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The Foundation, Manifestations, and Developmental Pathways of Digital Technology-Empowered Collaborative Teaching in University Ideological and Political Theory Courses

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Abstract
The advancement of digital technology has catalyzed innovations in collaborative teaching models for university-level ideological and political theory courses. Technological foundations—including cloud-based collaboration platforms, resource databases, intelligent algorithm systems, virtual simulation technologies, and communication infrastructures—furnish robust support for collaborative pedagogy. Concurrently, pedagogical imperatives such as collective lesson preparation among instructors, curriculum content renewal, and optimization of teaching resources further propel these courses toward collaborative paradigms. The empowering role of digital technology manifests primarily in facilitating instructor-instructor collaboration, bridging disparities in resource access and pedagogical cognition among faculty members. Furthermore, digital tools serve as virtual teaching assistants, alleviating administrative burdens, constructing structured knowledge graphs and deconstructed learning units for students, and enabling asynchronous or personalized content delivery. Future development pathways should focus on 1) enhancing virtual assistant capabilities to advance human-machine collaboration, 2) refining learning algorithm systems to stimulate student agency in collaborative learning, and 3) strengthening teaching platforms and resource repositories to optimize instructor collaboration mechanisms. This investigation into digitally empowered collaborative teaching frameworks holds significant value for the ongoing digital transformation of ideological and political theory education in higher institutions.
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1. Introduction

Teaching of ideological and political theory courses in higher education institutions is a crucial project for nurturing talent, as it undertakes the significant mission of imparting knowledge and values. The advancement of this initiative necessitates the collaborative efforts of multiple stakeholders, with the concerted cooperation of course instructors being particularly vital. In the digital era, some scholars have highlighted that the informatization of collaborative teaching in ideological and political theory courses in higher education institutions should promote various types of collaboration. These include the synergy of information networks, teaching subjects, cooperative teaching, task objectives, and potential release(Yan 2020). From this, it can be seen that the innovation of the collaborative teaching model for ideological and political theory courses in higher education institutions is inseparable from the support of information technology or digital technology.

At present, the main focuses of academic research on the integration of digital technology with the teaching model of ideological and political theory courses are as follows: First, teaching precision. The empowerment of digital technology for precise teaching in ideological and political theory courses in higher education institutions is an inevitable trend of technological empowerment, a requirement of course practice, and a need for the development of the main body. Its core lies in the unity of teacher dominance and student subjectivity(Cao 2022).

With precision as the concept, it aims to enhance the quality and efficiency of teaching in ideological and political theory courses through precise identification, precise profiling, precise monitoring, precise pushing, precise feedback, and precise decision-making(Xiao & Lv 2025). Second, situational teaching. The incorporation of artificial intelligence (AI) technology into the teaching of ideological and political theory courses in higher education can enhance teaching appeal and attraction. It stimulates students' curiosity and participation in the classroom. It also creates virtual social situations that facilitate the combination of teaching theory and practice(Liu 2021). Third, intelligent teaching. Innovating teaching methods with AI requires better training for teachers of ideological and political theory courses. We should fully leverage students' subjective initiative to make teaching classes more lively. We should promote teaching-method innovation with the goal of cultivating students' moral values and talents. To achieve this, teachers need to transform their thinking. At the same time, we should improve the legal system related to the application of regulations and technologies. We should build precise and intelligent platforms for ideological and political theory and reform think tanks. We should also strengthen the research and development of key and common teaching technologies, and enhance the ability to manage and control risks associated with AI(Yan & Lin 2022).

In brief, scholars have extensively explored how digital technology can enhance the precision, situational relevance, and intelligence of teaching in ideological and political theory courses. However, research on collaborative teaching models for these courses based on digital technology remains inadequate. Collaborative teaching in ideological and political theory involves using digital technology to provide students with high-quality and diverse teaching practices and experiences, driven by shared teaching goals and task cooperation. This new collaborative teaching model is significant for promoting innovation in ideological and political theory courses in higher education, improving students' learning experiences and sense of gain, and achieving the teaching goal of cultivating students' moral character. Therefore, the authors propose to explore the collaborative teaching model of ideological and political theory courses in higher education institutions empowered by digital technology.

2. The Technological Foundation of Digital Technology Empowerment for Collaborative Teaching in Ideological and Political Theory Courses

Cloud collaboration platforms, resource databases, intelligent algorithm systems, virtual simulation technologies, and communication technologies provide a solid technological foundation for collaborative teaching in college ideological and political courses. The teaching needs of collective lesson planning, content updates, and curriculum resource optimization further drive the development of collaborative teaching in these courses.

2.1 The Technological Foundation of Digital Technology Empowerment for Collaborative Teaching in College Ideological and Political Theory Courses

In the digital and intelligent era, communication technologies like low - latency audio - video transmission and instant messaging protocols (XMPP/MQTT), along with cloud collaboration platforms like online document collaboration and virtual classroom systems, break geographical barriers for teachers and students in ideological and political theory courses. They enable multi - terminal sharing of teaching resources and real - time interaction.For example, "Tencent Meeting + online documents" plays a significant role in collaborative teaching of college ideological and political theory courses. Tencent Meeting offers various functions in teaching, such as live lectures, resource sharing, group discussions, Q&A with a show of hands, course recording, and playback. Teachers and students of ideological and political theory courses can use digital online collaborative document editing for teaching plans, problems, and processes. They can instantly label confusing points and share teaching resources like presentations. These online tools enable college teachers to teach collaboratively online, share diverse content, and support student interaction and discussion. Digital technology also allows online meeting tools to create digital research spaces and virtual classrooms for ideological and political theory teachers across regions and institutions. This facilitates real-time collaboration, experience - sharing, and teaching innovation. In September 2021, Tsinghua University's Marxist College held an online collective lesson - planning meeting for the "Basic Principles of Marxism" teaching and research section. Many teachers exchanged teaching experiences and plans remotely, ensuring the smooth conduct of semester - long teaching activities(Liu & Long 2021).

Structured storage systems, intelligent tagging technologies, learning management systems (LMS), and content management systems (CMS) collectively enable the construction of digital repositories and learning platforms for ideological and political theory courses in higher education. These ecosystems provide robust environments for collaborative lesson planning, a pedagogical approach that optimizes instructional content and delivery. By

fostering collective preparation, such platforms enhance overall teaching efficiency, elevate instructional quality, and strengthen the pedagogical competencies of educators—particularly early-career faculty—while driving collaborative innovation to meet evolving student needs. Digital learning platforms further facilitate real-time, cross-institutional collaboration among instructors, enabling joint problem-solving, resource sharing, co-creation of innovative teaching methods, peer evaluations, and reflective practice. These environments also encourage the dissemination of best practices and interdisciplinary teamwork. For example, the Ministry of Education's National Networked Collective Lesson Planning Platform for Ideological and Political Theory Courses provides an open, interactive space for online collaboration, cross-institutional team building, and synchronized teaching initiatives.

Intelligent recommendation algorithms, virtual simulation technologies, natural language processing (NLP), large language models (LLMs), and virtual digital human technologies provide the technological backbone for human-machine collaborative teaching in college ideological and political theory courses. These innovations enable the creation of virtual scenarios to animate abstract theoretical concepts from textbooks, intelligently recommend ideological and political theory resources based on user needs, and provide intelligent assessment and feedback on teaching outcomes. Additionally, they leverage content analysis techniques, rule engines, machine learning models, and dynamic feedback mechanisms to help students identify and filter discourses containing erroneous values. For example, the School of Marxism at Zhejiang University has implemented an AI-enhanced "Ideology, Morality, and Rule of Law" course. Supported by deep learning algorithms and computer vision technologies, this initiative simulates human brain neural networks to create digital instructors with robust learning and analytical capabilities. These virtual educators not only feature highly realistic avatars but also understand natural language input, rapidly grasp students' intentions, and provide accurate feedback. By integrating knowledge graphs, they can swiftly retrieve and deploy relevant ideological and political theory content, offering students comprehensive and systematic theoretical instruction and responses. The customization of digital human teachers exemplifies the deep integration of AI technologies with ideological and political theory curricula.

2.2 Pedagogical Foundations for Digital Technology Empowering Collaborative Teaching in College Ideological and Political Theory Courses

Teaching ideological and political theory courses in colleges and universities constitutes a critical endeavor for fostering virtue and cultivating students. To operationalize this objective, it is essential not only to coordinate these courses with other academic disciplines but also to facilitate collaboration between ideological and political theory instructors and their peers across faculties, thereby generating a synergistic effect in moral education. This underscores that teaching ideological and political theory is not a single-threaded task but a collective enterprise requiring concerted efforts from multiple stakeholders. Notwithstanding the series of achievements attained in this field, contemporary teaching of ideological and political theory courses still harbors challenges that demand urgent self-innovation or technological intervention to advance toward a more collaborative pedagogical model.

First, the demand for collective instructional design among instructors of college ideological and political theory courses has catalyzed the emergence of collaborative teaching models. As university-wide public courses—take Fundamentals of Marxist Theory as an illustrative case—these subjects are typically taught by faculty from the Teaching and Research Section for Fundamentals of Marxist Theory to students across all academic disciplines. Within such sections, multiple instructors often develop distinct teaching presentations and lecture materials based on the same textbook, with these instructional design processes predominantly carried out in isolation. This individualistic approach entails two significant risks: (a)Variations in disciplinary expertise, pedagogical experience, and knowledge architectures create cognitive gaps among instructors. Novice educators, in particular, often exhibit less refined instructional design capabilities compared to their seasoned counterparts, leading to inconsistent or starkly divergent teaching quality that undermines learning experiences for some students. (b)Independent instructional design under uniform curricula and textbooks inevitably generates repetitive efforts, exacerbating faculty workloads while constraining holistic pedagogical innovation due to the limitations of individual cognitive frameworks. Collective instructional design for ideological and political theory courses offers a viable solution to bridge these cognitive disparities and enhance both the efficiency and innovativeness of teaching preparation. Through collaborative discourse and complementary expertise, instructors can dismantle intellectual silos while upholding the political correctness of instructional orientations. This process facilitates the sharing of cutting-edge knowledge, teaching strategies, and pedagogical insights, broadens instructional perspectives, optimizes curriculum design, and fosters synergistic co-creation of teaching wisdom. By delivering more intellectually profound and comprehensive learning experiences, it propels the advancement of

collaborative teaching methodologies in ideological and political theory education.

Second, the need for instructors of college ideological and political theory courses to update teaching content has propelled the emergence of collaborative teaching. The instructional content of these courses must keep pace with the times, as only by remaining dynamically relevant can they enhance the effectiveness of ideological and political education. With continuous shifts in societal dynamics and textbook revisions, only vibrant teaching content can withstand temporal scrutiny and meet students' evolving needs. As a pedagogical practice inherently requiring constant renewal, the content, formats, textbooks, and course materials of college ideological and political theory courses should evolve in tandem with societal development and environmental changes. However, in practice, some courses still exhibit inconsistent quality and sluggish updates in teaching content(Wang & Yu 2015). Some instructors reuse outdated courseware across multiple semesters and classes, while others—restricted by variations in expertise and pedagogical experience—deliver significantly divergent instructional content and narrative styles using identical curricula and textbooks. This disparity often results in inconsistencies in teaching content and unequal teaching quality. Digital technologies address these challenges by providing a continuous supply of teaching resources, including exemplary cases, courseware, curricula, methodologies, and models, all serving as vital sources and robust supports for instructional content. These abundant resources broaden instructors' intellectual horizons, inspire innovative approaches, and facilitate systematic renewal of teaching materials while narrowing quality gaps across different instructional contexts.

Third, the need to optimize online ideological and political theory course resources in colleges necessitates collaborative teaching among instructors. Currently, many comprehensive and specialized course platforms host vast amounts of curricular resources, ranging from Marxist worldviews and methodologies, modern Chinese history, core socialist values, to constitutional and legal awareness. While these open online platforms provide rich disciplinary knowledge for faculty and students, they also suffer from redundant course development and inconsistent resource quality. The proliferation of digital materials not only wastes human and financial resources and storage space but also increases the cost and effort of precise searching, leading to suboptimal learning experiences or even misleading ideological content for platform users, including teachers and students. To address these challenges, instructors of ideological and political theory courses must leverage digital technologies to engage in collaborative teaching, reducing low-level repetitive course development and redirecting more time, energy, and intellectual capital toward the research and construction of high-quality ideological and political theory curricula.

3. Manifestations of Digital Technology Empowering Collaborative Teaching in Ideological and Political Theory Courses

The empowerment of digital technology in collaborative teaching of college ideological and political theory courses is primarily manifested in its ability to facilitate teacher-teacher collaboration, bridge resource and cognitive gaps among instructors, and even serve as virtual teaching assistants to handle instructional tasks—such as constructing knowledge graphs, decomposing knowledge points, and delivering delayed or personalized learning content for students.

3.1 Digital Technology Facilitates Teacher-Teacher Collaboration

As an instrumental agent, digital technology plays a pivotal role in enabling collaborative teaching of ideological and political theory courses by fostering collective exchanges and coordinating faculty capabilities. Instructors can leverage digital tools to transcend spatial barriers and engage in diverse forms of online interactive activities, thereby enhancing professional collaboration. For instance, academic forums, seminars, and collective instructional design sessions enable teachers from different institutions to engage in mutual support, experience sharing, and pedagogical reflection exchange—even forming collaborative teams to co-create semester course plans, organize classroom activities, and manage student cohorts. In recent years, the School of Marxism at Central China Normal University has leveraged diverse digital technologies to institutionalize "same-course diverse-design, collaborative co-research" lesson planning activities for ideological and political theory courses. Focused on specific teaching objectives and content, these initiatives convene teachers from undergraduate institutions, vocational colleges, and other higher education sectors to conduct comprehensive mutual-aid exchanges on instructional design, teaching content, pedagogical methods, educational outcomes, and faculty professionalism. This approach has thoroughly transcended the traditional "single-department single-office" enclosed lesson planning model, yielding significant pedagogical benefits and widespread societal impact(School of Marxism 2021).

The 13th Five-Year Plan for Education Informatization proposes deepening the construction of "specialized delivery classrooms," "distinguished teacher classrooms," and "elite school network classrooms." Through a model where outstanding educators mentor ordinary teachers, these initiatives aim to continuously expand the online coverage of high-quality teaching resources in colleges and universities while promoting the collaborative development of faculty capabilities and structures (Ministry of Education 2016).The specific forms of digital technology-enabled regional collaborative teaching of ideological and political theory courses include: sharing teaching resources of ideological and political theory courses, conducting remote collaborative lesson planning, organizing synchronous or asynchronous teaching activities, and carrying out collective teaching evaluation and summarization after class. With the empowerment of digital technologies, instructors of college ideological and political theory courses are expanding the reach of high-quality online teaching resources, striving to bridge the gaps in faculty capabilities between superior and underdeveloped regions, advanced and lagging institutions. Through specialized technological platforms and devices, excellent teaching methodologies, instructional models, course content, procedural frameworks, and case materials are intelligently delivered to instructors in ordinary colleges, combining the provision of "fish" (ready-made resources) with "fishing skills" (capacity-building). This dual approach enhances their capabilities for independent innovation and participation in digital co-construction of ideological and political theory curricula. Through accessing and observing high-quality ideological and political theory course resources, instructors in ordinary colleges and universities can narrow the digital divide, creating opportunities for self-improvement while fostering national-level connectivity among teachers of these courses. This process alleviates the tensions arising from unequal faculty distribution, thereby optimizing the structural composition and overall competence of teaching teams for ideological and political theory courses. By doing so, it meets the expectations for comprehensive connectivity and enhanced effectiveness in future teaching, maximizing the utilization of digital teaching resources(Xiao & Lv 2023). For instance, some instructors of college ideological and political theory courses acquire techniques to enhance student engagement from outstanding teachers of the *Outline of Chinese Modern and Contemporary History* course through ideological and political theory consultation platforms. They integrate English-language historical materials into instruction for English majors, employ the case of Liang Sicheng and his wife's efforts to protect the ancient city walls of Beijing or their institution's founding history to illustrate the vicissitudes of modern Chinese history for engineering students, and utilize the medical education experiences of Sun Yat-sen and Lu Xun as thematic content in modern Chinese history lessons for medical students.

3.2 Digital Technology Promotes Human-Machine Collaboration

Digital technology, assuming an agentive role, significantly aids college instructors in delivering ideological and political theory courses, promoting human-machine collaborative teaching. A prominent model is the "ideological and political theory instructor + virtual teaching assistant," where virtual assistants mimic or undertake part of the teaching workload, such as recording students' learning behaviors and outcomes while providing personalized services including real-time Q&A, learning diagnostics, after-class tutoring, study plan adjustment, learning path planning, and humanistic care(Guo, Zheng, & Huang, 2017). In 2024, Tsinghua University leveraged the GLM large-scale multimodal model with hundreds of billions of parameters to create AI teaching assistants for multiple courses, exemplifying innovative human-technology collaboration in higher education.

First, prior to ideological and political theory course instruction, college teachers can upload pre-class reading materials through teaching assistant systems and assess students' autonomous pre-learning engagement based on document download counts and browsing durations in the backend. During students' online pre-learning, intelligent systems can provide pre-class guidance tailored to their questions or needs. Generative artificial intelligence (AI) tools represented by ChatGPT and Microsoft Copilot help clarify fundamental terminology, theoretical perspectives, and timelines, while recommending suitable Marxist works, important party and state documents, international communist movement materials, historical and philosophical knowledge, academic papers, ideological and political theory lectures, and practice question links based on pre-learning performance data. Technical systems functioning as virtual teaching assistants can also stimulate students' motivation and interest in these courses, expand the depth and breadth of their pre-learning, evaluate pre-learning outcomes, and provide timely feedback to instructors before class. By leveraging data feedback from the pre-learning phase, teachers gain a more comprehensive understanding of student readiness, enabling more rational design of teaching content and activities.

Secondly, virtual teaching assistants can assist students in constructing multi-level knowledge graphs or refining and decomposing knowledge points, enabling them to holistically grasp and form a clearer ideological and

political theory knowledge system. For example, for students studying the Fundamentals of Marxist Theorycourse, virtual assistants can generate a structured knowledge framework based on the entire textbook, covering core modules, fundamental laws, key categories, and methodologies—including Marxist philosophy with dialectical and historical materialism as its core module, Marxist political economy centered on commodity economy, surplus value theory, and the essence and development of capitalism, and scientific socialism focusing on the essence of socialism and communist ideals. These systems further categorize and summarize key knowledge points within each core module, using hierarchically analyzed and logically structured knowledge graphs to help students build cognitive frameworks for ideological and political theories, facilitating the comprehension, correlation, and memorization of theoretical principles while cultivating their theoretical and applied thinking abilities. This human-machine collaboration model not only enhances students' learning efficiency, enthusiasm, and effectiveness by providing more diversified learning services for ideological and political theory courses but also supports teaching reform and innovation in these courses while advancing the educational goal of fostering virtue through education. Additionally, virtual assistants can assume part of the procedural, repetitive, standardized, and simple knowledge-point explanations, thereby alleviating instructors' teaching burdens to some extent and maintaining their pedagogical enthusiasm. Furthermore, they can efficiently grade objective questions, statistically analyze student performance, generate corresponding learning reports, and assist teachers in comprehensive evaluation and scientific decision-making through quantitative teaching assessments.

Finally, virtual teaching assistants offer sustained learning services to students. For instance, when reviewing course content after class, students can continuously pose questions to virtual assistants at any time. AI assistants grounded in large language models and course knowledge bases exhibit robust language comprehension and generation capabilities, enabling real-time online interactions to clarify doubts in ideological and political theory instruction or textbooks, and even recommend learning resources and path planning. They can also capture real-time social trends post-class, precisely recommending current affairs news, political theories, historical culture, moral and legal principles, and policy analyses tailored to students' individual preferences. Based on students' needs and performance, these systems customize learning pathways and plans for Marxist theory and political education. While assisting instructors in achieving classroom teaching objectives, they strengthen the cultivation of students' patriotic sentiment, social responsibility, people-centered ethos, dedication, practical competence, and innovative thinking through rich digital media content, addressing their growing demands for emotional and skill development. Furthermore, to foster the integration of theoretical and practical instruction in ideological and political courses, virtual assistants can optimize functions for intelligently pushing practical teaching activities such as red culture visits, community research services, and environmental protection initiatives. These efforts help students apply Marxist theory to social practice, deepen their sense of national and familial commitment, and enhance dialectical thinking, innovative problem-solving, and practical abilities through analyzing and resolving real-world challenges.

4. Approaches to Digital Technology Empowering Collaborative Teaching in Ideological and Political Theory Courses

To further deepen the empowerment of digital technology in collaborative teaching of college ideological and political theory courses, three strategic pathways may be pursued: upgrading the capabilities of virtual teaching assistants for ideological and political theory courses to enhance human-machine collaboration, optimizing learning algorithm systems for these courses to stimulate students' subjectivity in collaborative learning, and strengthening the construction of teaching platforms and resource repositories to promote teacher-teacher collaboration.

4.1 Upgrading the Capabilities of Virtual Teaching Assistants for Ideological and Political Theory Courses

Virtual teaching assistants supported by digital technology represent a critical avenue for human-machine collaborative teaching in ideological and political theory courses. Enhancing the capabilities of virtual teaching assistants is essential to assisting instructors and advancing the collaborative development of teaching in these courses.

Building on the current real-time Q&A functionality, further upgrade the capabilities of virtual teaching assistants (VTAs) for ideological and political theory courses by optimizing deep learning, natural language processing (NLP), knowledge graphs, and multimodal pre-trained large models. This enhancement enables VTAs to more accurately interpret students' questions or behaviors during interactive dialogues and deliver more

relevant, comprehensive, and in-depth correct answers aligned with ideological and political theory learning. Meanwhile, integrating computer vision and emotion recognition technologies empowers VTAs to comprehensively capture, record, and analyze classroom learning data—including eye movement, voice, facial expression, and motor action data—to precisely identify students' emotional, psychological, and learning states. Such capabilities provide scientific and comprehensive foundations for addressing students' emotional needs post-class, constructing learner models, and facilitating instructors' analysis and reflection on teaching processes to identify issues promptly and refine teaching strategies. For example, instructors of the Outline of Chinese Modern and Contemporary History course might use VTAs to collect student discourse data on the *"Chongqing Negotiations*" thereby mining their familiarity with the event's figures, locations, nature, content, and outcomes(Li 2022).

Viewed through the lens of educational ecology optimization, teachers' instructional characteristics and students' learning traits can be conceptualized as a dynamic "genetic chain" to construct a coevolutionary matching model for teacher-student collaboration. Specifically, virtual teaching assistants extract multi-dimensional expertise from instructors—such as theoretical interpretation, case-based teaching, and practical guidance—and categorize teaching styles into speculative, narrative, and interactive types. Meanwhile, they integrate students' cognitive modalities (visual, logical, experiential) with knowledge base vectors to form a multidimensional feature gene pool. Through crossover and mutation operations of genetic algorithms, the system generates diversified pairing schemes for teachers and students, using fitness functions composed of teaching objective achievement rates, cognitive gain curves, and emotional resonance indices to quantitatively evaluate the effectiveness of different teacher-student combinations. Highly compatible combinations are selected for iterative optimization, and through multi-generational evolutionary screening, dynamic resonance is achieved between teachers' instructional resource allocation and students' personalized needs for ideological and political theory education. This model breaks through the limitations of traditional static matching, employs computational intelligence to drive teacher-student collaborative teaching in ideological and political theory courses, and provides a theoretical framework for enhancing the synergistic educational effectiveness of curriculum instruction.

Continuously Enhancing the Teaching Service Level of Virtual Teaching Assistants in College Ideological and Political Theory Courses. Current virtual teaching assistants (VTAs) can assist teachers and students in teaching according to predefined procedures, particularly playing a significant role in answering questions related to ideological and political theory courses during pre-class preview and post-class tutoring phases. However, these interactions generally rely on text-based input and output. To further improve the efficiency of human-machine communication and students' learning experience, the development and refinement of voice interaction functions for VTAs are essential. Voice interaction eliminates the need for visual focus on screens, enabling faster transmission of needs and information through sound signals alone while conveying linguistic emotions and tones, which is more intuitive, natural, and richer in layers compared to text. Additionally, even more intelligent human-machine interaction could be achieved through brain-computer interface (BCI) technology. For example, in the future, students might transmit their brainwave signals related to searching for "the operating laws of capitalist society" to a computer, which would process and convert these signals into instructions for searching specific knowledge points in ideological and political theory courses. Finally, computers or other terminal devices would directly display the answers without conventional text or audio input.

4.2 Optimizing the Learning Algorithm System for Ideological and Political Theory Courses

Optimizing algorithm recommendation systems to stimulate students' subjectivity in collaborative learning requires not only enabling algorithms to precisely push relevant learning materials (e.g., literature, videos) based on students' mastery of specific knowledge points and learning behaviors but also enhancing model structures, accelerating training processes, and strengthening semantic analysis. These improvements allow the system to accurately analyze students' submitted assignments and discussion forum posts, assess their depth of understanding and thinking tendencies regarding ideological and political theory concepts. Simultaneously, by constructing student relationship graph models from multi-source information, the system calculates similarity and correlations between student nodes through information dissemination and aggregation, capturing complex hidden connections among students. This process matches students with similar learning profiles into collaborative groups for targeted ideological and political theory knowledge point discussions, automatically forming study clusters.

Reinforced deep learning algorithms play a pivotal role in optimizing algorithmic recommendation systems. By intelligently analyzing students' learning history records in ideological and political theory courses—such as

study duration, attention to current political topics, discussion participation frequency, and interest needs—these algorithms can deeply uncover students' latent learning interests and behavioral patterns in learning. For example, neural network algorithms are continuously employed to extract and analyze behavioral data and features like browsing records, clickstream data, dwell time, and note-taking records, identifying students' high attention to specific current political topics to infer their interest points in related ideological and political theory knowledge and their evolutionary trends, while mining student groups with similar learning trajectories to classify them into different ideological and political theory learning communities. After establishing digital communities, a reinforcement learning-based community management model is constructed, using multi-agent systems to continuously support community activities, promote the sharing of ideological and political theory resources across communities, and provide intelligent learning assistance—such as setting discussion themes and activity processes, real-time monitoring of students' learning participation, discussion depth, and satisfaction; establishing a student feedback mechanism to continuously feedback data on clicks, collections, and completion of pushed ideological and political theory materials—to dynamically optimize the accuracy of algorithm parameters, recommendation strategies, activity content, and organizational plans.

4.3 Strengthening the Construction of Teaching Platforms and Their Resource Libraries

The sharing of teaching resources in college ideological and political theory courses serves as the foundation for promoting complementary faculty strengths, particularly between remote and central regions, and advancing collaborative teaching in these courses. Therefore, it is essential to enhance the construction of technological teaching platforms and their teaching resource libraries. On one hand, to create a favorable collaborative teaching environment for college ideological and political theory course instructors, efforts must be made to continuously consolidate the infrastructure of technological teaching platforms to support nationwide access and collaborative teaching research among instructors; optimize search and filtering functions to enable teachers to efficiently locate sssrequired teaching resources or training materials; improve loading speeds to ensure smooth remote sharing, interactive communication, and real-time collaboration among teachers; continuously collect and incorporate the experience and feedback of instructors using the platform for improvement; and simultaneously protect the information and privacy security of college ideological and political theory course teachers when using the platform.

On the other hand, establishing collaborative teaching resource libraries is crucial. The *Notice of the Ministry of Education and Other Ten Departments on Issuing the Work Plan for Comprehensively Promoting the Construction of "Grand Ideological and Political Theory Courses*" emphasizes the need to strengthen the construction of digital teaching resources for ideological and political theory courses, promote the normalization and institutionalization of teaching resource development, and "organize the development and recommendation of a batch of scientific, authoritative, and practical courseware and teaching materials to facilitate unified adoption by frontline teachers."(Ministry of Education, et al 2022)Based on this, the following resource libraries can be established. Firstly, a teaching case library of the ideological theory of the Communist Party of China, especially Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, can be established by integrating vivid practices. Secondly, an advanced teaching content library can be created by aggregating the teaching designs, high - quality courseware, and exemplary teaching materials of the backbone teachers of the ideological and political theory courses in colleges and universities. Thirdly, by paying real - time attention to and investigating public opinions, a hot - spot and difficult - problem library for the ideological and political theory courses in colleges and universities can be captured and maintained. Fourthly, a multi - level, high - quality, systematic, and open cloud - based ideological and political theory course library for colleges and universities can be established. Fifthly, a digital learning space for the ideological and political theory courses in colleges and universities that allows for self - setting, interaction, innovation, and sharing can be established, and students are encouraged to utilize resources, analyze knowledge, conduct inquiry - based learning, discuss themes, carry out cloud - based practices, and provide feedback on questions according to their actual needs. In addition, the collaborative teaching platform can also regularly organize themed, interdisciplinary, and cross - regional seminars to jointly explore the moral - education elements in the course knowledge, share innovative cases that combine the latest developments with political theories, conduct online collective lesson preparation and cooperative exchanges, and promote the collaborative education of the ideological and political theory courses and other courses. In conclusion, as a digital hub for storing, converting, and connecting the teaching resources of the ideological and political theory courses in colleges and universities, the digital - technology - based teaching platform can open up new paths for the collaborative teaching of these courses.

5. Conclusion

This study explores how digital technology can promote collaborative teaching in college - level ideological and political education. It focuses on the logical foundation, forms and practical approaches of this promotion, aiming to provide a theory reference for renewing the teaching paradigm of ideological and political courses in the new era by deeply integrating technology and teaching. In terms of logical foundation, the study explores the underlying conditions for digital - technology - enabled collaborative teaching from two aspects: technological and teaching foundations. Cloud - based collaborative ecosystems, smart resource storage, intelligent algorithm systems, virtual simulation environments, and advanced communication technologies are highlighted. These offer robust technological support for innovating the teaching model of ideological and political courses in higher education. Meanwhile, teachers' strong demand for collective research and teaching, and the urgent need for teaching - content iteration and course - resource integration, are driving ideological and political education towards collaborative transformation. In terms of forms, the focus is on how digital technology promotes teacher - to - teacher collaboration and human - machine collaboration. It reveals the important role of digital platforms for ideological and political education and virtual teaching assistants. They can improve the efficiency and experience of collaborative teaching. Specifically, they promote the sharing of teachers' wisdom. They help reduce differences in knowledge reserves and teaching understanding through complementary advantages. They also assist teachers in teaching management via intelligent assistant systems. By building visual knowledge frameworks and breaking down knowledge units, they offer students customized learning services. In terms of practical approaches, the paper proposes strategies for deeper empowerment. These strategies focus on three aspects: improving the interactive effectiveness of intelligent teaching assistants, optimizing personalized learning algorithms, and refining the resource ecosystem of smart teaching platforms. The paper notes that further exploration is needed in deeply integrating human - machine collaboration. This will drive the high - quality development of collaborative teaching models in college ideological and political courses.

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