms, models, and data processing logic inherently pursue standardization, maximization of sensory stimulation, and quantifiability of behavior. "Value rationality," on the other hand, pertains to purpose, meaning, dignity, and ultimate concerns. It questions the "oughtness" of actions, emphasizing intrinsic spiritual values and humanistic care. Red culture education essentially is a great undertaking full of value rationality, whose ultimate goal is to cultivate builders of socialism with firm communist beliefs and noble moral sentiments. It focuses on human spiritual growth and the construction of the world of meaning.

In the practice of digital intelligence empowerment, technological rationality continues to expand its sphere of influence through its powerful instrumental efficacy and visible outcomes. It attempts to subsume vivid red narratives into standardized databases, simplify profound emotional resonance into sensory immersion stimuli, and reduce complex spiritual internalization to cold data indicators. In this process, technological rationality alienates from a "servant" to a "master," forcing value rationality to continuously concede and compromise, thereby leading to the alienation of educational practice: the more we pursue technical precision and efficiency, the farther we may deviate from value guidance. Therefore, the key to resolving the dilemma of digital-intelligent empowerment lies not in abandoning technology but in a profound return to values. We must always remain acutely aware that digital and intelligent technologies are merely tools, while the ultimate goal is to nurture individuals. Future innovations must be grounded in the fundamental principle that 'value rationality' guides and regulates 'technical rationality,' ensuring that technology, in the process of empowerment, consistently serves the noble mission of cultivating the soul and educating through red culture—rather than the reverse.

3. PATH CONSTRUCTION FOR DIGITAL-INTELLIGENT EMPOWERMENT GUIDED BY VALUE RATIONALITY

In the process of digital empowerment of red culture education, the internal tension is exposed, and it is not wise to simply deny technology or return to tradition. The true way out lies in a profound "path reconstruction" – shifting from the passive adaptation of a "technology-oriented" approach to the active design of an "education-oriented" approach. This requires us to commit to constructing a new integrated paradigm where value rationality is the "soul" and digital-intelligent technology is the "carrier." Only in this way can we fundamentally resolve the aforementioned structural tensions and complete the profound transformation from mechanical "application" to organic "integration."

3.1 Conceptual Adaptation: "Technology Application" to "Educational Integration"

All practical innovation begins with conceptual innovation. To fundamentally curb the offside of technological rationality, "education-led, technology-empowered" must be established as the practical guideline for top-level design. This means that the introduction of any technological solution must pass through an ultimate "value filter": Can it, and to what extent, deepen students' understanding, identification with, and practice of the value core of red culture? It should be a meta-rule of top-level design, systematically embedded in the whole process from project initiation to evaluation, ensuring that the tool attribute of technology always serves the value attribute of education.

First shift from an "instrumental mindset" to an "ecological mindset." Proceeding from systems thinking, digital-intelligent technology should be positioned as an endogenous variable interacting structurally with the educational ecology, rather than merely an external tool for specific links. The goal of technology integration is to build a new red culture education ecology centered on student spiritual growth, integrating online and offline, and featuring human-machine collaboration. In this ecology, technology is like air and water, omnipresent yet naturally imperceptible, truly serving the creation of an educational atmosphere.

Second, shift from a "supply orientation" to a "growth orientation." With the deepening of digital transformation, digital thinking, digital subject identity, and the dynamic updating of digital technology have become important factors affecting the quality of talent cultivation [4]. We should abandon the traditional supply mode of "what we have technology to provide", and turn to the growth-oriented mode of "what kind of technology experience we need to design and create for the spiritual growth of students". The identity of educators should change from "technology users" to "designers of educational scenarios," where the selection and application of technology are entirely subordinated to the fundamental goal of promoting the shaping of students' values.

Third, establish the teacher's authority as the "guide." In digital-intelligent educational scenarios, the teacher's subjective status should not be marginalized but strategically strengthened. In the digital and intelligent education scenario, the main position of teachers should not be marginalized, but should be strategically strengthened. The technology is mainly responsible for the basic function of resource integration and situation construction, while the teacher is responsible for the core mission of value interpretation, spiritual guidance and emotional arousal. They are the value anchors in "guided immersion," the narrative subjects behind "intelligent narration," the critical thinkers in data interpretation, and the fundamental guarantee that technological practices always follow the track of education.

3.2 Content Path: "Resource Digitization" to "Narrative Intellectualization"

In response to the tension between "content standardization and narrative personalization," we need to achieve a strategic dimensional ascension at the content level, from "resource digitization" to "narrative intellectualization." The core lies in the creative combination of a standardized technological base with personalized narrative expression. Through this path, we leverage the efficiency of technological standardization while perfectly preserving and stimulating the personalized charm of red narratives, achieving the dialectical unity of a "standard base" and "a thousand facets of narration."

First, construct the underlying "Red Culture Gene Bank" and its knowledge graph. This is far from simple digital storage of documents and images. Rather, it involves deep semantic parsing and structured reorganization of red culture resources relying on key technologies like Natural Language Processing (NLP). By systematically extracting entities such as characters, events, locations, spiritual connotations, and artifacts, and clarifying the

complex relationships among them, an ontologically coherent model is formed. This knowledge graph serves as the "standardized" underlying architecture for content, ensuring not only the accuracy, relevance, and systematicity of resources but also providing a systematic, structured, multimodal "semantic material library" for upper-layer applications. Then, achieve the key leap from knowledge organization to narrative construction – develop an AI-powered "story engine" to drive the generation of "intelligent narration." The knowledge graph constitutes the structural support for the narrative, not the final form directly facing students. On this basis, an intelligent narrative system capable of dynamically recognizing and responding to students' cognitive characteristics and emotional states should be built, achieving the leap from standardized content to personalized, generative narrative experiences.

At the user generation level, based on data such as students' major backgrounds, historical browsing preferences, and interaction behaviors, intelligently match them with narrative entry points most likely to spark their interest – telling medical students touching stories from red medical history, showing engineering students the wisdom in military engineering. At the narrative generation level, efforts should be made to break through the limitations of traditional linear narratives. Relying on the "story engine," dynamically extract and reorganize content from the knowledge graph to achieve "thousands of faces, thousands of narratives" personalized narrative path generation. For instance, the system might guide students interested in macro-history naturally from the "Long March" theme to the technical details of "radio communication during the Long March"; while students more sensitive to character stories might be precisely guided from the "People's Military Industry" theme to the moving story of "Wu Yunduo and weapons manufacturing." At the multimodal content level, the engine can not only recommend existing resources but also use AIGC (AI-Generated Content) technology to automatically generate scripts suitable for short video dissemination, illustrated social media posts, or even virtual character oral history broadcasts based on key information in the knowledge graph, bringing standardized materials to life in highly personalized "story" forms.

3.3 Scenario Path: "Technology Silos" to "Guided Immersion"

To resolve the paradox of "emotional resonance and technological detachment," we must redesign immersive technology scenarios. The core strategy is to shift from pursuing "holographic" sensory bombardment to "guided immersion" aimed at "empathy." The construction of the "guided immersion" experience field follows a three-stage model: "pre-guidance – technological immersion – reflection and internalization."

The first stage is pre-guidance – laying the foundation for empathy. During the introduction phase, teachers can skillfully employ virtual reality (VR) and augmented reality (AR) to create an immersive cultural environment, naturally connecting the course content with traditional culture and effectively sparking students' interest in learning [5]. Before students engage with immersive technologies like VR/AR, teachers should transition from being mere technical instructors to becoming facilitators of meaning-making. Through carefully designed critical questions, compelling narrative contexts, and thought-provoking scenarios, educators can create a cognitive and emotional "preheating phase" that lays the groundwork for understanding the value of these technologies. For instance, before experiencing the VR simulation of the Red Army crossing snow-capped mountains, teachers might guide students: "During the experience, pay special attention to the soldiers' attire, movements, and facial expressions. Consider what drives them to push forward in such extreme conditions." This approach transforms students from passive "observers" into active "explorers," fostering deeper engagement with the technology.

The second stage is technological immersion – setting "reflective pauses." When the VR experience reaches the most critical or difficult moments, the scene can temporarily freeze, with historical figures' original diary excerpts or a thought-provoking multiple-choice question appearing on the screen: "If you were the commander at that time, what decision would you make? Why?" This "pause" forces students to detach from sensory stimulation and engage in immediate, deep cognitive processing and emotional reflection, transforming external "experience" into internal "choice."

The third phase involves reflective internalization to foster collective resonance. Following the technical experience, immediate offline sessions are organized for sharing, discussion, and summarization. Guided by teachers and peers, students process their intuitive perceptions and reflections from the technical scenario, refining, challenging, and elevating their emotional and cognitive understanding. Upon completing the experience, teachers should promptly guide students in systematic value reflection and meaning integration. This process transforms individualized, vague technical impressions into clear and stable value cognition through structured discussions and theoretical explanations, achieving the critical leap from sensory stimulation to spiritual internalization.

Through collective dialogue, personal insights are validated and reinforced, ultimately crystallizing into shared spiritual wealth.

As the primary agents in ideological and political education, teachers' subjectivity transcends mere static "teaching competencies" to embody a dialectical synthesis of autonomy, creativity, and critical thinking in educational practice [6]. This approach fundamentally overcomes fragmented "technological silo" models by systematically integrating cutting-edge digital-intelligent scenarios into a holistic teaching framework. Centered on teacher guidance, peer interaction, and value internalization as its core objectives, this organic integration effectively channels technology-driven immersive experiences toward profound emotional resonance and enduring spiritual identity.

3.4 Evaluation Path: "Data Precision" to "Comprehensive Effectiveness Evaluation"

To address the tension between "data precision and the ambiguity of education," we must shift the educational evaluation paradigm from singular data worship to a comprehensive assessment model that respects the complexity of education through "multimodal data integration." This approach not only evaluates the efficiency gains from technological empowerment but also focuses on realizing the intrinsic value of education, revealing the educational effects of technology intervention through contradiction analysis [7]. The "comprehensive evaluation" model constructs a three-dimensional framework that "quantifies data for practical use while prioritizing qualitative judgment," with its core lying in the organic unity of three dimensions: First, combining behavioral data with affective computing. While collecting behavioral metrics like click-through rates and completion times, affective computing technology is introduced. For example, facial expression coding analyzes students 'emotional engagement when viewing red-themed films, or semantic analysis assesses value orientations in online discussions, thereby capturing emotional signals beyond surface-level behaviors. Second, process data complements outcome evaluations. The system records students' exploration paths in the "story engine" and interactive choices in immersive scenarios, integrating these with final practice reports and artistic creations to collectively present the dynamic journey of students' spiritual growth. Third, machine evaluation collaborates with teacher judgment. System-generated data reports serve as auxiliary references, while teachers obtain contextualized information and provide professional interpretations through qualitative methods like organizing discussions and reviewing reflection logs, leveraging their "expert perspective" in value judgments. The model does not pursue the "precision" quantification of educational effectiveness with simple scores, but realizes the three-dimensional portrayal of the educational effect of red culture through multi-dimensional, long-term, and human-machine collaboration, which respects the objectivity of data and preserves the complexity and artistry of education.

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