

Research on the System of Ideological-Political Cultivation through Computing Curricula from the Perspective of Nourishing Xinjiang with Culture

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Abstract: Nourishing Xinjiang with culture (*wenhua runjiang*) represents a key practice of the Party's Xinjiang governance strategy in the educational domain in the new era, while curriculum-based ideological and political education constitutes a strategic initiative for implementing the fundamental task of fostering virtue through education. Confronted with the distinctive ideological and political education ecology and the demand for application-oriented talent cultivation in the Xinjiang region, local higher education institutions face an urgent imperative: how to construct a systematic ideological-political cultivation framework through computing curricula, with nourishing Xinjiang with culture serving as the value compass and computing courses functioning as the disciplinary vehicle. Grounded in cultural identity theory and the consciousness of the community for the Chinese nation, this study elucidates the unique role of computing education in transmitting Chinese culture and safeguarding ideological security in border regions. It proposes an integrated "value-knowledge-competence" framework. Centering on the design of instructional objectives, content restructuring, methodological innovation, and evaluation and feedback, the study transforms discipline-specific features—such as cybersecurity, artificial intelligence, digital preservation of ethnic cultures, and algorithmic ethics—into focal points for ideological and political education, and substantiates them through concrete teaching cases. Furthermore, the article constructs a safeguarding closed-loop encompassing faculty capacity building, organizational leadership, and quality evaluation, with the aim of developing a replicable and scalable system of ideological-political cultivation through computing curricula, thereby providing intellectual and talent support for the initiative of nourishing Xinjiang with culture.

Keywords: Nourishing Xinjiang with culture; Curriculum-based ideological and political education; Computing education; Cultural identity

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1. Introduction

During his inspection tour of Xinjiang, the General Secretary emphasized: “Strengthen the effort to nourish Xinjiang with culture, focus on edifying people through culture, and guide cadres and the masses of all ethnic groups to establish correct perspectives on the nation, history, ethnicity, culture, and religion”^[1,2]. This directive not only charts the course for Xinjiang’s governance but also poses a profound question for local higher education: How can we seamlessly embed Chinese cultural identity into disciplinary education, so that young people of all ethnicities, while acquiring modern technological skills, consciously become forces for safeguarding national unity and promoting ethnic solidarity?

Computing-related programs in Xinjiang’s higher education institutions possess a dual character^[3]. On the one hand, information technology serves as the core engine of contemporary economic and social development, and cultivating application-oriented talent to meet the demands of regional informatization constitutes a fundamental mission of local colleges and universities. On the other hand, cyberspace has become the frontline of cultural contestation, and computing technology itself embodies specific cultural logics and value orientations^[4]. Consequently, computing curricula are by no means value-neutral “purely technical” education; rather, they represent an irreplaceable practical arena for the project of nourishing Xinjiang with culture. Nevertheless, current research predominantly concentrates on the general construction of curriculum-based ideological and political education systems and has yet to adequately address how computing as a discipline can, through its own knowledge logic, underpin the cultural nourishment initiative, nor how to achieve the deep integration of value guidance and skill development within a multi-ethnic student body^[5].

Against this backdrop, this article takes nourishing Xinjiang with culture as its value coordinate and computing curricula as its fulcrum, endeavoring to construct a curriculum-based ideological and political education system for local higher education institutions that permeates the entire talent-cultivation process and embodies the distinctive characteristics of the computing discipline. This endeavor, which seeks to align computing courses with humanities courses in a synergistic, radiating partnership, warrants thorough exploration by every disciplinary instructor.

2. “Nourishing Xinjiang with Culture” as the intrinsic connotation of the ideological-political curriculum system

The essence of nourishing Xinjiang with culture lies in deploying fine traditional Chinese culture, revolutionary culture, and advanced socialist culture as content, and educational exchange, interaction, and integration as pathways, to continuously enhance the sense of identification with Chinese culture among people of all ethnic groups, thereby consolidating the consciousness of the community for the Chinese nation^[6]. From the perspective of cultural identity theory, an individual’s sense of cultural belonging is not naturally given but is progressively internalized through repeated constructions involving symbolic systems, narrative frameworks, and practical rituals^[7]. School education represents the most crucial institutionalized arena for such construction^[8]. Embedding the initiative of nourishing Xinjiang with culture into the curriculum-based ideological and political education system, therefore signifies a return to the intrinsic cultural mission of education.

Computer science and technology may appear to be a universal and instrumental knowledge system, yet their underlying logic, interface language, and application scenarios are all saturated with specific cultural

presuppositions. Internet culture and digital media have become the dominant modes of contemporary cultural production and dissemination. The inheritance and innovation of Chinese culture must rely on digital carriers to achieve enduring and extensive influence. For instance, ethnic language information processing, the digital archiving of intangible cultural heritage, and the visual representation of multi-ethnic cultural elements in software interfaces are not only application areas of computing expertise but also concrete pathways for the creative transformation and innovative development of Chinese culture in the information age. The task of ideological-political cultivation through computing curricula is precisely to guide students toward the recognition that keyboards and code are also brushes for writing commitment to family and nation, and that cyberspace is likewise territory for constructing the shared spiritual homeland of the Chinese nation.

Facing a multi-ethnic student population in Xinjiang, this mission is particularly urgent. The curriculum-based ideological and political education system must elevate itself from mere knowledge transmission and skill training to a progressive process of “cultural cognition–emotional belonging–value practice,” enabling students to develop rational and emotional identification with the community for the Chinese nation while acquiring competencies in programming, algorithms, and data analysis. Only in this way can nourishing Xinjiang with culture be genuinely translated into educational reality, and the system of ideological-political cultivation through computing curricula acquire its rightful connotation (see Figure 1).

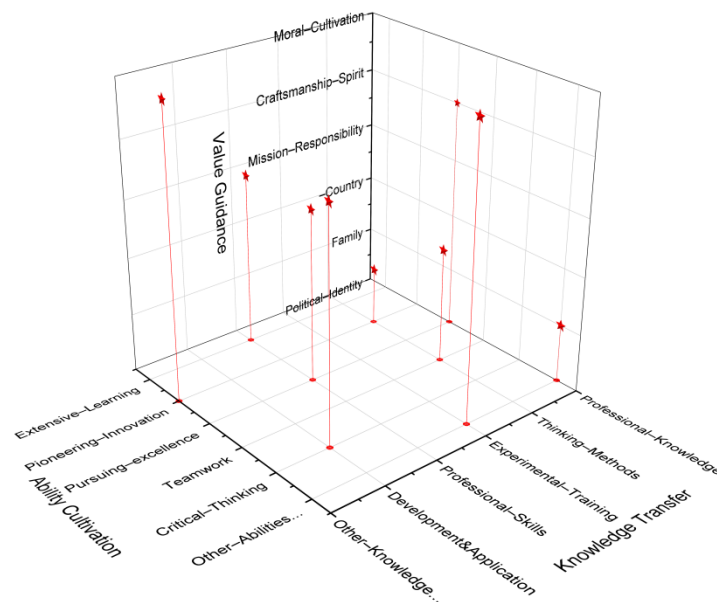


Figure 1. A localized microcosm of the ideological-political curriculum system

Figure 1 utilizes a three-dimensional coordinate system to intuitively present the elemental composition and hierarchical relationships of the objectives for ideological-political cultivation through computing curricula. Its framework is interwoven from three dimensions—value, competence, and knowledge—with elements within each dimension arranged hierarchically according to their cultivation weight, forming a complete cultivation logic extending from the spiritual core to practical externalization. It demonstrates that while theoretical knowledge acquisition is foundational, it must be channeled through value guidance

and competence transformation to be sublimated into holistic educational efficacy. This structural schema profoundly reveals that ideological-political cultivation through computing curricula is by no means a mechanical juxtaposition of knowledge and values, but an organic whole guided by values, mediated by competencies, and supported by knowledge.

3. Advancing “discipline-based ideological-political education” centered on cultivating local application-oriented talent

The construction of the core area of the Silk Road Economic Belt has presented Xinjiang with unprecedented developmental opportunities and simultaneously imposed higher demands on the supply of local informatization talent ^[9]. Computing-related programs in Xinjiang shoulder the dual responsibility of providing talent for the region’s digital transformation and offering technical support for nourishing Xinjiang with culture ^[10]. This implies that the construction of “discipline-based ideological-political education” cannot remain at the level of generic value supplementation but must be deeply integrated with disciplinary cultivation objectives, forming a talent-development main thread of “education as the foundation, morality and skill equally emphasized.”

Implementing “discipline-based ideological-political education” within computing curricula is a fundamental requirement for comprehensively carrying out the task of fostering virtue through education; it is the basis for practicing the core socialist values with Chinese characteristics; it is an effective pathway for guiding university students of all ethnic groups in Xinjiang toward patriotism and dedication to their work; and it is essential for cultivating generations of talent capable of taking root in, serving, and safeguarding the border regions.

The term “discipline-based ideological-political education” refers to the systematic design and internalized implementation of the principles, content, and requirements of ideological and political education according to the generative logic of disciplinary knowledge and competence. For computing-related disciplines, this construction entails three levels. First, at the level of disciplinary orientation, it must be clearly established that the talent cultivated should not only possess hard skills in programming, system development, and network maintenance, but also become guardians of borderland information security, promoters of the digitization of ethnic cultures, and practitioners of a wholesome cyberspace. Second, at the level of course content, safeguarding national cybersecurity and consolidating the consciousness of the community for the Chinese nation should be adopted as authentic contexts for knowledge instruction and project practice, forging an organic mapping between ideological-political elements and disciplinary knowledge points. Third, at the level of cultural cultivation, computing technologies should be leveraged to create immersive cultural experiences, thereby strengthening students of all ethnicities’ perception and identification with Chinese culture.

Through these pathways, “discipline-based ideological-political education” can not only provide a sustained talent pipeline for nourishing Xinjiang with culture but also transform computing education itself into a nexus for enhancing ethnic solidarity and elevating societal informatization literacy, genuinely realizing the radiating effect of “excelling in one discipline, energizing an entire region.”

4. Integrating ideological-political education into the entire process of classroom instruction

Classroom instruction is the principal battleground for curriculum-based ideological and political education. Computing curricula must center on the integrated “knowledge–value–competence” objective, design a closed-loop for ideological-political integration within the full instructional process, and endow it with vivid vitality through the discipline’s unique technological contexts. The following discussion unfolds across four dimensions, supplemented by concrete cases.

4.1. Instructional objectives and design: Deeply excavating ideological-political elements within disciplinary knowledge

During the objective-setting phase, content nodes capable of bearing ideological-political education should be systematically identified from the core concepts, typical methods, and application scenarios of computing, constructing an objective matrix of “explicit knowledge–implicit values–externalized competence.” For example, the “Computer Networks” course can adopt “safeguarding national cyber sovereignty and data security” as one of its ideological-political objectives; the “Artificial Intelligence” course can establish the objective dimension of “promoting technological fairness and preventing algorithmic bias.”

Case 1: An Excerpt of Ideological-Political Instructional Design for the “Cybersecurity Technology” Course

In the chapter “Network Attacks and Defense,” the objectives are set as follows: (1) Master the principles of common network attacks and defense strategies (knowledge objective); (2) Understand the strategic significance of cybersecurity for national sovereignty and border stability (value objective); (3) Be able to design basic network security protection schemes for local small and medium-sized enterprises in Xinjiang (competence objective). Through this design, originally purely technical instructional content is sublimated into a social practice subject concerning the safeguarding of border security.

4.2. Instructional content and resources: Bearing cultural identity through discipline-specific resources

The selection and organization of course content should embody the capacity of computing technology to carry and disseminate Chinese culture and multi-ethnic cultures. On the one hand, teaching cases and digital resources integrating Chinese aesthetics and regional cultural elements can be developed; on the other hand, practical projects such as the digital preservation of ethnic cultures and smart cultural tourism can be introduced into the classroom, enabling students to perceive cultural value while solving authentic problems.

Case 2: Content Supplement for the “Database Principles and Applications” Course

In the “Database Design and Implementation” unit, a project titled “Database Design for the Intangible Cultural Heritage of Xinjiang’s Multi-Ethnic Groups” is established. Students are required to investigate the data characteristics of intangible cultural heritage items such as the Uyghur Muqam and Kazakh Aken singing, complete the design of conceptual, logical, and physical models, and implement queries and displays. This segment not only trains core database skills but also prompts students, in the process of data annotation, classification, and description, to deeply comprehend the pattern of unity in diversity within Chinese culture, thereby reinforcing their awareness of cultural preservation.

Case 3: Cultural Integration in the “Web Front-End Development” Course

In the “CSS Styling and Interface Design” section, a special topic on “The Integration of Traditional

Chinese Motifs and Modern Web Interfaces” is introduced. Students analyze the compositional principles of typical ethnic motifs in Xinjiang (such as Atlas patterns and Mongolian cloud patterns), abstract them into reusable front-end components, and explore the principles for appropriately applying ethnic aesthetic elements in commercial websites and government platforms. This project enables students, while enhancing their interface design capabilities, to build cultural confidence and comprehend the design ethic of “each beauty in its own way, all beauties in harmony.”

4.3. Instructional methods and approaches: Project-driven learning and scenario simulation to evoke emotional resonance

The computing discipline emphasizes practicality. Instructional methods should fully leverage project-based learning, scenario simulation, and the integration of virtual and physical approaches to create experiential fields of “learning by doing, perceiving by doing.” Instructors can design comprehensive projects around real-world issues pertinent to nourishing Xinjiang with culture, enabling students to naturally achieve value internalization through collaborative problem-solving.

Case 4: Project-Based Teaching in the “Introduction to Artificial Intelligence” Course

A project titled “Image Recognition-Based Classification and Aesthetic Feature Analysis of Traditional Uyghur Attire” is designed. Students collect image data, train convolutional neural network models to achieve attire category recognition, and based on this, compose analytical reports exploring the aesthetic characteristics of traditional attire patterns and their potential for modern inheritance. This project integrates deep learning techniques, image processing knowledge, and cultural aesthetic education, fostering in students, through technological exploration, a sense of appreciation and pride in the diversity of Chinese culture.

Case 5: Ethical Deliberation in the “Algorithm Design and Analysis” Course

When teaching “Recommendation Algorithms,” a seminar on “Algorithmic Fairness and Ethnic Solidarity” is established. The instructor provides simulated data indicating potential biases in the content recommended by a social platform to different ethnic user groups, guiding students to analyze the mechanisms by which algorithmic bias forms and to propose corrective strategies. Through this case, students deeply grasp that technology is not neutral and that algorithm design must consider social impact, thereby cultivating a sense of responsibility to “do good with technology” and to promote inter-ethnic exchange, interaction, and integration.

4.4. Instructional evaluation and feedback: Constructing a closed-loop mechanism centered on “cultivation”

Instructional evaluation must transcend singular knowledge assessment, incorporating students’ performance in cultural identity, sense of social responsibility, and technological ethical judgment into both formative and summative evaluation. For example, in the aforementioned intangible cultural heritage database design project, evaluation encompasses not only the correctness of SQL statements and database normalization but also a “cultural understanding and expression” dimension, jointly assessed through peer and instructor evaluation. Furthermore, online teaching platforms can be utilized to collect data on student learning behaviors, and through sentiment analysis and semantic mining, dynamically monitor changes in student attitudes, allowing timely adjustment of instructional strategies and realizing the continuous empowerment of student growth through evaluative feedback.

The pedagogical principle architecture presented in Figure 2 delineates the closed-loop logic of implementing curriculum-based ideological and political education from the perspective of nourishing Xinjiang with culture: with “fostering virtue through education” as the center, and “instructor-led guidance” and “student emotional generation” as dual driving wheels, it ultimately produces predictable “ideological-political effects” that return to the overarching framework of “core socialist values.” Specifically, instructors, through disciplinary guidance, organically integrate ideological-political elements into knowledge transmission and practical training, thereby triggering students’ “self-generated emotions”—a sense of identification, responsibility, and mission that is not the result of external indoctrination, but naturally arises from students’ engagement in solving real technical problems, participating in cultural preservation projects, and scrutinizing the social impact of algorithms. When emotions continuously ferment and externalize into conscious action, the educational effect of “internalization in mind, externalization in conduct” is achieved. The entire circuit is consistently immersed in the soil of “nourishing Xinjiang with culture,” highlighting the value orientation of enhancing ethnic solidarity through Chinese cultural identity and serving borderland construction through professional practice. This architecture demonstrates that curriculum-based ideological and political education is not a one-way propagation of values but a generative process of mutual activation and the fusion of reason and emotion between instructors and students. It also precisely provides the overarching blueprint for the detailed design of the four subsequent aspects: instructional objectives, content, methods, and evaluation.

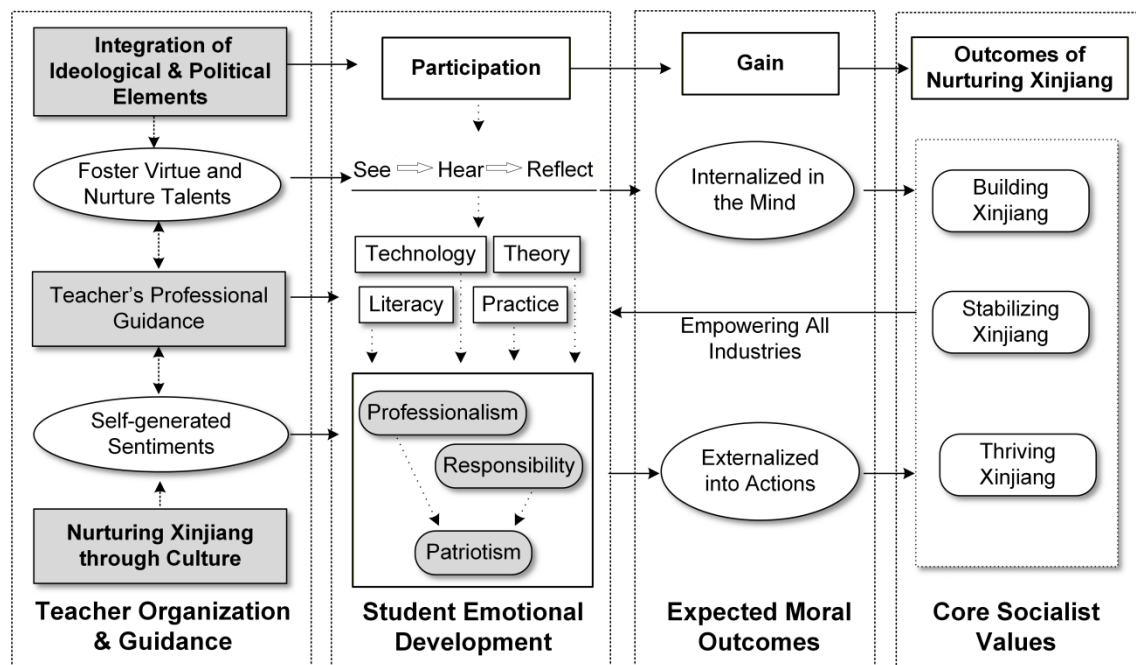


Figure 2. The pedagogical principle architecture of curriculum-based ideological and political education

In summary, the design of the entire instructional process for computing curricula should take disciplinary knowledge as its “body” and nourishing Xinjiang with culture as its “soul.” Through meticulously designed cases and projects, it should achieve a chemical fusion of knowledge transmission and value guidance, rather than a mechanical juxtaposition.

5. Enhancing faculty awareness and competence in curriculum-based ideological and political education construction

The three-foot podium bears upon the nation's destiny. In comprehensively advancing discipline-based ideological-political education, faculty are the key, and their awareness and competence constitute the wellspring for the quality of such work ^[11]. In confronting the mission of nourishing Xinjiang with culture, instructors in computing disciplines need to achieve a leap forward in three aspects of awareness and competence.

First, they must stand firm in their political stance and deepen their understanding of regional conditions and culture. Instructors must accurately master the Party's Xinjiang governance strategy and profoundly comprehend the regional characteristics of multi-ethnic cohabitation and multicultural coexistence in Xinjiang. Only then can they consciously and precisely integrate the consciousness of the community for the Chinese nation into disciplinary instruction, avoiding abstract preaching divorced from reality. This requires instructors to proactively acquire knowledge related to ethnology and cultural studies, enhance their understanding and respect for the cultures of all ethnic groups, and become qualified interpreters of nourishing Xinjiang with culture.

Second, they must enhance their cultural sensitivity and capacity for value transformation. Instructors cannot be mere "porters" of knowledge but must become "igniters" of values. Facing a multi-ethnic student body, instructors need the ability to "encode" and "translate" the spirit of Chinese culture and commitment to family and nation into the disciplinary knowledge of computing, transforming abstract ideological-political principles into perceptible project contexts and technological controversies that students can feel and understand. For instance, when explaining digital watermarking technology, they can extend the discussion to digital copyright protection and the security of cultural dissemination; when teaching software testing, they can emphasize the paramount importance of quality assurance for critical borderland information systems.

Third, they must consciously renew their educational philosophies and embrace the "grand ideological-political education" framework. Curriculum-based ideological and political education is not an added burden but a return to the authentic essence of education and teaching. Computing instructors should recognize that coding standards, architectural design, and interface interaction all embody values, and they must thread cultivation consciousness through the entire chain of lesson preparation, instruction, mentoring, and evaluation. Institutions should purposefully organize teaching workshops grounded in the computing discipline, ethnic cultural experience activities, and demonstration class exchanges for curriculum-based ideological and political education, assisting instructors in accumulating practical wisdom for cross-cultural teaching, so that every instructor can nourish a field of hearts within their own "section of the canal."

In the information age, computing curricula are not bystanders. All computing sub-disciplines must guard their own section of the canal and cultivate their own field of responsibility, forming a teaching community across courses, in which every instructor has vast potential for contribution.

6. Strengthening the organization, implementation, and conditional guarantees for curriculum-based ideological and political education construction

An effective organizational structure and resource guarantee are the foundations for translating the blueprint of curriculum-based ideological and political education into a construction plan.

First, the three-tier linkage mechanism of "university-faculty/department-grassroots teaching

organization” must be perfected. The university Party committee assumes responsibility for top-level design and overall coordination, incorporating curriculum-based ideological and political education into the university’s development plan and “Double First-Class” construction indicators. At the faculty/department level, curriculum-based ideological and political education working groups are established to formulate discipline-specific implementation plans and conduct regular supervision. Teaching and research sections and course teams, as the vanguard units, are responsible for excavating ideological-political elements in specific courses, developing teaching cases, and reviewing their effectiveness.

Second, cross-departmental coordination and resource guarantees must be improved. The boundaries of educational responsibilities among academic affairs, human resources, student affairs, and research departments should be clarified. A dedicated fund for curriculum-based ideological and political education should be established to support the development and sharing of resources such as case libraries, online courses, and virtual simulation experiments. In particular, the informatization advantages of the computing discipline should be leveraged to build an on-campus platform for sharing curriculum-based ideological and political education resources and a data analytics dashboard, enabling the real-time push of exemplary cases and the dynamic monitoring of teaching effectiveness.

Third, the construction of teaching and research communities must be strengthened. Interdisciplinary teaching and research teams composed of disciplinary instructors, ideological and political theory course instructors, ethnology researchers, and industry experts should be formed to conduct regular discussions centered on the focal points for nourishing Xinjiang with culture within the computing discipline. Through collective lesson preparation, teaching observations, and specialized training, instructors’ capacity for pedagogical transformation can be rapidly enhanced, yielding a suite of demonstration courses and teaching standards that possess the distinctive characteristics of the computing discipline and are suitable for wider promotion.

7. Establishing and perfecting the quality evaluation and supervision system for curriculum-based ideological and political education construction

The effectiveness of talent cultivation is the primary criterion for evaluating curriculum reform and the integrated construction of ideological and political education. An evaluation mechanism, supervision mechanism, and feedback mechanism oriented toward scientific cultivation must be established and perfected. The construction of “discipline-based ideological-political education” should be promoted to be implemented in a detailed and practical manner across all teaching activities, achieving all-member, whole-process, and all-round cultivation.

First, an evaluation framework with core socialist values as the core indicators should be established. Students’ ideals and convictions, commitment to family and nation, and sense of ethnic solidarity should be incorporated into course assessment, with particular attention paid to the social responsibility and technological ethical judgment demonstrated by students in project practice, forming a three-dimensional evaluation scale encompassing knowledge, competence, and values.

Second, a two-tier closed-loop quality supervision system at the faculty/department and university levels should be constructed. The implementation of curriculum-based ideological and political education should be incorporated into program evaluation, course evaluation, and faculty assessment, and advanced in coordination with the fulfillment of the principal responsibility for full and rigorous Party self-governance

and the construction of first-class programs. The evaluation should focus on analyzing the “gap” between instructional design and actual effectiveness, identifying deficiencies through student evaluations of teaching, peer reviews, and expert supervision to drive continuous improvement.

Third, the advantages of the computing discipline should be harnessed to promote the digital transformation of evaluation. A data middle platform for curriculum-based ideological and political education teaching should be developed or introduced, integrating multi-modal data such as online learning behaviors, assignment performance, and discussion sentiment tendencies. Learning analytics and natural language processing technologies can be employed to generate visualized diagnostic reports, providing instructors with timely and objective evidence for adjusting instructional strategies and genuinely achieving data-driven precision cultivation.

Fourth, external evaluation dimensions should be expanded. Industry enterprises, employers, alumni, and community representatives should be engaged in evaluation, focusing on examining graduates’ long-term performance in borderland informatization construction and ethnic solidarity practice, using social feedback as a crucial reference for the iterative upgrading of the curriculum-based ideological and political education system.

Fifth, the incentive and constraint functions of evaluation results should be strengthened. Faculty members’ actual achievements in participating in curriculum-based ideological and political education and their cultivation effectiveness should serve as important bases for professional title evaluation, award and honor selection, and position appointment. Special teaching achievement awards should be established to stimulate instructors’ intrinsic motivation.

8. Conclusion

Information technology shapes the face of the contemporary world and profoundly influences the human spiritual realm. Every line of code written and every system constructed by students of computing may generate far-reaching physical and cultural impacts in virtual space. On the vibrant, multi-ethnic soil of Xinjiang, ideological-political cultivation through computing curricula must transcend generic value advocacy and advance toward specialized, systematic, and precise deep-level construction.

This study takes nourishing Xinjiang with culture as its value source and the consciousness of the community for the Chinese nation as its spiritual foundation. It transforms the unique technological contexts of the computing discipline into tangible carriers for ideological and political education, outlining a potential pathway encompassing the restructuring of the cultivation system, whole-process instructional design, faculty competence enhancement, and safeguarding and evaluation mechanisms. Standing at a new historical starting point, local higher education institutions in Xinjiang should drive educational modernization through educational informatization, tell Xinjiang’s story compellingly through digital technology, and forge the Chinese national spirit through professional expertise. They must cultivate generation after generation of information technology talent who bear the nation in their hearts, possess skills in their hands, and have roots beneath their feet, jointly authoring a new chapter in the construction of the community for the Chinese nation across the dual territories of the real and the virtual.

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Disclosure statement

The authors declare no conflict of interest.

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