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Digital Technology Empowerment for Precision Teaching in University Ideological and Political Theory Teaching Including Foundations, Manifestations, and Development Paths

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Abstract: Digital technology offers new prospects for precision teaching in ideological and political theory courses at universities. This empowerment is based on big data, algorithms, and computing power, and it also responds to the practical needs of teaching innovation and the development of teachers and students. It mainly takes the forms of accurately identifying learning situations, precise monitoring, analysis, content delivery, evaluation, and decision-making. To further enhance digital technology's role in teaching, we can collect more teaching data, build better digital support systems, and improve teachers' digital literacy. Exploring the foundations, manifestations, and development paths of digital technology's empowerment in this field is crucial for promoting the digital transformation of teaching and building a strong educational nation.

1. Introduction

Ideological and political theory courses in higher education, known as ideological and political courses, are crucial for consolidating Marxism's guiding role in ideology, cultivating talents for the Party and the nation, enhancing the four consciousnesses, fostering builders and successors for socialism with Chinese characteristics, and nurturing new-era individuals dedicated to national rejuvenation. However, traditional teaching methods in these courses are struggling to meet students' growing personalized learning needs. There is a contrast between teachers' enthusiasm and students' disengagement, with delayed feedback mechanisms and reduced time for understanding student needs due to research pressures, all of which hinder knowledge internalization in ideological and political courses. To accurately grasp students' learning needs, cognitive states, and learning paths, and to enhance teaching efficiency, digital technologies offer new approaches for precision teaching in higher education ideological and political courses.

2. The Foundation of Precision Teaching in Ideological and Political Courses in Higher Education Empowered by Digital Technology

The technological foundation of digital technology-enabled precision teaching in ideological and political courses lies in its unique data, algorithm, and computing power advantages. Big data is the data foundation, algorithms the intelligence engine, and computing power the technological guarantee. The teaching foundation of digital technology-enabled precision teaching in these courses is the internal demand of ideological and political courses for self-renewal, moving from general understanding to grasping student needs, learning dynamics, and evaluation accurately. Digital technology, as a powerful tool extending teachers' and students' physical and intellectual capabilities, meets students' individuality needs in precision teaching and helps teachers improve their information literacy and professional skills.

2.1. Technological Foundation

Big data is the cornerstone of digital-enabled precision teaching. The more comprehensive the principal (student-related) and resource data, the more precise the teaching. Principal data includes student basics, learning status, and life performance, while resource data covers texts, videos, images, audio, and HTML related to ideological and political courses. Especially, principal data reveals learning and living patterns. Analyzing full-sample data with digital technology uncovers hidden student knowledge levels, learning states, and ideological qualities, presenting this information visually. This supports early problem identification, self-evaluation, customized learning paths, and trend prediction for students.

Next, algorithms are the intelligence engine of digital-enabled precision teaching. In ideological and political courses, teachers and students use diverse algorithms to boost teaching and learning accuracy. Recommendation algorithms tailor learning plans to students' levels, needs, preferences, habits, and pain points, personalizing learning. Sentiment analysis algorithms help teachers grasp students' psychological and emotional shifts, analyze their states and motives, and adjust methods for targeted intervention. Deep learning algorithms monitor learning dynamics, promptly detecting and feeding back students' issues to teachers. Self-adaptive learning algorithms adjust teaching content, pace, and difficulty based on students' learning demands, progress, and performance, offering adaptive tests and knowledge-filling solutions.

Finally, computing power is the technological guarantee for digital-enabled precision teaching in these courses. It refers to the ability to process data into useful information, covering computing speed, data storage, and transmission, determining data processing efficiency. Strong computing power is essential for handling large-scale, complex, and real-time ideological and political course data. The stronger the computing power, the better the data mining and analysis. It helps identify students' knowledge levels and teaching expectations, spot learning patterns and ideological trends, and provide real-time feedback. This enables teachers to adjust teaching contents, methods, and pace more precisely, predict students' future learning needs more accurately, and offer more targeted support or interventions.

2.2. Teaching foundation

The application of digital technology in precision teaching of ideological and political courses in higher education is rooted in the practical need for teaching innovation. Traditional teaching methods have certain limitations in accurately understanding students' learning situations and require technological integration to enhance precision.

Firstly, there is a transition from vague understanding to accurately determining student needs.

The conventional "one-size-fits-all" teaching approach can no longer satisfy students' diverse demands, leading to an imbalance between standardization and personalization. Therefore, ideological and political course instruction cannot depend solely on subjective estimation of student needs but should utilize technical tools for extensive surveys and assessments to clarify true demands. By collecting and analyzing relevant information, a detailed student-need profile can be created, allowing for precise setting of teaching contents, strategies, and processes based on these needs.

Secondly, the direction is from general methods to precisely grasping learning dynamics. In traditional teaching, teachers find it difficult to comprehensively understand students' psychological and ideological states, values, knowledge reserves, ability levels, and learning behaviors. Moreover, teachers may fail to dynamically adjust teaching contents due to inattention to student changes, losing the basis for differentiated instruction and reducing course relevance and appeal, which results in a disconnect between teaching and learning. To resolve this, before teaching, instructors can leverage technical advantages to pre-understand students' cognitive expectations and attitudes towards teaching themes, or engage with their views on social issues and phenomena[1]. They can also grasp students' current ideological, psychological, moral, cultural, legal awareness, and knowledge levels through learning logs, conversations, etc., identifying teaching priorities and the "Zone of Proximal Development." During teaching, digital technology enables teachers to observe and record students' learning emotions, participation, engagement, and attention. After teaching, educators can promptly and objectively analyze and diagnose student learning dynamics and precisely determine further consolidation or compensatory teaching based on learning outcomes.

Lastly, the shift is from general evaluation to accurate assessment. Current teaching in ideological and political courses tends to focus on result-based evaluation, primarily using academic performance to measure learning effectiveness. However, educators should also monitor students' ideological states and values beyond academic performance. Therefore, the evaluation approach should evolve from result-based to process-based, considering students' specific situations and course characteristics for refined assessment. A rubric evaluation system blending quantitative and qualitative methods should be established, encompassing not only explicit scores and attendance but also implicit indicators such as political literacy, ideological character, values, moral behavior, and practical skills.

2.3. Humanistic Foundation

The needs and development of teachers and students are the main basis for digital-enabled precision teaching in ideological and political courses. Firstly, digital technology is a powerful tool that extends the physical and intellectual capabilities of teachers and students. For example, wearable devices can be used by teachers and students to go beyond spatial and temporal limits and get a more three-dimensional and lifelike teaching experience in virtual reality teaching scenarios.

Secondly, digital-enabled precision teaching meets students' individuality needs. In the information age, pervasive technology plays an important role in students' learning and daily life, providing them with digital information, intelligent platforms, and virtual partners. Interacting with technology daily shapes students' unique learning needs and styles for ideological and political courses, requiring a shift from traditional teaching to more personalized instruction. Moreover, students' values, influenced by internet-based information and surroundings, need precise guidance from these courses.

Finally, digital-enabled precision teaching also meets the internal need of teachers to enhance their information literacy and professional competence. As digital technology integrates more deeply with teaching, teachers' existing knowledge and ability reserves may be limited due to their educational background and experience. They need to use digital technology, especially generative AI, to broaden their knowledge, learn from others' teaching methods, and update teaching materials and discourse to

improve their teaching proficiency.

3. The Key Dimensions of the Manifestation of Digital Technology - Enabled Precision Teaching in Ideological and Political Courses in Higher Education

Digital technology can enhance the precision teaching of ideological and political courses in higher education through accurate identification, monitoring, analysis, recommendation, evaluation, and decision-making.

Accurate student-need identification is the starting point for digital-enabled precision teaching in ideological and political courses. Teachers can use digital technology to create detailed student profiles. Facing students from diverse academic backgrounds, learning foundations, personalities, interests, family backgrounds, and life trajectories, teachers can apply machine learning to analyze behavioral data and uncover students' needs, learning patterns, and difficulties in these courses. They can also use natural language processing to extract from generated text data students' interest, attitudes, and current moral standards, precisely mapping out their learning situations. Through intelligent testing, perception, and analysis of historical learning traces, teachers can identify students' attributes, interests, thinking patterns, and knowledge structures, model them, and generate visual, multi-dimensional teaching profiles, presenting concrete, three-dimensional, and multi-faceted teaching targets for ideological and political courses.

Accurate monitoring is the control center for digital-enabled precision teaching in ideological and political courses. During teaching, teachers can monitor and record students' actions, expressions, and voices in real time using video surveillance, voice recognition, and data mining technologies. This generates corresponding eye-movement, expression, action, language, and learning data, allowing teachers to precisely capture students' learning dynamics, homework completion, understanding of content, and value judgments in these courses. They can even track students' daily life data to analyze their ideological and emotional states, learning preferences, motivations, needs, and problems[2]. For example, smart classroom technologies can record the entire teaching process, including students' listening expressions, movements, duration, interaction, and task completion. Digital platforms can monitor students' login, browsing, answering, discussion, and testing data. These real-time data provide a basis for teachers to review the "whole picture" of teaching, reflect, and make decisions.

Accurate analysis is the core of digital-enabled precision teaching in ideological and political courses. Teachers can use the statistical functions of digital technology to precisely analyze students' quiz scores, in-class attention, and satisfaction with teachers and courses, identifying teaching outcomes, strengths, problems, blind spots, and warning signs. Through deep learning, they can analyze students' daily life and learning behavior data to understand their rational beliefs, value-emotional states, civic literacy, and cognitive confusion points, grasping the characteristics and trends of students' ideological and behavioral development. Data mining technology's association rules can be used to analyze the hidden connections between student motivation and learning behavior, teacher performance and student learning, and different teaching phases. Cluster analysis can accurately group students by interests or learning levels, enabling targeted guidance and personalized teaching.

Accurate recommendation is the core mechanism of digital-enabled precision teaching in ideological and political courses. Relying on student data analysis, algorithm models, and feedback mechanisms, digital technology can accurately recommend teaching contents and forms. The recommendation approaches are mainly based on user, collaborative, associative, and learner-model recommendations[3]. User-based recommendation delivers suitable learning materials according to students' learning needs, interests, and historical behaviors in ideological and political courses, stressing the match between learning situations and contents. For instance, if a student is interested in patriotism education, the algorithm can recommend relevant materials to him. Collaborative

filtering groups students by the similarity of their learning thoughts or behaviors, promoting cooperation and exchange among them, and accurately recommending suitable or preferred learning contents. Associative recommendation, based on the correlation or progression between different learning contents, recommends information resources related to what students have learned, helping them gain a more comprehensive understanding and mastery of the knowledge.

Accurate evaluation is crucial in digital-enabled precision teaching of ideological and political courses. As digital technology becomes more integrated with teaching, it offers new prospects for precise evaluation. It allows for comprehensive, full-process, and life-cycle data collection and analysis on student basics, teaching process, and effects, based on preset criteria. This enables visual tracking of students' ideological and behavioral changes, trends, and patterns. Evaluations are dynamic, with data-based interpretations and summary reports fed back to teachers. The evaluation covers diverse aspects: class performance, knowledge acquisition, and changes in emotions, abilities, ethics, cognition, thinking, and aesthetics due to learned knowledge, all key for precise teaching evaluation.

Accurate decision-making is the functional direction of digital-enabled precision teaching in ideological and political courses. Traditional teaching decisions in this area often rely on teachers' experience and instant intuition, which can be subjective and may deviate from actual situations. Digital technology can enhance the precision, scientific nature, and objectivity of decision-making in ideological and political course teaching. Digital technology supports teachers' decision-making through two mechanisms. The first is data collection and analysis. Under specific teaching goals, it collects a large amount of dynamic data, including student situations, teaching process, and results. Then, it professionally and intelligently processes this data according to analytical models to accurately determine students' learning needs, states, characteristics, patterns, and problems in these courses. The second mechanism is feedback and adjustment. Digital technology can continuously adjust and optimize algorithm models based on feedback results. This allows it to provide teachers with more precise data and better teaching suggestions or plans, helping them make more accurate and wise decisions.

4. The Way Forward for Digital Technology-Enabled Precision Teaching in Ideological and Political Courses in Higher Education

As mentioned, digital technology is crucial for precision teaching in higher education ideological and political courses. To deepen its integration with teaching, we can focus on three aspects: promoting big data collection, establishing digital support systems, and enhancing the teaching team's digital literacy.

Firstly, promoting big data collection for ideological and political courses is essential. Data is the foundation for digital technology to drive teaching. Without sufficient data, teaching efforts would struggle. Therefore, collecting and integrating teaching data is the first step in enhancing digital-enabled precision teaching. This involves two main approaches. On one hand, comprehensive data collection methods such as digital surveys, online interviews, system collection, web crawling, intelligent sensing, data mining, and open-source data can be used. These methods should be employed to gather data on teachers, students, teaching processes, and results around the clock. Given the special nature of ideological and political courses, it is important to focus on students' cognitive, emotional, conative, and behavioral data. Regarding cognition, teachers should use digital technology to collect students' existing knowledge and views on political ideology, theoretical literacy, values, principles, methods, party history, national history, morality, and law. They should also gather information on students' outlooks on life, worldviews, learning needs, abilities, innovation skills, and practical skills. For emotions, data on students' learning emotions, interests, ideals, faith, patriotism,

social responsibility, and work spirit should be collected. In terms of conation, data collection should focus on students' willpower, motivation, concentration, attitude, determination, and thinking during the learning process. Regarding behavior, data on students' execution, time management, learning methods, habits, performance, effectiveness, and patterns in ideological and political courses should be gathered. This also includes their dynamic behavior in the "second classroom." On the other hand, digital technology should be used to establish and update databases related to teaching processes and results. This involves collecting and integrating information on teaching content, methods, models, tasks, effects, interactions, innovations, and shortcomings for each ideological and political course, both online and offline. These data will provide an objective basis for teachers to evaluate, decide, and predict teaching outcomes, as well as to fully understand, reflect on, and improve their teaching.

Secondly, it is vital to enhance the digital infrastructure for precise teaching in ideological and political courses. An effective digital system is essential for processing big data and promoting precision teaching. This digital support system encompasses equipment, technology, methods, and applications[4], all of which should be synchronized with teaching activities to provide continuous support. Updates to the system include real-time data collection, analysis model optimization, performance enhancement, platform functionality expansion, and vulnerability fixes. These tasks are collaboratively undertaken by professional technicians and teachers. Prior to updates, it is necessary to assess the compatibility between the current system and teaching activities, the system's data collection capabilities, its performance in teaching, and user feedback. Based on this evaluation, a well-planned update strategy can be formulated. To satisfy the diverse needs of teachers and students, improve teaching services, and maintain optimal system performance, technicians should regularly develop, maintain, and refine the software. They must also conduct functional and security tests on the new system to ensure stable operation. Additionally, data backup and recovery measures should be implemented to prevent data leaks and misuse.

Thirdly, it is essential to comprehensively enhance the digital literacy of the teaching staff for digital-enabled precision teaching in ideological and political courses. Digital technology and its application in teaching bring both opportunities and challenges, imposing new requirements on teachers' skills, roles, and literacy. To advance digital-enabled precision teaching, teachers need to boost their digital literacy to increase knowledge reserves, improve teaching ability, promote students' all-round development, and achieve moral education goals. Teachers should proactively enhance their digital awareness by closely following the development of digital technology, especially generative AI, and its application in ideological and political courses. They need to understand common intelligent teaching tools like ChatGPT, DeepSeek, and Kimi, including their usage and precautions, and clarify the value, characteristics, methods, principles, and risks of integrating digital technology with teaching. Teachers should skillfully use AI tools to search for information, maintain focus in vast data, and efficiently obtain, analyze, and filter needed information. They should objectively evaluate and critically use information, correctly applying it to precision teaching practice, strengthening digital innovation awareness, and enhancing professional knowledge and ability to improve teaching quality. Teachers must adhere to information ethics, legally use digital technology for information acquisition and interaction, respect others' rights, comply with laws, protect their and their students' information security, and avoid information ethical and moral risks[5].

5. Conclusion

In summary, exploring the basis, manifestations, and pathways of digital technology-enabled precision teaching in ideological and political courses aims to enhance teaching appeal, optimize talent-cultivation mechanisms, boost moral education effectiveness, and advance the national education strategy. In terms of basis, this paper elaborates on the foundations of digital technology in

these courses from technological, teaching, and human aspects, clarifying its technical logic, transparency, demand for teaching digital transformation, and the growth needs of teachers and students. Regarding manifestations, analyzing accurate student-need identification, monitoring, analysis, recommendation, evaluation, and decision-making helps clarify the operational logic of integrating technology into these courses and innovate their digital-based moral education elements and systems. As for pathways, this paper proposes optimizing the integration of digital technology into these courses through data collection, digital infrastructure, and faculty literacy. However, how to achieve deep integration of digital technology with the content and form of ideological and political courses in practice still needs further exploration.

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