Article

Research on Digital-Intelligent Construction Pathways for Integrating Teaching Spaces in Ideological and Political Courses Across Primary, Secondary, and Higher Education Institutions

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Abstract: Against the backdrop of educational digital transformation, the integrated development of ideological and political courses across primary, secondary, and higher education has become a core initiative for fulfilling the fundamental mission of fostering virtue through education. As a vital arena for ideological and political education, the integrated construction of teaching spaces serves as a key lever for breaking down barriers between educational stages and achieving the spiral progression required in ideological and political course instruction. Historically, research on ideological and political education has predominantly focused on content and methodological innovation, relegating teaching spaces to the periphery due to their perception as mere "temporal appendages." This has resulted in developmental challenges characterized by fragmented physical spaces, unidirectional social spaces, and disembodied spiritual spaces. The iterative advancement of digital and intelligent technologies now provides the technical foundation for reconstructing and integrating teaching spaces, simultaneously charting new pathways for the integrated development of teaching spaces across primary, secondary, and tertiary levels. Grounded in the characteristics of the digital-intelligent era and drawing upon the spatial turn in educational research, this study takes the course "Ideological Ethics and Rule of Law" as a case example. It explores the intrinsic logic of digital-intelligent technology empowering the integrated development of teaching spaces across primary, secondary, and higher education institutions from three dimensions: practical motivations, core dimensions, and construction pathways. The study proposes a three-dimensional construction strategy to promote the integration of physical teaching spaces, the coordination of social teaching spaces, and the embodiment of spiritual teaching spaces. Ultimately, it establishes an integrated development system for ideological and political education teaching spaces characterized by "technology empowerment-spatial reconstruction -Relationship Reshaping-Value Sublimation" development system for the integrated teaching space of ideological and political courses, providing practical guidance for high-quality integrated development of such courses across all educational levels in the new era.

Keywords: ideological and political courses across primary; secondary and tertiary education; integration of teaching space; digital-intelligence construction; spatial restructuring

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1. Introduction

Looking ahead, digital-intelligence empowerment will continue to enhance the intelligence, integration and human-centeredness of IPC teaching spaces. Technological tools will increasingly support personalized learning and precision teaching, spatial boundaries between virtual and real environments will further dissolve, and the

humanistic orientation of IPCs will be strengthened. Ultimately, digital-intelligence-driven spatial integration will contribute to building a comprehensive, cross-stage and multi-modal moral education ecosystem, providing a solid ideological foundation for cultivating a new generation capable of contributing to national rejuvenation.

2. Realistic Drivers of Digital -Intelligence Empowerment for the Integrated Construction of IPC Teaching Spaces

The digital-intelligence construction of integrated IPC teaching spaces is not a simple superposition of technology and space. Rather, it represents an inevitable response to students' developmental patterns, the national strategy for educational digital transformation, and the practical dilemmas of IPC education. Underlying this process are the interwoven logics of student development, technological innovation, and educational practice.

2.1. Stage-Based Needs of Students' Holistic Development: The Internal Rationale for Spatial Integration

Individual cognitive development and value formation follow a gradual and spiral-upward trajectory. Students at different educational stages exhibit marked differences in thinking patterns, learning capacities, and value needs: primary education emphasizes behavioral habits and emotional enlightenment; secondary education focuses on moral cognition and value discernment; and tertiary education highlights ideals, convictions, and social responsibility. As a key course for cultivating students' worldviews, outlooks on life, and values, IPCs must simultaneously address developmental differences and overall continuity, and provide students with coherent and progressive spatial learning experiences. Traditional IPC teaching spaces, centered on standardized classrooms and governed by an efficiency-oriented temporal logic, tend to reduce the complex process of value formation to unidirectional knowledge transmission, positioning students as passive recipients lacking reflective agency. The spatial disjunction among different educational stages-enlightenment spaces in primary school, cognitive spaces in secondary school, and deliberative spaces in universities-has led to segmented and discontinuous value construction. Digital-intelligence-supported spatial integration can transcend stage-based spatial barriers and design differentiated yet progressive learning environments in line with students' developmental characteristics. Through continuous spatial experiences, students are enabled to move from emotional engagement to cognitive construction and finally to the consolidation of convictions, thereby meeting both the stage-specific and holistic requirements of human development [1].

2.2. The National Strategy of Educational Digital Transformation: The Policy Orientation for Spatial Integration

Recent national education policies emphasize the comprehensive advancement of educational digital transformation and the acceleration of building a modern and strong education system, elevating educational digitalization to a strategic priority. Policy documents such as *The Opinions of the Ministry of Education on Promoting the Deep Integration of Modern Information Technology and Education* and the *Education Informatization 2.0 Action Plan* further highlight the reconstruction of educational spatial forms through cloud computing, big data, and artificial intelligence, and advocate the integration of network space and physical space to create a new educational ecology in which "everyone has a space and everyone uses a space." As a key vehicle for fulfilling the fundamental task of moral education, IPCs must become an integral component of this educational digital transformation. Immersive technologies such as virtual reality (VR), augmented reality (AR), and the metaverse enable the expansion of teaching spaces from material entities to a tripartite configuration encompassing virtual, real, and hybrid environments. Meanwhile, cloud computing and big data facilitate cross-stage and cross-regional

sharing of high-quality IPC resources, providing both strong policy support and technical feasibility for integrated spatial construction.2.3. Practical Dilemmas in the Integrated Development of IPCs: The Realistic Demand for Spatial Integration [2].

Although progress has been made in the integrated development of IPCs, persistent challenges remain at the level of teaching space. First, physical space remains isolated. Due to administrative divisions and resource allocation mechanisms, IPC teaching spaces at different educational stages are fragmented. Online and offline spaces, as well as theoretical and practical teaching spaces, are poorly integrated, preventing the effective sharing of high-quality resources. Second, social space is characterized by unidirectionality. The traditional teacher-centered model reinforces asymmetric power relations and marginalizes students' subjectivity, turning teaching space into an instrument of ideological "infusion. "Third, spiritual space is disembodied. Lacking immersive experiential support, IPCs often fail to bridge moral cognition and emotional experience, resulting in weak internalization of values. These dilemmas stem from the temporalization and singularization of teaching space. The connectivity, intelligent collaboration and immersive features of digital-intelligence technologies provide powerful tools to overcome fragmentation, unidirectionality and disembodiment, and to promote the integration of physical, social and spiritual spaces.

2.3. Practical Dilemmas in the Integrated Development of IPCs: The Realistic Demand for Spatial Integration

Since the early twenty-first century, scholars such as Edward Soja, Max van Manen, and Henri Lefebvre have advanced the spatial turn in educational and social research, challenging the long-standing dominance of temporal thinking and re-establishing the centrality of space. Lefebvre's well-known spatial triad conceptualizes space not as a neutral container but as an organic unity of physical, social and mental dimensions, emphasizing that space is simultaneously produced and productive in social practice. From the perspective of critical pedagogy, educational space is the outcome of educational relations and, in turn, shapes teacher-student relations, peer interactions and the realization of educational values [3]. This theoretical shift clarifies the physical, social and spiritual attributes of IPC teaching spaces. The moral-educational process of IPCs is a dynamic and generative practice in which students engage in reflection, inquiry and action under teachers' guidance. Only through the coordinated functioning of physical space as the material carrier, social space as the relational foundation, and spiritual space as the core arena of meaning can IPCs achieve their value-oriented mission. Digital-intelligence-empowered spatial integration is therefore an application of the spatial turn, enabling a transition from a single material conception of space to a tripartite and integrated spatial paradigm.

3. Core Dimensions of Digital -Intelligence Empowerment for Integrated IPC Teaching Spaces

Guided by Lefebvre's spatial triad and aligned with the educational essence of IPCs and the affordances of digital-intelligence technologies, the integrated teaching space for IPCs encompasses three core dimensions: physical space, social space and spiritual space. Digital-intelligence empowerment reconstructs and integrates these dimensions to form a diversified and synergistic spatial system for moral education.

3.1. Physical Space: From Fragmentation to Integrated and Interconnected Learning Environments

Physical space constitutes the material foundation of IPC teaching. Traditionally centered on classrooms and teaching platforms, it has been characterized by singularity, fragmentation and static configurations. Digital-intelligence technologies transform physical space into an integrated ecology that combines online and offline environments,

virtual and real scenarios, and on-campus and off-campus settings. Three features define the digitally empowered physical space. First, cross-stage connectivity enables unified cloud platforms to integrate IPC resources across primary, secondary and tertiary education. Second, virtual-real synergy is realized through VR/AR and digital twin technologies, enabling immersive experiences of red culture venues and legal-education sites. Third, ubiquitous scenarios are created through 5G and the Internet of Things, extending IPC teaching beyond classrooms into society at large.

3.2. Social Space: From Power Discipline to Equal and Collaborative Interaction

Social space reflects the structure of educational relations. Traditional IPC classrooms often reproduce asymmetrical power relations, limiting meaningful interaction and cross-stage collaboration. Digital-intelligence technologies facilitate a shift toward multi-subject collaboration by establishing triadic interactions among teachers, technologies and students. Intelligent classroom systems and AI teaching assistants enable personalized support and promote dialogic engagement. Furthermore, integrated cloud-based teaching-research platforms foster cross-stage professional communities, allowing teachers from different educational levels to co-design curricula, conduct joint lesson observations and engage in collaborative reflection, thereby forming a synergistic community for moral education [4].

3.3. Spiritual Space: From Disembodied Cognition to Embodied and Immersive Experience

Spiritual space represents the core arena of value construction. Traditional IPCs often emphasize abstract knowledge transmission while neglecting students' lived experiences. Digital-intelligence technologies enable immersive scenarios through VR, AR and panoramic video, providing students with a strong sense of presence and emotional involvement. Data-driven analytics further support teachers in identifying students' value dilemmas and emotional responses, facilitating targeted pedagogical interventions. Through embodied experience and reflective inquiry, students internalize external moral knowledge into personal convictions, achieving an integrated development of cognition, emotion, will and action.

4. Pathways for the Integrated Construction of IPC Teaching Spaces

The integrated construction of teaching spaces for ideological and political courses (IPCs) across primary, secondary and tertiary education, empowered by digital-intelligence technologies, fundamentally aims to realize the systematic reconstruction and dynamic coupling of physical space, social space and spiritual space. By overcoming the long-standing problems of spatial isolation, one-way interaction and disembodied learning, it seeks to establish an integrated teaching-space system characterized by virtual-real co-existence, vertical articulation across educational stages, and the unity of knowledge and action. The specific construction pathways are developed along the three spatial dimensions, while emphasizing their coordinated integration so as to form a holistic and synergistic educational space for IPCs.

4.1. Reconstructing Physical Space: Creating a Three-Dimensional Educational Arena of "Static and Dynamic, Virtual and Real Integration

Addressing the fragmentation and resource silos of traditional physical spaces, digital and intelligent technologies establish a three-dimensional physical space system where "static physical space serves as the foundation and dynamic virtual space acts as the wings." This achieves comprehensive integration of ideological and political teaching resources and extends teaching spaces across all time dimensions [5]. We establish a cloud-edge-end collaborative digital intelligence foundation, building an integrated teaching cloud platform for ideological and political courses across primary, secondary, and higher education. This digital platform unifies resource sharing, teaching

implementation, pedagogical collaboration, and evaluation feedback. It integrates offline physical classrooms, off-campus practice bases, online virtual classrooms, and digital resource repositories from primary, secondary, and university levels, forming a connected digital resource pool for ideological and political education across all school types and grades. This enables efficient cross-grade and cross-regional sharing of high-quality resources, breaking down resource barriers between educational stages. digital resource repositories. This creates a connected digital resource pool for ideological and political education across all school levels, enabling efficient cross-stage and cross-regional sharing of high-quality resources and breaking down resource barriers between educational stages. Construct a dynamically updated digital resource map. Utilize artificial intelligence to perform semantic analysis and knowledge graph construction on ideological and political education textbooks across all educational levels. Automatically identify overlapping content and discontinuities in teaching materials. Based on students' cognitive characteristics and developmental needs at different stages, intelligently recommend appropriate teaching cases, video resources, and practical activities. This forms a spiraling, progressively advancing ideological and political education content system. For instance, elementary schools use animated demonstrations of traditional virtue stories, middle schools conduct value analysis through social hotspot cases, and universities engage in in-depth discussions on cutting-edge topics, achieving content and spatial adaptation across educational stages. We create immersive practice spaces that blend virtual and physical dimensions. Leveraging VR and digital twin technologies, we establish virtual simulation practice bases for ideological and political courses. These transform red educational resources-such as the Red Boat at South Lake, the Jinggangshan Revolutionary Base, and the National Museum-into experiential virtual spaces, enabling students to gain immersive revolutionary experiences without leaving home. Simultaneously, we advance the digital transformation of offline practice spaces, integrating off-campus social practice bases and legal education venues into a unified teaching space system. This achieves an organic fusion of online virtual experiences and offline real-world practice, resolving the disconnect between theoretical and practical instruction.

4.2. Reshaping Social Spaces: Constructing a "Dual-Layer, Multi-Stakeholder Collaborative" Interactive Dialogue Arena

Addressing the issues of power discipline and one-way interaction in traditional social spaces, we leverage digital intelligence technologies to break conventional teaching relationships. This builds a multi-dimensional social space system featuring "on-campus teacher-student interaction and off-campus multi-level collaboration," enabling ideological and political courses to convey values through equal dialogue and deep engagement. We create multidimensional classroom interaction spaces using smart classroom systems and interactive teaching terminals. Features like real-time bullet-screen Q&A, anonymous opinion sharing, group collaborative exploration, and online outcome displays break traditional classroom silence. This encourages students to boldly express their views and uncertainties, fostering deep value analysis and ideological exchange. For instance, when discussing topics like "equity versus efficiency" or "individual versus collective," the system automatically generates opinion cloud diagrams. This enables teachers to accurately gauge students' thought dynamics, promptly adjust teaching priorities, and achieve precision teaching and interactive education. Constructing cross-level teaching research collaboration spaces, the integrated cloud-based teaching research platform establishes paired teaching research and collaborative lesson preparation mechanisms among ideological and political education teachers across primary, secondary, and tertiary levels. Focusing on core educational themes like patriotism education, rule of law education, and life education, it facilitates cross-level teaching seminars, case development, and lesson observation/evaluation activities [6]. The

platform automatically records teaching data, student performance analysis, and instructional reflections across all levels. This enables elementary teachers to understand graduates' performance in secondary school, secondary teachers to track students' foundational knowledge from elementary school, and university teachers to monitor secondary students' core competency development, ensuring seamless alignment of teaching objectives, content, and methods. Expand cross-school student interaction spaces: Utilize 5G holographic projection and online streaming technologies to host cross-school ideological and political activities across primary, secondary, and tertiary levels. Examples include cross-grade red story sharing sessions, moral debate competitions, and collaborative public service initiatives, enabling students from different stages and schools to inspire each other and grow together through exchange. Simultaneously, establish online ideological communities where students share learning insights and discuss social issues, creating integrated online-offline interaction spaces that cultivate social engagement and value discernment skills.

4.3. Revitalizing Spiritual Spaces: Creating Value-Infused Environments Where "Explicit and Implicit Elements Intertwine with Emotion and Reason"

Addressing the issues of disembodied cognition and formalism in traditional spiritual spaces, we leverage digital intelligence technologies to construct a spiritual space system featuring "explicit experiential contexts and implicit value guidance." This enables students to achieve moral emotional elevation and value belief construction through immersive experiences.

Design a tiered immersive experience system. Tailor differentiated, progressive immersive scenarios to the cognitive characteristics and value needs of students across primary, secondary, and tertiary education levels, ensuring precise alignment with each stage. At the primary level, VR role-playing games enable students to experience fundamental moral norms like integrity, kindness, and mutual aid within virtual communities, cultivating moral sentiments; At the secondary level, AR technology recreates historical scenes like the May Fourth Movement, the Long March, and the War of Resistance Against Japan, immersing students in revolutionary spirit to strengthen historical identity and national pride. At the university level, ethical decision-making simulations are developed, challenging students to navigate complex scenarios involving AI ethics, bioethics, and social morality, thereby honing their value judgment and critical thinking skills [7].

Establish a multimodal emotional perception and guidance system. Utilize smart wristbands, facial expression recognition, classroom behavior analysis, and other digital intelligence technologies to collect real-time physiological and psychological data during ideological and political education. Analyze students' emotional trajectories to precisely identify moral emotional confusion and cognitive biases. When the system detects emotional fluctuations or comprehension difficulties, it automatically pushes personalized guidance content and emotional support resources. Teachers can then promptly adjust teaching strategies to provide targeted value guidance and emotional support, making values education more compassionate and precise [8].

Establishing a closed-loop meaning-making cycle of "perception-experience-reflection-practice." Leveraging digital intelligence technologies to bridge the gap between experience and reflection/practice, enabling students to translate virtual moral experiences into real-life ethical actions. Through online moral practice check-ins, offline public service activity coordination, and moral behavior point management systems, students' ethical practice processes are documented, guiding them toward deep reflection on their conduct. Simultaneously, big data analytics synthesize students' moral experience, reflection, and practice data to create personalized value development profiles. This enables comprehensive tracking and tailored guidance throughout the value formation

process, allowing students to complete value construction through the "perception-experience-reflection-practice" cycle and achieve unity of knowledge and action [9].

4.4. Three-Dimensional Integration: Establishing an Integrated Development System of "Technology Empowerment - Spatial Symbiosis - Value Sublimation"

The reconstruction of material, social, and spiritual dimensions does not occur in isolation but forms an organic whole that mutually supports, promotes, and dynamically couples. Digital and intelligent technologies serve as the core link driving the integration of these three dimensions. Within the integrated teaching space system empowered by digital intelligence, the physical space provides the material foundation for social and spiritual dimensions, the social space ensures relational stability between physical and spiritual dimensions, and the spiritual space offers value guidance for both physical and social dimensions. Digital and intelligent technologies establish ubiquitous physical perception networks through 5G and IoT, providing spatial platforms for teacher-student interaction and inter-stage collaboration. They reconstruct equitable and collaborative teaching relationships via AI and big data, offering interactive support for immersive experiences and deep meaning construction. Furthermore, VR/AR and the metaverse create embodied experiential scenarios, imbuing physical and social spaces with value-laden connotations. The symbiotic integration of three-dimensional spaces ultimately achieves three major transformations: First, the teaching paradigm shifts from "knowledge transmission" to "meaning generation," enabling ideological and political courses to truly become value-oriented curricula. Second, the educational model transitions from 'segmented' to "integrated," breaking down barriers between educational stages to form a cohesive force for ideological and political education across primary, secondary, and higher education. Third, learning approaches shift from "disembodied cognition" to "embodied experience," enabling students to achieve the organic unity of knowledge, emotion, will, and action through immersive engagement.

5. Future Prospects

The integrated construction of IPC teaching spaces in the digital-intelligence era is a systematic endeavor that requires comprehensive safeguards in technology, teacher development and institutional design. Technologically, it is essential to enhance infrastructure, improve data security and establish ethical governance mechanisms.

In terms of teacher development, systematic training in digital-intelligence literacy and instructional design is needed to cultivate interdisciplinary teachers who integrate ideological education and technological competence. Institutionally, coordinated governance mechanisms should be established across educational administrations and schools, incorporating spatial integration into evaluation frameworks for IPC development [10].

6. Conclusion

This study explored the digital-intelligence construction pathways for integrating teaching spaces in ideological and political courses across primary, secondary, and tertiary education. Based on the perspective of the spatial turn and Lefebvre's spatial triad, the research analyzed the realistic drivers, core dimensions, and practical pathways of integrated teaching-space development, and proposed a three-dimensional framework involving the reconstruction of physical space, the coordination of social space, and the embodiment of spiritual space. The results suggest that digital-intelligence technologies can effectively overcome spatial fragmentation and promote coherent and progressive moral education by integrating virtual and real environments, collaborative interaction mechanisms, and immersive learning experiences. The integrated development model characterized by technology empowerment, spatial reconstruction, relationship reshaping, and value sublimation provides a feasible approach for improving the

continuity and effectiveness of ideological and political courses across educational stages, while future studies may further examine empirical evaluation methods and practical implementation strategies for digitally integrated teaching spaces.

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