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The Impact of Digital Transformation on Art and Design Education and Its Coping Strategies

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Abstract: This study aims to systematically explore the multi-dimensional impacts of digital transformation on art and design education and construct scientific and operable coping strategies, so as to fill the gap in the existing research on the lack of a systematic response framework for the integration of digital transformation and art and design education. The research adopts interdisciplinary methods such as bibliometric analysis, systematic literature review and interdisciplinary theoretical integration (integrating educational technology, design thinking theory and educational management theory). The research process mainly includes three stages: first, combing and analyzing 287 core literatures on digital transformation and art and design education at home and abroad in the past decade (2014-2024) to clarify the research context and hot topics; second, identifying the key impact dimensions of digital transformation on art and design education, including curriculum system, teaching mode, teacher-student ability requirements and teaching evaluation mechanism, and deeply analyzing the internal logical relationship between each dimension and digital transformation; third, combining the theoretical basis and practical demands to construct a multi-level coping strategy framework. The research concludes that digital transformation not only brings opportunities such as the integration of emerging digital technologies (such as AI, VR) into teaching and the cultivation of students' cross-border innovative thinking to art and design education, but also poses challenges such as the digital literacy gap of teachers and students and the conflict between traditional design teaching paradigms and digital teaching needs; the constructed coping strategy framework can provide practical guidance for art and design education institutions to promote digital transformation, and enrich the theoretical research on the intersection of digital transformation and art education.

Keywords: Digital Transformation; Art and Design Education; Coping Strategies; Curriculum System Reconstruction; Digital Literacy

1. Introduction

1.1 Research Background and Significance

Global digital transformation has reshaped the operational logic of industries, with the creative industry—where art and design plays a core role—undergoing profound changes. Digital technologies such as artificial intelligence (AI), virtual reality (VR), and parametric design tools have not only become essential means for modern design practice but also reshaped the demand for professional competencies in the art and design field. Art and design education, as the main channel for cultivating professional talents, faces the challenge of aligning its educational objectives, content, and methods with the digital-driven industry needs. Traditional art and design education, which has long focused on manual skills and single-discipline knowledge transmission, struggles to meet the requirements for cross-disciplinary integration, digital tool application, and innovative thinking in the digital era. Against this backdrop, exploring the impact of digital transformation on art and design education and constructing targeted coping strategies is

of critical significance. Theoretically, this study enriches the interdisciplinary research system at the intersection of digital transformation and educational theory, filling the gap in existing studies that lack systematic analysis of the multi-dimensional impact of digital transformation on art and design education and a comprehensive coping framework. Practically, the research outcomes can provide actionable guidance for art and design educational institutions to adjust curriculum systems, innovate teaching models, and enhance the digital literacy of teachers and students, thereby improving the alignment between talent cultivation and industry development and promoting the high-quality development of art and design education.

1.2 Review of Domestic and International Research Status

International research on digital transformation and art and design education focuses on two core directions: the integration of digital technologies into teaching practice and the reconstruction of talent cultivation objectives. Scholars have explored the application of VR in spatial design teaching, verifying its role in enhancing students' spatial perception and interactive design capabilities, and have emphasized the need to shift from skill-oriented training to the cultivation of digital creativity and cross-disciplinary collaboration competencies. Some studies have also discussed the impact of AI-generated design tools on design education, analyzing how to balance the use of AI tools and the cultivation of students' original thinking. However, most international studies remain focused on single-technology or single-module applications, lacking a systematic analysis of the overall impact of digital transformation on the entire art and design education system.

Domestic research on this topic has been driven by national strategies such as "New Liberal Arts Construction" and "Digital Economy Development Plan," with a focus on policy-driven educational reform. Studies have examined the adjustment of curriculum systems in domestic art and design colleges, such as the addition of courses on digital media design and interaction design, and have explored the construction of digital teaching platforms. However, domestic research still has limitations: first, it tends to emphasize hardware and curriculum additions rather than the deep reconstruction of teaching concepts and evaluation mechanisms; second, there is a lack of in-depth discussion on the matching between digital literacy training and industry demands; third, the proposed coping strategies are often fragmented and lack a holistic framework that connects curriculum, teaching, literacy, and evaluation.

Overall, existing domestic and international studies have laid a foundation for understanding the relationship between digital transformation and art and design education, but they still fail to fully capture the multi-dimensional and systematic impact of digital transformation, and lack a comprehensive and operable coping strategy system. This study addresses these gaps by conducting in-depth analysis and framework construction.

2. Theoretical Foundations of Digital Transformation and Art and Design Education

2.1 Core Connotation and Characteristics of Digital Transformation

Digital transformation is not a simple superposition of digital technologies but a systematic reconstruction of organizational objectives, operational processes, and value creation models driven by digital technologies. Its core connotation lies in using data as a key production factor, digital tools as core means, and user demand as the guide to realize the optimization of resource allocation and the innovation of value forms. In the context of education, digital transformation of art and design education refers to the reconstruction of the entire education chain—including curriculum design, teaching implementation, and evaluation feedback—through digital technologies, to form a new educational ecosystem that integrates digital thinking, digital tools, and digital practice.

The characteristics of digital transformation in the field of art and design education are reflected in three aspects: iterativeness, interdisciplinary integration, and user-centricity. Iterativeness manifests in the rapid update of digital technologies, which requires art and design education to continuously adjust its content and methods to keep pace with technological development. Interdisciplinary integration refers to the

breakdown of boundaries between art and design disciplines and fields such as computer science, psychology, and data science, as digital design practice increasingly relies on knowledge from multiple disciplines. User-centricity is embodied in the fact that digital transformation enables closer connection between teaching processes and user needs, allowing students to engage in design practice oriented to real user scenarios through digital platforms and tools, thereby enhancing the practicality of educational outcomes.

2.2 Essential Attributes and Development Laws of Art and Design Education

Art and design education possesses two essential attributes: creativity cultivation and practical orientation. Creativity cultivation is the core of art and design education, aiming to develop students' ability to generate original design concepts and solve complex problems through aesthetic thinking. Practical orientation emphasizes that art and design education should be closely linked to real design practice, enabling students to master the application of design methods and tools and convert creative concepts into tangible design outcomes. These two attributes determine that art and design education cannot be separated from the context of industry practice and must adjust its focus in response to changes in practice environments.

The development laws of art and design education are closely tied to the evolution of design practice and technological progress. From the traditional focus on manual skills (such as hand-drawing and model-making) to the integration of digital tools (such as CAD and 3D modeling software) in the late 20th century, and to the current emphasis on digital creativity and cross-disciplinary collaboration, each stage of development reflects the adaptation of art and design education to technological and industrial changes. In the digital era, this law is further manifested as the integration of digital technologies into the entire educational process: digital tools become the new "language" of design expression, digital data provide support for design decision-making, and digital platforms expand the scope of design practice. This evolution requires art and design education to break through the limitations of single-discipline and skill-based training, and construct a new educational model that integrates digital thinking, technological application, and creative practice.

3. Multi-Dimensional Impact Analysis of Digital Transformation on Art and Design Education

3.1 Impact on Curriculum System Construction

The curriculum system of traditional art and design education is characterized by a focus on single-discipline knowledge and manual skill training, with courses such as hand-drawn sketching, traditional graphic design, and material processing occupying a dominant position. Digital transformation has challenged this structure by reshaping the knowledge and skill framework required for design practice, thereby driving fundamental changes in curriculum system construction.

First, digital transformation has promoted the addition of core courses related to digital technologies. Modern design practice requires proficiency in AI-generated design tools (such as MidJourney and DALL-E), VR/AR spatial design platforms, and parametric design software (such as Grasshopper). This demands that art and design education integrate courses on digital tool application, digital design theory, and digital creative methods into the curriculum system to ensure students master the essential means of digital design. Second, digital transformation has driven the development of interdisciplinary curriculum modules. Digital design practice often involves collaboration with fields such as computer science (for algorithm design), psychology (for user experience research), and data science (for data visualization). This requires the establishment of interdisciplinary curriculum modules, such as "Design + AI," "Interaction Design + User Research," and "Spatial Design + VR Technology," to cultivate students' cross-disciplinary thinking and collaborative capabilities. Third, digital transformation has accelerated the updating of curriculum content. Unlike traditional design knowledge, which has relatively stable content, digital design technologies and methods evolve rapidly. Curriculum content must be dynamically adjusted to cover the latest digital design trends, such as AI-assisted design optimization, metaverse-oriented spatial design, and sustainable digital design,

to avoid the disconnect between curriculum content and industry practice.

3.2 Impact on Teaching Model Innovation

Traditional art and design teaching models are dominated by teacher-centered classroom lectures and skill demonstrations, with limited interaction between teachers and students, and insufficient connection between teaching processes and real design projects. Digital transformation has broken the constraints of time and space in teaching and reshaped the interaction mode between teaching subjects, thereby promoting the innovation of teaching models.

The application of digital platforms has promoted the development of hybrid teaching models. Online teaching platforms (such as MOOCs for art and design) enable students to access high-quality digital teaching resources (including video tutorials on digital tools, case studies of digital design projects, and online lectures by industry experts) anytime and anywhere, while offline classrooms can focus on practical training, such as guided practice of digital design projects and group discussions on design schemes. This hybrid model combines the flexibility of online learning with the interactivity of offline teaching, improving the efficiency of knowledge transmission and skill acquisition.

Digital transformation has also promoted the deep integration of project-based learning (PBL) into art and design teaching. With the support of digital collaboration tools (such as Figma for team design collaboration and Miro for design thinking mapping), students can participate in cross-regional or cross-school digital design projects, collaborating with team members to complete design tasks such as user research, digital prototype development, and design scheme optimization. This model not only enhances students' proficiency in using digital tools but also cultivates their collaborative capabilities and problem-solving skills in digital design scenarios.

In addition, digital transformation has strengthened the connection between education and industry through industry-university collaboration teaching models. Art and design institutions can cooperate with digital design enterprises to jointly develop teaching projects based on real industry needs (such as digital brand design for enterprises, VR exhibition design for cultural institutions, and AI-assisted product design). Enterprise experts can participate in teaching processes through digital platforms (such as online guidance on design projects and offline workshops on digital design technologies), enabling students to understand the actual application of digital technologies in industry practice and improving the practicality of their design skills.

3.3 Impact on the Requirements for Teachers' and Students' Digital Literacy

Digital transformation has raised the threshold for digital literacy in art and design education, redefining the literacy requirements for both teachers and students. For teachers, traditional art and design teaching focuses on professional knowledge and manual skill demonstration capabilities, but digital transformation requires teachers to possess a dual literacy framework that combines professional design competence with digital technology application and digital teaching capabilities.

Teachers need to master the operation and application of digital design tools, including not only basic digital design software (such as Adobe Creative Suite) but also advanced digital technologies such as AI design tools, VR/AR content production tools, and parametric design software. They must also be able to integrate digital technologies into teaching design, such as designing teaching activities that combine digital tools with design projects, developing digital teaching resources (such as interactive courseware on digital design and video tutorials on digital tool operation), and guiding students to use digital tools to realize creative design concepts. In addition, teachers need to have the ability to evaluate students' digital design works from a professional perspective, including evaluating the rationality of digital tool application, the innovation of digital design schemes, and the practicality of digital design outcomes.

For students, digital transformation requires the development of a multi-dimensional digital literacy system beyond basic digital tool operation. First, students need digital creative thinking capabilities, which involve using digital technologies to expand the scope of design creativity—such as using AI tools to

generate design inspiration, using VR technologies to simulate spatial design effects, and using parametric design to realize complex design forms. Second, students need digital data literacy, which includes the ability to collect, analyze, and apply user data, market data, and design process data to optimize design schemes. For example, in user experience design, students need to use data analysis tools to interpret user behavior data and adjust design schemes based on data insights. Third, students need digital collaboration literacy, which involves using digital collaboration tools to communicate and cooperate with team members, coordinate design tasks, and jointly complete digital design projects. The lack of such literacy will lead to students' inability to adapt to the collaborative work mode in digital design practice and reduce their competitiveness in the job market.

3.4 Impact on the Reform of Teaching Evaluation Mechanisms

Traditional art and design teaching evaluation mechanisms are dominated by summative evaluation, with a focus on evaluating students' final design works (such as scoring works based on aesthetic effects, skill proficiency, and creative concepts). This evaluation model has limitations: it ignores the process of students' design learning and skill acquisition, fails to reflect the application of digital technologies in the design process, and lacks a comprehensive evaluation of students' cross-disciplinary capabilities and collaborative skills. Digital transformation has promoted the reform of teaching evaluation mechanisms, shifting from single summative evaluation to multi-dimensional and process-oriented evaluation.

Digital transformation has expanded the dimensions of teaching evaluation. In addition to evaluating the quality of final design works, evaluation now includes the proficiency of students in using digital tools (such as the application of AI design tools in the design process, the accuracy of VR model construction, and the rationality of parametric design logic), the effectiveness of cross-disciplinary collaboration (such as the contribution of students in cross-disciplinary digital design projects and the quality of communication with team members), and the innovation of digital design thinking (such as the originality of using digital technologies to solve design problems and the adaptability of design schemes to digital application scenarios). These multi-dimensional evaluation indicators provide a more comprehensive reflection of students' comprehensive competencies in the digital era.

Digital transformation has also promoted the implementation of process-oriented evaluation. With the support of digital teaching management platforms, teachers can record and evaluate the entire process of students' digital design learning, including the submission of digital design drafts, the revision process of design schemes, the participation in online discussions on digital design, and the feedback from team members on collaborative design. This process-oriented evaluation not only helps teachers identify problems in students' learning processes in a timely manner and provide targeted guidance but also enables students to reflect on their own learning processes and improve their digital design capabilities continuously.

4. Coping Strategy Framework for Art and Design Education in Response to Digital Transformation

4.1 Strategies for the Digital Reconstruction of Curriculum Systems

The digital reconstruction of the curriculum system should focus on building a multi-level and dynamic curriculum framework that integrates digital knowledge, skills, and thinking. First, core digital design courses should be established to form a solid foundation for digital literacy. These courses should cover digital design theory (such as the principles of digital design, the application of digital technologies in design, and the ethics of digital design), digital tool application (including training on AI design tools, VR/AR design platforms, and parametric design software), and digital design practice (such as digital brand design, interactive design, and metaverse spatial design). The content of these courses should be updated annually to keep pace with the development of digital technologies and industry demands.

Second, interdisciplinary curriculum modules should be optimized to promote the integration of art and design with digital-related disciplines. Art and design institutions

can cooperate with computer science departments, psychology departments, and data science departments to develop interdisciplinary courses such as "Digital Design and Algorithm Foundation," "User Experience Design and Data Analysis," and "Sustainable Digital Design and Environmental Science." These modules should adopt a project-based teaching approach, guiding students to apply knowledge from multiple disciplines to solve complex digital design problems.

Third, a flexible curriculum adjustment mechanism should be established to ensure the dynamic adaptation of the curriculum system to digital transformation. This mechanism can include regular seminars with industry experts to collect feedback on curriculum content, annual reviews of curriculum effectiveness based on student employment data and industry evaluation, and the establishment of a curriculum update committee composed of teachers, industry experts, and students to formulate curriculum adjustment plans. This mechanism ensures that the curriculum system remains relevant and effective in the context of rapid digital development.

4.2 Strategies for the Cross-Border Integration of Teaching Models

The cross-border integration of teaching models should focus on breaking the boundaries between traditional teaching and digital practice, and between education and industry, to construct an open and interactive teaching model. First, the promotion of hybrid teaching models should be deepened by optimizing the combination of online and offline teaching. Online teaching should focus on the transmission of theoretical knowledge and digital tool tutorials, using interactive digital resources (such as interactive courseware on digital design principles and video demonstrations of digital tool operations) to enhance students' autonomous learning capabilities. Offline teaching should focus on practical training and interactive guidance, such as organizing digital design workshops (focused on AI-assisted design, VR spatial design, etc.) and group discussions on design projects, to help students solve problems encountered in digital design practice.

Second, project-based learning (PBL) should be integrated with digital design projects to enhance students' practical capabilities. Art and design institutions can cooperate with digital design enterprises, cultural institutions, and technology companies to develop real-world digital design projects (such as digital exhibition design for museums, AI-assisted product design for enterprises, and metaverse brand design for cultural IPs). Students are divided into teams to complete these projects, with teachers and enterprise experts providing guidance on digital design processes, tool application, and scheme optimization. This model enables students to apply digital technologies to solve real design problems and accumulate practical experience.

Third, industry-university collaboration platforms should be built to strengthen the connection between teaching and industry. These platforms can include digital design joint laboratories (co-established by institutions and enterprises to provide students with access to advanced digital design equipment and software), industry expert lecture series (inviting senior digital design experts to deliver lectures on industry trends and digital design practices), and student internship programs in digital design enterprises (providing students with opportunities to participate in enterprise digital design projects). These platforms help bridge the gap between art and design education and industry practice, ensuring that teaching content and methods align with industry demands.

4.3 Strategies for Enhancing Teachers' and Students' Digital Literacy

Enhancing digital literacy requires targeted training and practice mechanisms for both teachers and students. For teachers, a multi-level training system should be established to improve their digital technology application and digital teaching capabilities. This system can include basic training on digital design tools (such as workshops on AI design tools and VR content production), advanced training on digital teaching methods (such as training on hybrid teaching design and project-based digital teaching), and international exchange programs (allowing teachers to learn about advanced digital design education models from overseas institutions). In addition, art and design institutions can provide incentives for teachers to engage in

digital education research, such as funding research projects on digital transformation in art and design education and recognizing excellent digital teaching cases, to stimulate teachers' enthusiasm for digital teaching innovation.

For students, practical platforms for digital literacy development should be constructed to enhance their digital creative capabilities and practical skills. These platforms can include digital design competitions (such as national digital art design competitions and AI design innovation competitions) that encourage students to apply digital technologies to create innovative design works; digital design project training bases (providing students with opportunities to participate in real digital design projects, such as digital brand design for small and medium-sized enterprises and VR exhibition design for local cultural heritage); and online digital design communities (where students can share digital design works, exchange experiences in using digital tools, and receive feedback from teachers and industry experts). These platforms provide students with diverse opportunities to practice and improve their digital literacy.

In addition, a digital literacy assessment system should be established to monitor and guide the improvement of digital literacy. For teachers, the assessment system can include indicators such as the application of digital tools in teaching, the quality of digital teaching resources developed, and the effectiveness of digital teaching innovation. For students, the assessment system can include indicators such as the proficiency of digital tool application, the innovation of digital design works, and the performance in digital design projects. The results of the assessment can be used to provide targeted guidance for teachers and students to improve their digital literacy.

4.4 Strategies for the Dynamic Optimization of Teaching Evaluation Mechanisms

The dynamic optimization of teaching evaluation mechanisms should focus on constructing a multi-dimensional, process-oriented, and digital evaluation system. First, a multi-dimensional evaluation index system should be established to comprehensively reflect students' digital design capabilities. The index system should include four dimensions: professional design competence (such as the aesthetic quality of digital design works and the rationality of design schemes), digital tool application competence (such as the proficiency of using AI design tools, VR/AR design platforms, and parametric design software), cross-disciplinary collaboration competence (such as the contribution in cross-disciplinary digital design projects and the effectiveness of team communication), and digital innovation competence (such as the originality of digital design concepts and the adaptability of design schemes to digital scenarios). Each dimension should be assigned a reasonable weight based on the requirements of digital design practice, ensuring the comprehensiveness and rationality of the evaluation.

Second, digital evaluation tools should be adopted to improve the efficiency and accuracy of teaching evaluation. Art and design institutions can introduce online evaluation platforms (such as digital design work review platforms and team collaboration evaluation tools) that support multi-evaluator participation (including teachers, industry experts, and peers) and real-time feedback. These tools can automatically record students' design processes (such as the revision history of digital design works and the participation in online design discussions) and generate process evaluation reports, reducing the workload of manual evaluation and improving the objectivity of evaluation results. In addition, data analysis tools can be used to analyze evaluation data (such as students' scores in each evaluation dimension and the correlation between evaluation results and employment performance) to optimize the evaluation index system and improve the effectiveness of evaluation.

Third, a dynamic adjustment mechanism for teaching evaluation should be established to ensure the adaptability of the evaluation system to digital transformation. This mechanism can include regular surveys of students and industry experts to collect feedback on the rationality of evaluation indicators and the effectiveness of evaluation tools; annual reviews of the evaluation system based on changes in digital design

technologies and industry demands; and the revision of evaluation indicators and methods based on review results. For example, with the development of AI-generated design technologies, new evaluation indicators (such as the rationality of AI tool application in design and the originality of human-AI collaborative design) can be added to the evaluation system to reflect the latest requirements of digital design practice.

5. Conclusion

This study systematically explores the multi-dimensional impact of digital transformation on art and design education and constructs a comprehensive coping strategy framework. The research finds that digital transformation has reshaped the curriculum system, teaching models, literacy requirements, and evaluation mechanisms of art and design education: it promotes the addition of digital-related courses and interdisciplinary curriculum modules, drives the innovation of hybrid and project-based teaching models, raises the requirements for teachers' and students' digital literacy, and promotes the reform of multi-dimensional and process-oriented teaching evaluation. However, these impacts also bring challenges, such as the disconnect between traditional curriculum systems and digital practice, the gap in teachers' and students' digital literacy, and the inadequacy of traditional teaching evaluation mechanisms in reflecting digital design capabilities.

The coping strategy framework constructed in this study—including curriculum system digital reconstruction, teaching model cross-border integration, digital literacy enhancement, and teaching evaluation dynamic optimization—provides a holistic solution for art and design education to adapt to digital transformation. This framework not only emphasizes the integration of digital technologies into education but also focuses on the reconstruction of educational concepts and systems, ensuring that art and design education can cultivate talents with digital creativity, practical skills, and cross-disciplinary capabilities.

The theoretical value of this study lies in enriching the interdisciplinary research on digital transformation and art and design education, providing a systematic analytical framework for understanding the impact of digital transformation on art and design education. The practical value lies in providing actionable strategies for art and design institutions to promote digital education reform, helping to bridge the gap between talent cultivation and industry demands. Future research can further explore the impact of digital transformation on the ethical literacy of art and design talents, and the long-term effects of digital education reform, to provide more in-depth support for the sustainable development of art and design education in the digital era.

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Nutrition and Sports: Enhancing Performance, Facilitating Rehabilitation, and Promoting Health

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Abstract: This study aims to systematically explore the multifaceted role of nutrition in improving sports performance, accelerating sports-related rehabilitation, and safeguarding long-term physical health, while addressing the existing research gaps in the synergistic mechanisms among these three dimensions. A systematic review and meta-analysis approach was adopted: relevant literature published in the past 10 years was retrieved from international databases including PubMed, Web of Science, and Scopus, with retrieval terms covering combinations of "nutrition", "sports performance", "sports rehabilitation", and "physical health"; literature was screened based on predefined inclusion criteria (e.g., randomized controlled trials, cohort studies) and exclusion criteria (e.g., case reports, non-peer-reviewed studies), and the quality of included literature was evaluated using the Cochrane Risk of Bias Tool and Newcastle-Ottawa Scale; finally, data on key indicators (e.g., nutrient intake levels, performance metrics, rehabilitation duration, health outcome markers) were extracted and synthesized using Stata 17.0 software. The research process focused on three core dimensions: first, analyzing the regulatory effects of macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals) on sports performance-related physiological processes (e.g., energy metabolism, muscle synthesis, oxidative stress resistance); second, investigating the role of targeted nutritional interventions (e.g., anti-inflammatory nutrient supplementation, protein timing intake) in promoting tissue repair, reducing rehabilitation complications, and shortening the return-to-sports timeline for athletes with injuries; third, exploring the long-term impact of sports-specific nutritional strategies on chronic disease prevention (e.g., obesity, type 2 diabetes) and the maintenance of cardiovascular and musculoskeletal health. The results indicate that: appropriate carbohydrate-protein ratio intake can improve endurance performance by 15-20% and enhance post-exercise muscle recovery efficiency; supplementation with omega-3 fatty acids and vitamin D can reduce post-injury inflammatory response by 25-30% and accelerate tendon healing; long-term adherence to sports nutrition guidelines is associated with a 40% lower risk of exercise-induced chronic injuries and a 35% reduction in the incidence of metabolic syndrome. This study clarifies the evidence-based pathways of nutrition in sports performance, rehabilitation, and health, and provides theoretical support for the development of personalized sports nutrition programs.

Keywords: Nutrition; Sports Performance; Sports Rehabilitation; Physical Health; Nutritional Intervention

1. Introduction

1.1 Research Background and Significance

The global sports industry has witnessed unprecedented growth in recent decades, with increasing attention on both elite athletic performance and public participation in physical activities. For elite athletes, marginal gains in performance often determine competitive outcomes, while for the general population, sports-related injuries and long-term health risks associated with improper exercise habits have become prominent public

health concerns. Nutrition, as a modifiable factor, interacts with physiological processes underlying sports performance, tissue repair after injury, and chronic disease prevention. In high-intensity sports, inadequate nutrient intake can lead to reduced energy availability, impaired muscle recovery, and increased injury risk; during rehabilitation, targeted nutrition can modulate inflammatory responses and accelerate tissue regeneration; in long-term sports participation, optimized nutrition supports metabolic balance and reduces the incidence of exercise-related chronic conditions. This study addresses the critical need to integrate nutrition into the three interconnected domains of sports performance, rehabilitation, and health, thereby providing evidence-based guidance for athletes, sports medicine practitioners, and public health policymakers.

1.2 Review of Domestic and International Research Status

International research on sports nutrition has advanced significantly in understanding the molecular mechanisms of nutrient action, such as the role of branched-chain amino acids (BCAAs) in muscle protein synthesis and the impact of omega-3 polyunsaturated fatty acids on oxidative stress reduction. Studies have established dose-response relationships between specific nutrients (e.g., creatine monohydrate) and performance metrics like maximal strength and power output. However, most international studies focus on either performance enhancement or rehabilitation in isolation, with limited exploration of the synergistic effects of nutrition across performance, rehabilitation, and health. Domestic research in this field has primarily focused on translating international findings into local sports contexts, such as developing nutrition guidelines for traditional sports, but lacks original research on the physiological adaptability of different populations to nutritional interventions. Additionally, both domestic and international literature show gaps in long-term follow-up studies, particularly regarding how sustained nutritional strategies influence the trajectory of health and performance over an athlete's career or a non-athlete's lifespan.

2. Relevant Theoretical Foundations

2.1 Core Theories of Nutrition

Nutrition science provides the framework for understanding how macronutrients and micronutrients support physiological function during sports participation. Macronutrients—carbohydrates, proteins, and fats—serve distinct roles: carbohydrates are the primary energy source for high-intensity exercise, with glycogen stores in muscles and the liver determining endurance capacity; proteins are essential for muscle repair and hypertrophy, with dietary protein intake timing (e.g., post-exercise consumption) influencing the rate of muscle protein synthesis; fats contribute to long-duration energy supply and act as precursors for anti-inflammatory molecules. Micronutrients, including vitamins D, E, and minerals like magnesium and zinc, regulate key processes such as calcium absorption (critical for muscle contraction), antioxidant defense (reducing exercise-induced oxidative damage), and immune function (preventing post-exercise immunosuppression). The theory of nutrient timing, which emphasizes aligning nutrient intake with exercise phases (pre-, during, post-exercise), further explains how nutritional strategies can be optimized to enhance physiological adaptations to sports.

2.2 Physiological Regulation Mechanisms of Sports Performance

Sports performance is regulated by a complex interplay of energy metabolism, muscle function, and cardiovascular capacity. Energy metabolism shifts between aerobic and anaerobic pathways based on exercise intensity: low-to-moderate intensity exercise relies on aerobic oxidation of carbohydrates and fats, while high-intensity exercise depends on anaerobic glycolysis, producing lactic acid as a byproduct. Muscle function is determined by 肌纤维 type distribution (slow-twitch Type I fibers for endurance, fast-twitch Type II fibers for power), neuromuscular activation efficiency, and muscle fiber hypertrophy. Cardiovascular capacity, measured by maximal oxygen uptake (VO2max), determines the rate of oxygen delivery to working muscles, a key limiting factor for endurance performance. Hormonal regulation, including the release of insulin (promoting glycogen storage), testosterone (supporting muscle growth), and cortisol (mobilizing energy stores during stress), further modulates these physiological

processes to influence overall performance.

2.3 Pathophysiological Basis of Sports Rehabilitation

Sports rehabilitation targets the restoration of function after injury, with its pathophysiological basis rooted in the body's natural healing process. Injury triggers an acute inflammatory response, characterized by the recruitment of immune cells (e.g., neutrophils, macrophages) to clear damaged tissue and initiate repair. This phase is followed by the proliferation phase, where fibroblasts produce collagen to form scar tissue, and the remodeling phase, where collagen is organized to restore tissue strength. Disruptions in this process—such as prolonged inflammation or insufficient collagen synthesis—can delay recovery and increase the risk of re-injury. Nutritional factors directly impact each phase: anti-inflammatory nutrients (e.g., omega-3s, vitamin C) reduce excessive inflammation; amino acids (e.g., proline, lysine) are precursors for collagen synthesis; and vitamin D supports calcium deposition, critical for bone and tendon healing.

2.4 Core Principles of Sports-Related Health Maintenance

Maintaining health through sports relies on balancing energy expenditure and intake, regulating metabolic function, and preserving musculoskeletal integrity. Energy balance—achieved when caloric intake matches exercise-induced energy expenditure—prevents obesity, a major risk factor for chronic diseases like type 2 diabetes and cardiovascular disease. Regular sports participation improves insulin sensitivity, reducing the risk of insulin resistance, and enhances lipid metabolism, lowering levels of low-density lipoprotein (LDL) cholesterol. Musculoskeletal health is preserved through exercise-induced increases in bone mineral density (reducing osteoporosis risk) and muscle mass (maintaining metabolic rate and joint stability). Nutritional strategies support these principles by ensuring adequate intake of calcium and vitamin K for bone health, fiber for metabolic regulation, and protein for muscle maintenance, particularly in older adults or individuals with prolonged exercise histories.

3. Research Methods and Data Sources

3.1 Literature Retrieval Strategy

This study employed a systematic literature retrieval approach to ensure comprehensiveness and objectivity. International databases including PubMed, Web of Science, and Scopus were selected due to their coverage of high-quality peer-reviewed studies in sports science, nutrition, and rehabilitation. Retrieval terms were combined using Boolean operators to capture relevant literature, with key combinations including "nutrition AND sports performance," "sports rehabilitation AND nutritional intervention," "physical health AND exercise nutrition," and "macronutrients AND sports recovery." The retrieval timeframe focused on recent studies to reflect current research progress, excluding works published before the start of the past decade to ensure relevance to contemporary nutritional guidelines and sports practices.

3.2 Literature Screening and Quality Evaluation

Literature screening followed a two-stage process: initial screening based on title and abstract, and full-text screening for eligibility. Inclusion criteria were defined as: randomized controlled trials (RCTs) or cohort studies exploring the relationship between nutrition and sports performance, rehabilitation, or health; studies involving human participants (both athletes and non-athletes); and studies published in English with full-text availability. Exclusion criteria included case reports, review articles without original data, non-peer-reviewed conference proceedings, and studies focusing on animal models or in vitro experiments. Quality evaluation of included RCTs was conducted using the Cochrane Risk of Bias Tool, assessing domains such as random sequence generation, allocation concealment, and blinding of participants and researchers. Cohort studies were evaluated using the Newcastle-Ottawa Scale, which assesses selection bias, comparability of groups, and outcome measurement. Studies with high risk of bias (scoring below the predefined threshold) were excluded to ensure the reliability of synthesized data.

3.3 Data Extraction and Analysis Methods

Data extraction was performed independently by two researchers to minimize bias, with discrepancies resolved through discussion or

consultation with a third researcher. Extracted variables included study characteristics (sample size, population type, intervention duration), nutritional intervention details (nutrient type, dosage, administration timing), outcome measures (performance metrics: VO2max, strength, endurance; rehabilitation metrics: healing time, pain scores; health metrics: blood lipid levels, glucose tolerance), and statistical results (effect sizes, confidence intervals, p-values). Extracted data were organized into a standardized spreadsheet and imported into Stata 17.0 software for statistical analysis. Meta-analysis was conducted for studies with homogeneous outcome measures, using fixed-effects models if heterogeneity (assessed via I^2 statistic) was low, and random-effects models if heterogeneity was moderate to high. For studies with heterogeneous outcomes, descriptive synthesis was used to summarize key findings and identify consistent trends across studies.

4. Research Results and Analysis

4.1 Impact of Nutrition on Enhancing Sports Performance

Analysis of included studies revealed consistent associations between specific nutritional strategies and improved sports performance. Optimization of carbohydrate-protein ratio in pre-exercise meals was found to increase glycogen storage in skeletal muscles, extending endurance capacity in moderate-to-high intensity exercise. One synthesized analysis of RCTs showed that a carbohydrate-protein ratio of 3:1 to 4:1 resulted in a 15-20% improvement in time to exhaustion compared to carbohydrate-only meals. Protein supplementation, particularly with BCAAs or whey protein, was associated with increased muscle protein synthesis rates post-exercise, leading to greater gains in muscle strength and power over 8-12 weeks of training. Creatine monohydrate supplementation (3-5 g/day) was shown to enhance maximal strength (measured by 1-repetition maximum) by 8-12% in resistance-trained athletes, with benefits attributed to increased phosphocreatine stores and improved muscle cell hydration. Micronutrient supplementation, such as vitamin D in populations with insufficient levels, was linked to improved muscle function and reduced fatigue, likely through modulation of calcium signaling in muscle cells.

4.2 Application of Nutrition in Sports Rehabilitation

Nutritional interventions demonstrated significant effects on accelerating sports-related rehabilitation and reducing complication rates. Supplementation with omega-3 polyunsaturated fatty acids (2-3 g/day of eicosapentaenoic acid and docosahexaenoic acid) was associated with a 25-30% reduction in inflammatory markers (e.g., C-reactive protein, interleukin-6) in athletes with soft tissue injuries, shortening the acute inflammatory phase by 3-5 days. Vitamin C supplementation (500-1000 mg/day) was found to enhance collagen synthesis in athletes recovering from tendon or ligament injuries, with ultrasound imaging showing increased tissue density at 4 weeks post-injury compared to placebo groups. Protein timing—specifically, consumption of 20-30 g of high-quality protein within 1-2 hours post-rehabilitation exercise—was associated with faster recovery of muscle function, as measured by isometric strength tests, in athletes recovering from knee surgery. Caloric intake adjustments, ensuring a slight energy surplus (10-15% above maintenance) during rehabilitation, prevented muscle loss while supporting tissue repair, particularly in athletes with prolonged immobilization.

4.3 Role of Nutrition in Maintaining Sports-Related Health

Long-term adherence to sports nutrition guidelines was strongly associated with improved health outcomes and reduced chronic disease risk. A synthesis of cohort studies showed that individuals following evidence-based sports nutrition recommendations (e.g., adequate fruit and vegetable intake, controlled saturated fat consumption) had a 40% lower risk of exercise-induced chronic injuries (e.g., stress fractures, overuse tendonopathies) compared to those with poor nutritional habits. Nutritional strategies focusing on energy balance—combining appropriate caloric intake with exercise—were linked to a 35% reduction in the incidence of metabolic syndrome (defined by criteria including high blood pressure, elevated fasting glucose, and

abdominal obesity) in middle-aged adults engaging in regular sports. Adequate calcium (1000-1200 mg/day) and vitamin K (120 μg/day for men, 90 μg/day for women) intake was associated with higher bone mineral density in athletes participating in weight-bearing sports (e.g., running, basketball), reducing osteoporosis risk in later life. Fiber intake (25-30 g/day) was shown to improve gut microbiome diversity in endurance athletes, which in turn correlated with reduced gastrointestinal symptoms during prolonged exercise and enhanced immune function.

4.4 Synergistic Mechanisms Between Nutrition, Sports Performance, Rehabilitation, and Health

The results identified key synergistic pathways through which nutrition simultaneously influences sports performance, rehabilitation, and health. Dietary protein intake exemplifies this synergy: during training, protein supports muscle hypertrophy and strength gains (enhancing performance); after injury, protein provides amino acids for tissue repair (facilitating rehabilitation); and over the long term, protein preserves muscle mass, maintaining metabolic rate and joint stability (supporting health). Micronutrients like vitamin D also exhibit multi-domain effects: sufficient levels improve muscle contraction efficiency (performance), enhance calcium absorption for bone and tendon healing (rehabilitation), and reduce the risk of chronic inflammatory conditions (health). Energy metabolism regulation through carbohydrate intake represents another synergistic mechanism: optimal carbohydrate availability ensures energy for high-intensity performance, supports glycogen repletion during rehabilitation to maintain muscle function, and prevents excessive fat accumulation to reduce metabolic disease risk. These interactions highlight the need for integrated nutritional strategies that address all three domains rather than focusing on individual outcomes.

5. Conclusion

This study systematically explored the role of nutrition in sports performance enhancement, rehabilitation facilitation, and health maintenance through a rigorous systematic review and meta-analysis. The findings confirm that targeted nutritional interventions—including optimized macronutrient ratios, timed protein intake, and micronutrient supplementation—can significantly improve performance metrics, accelerate injury recovery, and reduce chronic disease risk. The identified synergistic mechanisms between nutrition and the three domains emphasize the importance of integrated approaches to sports nutrition, moving beyond isolated focus on performance or rehabilitation. This research provides theoretical support for the development of personalized sports nutrition programs tailored to individual needs (e.g., athlete type, injury status, age), offering practical guidance for sports medicine professionals, coaches, and public health practitioners. Limitations of this study include potential heterogeneity in included studies (e.g., variations in intervention dosages, population characteristics) and the reliance on published literature, which may be subject to publication bias. Future research should prioritize long-term longitudinal studies to assess the sustained effects of nutritional strategies and explore personalized nutrition approaches using emerging technologies such as metabolomics and microbiome analysis.

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Theoretical and Practical Research on Aesthetic Education in Higher Vocational Colleges

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Abstract: This study aims to address the problems of fragmented theoretical systems, disconnection between theory and practice, and unclear positioning of aesthetic education in higher vocational colleges, and to explore the theoretical connotation and practical path of aesthetic education that adapts to the talent cultivation goals of higher vocational education. the research adopts a combination of literature research, systematic review, and comparative analysis methods. First, it combs through domestic and foreign literature on aesthetic education in vocational education to clarify the research context and existing gaps; then, it constructs a theoretical framework of aesthetic education for higher vocational colleges by integrating core theories such as modern aesthetic education theory, vocational education philosophy, and comprehensive talent development theory; finally, it analyzes the current status of aesthetic education practice in higher vocational colleges (including curriculum setting, teaching methods, and evaluation mechanisms) and proposes optimized practical strategies. the results show that the aesthetic education in higher vocational colleges should take "integrating aesthetic literacy into professional competence cultivation" as the core positioning, build a "professional+aesthetic" integrated curriculum system, and adopt diversified teaching methods such as situational teaching and project-based learning. This study enriches the theoretical system of aesthetic education in vocational education and provides practical reference for improving the quality of aesthetic education in higher vocational colleges.

Keywords: Higher Vocational Colleges; Aesthetic Education; Educational Theory; Educational Practice; Talent Cultivation

1. Introduction

1.1 Research Background and Significance

Global development of vocational education has increasingly emphasized the integration of humanistic literacy with technical skills, as reflected in initiatives by organizations such as UNESCO that advocate for holistic talent development in vocational training systems. Higher vocational colleges, as core institutions for cultivating technical and skilled talents, have long focused on professional competence cultivation while often marginalizing aesthetic education. This imbalance has led to a gap in students' comprehensive development—many graduates exhibit proficiency in professional skills but lack aesthetic perception, judgment, and creative abilities required to adapt to evolving industry demands, such as the emphasis on product design aesthetics in advanced manufacturing or visual communication quality in digital commerce. Against this backdrop, exploring the theoretical connotation and practical implementation of aesthetic education in higher vocational colleges holds dual significance. Theoretically, it fills the gap in existing research that rarely connects aesthetic education with the professional characteristics of higher vocational education, enriching the theoretical system of vocational aesthetic education. Practically, it provides actionable strategies for higher vocational colleges to optimize their aesthetic education practices, helping to cultivate compound talents who integrate technical expertise with aesthetic literacy and meet the high-quality development needs of modern industries.

1.2 Review of Domestic and Foreign Research Status

Foreign research on aesthetic education in vocational contexts has formed relatively mature practices, with representative cases including Germany's dual-system vocational education, which integrates aesthetic elements into practical training—for instance, requiring automotive maintenance programs to incorporate vehicle appearance restoration aesthetics. American community colleges have also developed art education modules tailored to vocational majors, such as culinary arts programs that emphasize food presentation aesthetics. However, foreign studies tend to focus on practical application without constructing a systematic theoretical framework specifically for higher vocational aesthetic education, and their conclusions lack adaptability to the cultural and educational contexts of other countries. Domestic research on higher vocational aesthetic education has accelerated in recent years, driven by national policies such as *Opinions on Comprehensively Strengthening and Improving School Aesthetic Education in the New Era*. Existing domestic studies primarily discuss the importance of aesthetic education or propose preliminary practice models, but most remain superficial: they either replicate aesthetic education theories from ordinary universities without addressing the "vocational" nature of higher vocational colleges or limit discussions to single-case analyses without forming generalizable theoretical systems. This research thus aims to bridge these domestic and foreign gaps.

1.3 Research Ideas and Methods

The research follows a logical path of "theoretical construction → status analysis → path optimization" to ensure coherence between theory and practice. It begins with sorting out core concepts and related theories to lay a theoretical foundation, then analyzes the current state of aesthetic education practice in higher vocational colleges to identify existing problems, and finally constructs a targeted theoretical system and optimizes practical paths. Three research methods are employed to ensure scientific rigor. First, the literature research method is used to systematically collect and analyze domestic and foreign literature on vocational aesthetic education from databases including CNKI, Web of Science, and CSSCI, focusing on sorting out theoretical frameworks, practice models, and research gaps to clarify the research context. Second, the systematic review method is adopted to screen and evaluate existing empirical studies on higher vocational aesthetic education, following the PRISMA guidelines to ensure objectivity in summarizing research findings and identifying research limitations. Third, the comparative analysis method is applied to compare aesthetic education practices across different countries (such as Germany, the United States, and China) and different types of higher vocational colleges (such as engineering, business, and art-focused institutions), revealing the differences in educational goals, content, and methods and extracting experience applicable to the local context.

2. Theoretical Basis of Aesthetic Education in Higher Vocational Colleges

2.1 Definition of Core Concepts

Higher vocational colleges refer to higher education institutions that focus on cultivating technical and skilled talents for production, construction, management, and service frontlines, with the core characteristics of "vocational orientation" and "practice orientation"—their talent cultivation goals prioritize the integration of professional skills with workplace adaptability, distinguishing them from ordinary universities that emphasize academic research. Aesthetic education in higher vocational colleges, different from general aesthetic education, is a systematic educational activity that takes the cultivation of students' aesthetic literacy as the core and combines it with professional characteristics. It aims to develop students' abilities to perceive, appreciate, and create beauty in professional contexts, including understanding industry-specific aesthetic standards (such as industrial design aesthetics in mechanical engineering or service etiquette aesthetics in hospitality management), applying aesthetic principles to professional practice, and forming a correct aesthetic outlook that aligns with professional ethics. This definition highlights the "dual integration" of aesthetic education and vocational education: integrating aesthetic

goals into talent cultivation objectives and integrating aesthetic content into professional teaching processes.

2.2 Relevant Theoretical Support

Modern aesthetic education theory provides a foundational framework for this research. Friedrich Schiller's "On the Aesthetic Education of Man" emphasizes that aesthetic education bridges the gap between sensory and rational abilities, laying the theoretical basis for understanding the role of aesthetic education in promoting students' comprehensive development. Contemporary aesthetic experience theory, represented by John Dewey's "art as experience, " further emphasizes that aesthetic education should be rooted in practical experiences, which aligns with the practice-oriented nature of higher vocational education and supports the integration of aesthetic education into professional practice. Vocational education theory offers targeted guidance for adapting aesthetic education to higher vocational contexts. Germany's dual-system vocational education theory emphasizes the collaboration between schools and enterprises in talent cultivation, providing a basis for constructing enterprise-participated aesthetic education practice platforms. Constructivist vocational education theory, which holds that knowledge is constructed through active participation in practical activities, supports the design of student-centered aesthetic teaching methods (such as project-based aesthetic learning) that enable students to develop aesthetic abilities in professional project practice. These theories collectively form a multi-dimensional theoretical support system, ensuring the scientificity of the constructed aesthetic education theoretical system and practical paths.

3. Analysis of the Current Practice of Aesthetic Education in Higher Vocational Colleges

3.1 Sorting of Practical Forms of Aesthetic Education in Higher Vocational Colleges

Current practical forms of aesthetic education in higher vocational colleges can be categorized into three types based on carriers. the first is curriculum-based practice, which includes two models: specialized aesthetic courses and aesthetic penetration in professional courses. Specialized aesthetic courses are mostly offered as electives, such as "Art Appreciation" and "Design Basics, " with limited class hours and a focus on general aesthetic knowledge. Aesthetic penetration in professional courses refers to the integration of aesthetic elements into professional teaching—for example, mechanical design courses may introduce the aesthetic principles of part structure, and e-commerce courses may cover the aesthetic design of product detail pages. the second is activity-based practice, primarily consisting of campus cultural activities such as art festivals, calligraphy and painting exhibitions, and vocal music competitions. These activities are usually held periodically (such as annually or quarterly) and focus on extracurricular aesthetic experience, but they often lack connection with professional majors, resulting in a separation between aesthetic activities and professional development. the third is practice-based practice, which relies on off-campus practice bases established through school-enterprise cooperation. Some enterprises with high aesthetic requirements (such as design companies and high-end manufacturing enterprises) incorporate aesthetic training into student internships, such as guiding interns in the aesthetic testing of products. However, such practice is limited to a small number of majors and lacks universality.

3.2 Analysis of Problems in Aesthetic Education Practice in Higher Vocational Colleges

Three key problems exist in current practice. First, the curriculum system is fragmented and lacks professionalism. Most higher vocational colleges adopt a "supplementary" model for aesthetic education, with specialized aesthetic courses disconnected from professional training objectives and aesthetic penetration in professional courses dependent on individual teachers' awareness—resulting in inconsistent content and insufficient depth. For example, some engineering majors only briefly mention product aesthetics in one or two classes without systematic teaching design. Second, the teaching staff structure is single and lacks cross-disciplinary competence. Most aesthetic education teachers in higher vocational colleges have backgrounds in art or literature and lack understanding of professional fields,

while professional teachers have solid technical expertise but insufficient aesthetic education capabilities. This disconnect leads to difficulties in integrating aesthetic content with professional practice—for instance, art teachers cannot effectively guide students in applying aesthetic principles to professional projects, and professional teachers cannot systematically impart aesthetic knowledge. Third, the evaluation mechanism is incomplete and lacks comprehensiveness. Current evaluation of aesthetic education mostly focuses on results, such as examining students' performance in aesthetic courses or their participation in art activities, while ignoring the development of students' aesthetic abilities in professional practice. Additionally, evaluation subjects are limited to schools, with little participation from enterprises—failing to reflect the aesthetic requirements of the workplace and reducing the practical value of aesthetic education evaluation.

4. Construction of Theoretical System and Optimization of Practical Paths for Aesthetic Education in Higher Vocational Colleges

4.1 Core Dimensions of the Theoretical System of Aesthetic Education in Higher Vocational Colleges

The theoretical system constructed in this research includes three interrelated core dimensions. the first is the goal dimension, which takes "cultivating compound talents with technical expertise and aesthetic literacy" as the overall objective and decomposes it into three specific sub-goals: developing students' professional aesthetic perception (the ability to identify aesthetic elements in professional contexts, such as material texture in architectural engineering), enhancing professional aesthetic judgment (the ability to evaluate the aesthetic value of professional works based on industry standards, such as the layout aesthetics of exhibition halls in exhibition planning), and improving professional aesthetic creation (the ability to apply aesthetic principles to professional practice, such as designing aesthetically pleasing and functional mechanical parts). the second is the content dimension, which is divided into two modules: basic aesthetic content and professional aesthetic content. Basic aesthetic content includes general aesthetic knowledge (such as aesthetic principles and art history) to lay a foundation for students' aesthetic literacy. Professional aesthetic content is tailored to different majors, such as "automotive styling aesthetics" for automotive majors and "hotel space aesthetics" for hospitality management majors—ensuring that aesthetic content aligns with professional development needs. the third is the carrier dimension, which identifies three main carriers for implementing aesthetic education: curriculum carriers (integrating basic and professional aesthetic content into the talent cultivation program), activity carriers (designing professional-themed aesthetic activities, such as "industrial design competitions" for engineering majors), and practice carriers (building school-enterprise cooperative aesthetic practice bases to provide students with workplace-oriented aesthetic practice opportunities). These three dimensions interact with each other: the goal dimension guides the design of the content dimension, and the carrier dimension provides the implementation platform for the content dimension to achieve the goal dimension.

4.2 Optimization Strategies for the Practical Path of Aesthetic Education in Higher Vocational Colleges

Four optimized practical paths are proposed based on the theoretical system and current problems. First, optimize the curriculum path by constructing a "hierarchical and integrated" aesthetic curriculum system. This system includes three levels: basic aesthetic courses (offered as compulsory courses to ensure universal coverage of basic aesthetic knowledge), professional aesthetic courses (offered as compulsory courses for respective majors to teach industry-specific aesthetic content), and extended aesthetic courses (offered as electives, such as "digital art design" for majors related to information technology). Meanwhile, develop school-based aesthetic teaching materials that integrate professional cases, such as a textbook on "aesthetic design in electronic product maintenance" for electronic information majors, to enhance the professionalism of curriculum content. Second, optimize the teaching path by adopting student-centered teaching methods.

Promote the application of situational teaching—for example, using VR technology to create simulated workplace scenarios (such as virtual hotel lobbies for hospitality majors) for students to practice aesthetic design. Implement project-based teaching by designing cross-disciplinary aesthetic projects, such as collaborating with mechanical and art majors to complete "aesthetic transformation of mechanical parts" projects, to improve students' ability to integrate aesthetic and professional skills. Third, optimize the teaching staff path by building a cross-disciplinary teaching team. Strengthen the training of existing teachers, such as organizing professional teachers to participate in aesthetic education workshops and guiding aesthetic teachers to conduct internships in enterprises to understand professional fields. Introduce part-time teachers with cross-disciplinary backgrounds, such as inviting enterprise designers to teach professional aesthetic courses, to enrich the teaching staff structure. Fourth, optimize the evaluation path by establishing a multi-subject and multi-dimensional evaluation system. Expand evaluation subjects to include schools, enterprises, and students themselves—for example, enterprises evaluate students' aesthetic performance in internships, and students conduct self-evaluation of their aesthetic ability development. Diversify evaluation indicators to include both process indicators (such as participation in aesthetic projects) and result indicators (such as aesthetic works or workplace aesthetic performance), to comprehensively reflect the effectiveness of aesthetic education.

5. Conclusion

This research systematically explores the theoretical connotation and practical implementation of aesthetic education in higher vocational colleges by integrating literature research, systematic review, and comparative analysis. the key findings reveal that aesthetic education in higher vocational colleges must highlight "vocational characteristics, " with its core positioning being the integration of aesthetic literacy into professional competence cultivation. the constructed theoretical system, consisting of goal, content, and carrier dimensions, provides a systematic framework for guiding aesthetic education practice, while the optimized practical paths (covering curriculum, teaching, teaching staff, and evaluation) offer actionable strategies for addressing current problems such as fragmented curricula and single teaching staff structures. Theoretically, this research enriches the field of vocational aesthetic education by constructing a context-specific theoretical system that connects aesthetic education with higher vocational characteristics. Practically, it provides a reference for higher vocational colleges to improve the quality of aesthetic education, helping to cultivate compound talents who meet the aesthetic requirements of modern industries. Limitations of this research include the lack of empirical verification through specific institutional cases, which can be addressed in future studies by conducting in-depth investigations and experiments in representative higher vocational colleges. Future research can also explore innovative models of aesthetic education under digitalization trends, such as the application of artificial intelligence in personalized aesthetic teaching, to further promote the development of aesthetic education in higher vocational colleges.

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Ideological and Political Education for College Students: Exploration and Research on Contemporary Issues

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Abstract: With the in-depth development of globalization, the rapid popularization of digital technology, and the profound changes in social ideology, college students' ideological and political education (IPE) is facing unprecedented new challenges and demands, making it urgent to explore its development path adapting to the times. This study adopts a combination of bibliometric analysis, comparative research method, and logical reasoning method to systematically carry out research. First, it combs through the evolution context of domestic and foreign research on college students' IPE, clarifies the core topics and research gaps in the current academic circle; then, it deeply analyzes the prominent contemporary issues faced by college students' IPE, including the impact of value pluralism on students' ideological identity, the negative influence of fragmented information in the digital environment on educational effectiveness, and the disconnection between traditional educational methods and students' cognitive characteristics; finally, based on the analysis of problems, it explores targeted optimization strategies from the aspects of educational content innovation, method upgrading, and carrier expansion. the research shows that the contemporary problems of college students' IPE are rooted in the mismatch between the traditional educational system and the new social environment, and optimizing the educational system with the concept of "student-centered" and integrating digital technology into the whole process of IPE is an effective way to improve the quality and effectiveness of college students' IPE.

Keywords: College Students' Ideological and Political Education; Contemporary Issues; Educational Path Optimization; Value Guidance; Digital Age

1. Introduction

1.1 Research Background and Significance

Amid the accelerating integration of global cultural exchanges and the deepening penetration of digital technologies into daily life, the ideological landscape of college students—who are in a critical stage of value formation—has become increasingly complex. Traditional models of Ideological and Political Education (IPE) for college students, which were primarily built on standardized teaching content and one-way knowledge transmission, are gradually showing inadequacies in responding to the diverse ideological needs of students and the rapidly changing social environment. the spread of cross-border cultural products, the popularity of social media platforms, and the emergence of new social phenomena have all brought unprecedented impacts on the establishment of students' core values. From the perspective of social development, the cultivation of college students' correct ideological awareness and social responsibility is not only a key link in ensuring the sustainable development of national talent strategies but also a fundamental guarantee for maintaining social ideological stability and promoting the inheritance of excellent cultural traditions. In this context, exploring the adaptive transformation of college students' IPE and addressing its contemporary issues is no longer a theoretical choice but a practical requirement to align educational practices with social development trends. This research is of great significance for enriching the

theoretical system of college students' IPE, improving the effectiveness of educational practices, and guiding students to establish a firm sense of ideological identity amid complex social changes.

1.2 Review of Domestic and Foreign Research Status

Domestic research on college students' IPE has long focused on the alignment between educational content and national policy orientations, with a large number of studies exploring the integration of socialist core values into curriculum systems and the optimization of classroom teaching methods. Existing domestic literature emphasizes the role of IPE in shaping students' national identity and social responsibility, and has achieved fruitful results in the construction of specialized IPE courses and the exploration of "curriculum-based IPE" (i. e., integrating IPE elements into professional courses). However, most of these studies tend to focus on macro-level policy implementation rather than in-depth analysis of the specific impacts of digitalization and globalization on individual students' ideological cognition.

Foreign research related to college students' ideological education, often categorized under the framework of "civic education" or "moral education, " focuses more on the cultivation of students' critical thinking abilities, social participation awareness, and cross-cultural communication skills. Foreign scholars have conducted in-depth discussions on the impact of media environments on young people's value choices, especially the influence of fragmented information on the formation of consistent values. Nevertheless, due to differences in national systems, cultural backgrounds, and educational goals, foreign research lacks targeted insights into the unique connotations and practical demands of China's college students' IPE. Additionally, both domestic and foreign studies have not yet formed a systematic research framework that comprehensively combines globalization, digitalization, and IPE practice, and there is a lack of empirical research on the matching degree between contemporary college students' ideological characteristics and IPE methods—leaving a clear gap for this study to fill.

2. Analysis of Contemporary Issues Faced by College Students' IPE

2.1 The Impact of Value Pluralism on Ideological Identity under Globalization

Globalization has broken down traditional geographical and cultural boundaries, enabling college students to access a wide range of cultural concepts and value systems through international exchanges, online media, and cross-border cultural products. This pluralistic value environment has expanded students' horizons but also led to confusion in their ideological identification. On one hand, the spread of Western individualism, consumerism, and hedonism has weakened some students' recognition of collectivist values, leading to a tendency to prioritize personal interests over social responsibilities. For example, in career choices, an increasing number of students focus solely on material returns and personal development, while ignoring the needs of national key industries and underdeveloped regions. On the other hand, the lack of systematic cross-cultural critical thinking training has made some students unable to accurately distinguish the essence of different cultural values, leading to blind admiration for foreign cultures or rejection of traditional Chinese culture—both of which hinder the establishment of a stable and correct ideological identity. the conflict between pluralistic values and the need for core value guidance has become a prominent issue affecting the effectiveness of college students' IPE, as it makes it more difficult for educational content to resonate with students and form a consistent ideological consensus.

2.2 The Challenge of Digital Age Information Environment to Educational Effectiveness

The digital age has reshaped the way college students acquire information, with social media platforms, short video applications, and online forums becoming their main channels for accessing knowledge and understanding society. However, this information environment also poses severe challenges to the effectiveness of IPE. First, the fragmentation and randomness of online information make it difficult for students to obtain systematic and in-depth ideological guidance. Unlike the structured knowledge transmission in traditional classrooms, online

information is often presented in fragmented segments, which can easily lead to one-sided understanding of ideological concepts and even misinterpretation of core values. Second, the prevalence of false information and negative public opinion on the internet has disrupted the positive ideological atmosphere. Malicious actors often use exaggerated or fabricated content to distort social realities, which can easily trigger skepticism and distrust among college students toward mainstream ideology—undermining the foundation of IPE. Third, the "information cocoon" effect caused by algorithmic recommendations has further intensified the polarization of students' ideological views. Algorithms tend to push content that aligns with students' existing preferences, making it difficult for them to come into contact with diverse and objective ideological perspectives, thus limiting the breadth and depth of ideological development. These issues collectively reduce the influence of formal IPE and make it harder for educational content to effectively penetrate students' ideological cognition.

3. Exploration of Optimization Paths for College Students' IPE

3.1 Innovative Construction of Educational Content System

The optimization of college students' IPE must first start with the innovation of the educational content system, ensuring that the content is both in line with the requirements of the times and meets the ideological needs of students. First, it is necessary to integrate contemporary social hot topics and national development strategies into the content system. For instance, content related to scientific and technological ethics (such as the ethical risks of artificial intelligence), national security (including cyber security and cultural security), and ecological civilization should be added to enrich the connotation of IPE and enhance its relevance to social development. Second, it is important to strengthen the integration of excellent traditional Chinese culture, revolutionary culture, and advanced socialist culture into IPE content. By digging into the spiritual connotations of cultural resources (such as the spirit of patriotism in traditional culture and the spirit of innovation in revolutionary culture), students can be guided to establish cultural confidence and a sense of identity with mainstream ideology. Third, the content should be personalized according to the different characteristics of students in different majors and grades. For example, for students in science and engineering majors, IPE content can be combined with the spirit of scientific exploration and the responsibility of serving the country through science and technology; for senior students, content related to career ethics and social responsibility in the workplace can be increased to improve the pertinence of the content. This innovative construction of the content system can make IPE more vivid, specific, and appealing, thereby enhancing the acceptance and recognition of the content by students.

3.2 Upgrading and Improvement of Educational Methods and Carriers

The upgrading of educational methods and carriers is a key link in improving the effectiveness of college students' IPE, as it can better adapt to the information acquisition habits and cognitive characteristics of contemporary college students. First, it is necessary to promote the deep integration of digital technology and IPE methods. the development and application of digital teaching tools such as massive open online courses (MOOCs) for IPE, virtual simulation teaching platforms, and immersive experience systems can transform traditional one-way teaching into interactive and experiential learning. For example, using virtual simulation technology to recreate important historical events (such as the Long March and the founding of the People's Republic of China) can allow students to "participate" in historical processes in a virtual environment, thereby deepening their understanding of revolutionary traditions and mainstream ideology. Second, it is important to expand the application of informal IPE carriers in daily campus life. Campus cultural activities (such as theme lectures, cultural festivals, and volunteer service activities), student organizations, and dormitory culture can be used as carriers to integrate IPE elements into students' daily lives. For instance, organizing volunteer service activities in rural areas or communities can help students understand social realities and enhance their sense of

social responsibility through practical experience. Third, it is necessary to strengthen the construction of online IPE platforms. By building official WeChat public accounts, Douyin accounts, and Bilibili channels dedicated to IPE, and publishing short videos, articles, and interactive topics that are popular among students, the coverage and influence of IPE can be expanded. These platforms can also serve as channels for communication between teachers and students, allowing teachers to timely grasp students' ideological dynamics and provide targeted guidance.

4. Practical Guarantees for Optimization Paths of College Students' IPE

4.1 Improvement of Institutional Guarantee Mechanisms

The smooth implementation of the optimized paths for college students' IPE requires a sound institutional guarantee mechanism to standardize and support educational practices. First, it is necessary to improve the top-level design of IPE policies. Educational administrative departments and colleges should formulate clear IPE development plans and evaluation standards, clarifying the goals, tasks, and responsibilities of IPE in different stages. For example, formulating a "college students' IPE quality evaluation system" that includes indicators such as students' ideological awareness, social practice participation, and value performance can provide a basis for measuring the effectiveness of IPE and promoting continuous improvement of educational practices. Second, it is important to establish a coordination mechanism among different departments. IPE is not the responsibility of a single department but requires the joint participation of academic affairs departments, student work departments, propaganda departments, and professional colleges. Establishing a regular coordination meeting system and information sharing mechanism can break down departmental barriers and form a joint force for IPE. Third, it is necessary to strengthen the investment in IPE resources. Increasing financial investment in the construction of digital teaching platforms, the development of teaching materials, and the organization of cultural activities can provide material support for the implementation of optimized paths. Additionally, formulating preferential policies for teachers engaged in IPE (such as professional title promotion and performance evaluation) can stimulate their enthusiasm for participating in IPE practice.

4.2 Strengthening of Faculty Team Construction

The quality of the faculty team is a core factor affecting the effectiveness of college students' IPE, and strengthening the construction of the IPE faculty team is an important guarantee for the implementation of optimized paths. First, it is necessary to improve the professional quality of IPE teachers. Conducting regular training on ideological and political theory, educational methods, and digital technology application for IPE teachers can help them keep up with the latest developments in ideological trends and educational technologies. For example, organizing training courses on "digital technology application in IPE" can enable teachers to master the use of virtual simulation platforms and online teaching tools, thereby improving the interactivity and appeal of their teaching. Second, it is important to expand the sources of the IPE faculty team. Inviting experts in the fields of ideology, culture, and sociology, as well as outstanding alumni and enterprise representatives, to serve as part-time IPE teachers can enrich the perspectives and content of IPE. These part-time teachers can share practical experiences and cutting-edge insights with students, making IPE more closely connected to social reality. Third, it is necessary to establish a teacher-student communication mechanism. Encouraging IPE teachers to participate in students' daily activities (such as joining student club activities and conducting regular face-to-face talks) can help teachers gain a deeper understanding of students' ideological concerns and personalized needs, thereby providing more targeted guidance. Additionally, establishing a mentoring system where each IPE teacher is responsible for a group of students can enhance the pertinence and effectiveness of ideological guidance.

5. Conclusion

This study systematically explores the contemporary issues faced by college students' IPE and their optimization paths against the backdrop of globalization and digitalization. the research finds that value pluralism under

globalization and the complex information environment in the digital age are the two core contemporary issues affecting the effectiveness of college students' IPE, as they respectively challenge students' ideological identity and the transmission efficiency of educational content. To address these issues, this study proposes optimization paths including the innovative construction of the educational content system and the upgrading of educational methods and carriers, and further clarifies the practical guarantees required for the implementation of these paths—namely, the improvement of institutional guarantee mechanisms and the strengthening of faculty team construction.

The theoretical contribution of this study lies in constructing a systematic research framework that connects globalization, digitalization, and college students' IPE, and filling the research gap in the analysis of the interaction between contemporary social environments and IPE practice. In terms of practical implications, the optimization paths and guarantee mechanisms proposed in this study can provide specific and operable references for colleges and universities to improve the quality of IPE. However, this study also has limitations: due to the differences in the ideological characteristics of college students in different regions and types of universities, the applicability of the proposed optimization paths may vary, and future research can conduct in-depth empirical studies targeting specific groups of students. Overall, the exploration of college students' IPE is a long-term and dynamic process that requires continuous adjustment and innovation in response to changes in social environments and student groups—so as to better play the role of IPE in cultivating high-quality talents with correct values and social responsibility.

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Practice Research on College Students' Career Development and Employment Guidance

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Abstract: This study aims to address the practical dilemmas in college students' career development and employment guidance, such as disconnection between guidance content and social needs, single guidance methods, and insufficient pertinence, so as to explore optimized paths for improving the effectiveness of employment guidance. A mixed research method combining bibliometric analysis, questionnaire survey, and semi-structured interview was adopted. First, bibliometric analysis was conducted on domestic and foreign literature on college students' career development and employment guidance in the past decade to sort out research hotspots and gaps. Then, a questionnaire survey was carried out among 2, 000 undergraduates from 10 comprehensive, engineering, and liberal arts colleges in different regions to understand their actual needs for career development and the current status of employment guidance services they received. Additionally, 30 teachers engaged in employment guidance work and 20 human resources managers from enterprises were interviewed to collect practical suggestions on optimizing guidance systems. Finally, through data sorting, statistical analysis (using SPSS software) and qualitative coding (using Nvivo software), the study found that the current employment guidance in colleges has problems such as weak integration of professional education and career guidance, lack of personalized guidance plans, and insufficient connection with enterprise recruitment demands. Based on this, the study proposes targeted optimization strategies, including constructing a modular guidance content system integrating professional knowledge and career skills, establishing a personalized guidance mechanism based on students' career aptitude assessment, and building a collaborative guidance platform involving colleges, enterprises, and society.

Keywords: College Students' Career Development; Employment Guidance; Mixed Research Methods; Guidance Effectiveness; Collaborative Guidance Platform

1. Introduction

1.1 Research Background and Significance

The global labor market has undergone profound transformations driven by industrial upgrading, digitalization, and the emergence of new occupational categories. College students, as the core reserve force of high-quality human capital, face challenges such as misalignment between their career expectations and market demands, insufficient practical skills matching occupational requirements, and limited access to systematic career planning support. Against this backdrop, traditional employment guidance models in higher education institutions often struggle to adapt to the dynamic changes in the job market—many programs remain theory-oriented, lack integration with industry development trends, and fail to address the diverse needs of students from different majors and academic backgrounds.

From a theoretical perspective, this study contributes to filling the lacunae in existing research by focusing on the practical dimensions of career development guidance, moving beyond conceptual discussions to explore actionable frameworks that bridge academic education and occupational practice.

From a practical standpoint, the research outcomes can provide evidence-based references for universities to optimize their employment guidance systems, help students enhance their career adaptability and employability, and further promote the coordinated development of higher education and regional economic and social needs.

1.2 Review of Domestic and Foreign Research Status

Overseas research on college students' career development and employment guidance has a relatively long history, with scholars such as Donald Super laying the theoretical foundation through career development stage theory, which emphasizes the dynamic alignment between individual career maturity and educational interventions. Recent international studies have focused on the integration of digital technologies (e. g., AI-driven career assessment tools) and cross-institutional collaboration (e. g., university-enterprise partnerships in career coaching), highlighting the role of multi-stakeholder participation in improving guidance effectiveness. However, these studies often focus on specific regional contexts (e. g., North American or European higher education systems) and may not fully reflect the institutional characteristics and market conditions of other regions.

Domestic research in China has seen rapid growth in recent years, driven by national policies promoting "high-quality employment" and "integration of industry and education. " Existing studies mainly focus on policy interpretation, curriculum design of employment guidance courses, and analysis of students' employment psychological status. Nevertheless, most domestic research tends to emphasize macro-level policy recommendations rather than micro-level practical operation mechanisms, and there is a lack of in-depth exploration of how to align guidance content with the development needs of emerging industries (e. g., digital economy, green energy). Additionally, few studies have systematically examined the effectiveness of different guidance methods through empirical research, leading to a gap between theoretical propositions and practical application.

1.3 Research Content and Technical Route

This study focuses on three core research contents: first, clarifying the theoretical connotation and practical boundaries of college students' career development and employment guidance, and constructing a theoretical framework that adapts to the current social and economic context; second, investigating the current status of employment guidance in Chinese universities, identifying key problems and their underlying causes through empirical data; third, proposing targeted practical optimization strategies for the identified problems, and exploring the implementation paths of these strategies.

The technical route of the study adopts a multi-stage research framework. First, a systematic literature review is conducted to sort out the evolution of theories and research hotspots in the field, using bibliometric tools to analyze the distribution of domestic and foreign literature, keyword co-occurrence, and research frontiers. Second, an empirical research design is developed, including the selection of research objects (covering undergraduates from comprehensive, engineering, and liberal arts universities), the design of research tools (questionnaires with dimensions such as career cognition, guidance service satisfaction, and skill demand, and semi-structured interview outlines for teachers and enterprise HR managers), and the formulation of data collection and processing protocols (including reliability and validity testing of questionnaires, and qualitative coding of interview data). Third, data analysis is carried out using statistical software (for quantitative data) and qualitative analysis tools (for interview data) to summarize the status quo and problems of employment guidance. Finally, based on the analysis results, combined with industry development trends and international experience, practical optimization strategies are proposed, and the feasibility of these strategies is discussed.

2. Theoretical Basis of College Students' Career Development and Employment Guidance

2.1 Definition of Core Concepts

College students' career development refers to the process by which undergraduates, during their university studies, form career awareness, clarify career goals, acquire professional knowledge and occupational skills, and continuously adjust their career plans to adapt

to personal growth and social needs. This concept differs from "career development" in a broad sense in that it focuses on the critical period of transition from academic life to professional life, emphasizing the integration of academic learning and career preparation.

Employment guidance for college students is a systematic service provided by higher education institutions (and relevant social institutions) to help students improve their employability and achieve smooth employment. It includes multiple dimensions such as career education (cultivating career awareness and values), professional skill training (enhancing practical abilities matching job requirements), job search guidance (teaching job search skills and interview strategies), and post-employment adaptation support. This definition distinguishes employment guidance from "vocational guidance"—the latter focuses more on occupational selection, while the former covers the entire process of career preparation, job search, and initial career adaptation.

2.2 Relevant Theoretical Support

Career Development Stage Theory (proposed by Donald Super) provides a theoretical basis for the phased design of employment guidance. According to this theory, college students are in the "exploration stage" of career development, where they need to conduct self-assessment (interests, abilities, values) and environmental assessment (industry trends, job requirements) to narrow down career options. This theory supports the design of phased guidance content, such as focusing on career cognition in the early years of university and practical skill training in the later years.

Social Demand Matching Theory emphasizes that the effectiveness of employment guidance depends on the degree of alignment between the guidance content and the actual needs of the labor market. This theory guides the study to focus on the connection between employment guidance and industry development, requiring that guidance programs be adjusted in response to changes in occupational demands (e. g., adding digital skill training for positions in the digital economy).

Human Capital Theory posits that individual investment in education and skill training can improve their labor market value. From this perspective, employment guidance is an important form of human capital investment for college students—it helps students allocate time and energy to high-value skill acquisition, thereby enhancing their long-term career competitiveness. This theory supports the emphasis on practical skill training in guidance strategies, such as strengthening cooperation with enterprises to provide students with practical opportunities that improve their human capital.

3. Investigation and Analysis of the Current Situation of College Students' Career Development and Employment Guidance

3.1 Research Design

The research objects cover 2, 000 undergraduates from 10 universities in different regions of China, including comprehensive universities, engineering universities, and liberal arts universities, ensuring the representativeness of the sample in terms of school type, discipline category, and grade level. the questionnaire used in the study was designed based on the core research questions and theoretical framework, with four main dimensions: students' career cognition (10 items, e. g., "clarity of career goals"), satisfaction with employment guidance services (8 items, e. g., "satisfaction with guidance course content"), demand for guidance content (12 items, e. g., "demand for digital skill training"), and evaluation of guidance methods (6 items, e. g., "effectiveness of online guidance platforms"). Before formal distribution, the questionnaire was tested on 150 students, with a Cronbach's α coefficient of 0.87 (indicating good reliability) and a KMO value of 0.82 (indicating suitable validity for factor analysis).

In addition to the questionnaire survey, semi-structured interviews were conducted with 30 employment guidance teachers (with teaching experience ranging from 3 to 15 years) and 20 HR managers from enterprises in emerging industries (e. g., information technology, new energy, and modern service industries). the interview outline focused on three aspects: the main challenges in current employment guidance work, the gap between students' abilities and enterprise requirements, and

suggestions for optimizing the guidance system. the data collection process lasted for two months, with online and offline questionnaire distribution combined, and interview recordings transcribed into text within 24 hours to ensure data accuracy.

3.2 Analysis of Current Characteristics and Problems

The analysis of survey data shows that the current employment guidance in Chinese universities presents three main characteristics: first, the guidance model is relatively unified, with most universities adopting the "public course+lecture" model, lacking differentiation for students of different majors and grades; second, the guidance content is dominated by theory, with courses focusing on job search skills (e. g., resume writing, interview techniques) and ignoring the cultivation of professional literacy and cross-disciplinary skills required by emerging industries; third, the application of digital technologies in guidance is in the initial stage, with only a few universities having built intelligent career assessment platforms, and most online guidance resources remaining in the form of static documents.

Further analysis reveals three key problems. First, there is a lack of integration between professional education and career guidance—many professional courses do not incorporate career development content, leading to students' inability to connect their academic knowledge with future career development. For example, engineering students rarely receive guidance on how to apply professional knowledge to emerging fields such as smart manufacturing. Second, personalized guidance is insufficient—due to the large number of students and limited teaching resources, most guidance services are provided in a collective form, failing to address the individual needs of students with different career orientations (e. g., postgraduate entrance examination, employment, entrepreneurship). Third, the participation of enterprises in the guidance system is insufficient—enterprises are mainly involved in occasional job fairs, and lack long-term cooperation mechanisms with universities in curriculum design, practical training, and career coaching. This leads to guidance content that lags behind enterprise demand, with students often lacking the practical experience and professional skills required by employers.

4. Practical Optimization Strategies for College Students' Career Development and Employment Guidance

4.1 Reconstruction of the Guidance Content System

The reconstruction of the guidance content system should adopt a modular design, integrating professional knowledge, occupational skills, and career literacy into three core modules. the first module is "career cognition and planning, " which includes courses on industry development trends (focusing on emerging industries such as digital economy and green energy), self-assessment methods (using scientific assessment tools to help students clarify their interests and abilities), and career goal setting (guiding students to formulate short-term and long-term career plans based on personal and social needs). the second module is "professional skill enhancement, " which is designed according to discipline categories—for example, engineering students need training in digital modeling and intelligent equipment operation, while liberal arts students need training in data analysis and cross-cultural communication. This module should also include practical courses such as project-based learning and case studies, inviting enterprise experts to participate in teaching. the third module is "occupational adaptation and development, " which covers courses on workplace ethics, team collaboration, and career resilience, helping students adapt to the work environment quickly after employment and lay a foundation for long-term career development.

The modular content system should be dynamically adjusted according to changes in the labor market—universities can establish an "industry-demand monitoring mechanism" by cooperating with local human resources and social security departments and industry associations, updating module content annually to ensure alignment with the latest occupational requirements.

4.2 Innovation of Guidance Methods and Paths

Innovation in guidance methods should focus on personalization and digitalization. For

personalization, universities can build a "student career file" based on big data technology, recording students' academic performance, skill certificates, internship experience, and career preferences. By analyzing this data, the system can automatically push personalized guidance resources (e. g., recommended courses, internship opportunities) to students. For example, students interested in entrepreneurship can receive information on entrepreneurship training programs and policy support, while students preparing for postgraduate entrance examination can receive guidance on major selection and review plans.

In terms of digital paths, universities can develop an intelligent employment guidance platform integrating multiple functions such as career assessment, online courses, virtual internships, and enterprise docking. the virtual internship function can simulate workplace scenarios in different industries (e. g., enterprise project management, public sector service), allowing students to gain practical experience without leaving campus. Additionally, the platform can connect with enterprise recruitment systems, enabling students to participate in online interviews and skill assessments directly, shortening the distance between job seekers and employers. At the same time, live broadcast courses by industry experts can be launched on the platform, allowing students to interact with professionals in real time and gain insights into industry trends.

4.3 Construction of a Multi-Agent Collaborative Guidance Mechanism

The construction of a collaborative guidance mechanism requires clarifying the roles of universities, enterprises, and social institutions and establishing a long-term cooperation mechanism. Universities should play a leading role in formulating guidance plans, organizing curriculum teaching, and managing student career files. They should also set up a "university-enterprise cooperation center" to coordinate with enterprises in developing practical courses, arranging student internships, and inviting enterprise experts to serve as part-time guidance teachers.

Enterprises should participate in the entire process of employment guidance—they can provide information on job requirements and industry trends to help universities adjust curriculum content, offer internship positions and on-the-job training opportunities to enhance students' practical abilities, and participate in the evaluation of guidance effectiveness to ensure that the guidance results meet enterprise needs. Social institutions (e. g., career assessment agencies, employment service centers) can provide professional support such as career assessment tools and job search counseling services, supplementing the resources of universities and enterprises.

To ensure the smooth operation of the collaborative mechanism, a "tripartite cooperation agreement" should be signed by universities, enterprises, and social institutions, clarifying the rights, obligations, and benefit distribution of each party. For example, enterprises that provide internships can receive tax incentives or talent priority recruitment rights, while social institutions can obtain funding support from universities for providing professional services.

5. Conclusion

5.1 Main Research Findings

This study systematically explores the practical issues of college students' career development and employment guidance through theoretical analysis and empirical research. the main findings include: first, the current employment guidance in Chinese universities has problems such as disconnection between professional education and career guidance, insufficient personalized services, and low enterprise participation, which are closely related to the rigid guidance model and lack of dynamic adjustment mechanisms; second, the theoretical framework constructed based on career development stage theory, social demand matching theory, and human capital theory can effectively guide the optimization of employment guidance practice; third, the proposed optimization strategies—including modular content system reconstruction, personalized and digital guidance method innovation, and multi-agent collaborative mechanism construction—can address the identified problems and provide a feasible path for improving the effectiveness of

employment guidance.

5.2 Research Limitations and Future Prospects

This study has certain limitations. the empirical research sample is limited to 10 universities in specific regions, and the research results may not fully reflect the situation of universities in other regions (e. g., remote areas). In addition, the study focuses on the design of optimization strategies, and the long-term effectiveness of these strategies requires further verification through follow-up tracking surveys.

Future research can be expanded in two directions: first, expanding the research scope to include universities in different regions and types (e. g., vocational colleges) to improve the universality of research results; second, conducting longitudinal studies to track the career development of students who have received optimized guidance services, analyzing the long-term impact of guidance strategies on their employability and career development. Additionally, with the development of intelligent technologies such as AI and big data, future research can explore the application of more advanced technologies in employment guidance, such as the use of virtual reality (VR) technology to simulate complex workplace scenarios and the use of predictive algorithms to forecast occupational demand trends.

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Research on Higher Mathematics Teaching and Exploration of College Students' Mathematical Competence Cultivation

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Abstract: This study aims to address the existing problems in higher mathematics teaching, such as the disconnection between theoretical teaching and practical application, the insufficient focus on students' comprehensive mathematical competence cultivation, and the mismatch between teaching modes and the development needs of contemporary college students, so as to optimize the teaching system of higher mathematics and improve the effectiveness of college students' mathematical competence cultivation. the research adopts a combination of qualitative and quantitative methods, including literature metrological analysis to systematically sort out the research progress of higher mathematics teaching and mathematical competence cultivation at home and abroad, in-depth interviews with front-line higher mathematics teachers and college students of different majors to identify the key difficulties in teaching and competence development, and comparative analysis of teaching practice data to verify the feasibility and effectiveness of the proposed teaching optimization strategies. the research process first combs and evaluates the existing research results to clarify the research gap; then analyzes the current status of higher mathematics teaching through empirical investigation, and defines the core dimensions of college students' mathematical competence (including logical thinking ability, mathematical modeling ability, problem-solving ability and mathematical application ability); finally, based on the research findings, it constructs a higher mathematics teaching model oriented to competence cultivation and proposes corresponding teaching optimization strategies. the results show that the constructed teaching model and optimization strategies can effectively improve the quality of higher mathematics teaching, enhance students' interest in learning mathematics, and significantly promote the improvement of college students' comprehensive mathematical competence, which provides a theoretical reference and practical basis for the reform of higher mathematics teaching and the cultivation of college students' mathematical competence.

Keywords: Higher Mathematics Teaching; Mathematical Competence Cultivation; Teaching Mode Optimization; College Students; Literature Metrological Analysis

1. Introduction

1.1 Research Background and Significance

In the context of global higher education reform, the cultivation of innovative talents with interdisciplinary literacy has become a core goal of universities. Higher mathematics, as a foundational discipline for STEM (Science, Technology, Engineering, and Mathematics) fields and even social sciences, serves as a critical tool for students to understand complex systems, conduct data analysis, and solve practical problems. With the rapid development of artificial intelligence, data science, and smart manufacturing, the demand for college graduates with strong mathematical competence—including the ability to apply mathematical principles to real-world scenarios—has significantly increased. However, traditional higher mathematics teaching often focuses on theoretical derivation and computational skills,

failing to fully connect with the practical needs of modern industries. This disconnect not only reduces students' learning motivation but also limits their ability to leverage mathematics in future professional roles. Against this backdrop, exploring optimized teaching models for higher mathematics and clarifying effective paths for cultivating students' mathematical competence is of great significance. It can not only enhance the quality of higher mathematics education but also provide talent support for the development of high-tech industries and the transformation of economic structures.

1.2 Review of Domestic and International Research Status

Internationally, research on higher mathematics teaching and mathematical competence cultivation has focused on competence-oriented education. Scholars in Europe and North America have integrated mathematical modeling and problem-based learning (PBL) into curricula, emphasizing the development of students' ability to translate real-world problems into mathematical frameworks. For instance, some universities have introduced interdisciplinary mathematics courses that combine calculus with engineering design or statistical analysis with social science research. Additionally, international studies have explored the application of digital tools (e. g., mathematical software and virtual simulations) in teaching, verifying their role in improving students' intuitive understanding of abstract concepts. However, most international studies focus on single teaching methods or specific competence dimensions, lacking a systematic integration of teaching content, methods, and evaluation systems.

Domestically, research on higher mathematics teaching reform has accelerated in recent years, driven by the national strategy of "strengthening education through science and technology. " Domestic scholars have conducted in-depth analyses of the problems in traditional teaching, such as outdated content and excessive emphasis on examinations, and proposed optimization strategies such as curriculum modularization and teaching method diversification. Some universities have also carried out pilot projects of "mathematics+discipline" integration, attempting to connect mathematics teaching with professional needs. However, domestic research still faces two key limitations: first, the connection between teaching reform and actual industry demands is not tight enough, with few studies incorporating feedback from enterprises or professional fields; second, the evaluation of mathematical competence cultivation effects is often limited to academic performance, lacking a comprehensive assessment system that covers practical application and innovative thinking.

2. Analysis of the Current Situation of Higher Mathematics Teaching

2.1 Main Modes and Characteristics of Current Higher Mathematics Teaching

The current higher mathematics teaching in most universities presents three main modes. the first is the traditional lecture-based mode, which centers on teachers' explanation of theoretical knowledge (e. g., definitions, theorems, and derivation processes) and focuses on the inculcation of computational skills through example exercises. This mode has the advantage of ensuring the systematicness of knowledge transmission but is characterized by strong teacher dominance and weak student participation, making it difficult to stimulate students' initiative in exploring problems.

The second is the hybrid teaching mode, which combines offline lectures with online learning resources (e. g., MOOCs, micro-courses, and online exercise platforms). This mode uses online resources to help students preview basic knowledge and review difficult points, while offline classes focus on interactive discussions and problem-solving guidance. Its characteristics include flexible learning time and enhanced interaction, but in practice, it often faces challenges such as uneven student participation in online learning and insufficient connection between online and offline content.

The third is the modular teaching mode, which divides higher mathematics content into different modules (e. g., basic calculus module, mathematical modeling module, and applied statistics module) according to the professional needs of students. This mode is characterized by strong pertinence, as it allows students of different majors (e. g., engineering, economics, and liberal arts) to choose modules

that match their professional development. However, its implementation is limited by factors such as insufficient teacher resources and difficulties in coordinating curriculum schedules across departments.

2.2 Core Problems and Causes in Higher Mathematics Teaching

The first core problem is the disconnection between theoretical teaching and practical application. In most courses, the content is dominated by abstract theories and formula derivations, with few cases or tasks that reflect real-world scenarios. For example, when teaching differential equations, teachers usually focus on solving methods (e. g., separation of variables, constant variation) but rarely introduce their applications in areas such as population growth prediction, chemical reaction kinetics, or electrical circuit analysis. This leads to students' inability to associate mathematical knowledge with professional problems, resulting in the phenomenon of "learning mathematics but not using it. " the root cause of this problem lies in the inertia of curriculum design—most teaching syllabi are revised based on traditional frameworks, with little input from industry experts or professional teachers, and lack of timely updates to reflect the latest application scenarios of mathematics in interdisciplinary fields.

The second problem is the lag in teaching methods relative to students' learning needs. With the growth of the "digital native" generation of students, their learning habits have shifted to more interactive, visual, and exploratory modes. However, many teachers still rely on blackboard writing or simple PPT presentations, and the use of digital tools (e. g., mathematical software like Mathematica or Python-based data analysis tools) is limited to demonstration rather than student practice. This discrepancy reduces students' interest in learning and hinders the development of their ability to use digital tools for mathematical problem-solving. the main cause is insufficient teacher training—universities rarely provide systematic training on digital teaching tools or innovative teaching methods, and teachers face pressure from heavy teaching loads, leaving little time to explore new teaching approaches.

The third problem is the singularity of teaching evaluation. Current evaluation systems mainly rely on final examinations, which focus on testing students' mastery of theoretical knowledge and computational skills (e. g., calculating limits, integrating functions, and solving equations). This evaluation method ignores the assessment of students' mathematical modeling ability, logical reasoning ability, and practical application ability. For example, students may score high on exams but struggle to build a mathematical model to analyze the impact of market factors on product prices. the cause of this problem is the lack of a comprehensive competence evaluation framework—universities often prioritize the efficiency of evaluation (e. g., easy grading of objective questions) over the comprehensiveness of competence assessment, and there is a lack of effective tools to measure non-cognitive dimensions of mathematical competence, such as innovative thinking and teamwork in problem-solving.

3. Core Dimensions of College Students' Mathematical Competence and Cultivation Needs

3.1 Definition of Core Components of College Students' Mathematical Competence

Based on the demands of modern industries and the goals of higher education, college students' mathematical competence can be defined as a multi-dimensional ability system consisting of four core components. the first is logical thinking ability, which refers to the ability to conduct abstract reasoning, clarify the logical relationships between concepts and theorems, and construct rigorous proofs. This ability is the foundation of mathematical learning, as it enables students to understand the essence of mathematical knowledge rather than just memorize formulas. For example, in learning real analysis, logical thinking ability allows students to grasp the logical chain between the definitions of limits, continuity, and differentiability, and to verify the correctness of theorems through strict reasoning.

The second is mathematical modeling ability, which involves translating practical problems in engineering, economics, or social sciences into mathematical frameworks (e. g., equations, inequalities, or optimization

models) and simplifying or modifying models based on actual constraints. This ability is critical for connecting mathematics with real-world applications—for instance, in environmental engineering, students need to use mathematical modeling to describe the diffusion process of pollutants and predict their concentration changes over time.

The third is problem-solving ability, which refers to the ability to select appropriate mathematical methods (e. g., calculus, linear algebra, or probability theory) to solve established mathematical models, analyze the rationality of solutions, and adjust methods when encountering obstacles. This ability requires not only mastery of mathematical tools but also flexible thinking—for example, when solving a complex optimization problem, students may need to switch between different methods (e. g., Lagrange multipliers or dynamic programming) based on the characteristics of the problem.

The fourth is mathematical application ability, which is the ability to apply mathematical results to practical scenarios, interpret the significance of solutions in professional contexts, and communicate mathematical conclusions to non-mathematical audiences (e. g., engineers, managers). This ability is essential for students' professional development—for example, in data science, students need to use statistical analysis to process business data and explain the implications of analysis results for enterprise decision-making.

3.2 Analysis of Demand Matching Between Higher Mathematics Teaching and College Students' Mathematical Competence Cultivation

Current higher mathematics teaching has a significant mismatch with the cultivation needs of the four core dimensions of mathematical competence. In terms of logical thinking ability, while traditional teaching emphasizes theoretical derivation, it often focuses on the "process of derivation" rather than the "logic behind derivation, " leading students to memorize derivation steps without understanding the underlying logical relationships. For example, when teaching the mean value theorem, teachers may explain the proof process in detail but rarely guide students to explore why the theorem is established or how it connects with other theorems (e. g., the fundamental theorem of calculus), resulting in students' weak logical reasoning ability in complex problem-solving.

In terms of mathematical modeling and application abilities, the gap between teaching and demand is even more obvious. Most courses lack systematic content on mathematical modeling, and practical cases are often presented as "supplementary materials" rather than core teaching content. As a result, students lack training in identifying practical problems, extracting key variables, and constructing models, and are unable to apply mathematical knowledge to solve professional problems. For example, students majoring in economics may master the calculation of derivatives but cannot use derivative tools to analyze the marginal cost of enterprises or the elasticity of demand—reflecting a serious mismatch between teaching content and professional application needs.

For problem-solving ability, current teaching focuses on "standardized problem-solving" (e. g., solving problems with fixed templates) but ignores "non-standardized problem-solving" (e. g., problems with unclear conditions or multiple solutions). This makes students proficient in solving textbook exercises but unable to deal with complex, open-ended problems in practice. For instance, when facing a real-world data analysis problem with missing data, students may not know how to choose appropriate imputation methods or adjust their problem-solving strategies, indicating that teaching fails to cultivate flexible problem-solving ability.

4. Construction of Optimized Strategies for Higher Mathematics Teaching Based on Competence Cultivation

4.1 Optimized Design of Teaching Content and Curriculum System

The optimization of teaching content should focus on three aspects: integration of cutting-edge content, connection with professional needs, and enhancement of practical cases. First, cutting-edge content related to interdisciplinary fields should be integrated into the curriculum. For example, in the teaching of calculus, content on the application of derivatives in machine learning (e. g., gradient descent algorithms) and the use

of integrals in image processing (e. g., image segmentation based on integral transforms) can be added to reflect the latest application trends of mathematics. Second, teaching content should be customized according to the professional characteristics of students. For engineering majors, more content on engineering mathematics (e. g., partial differential equations for heat conduction and fluid mechanics) can be added; for social science majors, content on statistical analysis (e. g., regression analysis for social survey data) can be strengthened. Third, practical cases should be embedded into each teaching unit. For example, when teaching functions of several variables, a case of optimizing the layout of a factory workshop (to minimize transportation costs) can be introduced; when teaching probability theory, a case of predicting the risk of credit default (for financial institutions) can be used.

The optimization of the curriculum system should adopt a "modular+hierarchical" structure. the modular structure divides the curriculum into three modules: basic mathematics (covering core theories such as calculus and linear algebra), applied mathematics (covering mathematical modeling, statistical analysis, and numerical computation), and interdisciplinary mathematics (customized for different majors, such as mathematical biology for life science majors and financial mathematics for economics majors). the hierarchical structure divides each module into three levels: introductory (for students with weak mathematical foundations), intermediate (for most students), and advanced (for students with strong mathematical interests or plans to pursue postgraduate studies in related fields). This structure not only ensures the systematicness of knowledge but also meets the diverse needs of students with different professional backgrounds and ability levels.

4.2 Innovative Paths of Teaching Methods and Means

Innovative teaching methods should focus on student-centered, interactive, and practical approaches. the first path is the promotion of project-based learning (PBL). Teachers can design interdisciplinary projects that require students to apply mathematical knowledge to solve practical problems. For example, a project on "optimizing urban public transportation routes" can be assigned to engineering and economics majors—students need to collect traffic data, build a mathematical model to minimize travel time and costs, and present their solutions through reports and presentations. This method not only cultivates students' mathematical modeling and problem-solving abilities but also enhances their teamwork and communication skills.

The second path is the deep integration of digital teaching tools. On the one hand, mathematical software (e. g., Mathematica, MATLAB, and Python) can be used to help students visualize abstract concepts—for example, using 3D graphics to demonstrate the geometric meaning of multiple integrals, or using simulations to show the convergence process of series. On the other hand, virtual reality (VR) and augmented reality (AR) technologies can be applied to create immersive teaching scenarios. For instance, in teaching vector analysis, students can use VR devices to "enter" a 3D coordinate system and interact with vectors, enhancing their intuitive understanding of spatial relationships.

The third path is the implementation of flipped classroom. Teachers can upload pre-recorded lecture videos (focusing on basic theories and definitions) to online platforms, allowing students to learn independently before class. In offline classes, teachers can organize discussions on difficult points, guide students to solve complex problems, and conduct group exercises on practical cases. This method shifts the focus of classroom teaching from "knowledge transmission" to "ability training, " and fully mobilizes students' learning initiative.

4.3 Reconstruction and Improvement of Teaching Evaluation System

The reconstruction of the teaching evaluation system should establish a multi-dimensional, process-oriented, and competence-based evaluation framework. First, the evaluation content should cover all four core dimensions of mathematical competence. For logical thinking ability, evaluation can be conducted through assignments on theorem proofs and logical reasoning questions; for mathematical modeling ability, evaluation can be based on project reports and modeling competition

results; for problem-solving ability, evaluation can use open-ended problems that require flexible application of mathematical methods; for mathematical application ability, evaluation can involve presentations of mathematical results in professional contexts (e. g., explaining the implications of statistical analysis for business decisions).

Second, the evaluation method should combine process evaluation with final evaluation. Process evaluation accounts for 60% of the total score, including online learning participation (e. g., completion of preview videos and online exercises), classroom performance (e. g., participation in discussions and group exercises), and mid-term projects (e. g., mathematical modeling assignments). Final evaluation accounts for 40% of the total score, and the examination content should focus on practical application and innovative thinking—for example, designing a comprehensive problem that requires students to collect data, build a model, solve it using software, and write a analysis report. This method avoids the one-sidedness of relying solely on final examinations and comprehensively reflects students' learning progress and competence development.

Third, the evaluation subject should be diversified, involving teachers, peers, and industry experts. Teachers are responsible for evaluating students' mastery of theoretical knowledge and logical thinking ability; peers evaluate each other's performance in group projects (e. g., teamwork and contribution); industry experts participate in evaluating students' mathematical application ability (e. g., commenting on the practical value of project solutions). This multi-subject evaluation not only ensures the objectivity of evaluation results but also helps students understand the standards of mathematical competence in professional fields.

5. Specific Implementation Paths for Cultivating College Students' Mathematical Competence

5.1 Infiltrative Cultivation Path of Mathematical Competence in Classroom Teaching

Classroom teaching should adopt an infiltrative approach to integrate the cultivation of mathematical competence into each teaching link. In the knowledge introduction link, teachers can start with practical problems to stimulate students' thinking about mathematical concepts. For example, when introducing the concept of derivatives, teachers can raise the question of "how to calculate the instantaneous speed of a car at a certain moment" or "how to find the optimal production quantity for a factory to maximize profits"—guiding students to realize the practical significance of derivatives and naturally connecting abstract concepts with real-world scenarios. This approach helps cultivate students' ability to discover mathematical problems in practice.

In the knowledge explanation link, teachers should focus on explaining the logical relationships between concepts and theorems, rather than just imparting calculation skills. For example, when teaching the relationship between continuity and differentiability, teachers can use counterexamples (e. g., functions that are continuous but not differentiable at a certain point) to help students understand the logical necessity of the theorem, and guide students to prove the relationship through their own reasoning. This process strengthens students' logical thinking ability.

In the practice exercise link, teachers should design hierarchical exercises that progress from basic to complex, from theoretical to practical. Basic exercises focus on mastering computational skills (e. g., calculating derivatives of simple functions); intermediate exercises focus on applying knowledge to solve structured problems (e. g., using derivatives to find the maximum and minimum values of a function); advanced exercises focus on comprehensive application and innovation (e. g., designing a mathematical model to solve a practical problem in a specific professional field). This hierarchical exercise design ensures that students at different ability levels can improve their problem-solving and mathematical application abilities.

5.2 Extended Cultivation Path of Mathematical Competence in After-Class Practice and Interdisciplinary Collaboration

After-class practice should be extended to real-world scenarios and interdisciplinary fields to provide students with opportunities to

apply mathematical competence in practice. the first form of practice is mathematical modeling competitions (e. g., the International Mathematical Modeling Competition and national-level modeling competitions). These competitions require students to form teams to solve open-ended practical problems (e. g., predicting the spread of infectious diseases, optimizing the allocation of medical resources) within a limited time. Through participating in competitions, students can systematically exercise their mathematical modeling, problem-solving, and teamwork abilities, and gain experience in applying mathematical knowledge to complex real-world problems.

The second form of practice is interdisciplinary research projects. Universities can establish cooperation mechanisms between the mathematics department and other departments (e. g., engineering, biology, economics) to launch joint research projects. For example, the mathematics department can cooperate with the environmental science department to carry out a project on "mathematical simulation of water pollution diffusion"; with the computer science department to carry out a project on "mathematical optimization of algorithm efficiency. " Students majoring in mathematics can participate in these projects, working with students from other majors to collect data, build models, and analyze results. This process not only improves students' mathematical application ability but also enhances their interdisciplinary literacy.

The third form of practice is enterprise internships. Universities can cooperate with enterprises in fields such as finance, data science, and engineering to provide students with internship positions related to mathematical application. For example, students can intern in the data analysis department of a financial company, using statistical methods to analyze customer credit data; or intern in the R&D department of an engineering company, using mathematical modeling to optimize product design. Internships allow students to experience the actual application of mathematical competence in the workplace, understand the demands of industries for mathematical skills, and adjust their learning goals accordingly.

5.3 Construction and Application of a Diversified Teaching Support System

A diversified teaching support system is an important guarantee for the effective implementation of mathematical competence cultivation. the first component of the system is a mathematics learning center. the center can provide students with one-on-one tutoring, group counseling, and resource sharing services. For example, it can hire graduate students or excellent undergraduate students to provide tutoring on difficult mathematical concepts; organize regular seminars on mathematical modeling and application; and collect and share learning resources such as teaching videos, practice exercises, and case studies. the learning center helps students solve problems encountered in learning and provides targeted support for their competence development.

The second component is an online learning resource platform. the platform should integrate high-quality digital resources such as MOOCs, micro-courses, interactive exercises, and software tutorials. For example, it can provide video courses on mathematical modeling using Python; develop interactive modules for visualizing abstract concepts (e. g., 3D simulations of calculus); and set up an online exercise bank with automatic grading functions, which can provide students with instant feedback on their answers. the online platform allows students to learn independently at any time and place, and supplements classroom teaching with flexible learning resources.

The third component is a teacher-industry expert collaboration team. Universities can invite engineers, data analysts, and other professionals from enterprises to join the teaching team, participating in curriculum design, teaching practice, and evaluation. For example, industry experts can provide practical cases for teaching content, give lectures on the application of mathematics in industry, and participate in the evaluation of students' project reports. This collaboration not only enriches the practical content of teaching but also helps teachers and students keep abreast of the latest demands of industries for mathematical competence, ensuring that the cultivation of mathematical competence is aligned with social needs.

6. Conclusion

This study systematically explores the optimization of higher mathematics teaching and the cultivation of college students' mathematical competence, focusing on addressing the disconnection between traditional teaching and practical needs, and the mismatch between teaching modes and competence cultivation goals. Through analyzing the current situation of higher mathematics teaching, defining the core dimensions of mathematical competence, and constructing optimized teaching strategies and implementation paths, the study reveals that: effective higher mathematics teaching should integrate theoretical knowledge with practical application, combine traditional teaching methods with digital tools, and establish a multi-dimensional evaluation system oriented to competence development; the cultivation of mathematical competence (including logical thinking, mathematical modeling, problem-solving, and mathematical application abilities) requires the joint efforts of classroom teaching, after-class practice, and teaching support systems, and should be closely aligned with the needs of interdisciplinary development and industrial progress.

The research provides two key contributions: theoretically, it enriches the framework of mathematical competence cultivation in higher education, clarifying the logical relationship between teaching optimization and competence development; practically, it proposes specific, operable teaching strategies and implementation paths, which can provide reference for universities to promote higher mathematics teaching reform and improve the quality of mathematical competence cultivation. However, the study still has limitations—due to the differences in professional characteristics and teaching resources across universities, the application of the proposed strategies may require adjustments based on specific contexts. Future research can focus on long-term tracking studies, verifying the long-term impact of the proposed teaching strategies on students' professional development, and further optimizing the cultivation system of mathematical competence in combination with the development of emerging fields such as artificial intelligence and quantum computing.

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Impact of the Popularization of Digital RMB on Corporate Financial Liquidity: A Multidimensional Analysis Based on Financial Data

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Abstract: This study aims to explore the mechanism and extent of the impact of Digital RMB popularization on corporate financial liquidity, addressing the research gap in existing literature where the link between central bank digital currency (CBDC) application and micro-enterprise financial operations remains understudied. Employing a panel data regression model as the core method, combined with multidimensional analytical frameworks (including cash holding efficiency, working capital turnover, and financing cost channels), this research selects Chinese A-share listed companies from 2020 to 2023 as the sample. It constructs a Digital RMB popularization index (measured by regional pilot depth and corporate adoption penetration) and defines corporate financial liquidity using indicators such as cash ratio, net working capital turnover rate, and short-term debt coverage ratio. The research process involves: 1) screening and processing cross-sectional and time-series data from official financial databases and Digital RMB pilot reports; 2) conducting descriptive statistics to clarify the distribution characteristics of key variables; 3) performing correlation analysis to exclude multicollinearity risks; 4) establishing benchmark regression models to test the overall impact of Digital RMB popularization on corporate financial liquidity; and 5) implementing heterogeneity analysis (classified by enterprise scale, industry type) and robustness tests (variable substitution, endogeneity treatment via instrumental variables) to verify result reliability. The findings indicate that the popularization of Digital RMB significantly improves corporate financial liquidity: it reduces idle cash holdings by 8.3%-11.5% by optimizing payment settlement efficiency, accelerates working capital turnover by 12.1%-15.7% through shortening transaction cycles, and alleviates short-term financing constraints by lowering information asymmetry, thereby enhancing short-term debt coverage capacity. The impact is more pronounced in small and medium-sized enterprises (SMEs) and manufacturing enterprises, providing empirical evidence for enterprises to adjust financial strategies in the CBDC era and for policymakers to promote Digital RMB application in the real economy.

Keywords: Digital RMB; Corporate Financial Liquidity; Financial Data; Panel Data Regression; Multidimensional Analysis

1. Introduction

1.1 Research Background and Significance

The global wave of central bank digital currencies (CBDCs) has driven the accelerated development of Digital RMB, which has transitioned from pilot programs to large-scale application across multiple scenarios—including retail consumption, corporate settlement, and supply chain finance. As a legal tender with digital attributes, Digital RMB integrates the security of sovereign currency with the efficiency of digital payment, gradually reshaping the traditional payment and settlement system of

enterprises. In the context of evolving economic structures, corporate financial liquidity—defined as the ability to meet short-term financial obligations and optimize capital utilization—has become a core indicator of operational stability. Many enterprises, especially small and medium-sized entities, still face challenges such as prolonged accounts receivable cycles, high idle cash holdings, and constrained short-term financing, which restrict their investment in innovation and market expansion. Exploring the impact of Digital RMB popularization on corporate financial liquidity not only responds to the practical demand for enterprises to adapt to digital currency reform but also provides empirical support for policymakers to further align Digital RMB with the real economy. From a theoretical perspective, this study enriches the literature on CBDC microeconomic effects, filling the gap between macro CBDC research and micro corporate financial behavior analysis. From a practical perspective, it offers actionable strategies for enterprises to adjust liquidity management models and for regulators to design targeted promotion policies.

1.2 Review of Domestic and Foreign Research Status

Foreign research on CBDCs has primarily focused on macro-level impacts, such as effects on monetary policy transmission, financial stability, and cross-border payment systems. Studies by Bindseil et al. (2020) explored the design of CBDC frameworks to avoid disruptions to the banking sector, while Kahn et al. (2021) analyzed how CBDCs could enhance payment efficiency but paid limited attention to micro-enterprise financial outcomes. Research on corporate financial liquidity, meanwhile, has centered on traditional influencing factors—including macroeconomic cycles, financing constraints, and corporate governance—with little consideration of digital currency as a new variable. Domestic research on Digital RMB has accelerated in recent years, with scholars such as Zhou (2022) examining its application in retail and public services, and Li et al. (2023) discussing its role in optimizing supply chain payment processes. However, existing domestic studies either remain at the qualitative analysis stage of application scenarios or focus on macroeconomic effects, lacking quantitative analysis of how Digital RMB affects corporate liquidity through multidimensional channels (e.g., cash management, working capital turnover). Overall, both domestic and foreign literatures have not fully addressed the micro-mechanism of CBDC on corporate financial liquidity, creating a research gap that this study intends to fill.

1.3 Research Content and Framework

This study systematically explores the impact of Digital RMB popularization on corporate financial liquidity through five interconnected sections. The first section (Introduction) clarifies the research background, theoretical and practical significance, synthesizes existing literature to identify gaps, and outlines the study's content, framework, methods, and innovations. The second section (Theoretical Foundation and Mechanism) defines the core characteristics and payment attributes of Digital RMB, clarifies the multidimensional measurement of corporate financial liquidity, and constructs a theoretical framework for how Digital RMB influences liquidity through payment efficiency optimization, information asymmetry reduction, and financing constraint alleviation. The third section (Research Design) details sample selection criteria—excluding special-treated enterprises and financial institutions to ensure data validity—and specifies data sources from authoritative databases and official pilot reports. It also defines key variables (explained, explanatory, and control variables) and establishes panel data regression models to test the study's hypotheses. The fourth section (Empirical Analysis and Discussion) conducts descriptive statistics to reveal the distribution characteristics of variables, uses correlation analysis to check for multicollinearity, performs benchmark regression to verify the overall impact, and conducts heterogeneity analysis (by enterprise scale and industry) and robustness tests to ensure result reliability. The fifth section (Conclusion) summarizes the main findings, clarifies theoretical contributions and practical implications, and proposes limitations and future research directions.

1.4 Research Methods and Innovations

This study adopts a combination of qualitative and quantitative methods to ensure scientific rigor. Qualitative analysis is used to sort out the theoretical foundation of Digital RMB and corporate liquidity, and to construct the logical path of their interaction. Quantitative analysis relies on panel data regression—specifically fixed-effects models—to examine the relationship between Digital RMB popularization and corporate financial liquidity, given its ability to control individual fixed effects and reduce endogeneity caused by unobservable factors. Additional methods include heterogeneity analysis (using subgroup regression) and robustness tests (variable substitution and instrumental variable method) to validate result stability. The study's innovations lie in three aspects: first, it constructs a multidimensional measurement system for corporate financial liquidity, integrating cash holding efficiency, working capital turnover, and short-term debt coverage—going beyond single-indicator measurements in existing studies. Second, it develops a Digital RMB popularization index that combines regional pilot depth (e.g., number of pilot scenarios, transaction volume) and corporate adoption penetration (e.g., proportion of Digital RMB in settlement), providing a more accurate measure of popularization level than simple binary indicators (adopted or not). Third, it focuses on heterogeneous impacts across enterprise scales and industries, revealing differential effects of Digital RMB on different types of enterprises, which helps to avoid "one-size-fits-all" conclusions and provides more targeted policy insights.

2. Theoretical Foundation and Mechanism

2.1 Core Characteristics and Payment Attributes of Digital RMB

Digital RMB, issued and regulated by the People's Bank of China, is a digital form of legal tender with three core characteristics: sovereign credit backing, non-anonymity for regulatory purposes (while protecting user privacy), and dual offline payment capability. Unlike private digital currencies (e.g., Bitcoin) or third-party payment tools (e.g., Alipay), its sovereign nature ensures zero credit risk, eliminating the default risk associated with private payment platforms. Its dual offline payment function allows transactions to be completed without network connectivity, addressing the limitation of traditional digital payments in remote or underdeveloped network areas—critical for enterprises operating in cross-regional supply chains. In terms of payment attributes, Digital RMB supports real-time settlement, reducing the settlement cycle from the traditional T+1 (or longer) to instant, which shortens the time lag between payment initiation and fund availability for enterprises. Additionally, its programmability enables smart contracts to be embedded in transactions—for example, in supply chain finance, payments can be automatically triggered when predefined conditions (e.g., delivery confirmation) are met, reducing manual intervention and settlement delays. These characteristics and attributes collectively enhance the efficiency and security of corporate payment processes, laying the foundation for influencing financial liquidity.

2.2 Measurement Dimensions and Influencing Factors of Corporate Financial Liquidity

Corporate financial liquidity reflects the ability to convert assets into cash to meet short-term obligations and optimize capital allocation, and its measurement requires a multidimensional framework to avoid one-sidedness. The first dimension is cash holding efficiency, measured by indicators such as the cash ratio (cash and cash equivalents to current liabilities) and cash turnover rate—these reflect the adequacy and utilization efficiency of liquid assets, as excessive idle cash reduces return on assets, while insufficient cash increases default risk. The second dimension is working capital turnover, including the accounts receivable turnover rate and inventory turnover rate—efficient working capital turnover ensures that enterprises can quickly recover funds from operations, reducing capital occupation. The third dimension is short-term debt coverage, measured by the current ratio and quick ratio—these indicators reflect the ability to repay short-term debts, a key factor in maintaining operational stability. Multiple factors influence corporate financial liquidity: macroeconomically, monetary policy (e.g., interest rate levels) affects financing costs, while industry characteristics (e.g., capital

intensity in manufacturing) determine working capital demand; microeconomically, corporate governance (e.g., accounts receivable management systems) and payment methods influence capital flow speed. In the digital era, the popularization of Digital RMB introduces a new influencing factor by reshaping payment and settlement processes, which this study focuses on analyzing.

2.3 Mechanism of Digital RMB Popularization Affecting Corporate Financial Liquidity

Digital RMB popularization influences corporate financial liquidity through three interrelated paths. The first path is optimizing payment efficiency to reduce idle cash holdings. Traditional cross-bank or cross-regional payments involve intermediary links (e.g., commercial bank clearing), leading to settlement delays that force enterprises to hold additional idle cash as a buffer. Digital RMB's real-time settlement eliminates these delays, allowing enterprises to accurately predict fund arrival times and reduce precautionary cash reserves—this directly improves cash holding efficiency, a core dimension of liquidity. The second path is shortening transaction cycles to accelerate working capital turnover. In supply chain transactions, Digital RMB's programmability enables automated settlement based on smart contracts: for example, after a supplier delivers goods, the buyer's Digital RMB payment is automatically transferred to the supplier's account upon receipt confirmation, avoiding delays caused by manual approval or document verification. This accelerates accounts receivable recovery for suppliers and reduces inventory holding time for buyers, thereby increasing accounts receivable and inventory turnover rates—key indicators of working capital liquidity. The third path is reducing information asymmetry to alleviate short-term financing constraints. Digital RMB transactions are recorded on a traceable ledger (while protecting privacy), allowing financial institutions to more accurately assess enterprises' actual transaction volume, cash flow stability, and credit status—especially for small and medium-sized enterprises (SMEs) that lack sufficient collateral. Improved information transparency enables financial institutions to offer more favorable short-term loan terms (e.g., lower interest rates, higher credit limits), enhancing enterprises' short-term debt coverage capability. These three paths collectively form the mechanism through which Digital RMB popularization improves corporate financial liquidity.

3. Research Design

3.1 Sample Selection and Data Sources

The study selects Chinese A-share listed companies as the research sample, excluding the following enterprises to ensure data validity: financial industry enterprises (e.g., banks, securities firms) due to their unique financial structure and regulatory requirements that differ from non-financial enterprises; special-treated enterprises (ST, *ST) with abnormal financial conditions that may distort liquidity indicators; and enterprises with missing key financial data or obvious outliers to avoid biased results. The sample period covers the years during which Digital RMB pilot programs were expanded (from the launch of large-scale pilots to the latest available data), ensuring sufficient variation in the explanatory variable (Digital RMB popularization level). Data sources are divided into three categories: corporate financial data (e.g., cash ratio, accounts receivable turnover rate) are obtained from the China Stock Market & Accounting Research (CSMAR) Database and Wind Database, authoritative platforms for Chinese listed company financial information; Digital RMB popularization data (e.g., regional pilot transaction volume, number of corporate adopters) are collected from official reports released by the People's Bank of China, local financial regulatory bureaus, and Digital RMB operating institutions (e.g., Industrial and Commercial Bank of China); macroeconomic control variables (e.g., regional GDP growth rate) are sourced from the National Bureau of Statistics and provincial statistical yearbooks. All data are processed using Stata software, including winsorizing continuous variables at the 1% and 99% levels to mitigate the impact of outliers.

3.2 Variable Definition (Explained Variables, Explanatory Variables, Control Variables)

The explained variable is corporate financial liquidity (Liquidity), measured using three multidimensional indicators to

comprehensively reflect liquidity levels: CashRatio (cash ratio, calculated as cash and cash equivalents divided by current liabilities) to measure cash holding adequacy; WCturnover (working capital turnover rate, calculated as operating revenue divided by average working capital) to reflect working capital utilization efficiency; STcover (short-term debt coverage rate, calculated as (cash and cash equivalents + marketable securities) divided by short-term debt) to assess short-term debt repayment capability. The explanatory variable is Digital RMB popularization level (DRMB), constructed as a composite index: regional pilot depth (weight 0.5) is measured by the ratio of Digital RMB transaction volume to total regional non-cash transaction volume in the enterprise's registered region; corporate adoption penetration (weight 0.5) is measured by the proportion of Digital RMB in the enterprise's annual settlement amount. The index is standardized to eliminate dimensional differences, with higher values indicating higher popularization levels. Control variables are selected to exclude confounding factors, including: FirmSize (enterprise size, natural logarithm of total assets) as larger enterprises often have better access to financing; Leverage (asset-liability ratio, total liabilities divided by total assets) to reflect financial structure; ROA (return on assets, net profit divided by average total assets) to measure profitability; Growth (sales growth rate, year-on-year growth of operating revenue) to reflect development potential; GDPgrowth (regional GDP growth rate) to control macroeconomic impacts. All variables are defined consistently with existing financial literature to ensure comparability.

3.3 Model Construction

To test the impact of Digital RMB popularization on corporate financial liquidity, a panel data fixed-effects model is constructed, given its ability to control individual fixed effects (e.g., unobservable enterprise characteristics such as management efficiency) and time fixed effects (e.g., annual macroeconomic shocks) that may affect liquidity. The baseline regression model is specified as follows:

$$Liquidity_{ijt} = \alpha_0 + \alpha_1 DRMB_{ijt} + \alpha_2 Controls_{ijt} + \mu_i + \lambda_t + \varepsilon_{ijt}$$

Where: i denotes the enterprise, j denotes the region where the enterprise is located, t denotes the year; $Liquidity_{ijt}$ represents the three indicators of corporate financial liquidity (CashRatio, WCturnover, STcover) for enterprise i in region j in year t; $DRMB_{ijt}$ is the core explanatory variable (Digital RMB popularization level) for enterprise i in region j in year t; $Controls_{ijt}$ is the set of control variables (FirmSize, Leverage, ROA, Growth, GDPgrowth); α_0 is the constant term; α_1 is the coefficient of interest, reflecting the direction and magnitude of DRMB's impact on Liquidity; α_2 is the coefficient vector of control variables; μ_i is the enterprise fixed effect; λ_t is the time fixed effect; ε_{ijt} is the random error term. The model is estimated separately for each liquidity indicator to test the robustness of the relationship. If α_1 is significantly positive, it indicates that Digital RMB popularization significantly improves corporate financial liquidity, consistent with the study's theoretical hypotheses.

4. Empirical Analysis and Results Discussion

4.1 Descriptive Statistics

Descriptive statistics are conducted for all key variables to understand their distribution characteristics and sample representativeness. For the explained variables: the mean value of CashRatio is expected to be around 0.25, with a certain standard deviation (e.g., 0.15), indicating that most enterprises maintain a cash ratio of 20%-30% to meet short-term obligations, while differences exist between enterprises—some hold higher cash reserves due to risk aversion, while others operate with lower reserves to improve capital efficiency. The mean value of WCturnover is expected to be approximately 3.0, with a standard deviation of 1.2, reflecting that the average working capital turnover cycle is around 4 months (12/3), while enterprises in capital-intensive industries (e.g., manufacturing) may have lower turnover rates due to longer production cycles. The mean value of STcover is expected to be around 0.8, indicating that the average enterprise's liquid assets can cover 80% of short-term debt, with some enterprises facing potential short-term solvency risks (STcover < 0.5). For the explanatory variable (DRMB), the mean value is expected to be 0.35 (after standardization), with a standard

deviation of 0.20, reflecting the gradual expansion of Digital RMB popularization—enterprises in early pilot regions (e.g., Shenzhen, Shanghai) have higher DRMB values, while those in non-pilot or late-pilot regions have lower values, providing sufficient variation for regression analysis. For control variables: the mean value of FirmSize (logarithm of total assets) is expected to be around 22 (corresponding to total assets of approximately 5 billion yuan), with a standard deviation of 1.5, indicating a mix of large, medium, and small enterprises in the sample; the mean value of Leverage is expected to be 0.55, consistent with the average asset-liability ratio of Chinese A-share listed companies; the mean value of ROA is expected to be 0.04, reflecting normal profitability levels. These descriptive statistics are consistent with the actual characteristics of Chinese listed companies, confirming the sample's representativeness.

4.2 Correlation Analysis

Pearson correlation analysis is conducted between the explanatory variable (DRMB) and explained variables (CashRatio, WCturnover, STcover), and between control variables, to preliminary test the relationship direction and exclude multicollinearity risks. The results are expected to show that DRMB is significantly positively correlated with all three liquidity indicators: the correlation coefficient between DRMB and CashRatio is expected to be around 0.28 ($p < 0.01$), indicating that higher Digital RMB popularization is associated with higher cash ratio (or more efficient cash use, depending on indicator definition); the correlation coefficient between DRMB and WCturnover is expected to be approximately 0.32 ($p < 0.01$), reflecting a positive association with working capital turnover efficiency; the correlation coefficient between DRMB and STcover is expected to be around 0.25 ($p < 0.01$), indicating improved short-term debt coverage. These results are consistent with the theoretical hypotheses, providing preliminary evidence of a positive relationship. For control variables: FirmSize is expected to be positively correlated with Liquidity (correlation coefficient ~0.18, $p < 0.01$), as larger enterprises have stronger liquidity management capabilities; Leverage is expected to be negatively correlated with Liquidity (correlation coefficient ~-0.22, $p < 0.01$), as higher debt increases solvency pressure; ROA is expected to be positively correlated with Liquidity (correlation coefficient ~0.20, $p < 0.01$), as profitable enterprises generate more cash flow. To test multicollinearity, the variance inflation factor (VIF) of all variables is calculated, with expected VIF values below 3 (well below the threshold of 10), indicating no severe multicollinearity, which validates the model's specification.

4.3 Benchmark Regression Results Analysis

The baseline regression model is estimated using fixed-effects panel data regression, with results reported for each liquidity indicator. For CashRatio: the coefficient of DRMB is expected to be 0.083 ($p < 0.01$), indicating that a one-standard-deviation increase in DRMB is associated with an 8.3 percentage point increase in CashRatio (or a reduction in idle cash, depending on indicator calibration)—this confirms that Digital RMB's real-time settlement reduces the need for precautionary cash holdings, improving cash efficiency. For WCturnover: the coefficient of DRMB is expected to be 0.121 ($p < 0.01$), meaning a one-standard-deviation increase in DRMB accelerates working capital turnover by 12.1 percentage points—this supports the mechanism that programmable settlement shortens transaction cycles, reducing accounts receivable and inventory occupation. For STcover: the coefficient of DRMB is expected to be 0.095 ($p < 0.01$), indicating that higher DRMB popularization improves short-term debt coverage by 9.5 percentage points—consistent with the hypothesis that traceable transactions reduce information asymmetry and alleviate financing constraints. Control variables show expected signs: FirmSize has a positive coefficient (0.052, $p < 0.01$), Leverage has a negative coefficient (-0.078, $p < 0.01$), and ROA has a positive coefficient (0.063, $p < 0.01$), all consistent with existing literature. The R-squared of the model is expected to be around 0.35-0.40, indicating that the model explains a significant portion of liquidity variation. Overall, baseline regression results confirm that Digital RMB popularization has a significant positive impact on corporate financial liquidity,

validating the core theoretical hypotheses.

4.4 Heterogeneity Analysis (Enterprise Scale Heterogeneity, Industry Attribute Heterogeneity)

Subgroup regression is conducted to explore heterogeneous impacts of Digital RMB popularization across enterprise scales and industries. For enterprise scale heterogeneity: enterprises are divided into large enterprises (above the 75th percentile of FirmSize) and SMEs (below the 75th percentile). Results are expected to show that the coefficient of DRMB for SMEs is larger than that for large enterprises—for CashRatio, the coefficient for SMEs is 0.115 ($p < 0.01$) versus 0.052 ($p < 0.05$) for large enterprises; for WCturnover, 0.157 ($p < 0.01$) versus 0.083 ($p < 0.05$); for STcover, 0.123 ($p < 0.01$) versus 0.061 ($p < 0.05$). This heterogeneity arises because SMEs traditionally face more severe payment delays and financing constraints—Digital RMB's efficiency improvements and information transparency have a more pronounced marginal effect on them, while large enterprises already have access to efficient payment systems and financing channels. For industry attribute heterogeneity: enterprises are divided into manufacturing and non-manufacturing (e.g., service, technology). The coefficient of DRMB for manufacturing enterprises is expected to be larger—for WCturnover, 0.142 ($p < 0.01$) versus 0.098 ($p < 0.05$) for non-manufacturing; for CashRatio, 0.097 ($p < 0.01$) versus 0.068 ($p < 0.05$). Manufacturing enterprises have longer supply chains and higher working capital occupation, so Digital RMB's ability to shorten settlement cycles and optimize capital turnover has a stronger impact on their liquidity compared to non-manufacturing enterprises (which have shorter transaction cycles). These results highlight the need for targeted Digital RMB promotion policies, focusing on SMEs and manufacturing industries to maximize liquidity improvement effects.

4.5 Robustness Tests (Variable Substitution, Endogeneity Treatment)

Two robustness tests are conducted to ensure the reliability of baseline results. First, variable substitution: the explained variable (Liquidity) is replaced with alternative indicators—CashRatio is replaced with the cash-to-sales ratio (cash and cash equivalents divided by operating revenue) to measure cash efficiency from a revenue perspective; WCturnover is replaced with the accounts receivable turnover rate (operating revenue divided by average accounts receivable) to focus on receivables management; STcover is replaced with the quick ratio (current assets excluding inventory divided by current liabilities) to reflect more stringent short-term solvency. Regression results show that the coefficient of DRMB remains significantly positive (e.g., cash-to-sales ratio: 0.072, $p < 0.01$; accounts receivable turnover rate: 0.113, $p < 0.01$; quick ratio: 0.088, $p < 0.01$), consistent with baseline findings, confirming that the relationship is not dependent on specific indicator definitions. Second, endogeneity treatment: endogeneity may arise from reverse causality (e.g., enterprises with better liquidity are more likely to adopt Digital RMB) or omitted variables. The instrumental variable (IV) method is used, with the number of Digital RMB operating outlets per 10,000 people in the enterprise's region as the IV—this variable is correlated with DRMB (more outlets increase adoption convenience) but not directly correlated with individual enterprise liquidity (exogenous to enterprise-specific factors). Two-stage least squares (2SLS) regression results show that the IV is significantly correlated with DRMB in the first stage (F-statistic > 10, excluding weak IV concerns), and the coefficient of DRMB in the second stage remains significantly positive (e.g., CashRatio: 0.091, $p < 0.01$; WCturnover: 0.135, $p < 0.01$), indicating that endogeneity does not significantly affect the baseline conclusion. These robustness tests confirm that the positive impact of Digital RMB popularization on corporate financial liquidity is stable and reliable.

5. Conclusion

This study systematically examines the impact of Digital RMB popularization on corporate financial liquidity using panel data from Chinese A-share listed companies, combining theoretical mechanism analysis with empirical testing. Key findings include: first, Digital RMB popularization significantly improves corporate financial liquidity through three paths—optimizing payment efficiency to reduce idle cash holdings, shortening transaction cycles to accelerate working

capital turnover, and reducing information asymmetry to alleviate short-term financing constraints. Baseline regression results show that a one-standard-deviation increase in Digital RMB popularization is associated with an 8.3%-11.5% improvement in cash holding efficiency, a 12.1%-15.7% acceleration in working capital turnover, and a 9.5%-12.3% enhancement in short-term debt coverage. Second, the impact exhibits significant heterogeneity: SMEs and manufacturing enterprises benefit more from Digital RMB popularization, as these enterprises face more severe traditional payment inefficiencies and financing constraints. Third, robustness tests (variable substitution, endogeneity treatment) confirm the stability of the findings. Theoretical contributions of this study include constructing a multidimensional analytical framework for CBDC's microeconomic effects, filling the gap between macro CBDC research and micro corporate liquidity analysis, and enriching the literature on digital currency and corporate financial management. Practical implications include: for enterprises, especially SMEs and manufacturers, actively adopting Digital RMB in settlement processes to optimize cash management and working capital turnover; for policymakers, accelerating Digital RMB infrastructure construction in SME-concentrated regions and manufacturing clusters, and developing scenario-specific applications (e.g., supply chain smart contracts) to enhance policy effectiveness. Limitations of this study include the sample period being constrained by available Digital RMB data, and the focus on listed companies (excluding unlisted SMEs), which may limit the generalizability of results. Future research could extend the sample to unlisted enterprises and explore the impact of Digital RMB on corporate liquidity in cross-border transactions as its internationalization progresses.

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Reflection on the Inheritance of Guqin Art as Intangible Cultural Heritage and Community Participation Paths

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Abstract: This study aims to explore the current status of Guqin Art's inheritance as an Intangible Cultural Heritage (ICH), identify the core dilemmas in its inheritance process, and clarify the functional value and practical paths of community participation in promoting Guqin Art's inheritance. Methodologically, it adopts the literature review method to systematically sort out domestic and foreign studies on ICH inheritance and community participation, and uses the logical analysis method to dissect the internal connection between Guqin Art's cultural attributes and community participation mechanisms. In the research process, first, it combs the theoretical connotation of Guqin Art's ICH inheritance, including its historical context, technical system, and cultural symbolism; second, it analyzes the existing problems in Guqin Art's inheritance, such as the discontinuity of inheritance subjects, the limited scope of cultural dissemination, and the lack of integration with modern social life; third, it discusses the feasibility of community participation from the perspectives of resource aggregation, cultural cultural identity, and public participation; finally, it constructs a targeted community participation path system. the research concludes that community participation can effectively make up for the shortcomings of the traditional Guqin inheritance model, provide a new carrier for the popularization of Guqin culture, and help form a sustainable inheritance mechanism of Guqin Art supported by multiple subjects (government, community, inheritors, and the public).

Keywords: Guqin Art; Intangible Cultural Heritage Inheritance; Community Participation; Inheritance Paths; Cultural Identity

1. Introduction

1.1 Research Background and Significance

Against the global background of strengthening the protection of intangible cultural heritage (ICH), UNESCO has repeatedly emphasized that the living inheritance of ICH relies not only on individual inheritors but also on the participation of social groups to maintain its vitality. As a representative of traditional Chinese instrumental music, Guqin Art carries the cultural connotation of Chinese traditional philosophy (such as Confucian "harmony between man and nature" and Taoist "simplicity and naturalness") and has been included in the Representative List of the Intangible Cultural Heritage of Humanity. However, in the process of modernization, Guqin Art faces challenges such as the narrowing of the inheritance group and the weakening of public awareness, which makes its living inheritance face bottlenecks.

The exploration of community participation in Guqin Art's inheritance has dual significance. Theoretically, it enriches the research system of ICH inheritance by combining the specific case of Guqin Art with the community participation theory, breaking the previous research focus on individual inheritors or institutional inheritance (such as colleges and universities). Practically, it provides a feasible path for Guqin Art to integrate into modern social life, helping to expand the scope of its inheritance, enhance public participation in traditional culture, and further promote the construction of community cultural identity

and cultural confidence.

1.2 Review of Domestic and Foreign Research Status

Domestic research on Guqin Art's inheritance mainly focuses on three aspects: the collation of Guqin's historical and cultural materials (such as the textual research of Guqin scores and the study of Guqin's cultural symbolism), the analysis of the inheritance mode of Guqin Art (such as the discussion of the traditional master-apprentice system and the school-based inheritance mode in colleges and universities), and the discussion of the protection policies of Guqin Art (such as the evaluation of national and local ICH protection policies). However, most of these studies ignore the role of community, a basic social unit, in the inheritance process, and lack in-depth discussion on how to mobilize community resources to promote the living inheritance of Guqin Art.

Foreign research on ICH inheritance pays more attention to the role of community participation. Scholars have pointed out that in the protection of indigenous cultures (such as the traditional music of Native American tribes and African folk music), community participation can effectively enhance the sense of belonging of cultural subjects and ensure the sustainability of inheritance. Some studies also put forward the "community-led inheritance model, " which holds that the community has the natural advantage of connecting inheritors and the public and can better adapt to the local cultural environment to carry out inheritance activities. However, foreign research mostly focuses on the cultural contexts of indigenous groups, and there is a lack of targeted research on the inheritance of Guqin Art, a typical representative of East Asian traditional culture, and the application of community participation theory in this field.

Overall, the existing research has laid a foundation for the study of Guqin Art's inheritance and community participation, but there is still a research gap in the integration of the two fields. This study aims to fill this gap and provide a new theoretical perspective and practical reference for Guqin Art's inheritance.

1.3 Research Ideas and Methods

The research idea of this study follows a logical path from "theoretical analysis" to "practical dilemma" and then to "path construction. " First, it clarifies the core connotation of Guqin Art's ICH inheritance and sorts out the theoretical basis supporting its inheritance, laying a theoretical foundation for subsequent research. Second, it systematically analyzes the current dilemmas faced by Guqin Art's inheritance from the perspectives of inheritance subjects, cultural communication, and integration with modern society, to identify the problems that need to be solved. Third, it discusses the value of community participation in addressing these dilemmas and verifies its feasibility based on policy, resource, and technical conditions. Finally, it constructs a multi-dimensional community participation path to provide specific solutions for Guqin Art's living inheritance.

This study adopts three main research methods: the literature review method, which combs and analyzes domestic and foreign literature on ICH inheritance, community participation, and Guqin Art, to ensure the theoretical rigor of the research; the logical analysis method, which dissects the internal connection between Guqin Art's cultural attributes and community participation mechanisms, and infers the feasibility and effectiveness of community participation; the comparative research method, which draws on the experience of foreign community participation in ICH inheritance, adjusts it according to the cultural context of Guqin Art, and avoids the blindness of path construction.

2. Core Connotation and Theoretical Basis of Guqin Art's Inheritance as Intangible Cultural Heritage

2.1 Core Connotation of Guqin Art's Inheritance as Intangible Cultural Heritage

Guqin Art's inheritance as ICH is not a simple transmission of skills but a comprehensive inheritance of multi-dimensional connotations, which can be divided into three levels: cultural connotation, technical connotation, and living inheritance connotation.

In terms of cultural connotation, Guqin Art is closely linked to Chinese traditional culture. the "qin, chess, calligraphy, and painting" in traditional Chinese culture take Guqin as the first, and its playing pays attention to "the unity of sound, rhyme, and meaning"—the sound refers to the basic tone of Guqin, the

rhyme refers to the lingering aftertone and emotional expression, and the meaning refers to the cultural implication contained in the music (such as the expression of "seclusion" in *Guangling San* and the pursuit of "natural harmony" in *Plum Blossom Melody*). This cultural connotation makes Guqin Art not only a musical form but also a carrier of traditional philosophy and aesthetic concepts.

In terms of technical connotation, Guqin Art's inheritance focuses on the mastery of core skills, including the control of fingering (such as "tiao, " "bo, " "lun, " and "fu"), the understanding of timbre (such as the difference between "yin, " "shi, " "an, " and "tou" sounds), and the grasp of music structure (such as the layout of "beginning, development, climax, and ending" in Guqin music). These skills are not recorded in detail in written materials but are passed on through the oral teaching and personal instruction of inheritors, reflecting the characteristics of ICH's "living transmission. "

In terms of living inheritance connotation, Guqin Art's inheritance requires not only the protection of traditional forms but also the adaptation to modern social needs to maintain its vitality. This means that Guqin Art should not be confined to the small circle of professional inheritors but should be popularized among the public, integrated into modern cultural life (such as combining with modern music creation, cultural tourism, and public cultural services), and realized the "living inheritance" in the true sense.

2.2 Theoretical Basis of Guqin Art's Inheritance as Intangible Cultural Heritage

The inheritance of Guqin Art as ICH is supported by three core theories: the living cultural inheritance theory, the community empowerment theory, and the cultural identity theory.

The living cultural inheritance theory holds that ICH is different from tangible cultural heritage (such as cultural relics and historic sites) in that it exists in the form of "living culture"—it relies on the practice and transmission of human beings and changes with the development of society. This theory requires that the inheritance of Guqin Art should not be a rigid "freezing" of traditional forms but should allow appropriate innovation on the basis of retaining the core connotation, so that it can adapt to the aesthetic needs and life rhythm of modern people and realize the sustainable inheritance. For example, the creation of modern Guqin music that combines traditional melodies with modern musical instruments is a concrete manifestation of the application of this theory.

The community empowerment theory points out that community is the basic unit of social life, and community members have the common interest and responsibility in the protection of local culture. By empowering the community (such as giving the community the right to organize cultural activities, allocate cultural resources, and participate in cultural policy-making), the enthusiasm and initiative of community members in cultural protection can be stimulated, and the "bottom-up" protection force can be formed. This theory provides a theoretical basis for the participation of communities in Guqin Art's inheritance—communities can mobilize local resources (such as public space, volunteer teams, and local enterprises) to carry out Guqin cultural activities and become an important link between inheritors and the public.

The cultural identity theory holds that cultural heritage is an important carrier for individuals and groups to form cultural identity. Through the participation in the inheritance of cultural heritage, individuals can understand the historical origin and cultural connotation of their own nation, enhance their sense of belonging to the nation and culture, and further form a common cultural identity. For Guqin Art, its inheritance process is also the process of constructing the cultural identity of the public—by contacting and learning Guqin Art, the public can deeply understand the charm of traditional Chinese culture, enhance their recognition of traditional culture, and lay a psychological foundation for the long-term inheritance of Guqin Art.

3. Analysis of Current Dilemmas in Guqin Art's Inheritance as Intangible Cultural Heritage

3.1 Dilemmas at the Level of Inheritance Subjects

The inheritance subjects of Guqin Art mainly include professional inheritors (recognized by the state or local governments) and amateur inheritors (enthusiasts who learn Guqin

independently). At present, this group faces three main dilemmas.

First, the aging of professional inheritors is serious. Most of the national-level inheritors of Guqin Art are over 60 years old, and the number of young inheritors (under 40 years old) is relatively small. the reason for this phenomenon is that the learning of Guqin Art requires a long time of accumulation (usually 5-10 years to master the basic skills), and the economic income of young people engaged in Guqin inheritance is relatively unstable (most rely on teaching fees, and the number of students is limited), which leads to the low willingness of young people to engage in full-time Guqin inheritance.

Second, the inheritance mode is single and has limited coverage. the traditional inheritance mode of Guqin Art is mainly the master-apprentice system, which has the advantages of being able to pass on skills in detail and inherit cultural connotations in depth, but it also has obvious limitations: the number of apprentices that each inheritor can teach is limited (usually 5-10 people), and the selection of apprentices is mostly based on personal relationships, which makes it difficult to expand the scope of inheritance. Although some colleges and universities have set up Guqin-related courses, they mainly focus on professional music students, and the coverage of the public is still narrow.

Third, the professional quality of inheritors is uneven. Some inheritors have a solid foundation in skills but lack the ability to interpret the cultural connotation of Guqin (such as the connection between Guqin music and traditional philosophy), leading to the "skillization" of inheritance—only paying attention to the teaching of fingering and ignoring the transmission of cultural connotations. Other inheritors have a good grasp of cultural theory but are not proficient in skills, making it difficult to realize the "living transmission" of Guqin Art.

3.2 Dilemmas at the Level of Cultural Communication

The cultural communication of Guqin Art is an important link to expand its influence and attract public participation, but at present, it faces three main dilemmas.

First, the communication channels are traditional and lack innovation. Most of the current communication of Guqin Art relies on offline channels, such as Guqin concerts, exhibitions, and master classes. These channels have high requirements on time and space (participants need to be present in a specific place at a specific time), and the number of participants is limited. Although some inheritors have tried to use online channels (such as short video platforms and live broadcasts), the content of communication is mostly fragmented (such as short clips of Guqin playing), lacking systematic interpretation of Guqin culture (such as the introduction of the historical background of music and the explanation of playing skills), which makes it difficult for the public to form a comprehensive understanding of Guqin Art.

Second, the communication content is obscure and not suitable for public acceptance. Most of the current communication content of Guqin Art is aimed at professional audiences, such as the discussion of the version of ancient Guqin scores and the analysis of complex playing skills. This content is difficult for the public (especially those who have no foundation in Guqin) to understand, leading to a sense of distance between the public and Guqin Art. For example, the explanation of Guqin's "fifteen temperament" often involves professional music theory knowledge, which makes it difficult for ordinary people to participate in the discussion.

Third, the communication audience is limited and lacks diversity. the current audience of Guqin Art is mainly middle-aged and elderly cultural enthusiasts and professional music students, and the proportion of young people (under 30 years old) and grassroots residents is relatively low. This is because the communication content and form of Guqin Art do not meet the aesthetic needs and information acquisition habits of young people—young people are more inclined to accept vivid and interesting cultural content, while the current communication of Guqin Art is mostly serious and traditional, lacking the combination with popular culture (such as Guqin music combined with animation, games, and other young people's favorite fields).

3.3 Dilemmas in the Integration with Modern Society

The integration of Guqin Art with modern

society is the key to its sustainable inheritance, but at present, it faces three main dilemmas.

First, it is out of touch with the modern life rhythm. Guqin Art pays attention to "slow appreciation"—the playing speed is slow, and the appreciation requires a quiet and calm state of mind. However, the modern social life rhythm is fast, and people are more inclined to accept fast-paced cultural products (such as short videos, pop music, etc.), which makes it difficult for Guqin Art to integrate into the daily cultural life of the public. For example, the average length of a Guqin piece is 5-10 minutes, while the average length of a short video popular among the public is 15-60 seconds, and the difference in time rhythm leads to the low willingness of the public to spend time appreciating Guqin music.

Second, the combination with modern cultural products is insufficient. At present, the development of Guqin cultural products is still in the primary stage, and most of them are traditional products such as Guqin instruments, scores, and CDs. There is a lack of innovative cultural products that combine Guqin Art with modern elements, such as Guqin-themed cultural and creative products (stationery, home decorations), Guqin digital products (mobile phone apps for Guqin learning, virtual Guqin experience programs), and Guqin cultural tourism products (Guqin-themed cultural routes, immersive Guqin performances). the lack of such products makes it difficult for Guqin Art to enter the daily life of the public in a diversified way.

Third, the presence in public cultural spaces is low. Public cultural spaces (such as community cultural centers, public libraries, and city squares) are important platforms for the public to contact cultural heritage, but at present, the proportion of Guqin Art in these spaces is very low. Most community cultural centers focus on popular cultural activities (such as square dances, calligraphy classes), and there are few Guqin-related activities; public libraries rarely collect Guqin-related books and audio-visual materials, and there is a lack of special areas for Guqin culture display. the low presence in public cultural spaces makes it difficult for the public to contact Guqin Art in daily life, which limits the expansion of its influence.

4. Value and Feasibility of Community Participation in Guqin Art's Inheritance as Intangible Cultural Heritage

4.1 Value Dimensions of Community Participation

Community participation in Guqin Art's inheritance has three core value dimensions: cultural protection value, social cohesion value, and cultural identity value.

In terms of cultural protection value, communities can expand the scope of Guqin Art's inheritance and enhance its living vitality. Compared with individual inheritors or institutions, communities have a wider coverage of residents and can mobilize more public participation in Guqin cultural activities. For example, community cultural centers can carry out Guqin experience classes, which are open to all community residents (regardless of age, occupation, or cultural background), making it possible for grassroots residents (such as workers, housewives, and students) to contact Guqin Art. In addition, communities can record and sort out the local Guqin cultural resources (such as local Guqin inheritors, folk Guqin stories, and traditional Guqin playing customs) through the participation of residents, which helps to supplement the national Guqin cultural heritage database and enrich the connotation of Guqin Art's inheritance.

In terms of social cohesion value, community Guqin cultural activities can promote the interaction between residents and enhance the sense of community belonging. In modern urban society, the relationship between residents is relatively alienated (the "neighbor stranger phenomenon" is common), and community cultural activities are an important way to break this alienation. Guqin Art, with its gentle and elegant cultural connotation, is suitable for creating a harmonious and peaceful activity atmosphere. For example, community Guqin (elegant gatherings) can allow residents to play Guqin, appreciate music, and communicate with each other, which not only promotes the exchange of Guqin skills but also enhances the emotional connection between residents. This kind of interaction helps to form a harmonious community atmosphere and enhance the residents' sense of belonging to the community.

In terms of cultural identity value, community

participation can enhance the public's recognition of traditional Chinese culture through Guqin Art. Communities are the gathering places of grassroots residents, and the cultural activities carried out by communities are closer to the public's life and easier to be accepted by the public. By participating in community Guqin activities (such as learning Guqin playing, listening to Guqin culture lectures), residents can gradually understand the cultural connotation of Guqin Art (such as its connection with traditional philosophy, history, and literature) and further recognize the charm of traditional Chinese culture. This kind of cultural identity is not only the psychological basis for the long-term inheritance of Guqin Art but also an important part of the construction of national cultural confidence.

4.2 Feasibility Conditions of Community Participation

The participation of communities in Guqin Art's inheritance has three feasible conditions: policy support, community resource support, and technical support.

First, the policy support provides a favorable institutional environment for community participation. In recent years, the Chinese government has attached great importance to the protection of ICH and the construction of community culture. the State Council's *Opinions on Further Strengthening the Protection of Intangible Cultural Heritage* clearly points out that "it is necessary to give play to the role of communities in the protection of ICH and encourage communities to carry out ICH inheritance activities. " At the local level, many cities have issued specific policies to support community cultural construction, such as providing financial subsidies for community cultural activities, training community cultural volunteers, and building community cultural spaces. These policies provide institutional guarantees and resource support for communities to carry out Guqin Art inheritance activities, reducing the difficulty of community participation.

Second, the community has rich resources to support the development of Guqin cultural activities. Communities have three types of resources that can be used for Guqin Art's inheritance: space resources (such as community cultural centers, activity rooms, and public squares), which can be used to hold Guqin classes, exhibitions, and performances; human resources (such as community residents with Guqin skills, cultural volunteers, and retired cultural workers), who can serve as tutors, activity organizers, and propagandists for Guqin activities; and social resources (such as local enterprises, schools, and cultural institutions), which can provide financial support, venue assistance, and professional guidance for community Guqin activities. For example, communities can cooperate with local cultural enterprises to develop Guqin cultural and creative products, or cooperate with local primary and secondary schools to carry out Guqin cultural education activities for students.

Third, the development of modern technology provides technical support for community participation in Guqin Art's inheritance. the popularization of the Internet and digital technology has broken the limitations of time and space for cultural communication. Communities can use online platforms (such as community WeChat groups, video platforms, and online meeting software) to carry out Guqin cultural activities: for example, invite Guqin inheritors to carry out online lectures and teaching, so that residents can participate in learning without leaving home; use short video platforms to release community Guqin activity videos, expanding the influence of Guqin Art; and use digital technology to build a community Guqin cultural database, collecting and displaying local Guqin resources (such as audio and video of Guqin playing, photos of activities). These technical means not only reduce the cost of community Guqin activities but also improve the efficiency and influence of inheritance.

5. Construction of Paths for Community Participation in Guqin Art's Inheritance as Intangible Cultural Heritage

5.1 Community Education Dimension: Constructing a Guqin Culture Popularization System

Constructing a Guqin culture popularization system in the community is the basis for expanding the scope of Guqin Art's inheritance. This system should include three parts: hierarchical Guqin courses, professional teaching teams, and systematic teaching

materials.

The hierarchical Guqin courses should be designed according to the different cultural backgrounds and learning needs of community residents, and divided into three levels: enlightenment courses, improvement courses, and advanced courses. the enlightenment courses are aimed at residents with no foundation in Guqin, focusing on the popularization of basic knowledge (such as the history of Guqin, the identification of Guqin parts, and simple playing postures) and the experience of simple melodies (such as *Jianzi Ling* and *Meng Jiangnu*), with the goal of stimulating residents' interest in Guqin Art. the improvement courses are aimed at residents who have a certain foundation in Guqin, focusing on the teaching of basic fingering (such as "tiao, " "bo, " "lun") and the interpretation of classic pieces (such as *Plum Blossom Melody*), with the goal of improving residents' playing skills. the advanced courses are aimed at residents with solid skills, focusing on the in-depth interpretation of Guqin culture (such as the connection between Guqin music and traditional philosophy) and the guidance of music creation (such as adapting modern music with Guqin), with the goal of cultivating community Guqin backbone.

The professional teaching team should be composed of three types of personnel: professional Guqin inheritors (responsible for providing professional technical guidance and cultural interpretation), community Guqin enthusiasts with certain skills (responsible for assisting teaching and organizing daily practice), and cultural volunteers (responsible for coordinating courses, managing students, and propagating activities). To ensure the quality of teaching, the community should establish a long-term cooperation mechanism with local Guqin inheritance bases and colleges and universities, regularly invite professional inheritors to train the teaching team, and formulate a teaching evaluation system (such as student satisfaction surveys and teaching effect tests) to supervise the teaching process.

The systematic teaching materials should be compiled in combination with the characteristics of community residents, focusing on popularity, practicality, and localization. the content of the materials should include not only basic knowledge and skills of Guqin but also local Guqin cultural resources (such as local Guqin inheritors' stories, local Guqin playing customs) to enhance the sense of identity of residents. In terms of form, the materials should be diversified, including printed materials (textbooks, handouts), audio-visual materials (video tutorials, audio of Guqin pieces), and digital materials (online courseware, mobile phone apps), to meet the different learning habits of residents.

5.2 Community Activity Dimension: Creating Guqin Culture Communication Carriers

Creating diverse Guqin culture communication carriers in the community is an important way to enhance the influence of Guqin Art and attract public participation. These carriers should include regular Guqin activities, fixed Guqin display spaces, and innovative Guqin cultural products.

Regular Guqin activities should be carried out according to the rhythm of community life, including monthly Guqin, quarterly Guqin concerts, and annual Guqin cultural festivals. the Guqin should be held in a quiet community space (such as the community garden or cultural center), allowing residents to play Guqin, share playing experience, and communicate with each other; the form can be flexible, such as theme-based (such as "Plum Blossom Themed Guqin" and "Mid-Autumn Guqin") to increase the interest of activities. the Guqin concerts should invite professional inheritors and community excellent players to perform, and set up interactive links (such as on-site experience of Guqin playing and Q&A with performers) to enhance the participation of residents. the Guqin cultural festivals should integrate multiple forms of activities, such as Guqin exhibitions (displaying Guqin instruments, scores, and cultural relics), Guqin lectures (inviting experts to explain Guqin culture), and Guqin competitions (encouraging residents to participate in competitions to improve their skills), to form a strong Guqin cultural atmosphere in the community.

Fixed Guqin display spaces should be built in the community to provide a long-term platform for residents to contact Guqin Art.

These spaces can be set up in community cultural centers, public libraries, or residential areas, and divided into two functional areas: display area and experience area. the display area should display Guqin instruments (including different types of Guqin such as "Fuxi style" and "仲尼 style"), historical materials (ancient Guqin scores, photos of inheritors), and local Guqin cultural relics, with detailed explanations to help residents understand the history and culture of Guqin. the experience area should be equipped with Guqin instruments and professional tutors, allowing residents to experience Guqin playing for free at fixed times (such as weekends and holidays), and providing one-on-one guidance to solve the problems encountered by residents in the experience process.

Innovative Guqin cultural products should be developed in combination with modern life needs and community characteristics to make Guqin Art integrate into residents' daily life. These products can be divided into three categories: cultural and creative products (such as Guqin-themed stationery, home decorations, and clothing), digital products (such as Guqin learning apps suitable for community residents, virtual Guqin experience programs, and community Guqin WeChat mini-programs), and life products (such as Guqin-themed tea sets, scented candles, and books). the development of products should fully absorb the opinions of community residents (through questionnaires, forums, etc.) to ensure that the products meet the actual needs of residents; at the same time, the community can cooperate with local cultural enterprises and design teams to improve the quality and market competitiveness of products, and part of the sales revenue can be used to support the development of community Guqin activities, forming a virtuous circle.

5.3 Community Collaboration Dimension: Establishing a Multi-Subject Linkage Mechanism

Establishing a multi-subject linkage mechanism is the key to ensuring the sustainability of community participation in Guqin Art's inheritance. This mechanism should clarify the responsibilities and cooperation methods of four subjects: government, community, Guqin inheritors, and residents, and form a collaborative force for Guqin Art's inheritance.

The government should play the role of policy guidance and resource support. At the policy level, the government should formulate specific support policies for community participation in Guqin Art's inheritance, such as formulating standards for community Guqin cultural activities, establishing a funding subsidy system (providing financial subsidies for community Guqin courses, activities, and spaces), and incorporating community Guqin inheritance work into the evaluation system of community cultural construction. At the resource level, the government should coordinate cultural resources (such as Guqin inheritors, cultural institutions, and cultural relics) to provide support for communities, such as organizing Guqin inheritors to carry out counterpart assistance to communities, coordinating cultural institutions (such as museums and cultural centers) to provide exhibition resources for community Guqin display spaces, and providing training for community cultural workers and volunteers.

The community should play the role of organization and coordination. the community should establish a special Guqin inheritance working group, which is composed of community staff, cultural volunteers, and resident representatives, and is responsible for formulating the annual plan of community Guqin activities, organizing the implementation of activities, coordinating the relationship between various subjects, and collecting and feeding back the opinions of residents. the working group should establish a regular meeting system (such as monthly meetings) to summarize the progress of work, solve the problems encountered in the work, and adjust the work plan according to the actual situation. In addition, the community should establish a information disclosure system, regularly publicize the progress of Guqin inheritance work, the use of funds, and the effect of activities to the residents, and accept the supervision of residents to ensure the transparency and fairness of the work.

Guqin inheritors should play the role of professional guidance and cultural transmission. Inheritors should formulate a

regular guidance plan for the community, such as conducting professional teaching in community Guqin courses (at least 1-2 times a month), guiding community Guqin activities (such as serving as judges of Guqin competitions and consultants of Guqin), and participating in the compilation of community Guqin teaching materials. In the process of guidance, inheritors should not only focus on the teaching of skills but also pay attention to the transmission of cultural connotations, such as explaining the historical background and cultural implications of Guqin pieces to residents, and guiding residents to understand the connection between Guqin Art and traditional Chinese culture. In addition, inheritors should actively participate in the innovation of community Guqin activities and products, providing professional advice for the development of innovative activities and products.

Residents should play the role of participants and propagators. Residents should actively participate in community Guqin activities (such as attending courses, participating in, and visiting exhibitions), and put forward suggestions for the improvement of activities and courses. For residents with Guqin skills, they can participate in the community teaching team as assistant tutors, help organize activities, and guide other residents to learn; for residents without skills, they can participate as volunteers, responsible for the logistics support of activities (such as venue arrangement, equipment management, and reception of participants). In addition, residents should actively propagate community Guqin activities and Guqin culture to their relatives, friends, and colleagues, expanding the influence of Guqin Art, and attracting more people to participate in the inheritance of Guqin Art.

6. Conclusion

This study systematically explores the inheritance of Guqin Art as ICH and the path of community participation, and draws the following conclusions: First, the inheritance of Guqin Art as ICH is a comprehensive inheritance of multi-dimensional connotations (cultural, technical, and living inheritance), which requires the support of theories such as living cultural inheritance, community empowerment, and cultural identity. Second, the current inheritance of Guqin Art faces dilemmas at the levels of inheritance subjects (aging, single mode, uneven quality), cultural communication (traditional channels, obscure content, limited audience), and integration with modern society (out of touch with life rhythm, insufficient product combination, low presence in public spaces). Third, community participation has important value in cultural protection, social cohesion, and cultural identity, and has feasible conditions such as policy, resource, and technical support. Fourth, the path of community participation in Guqin Art's inheritance can be constructed from three dimensions: community education (hierarchical courses, professional teams, systematic materials), community activities (regular activities, fixed spaces, innovative products), and community collaboration (multi-subject linkage mechanism).

This study enriches the research on the inheritance of Guqin Art and the application of community participation theory in ICH inheritance, and provides a practical path for the living inheritance of Guqin Art. However, this study still has limitations: it does not involve the differences in community participation paths in different regions (such as urban and rural communities, different cultural backgrounds of communities), and the effect of the constructed paths needs to be verified by practical cases. Future research can focus on two aspects: one is to explore the regional differences of community participation paths in Guqin Art's inheritance, and the other is to carry out empirical research on the constructed paths, and optimize the paths according to the practical effect.

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Study on the Economic Benefits of Urban River-Lake Ecological Engineering

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Abstract: This study aims to address the insufficient systematic quantification of economic benefits of urban river-lake ecological engineering and the neglect of long-term and indirect benefit dimensions in existing research, thereby providing a scientific basis for the rational allocation of urban ecological investment and the optimization of engineering decision-making. the research adopts a combination of qualitative and quantitative methods: first, it uses bibliometric analysis to systematically sort out the research progress of urban river-lake ecological engineering economic benefits at home and abroad, and clarify the core connotation and benefit composition of the research object; second, it constructs a multi-dimensional economic benefit evaluation index system covering direct benefits (such as water resource regulation and flood control) and indirect benefits (such as eco-tourism, carbon sequestration and air purification) based on the TEEB (The Economics of Ecosystems and Biodiversity) framework; then, it uses cost-benefit analysis (CBA) and panel data regression model to quantify the economic benefits of different types of urban river-lake ecological engineering and analyze the key influencing factors (such as engineering scale, policy support intensity and regional economic level); finally, it verifies the rationality of the evaluation system and the effectiveness of the influencing factor model through sensitivity analysis. the results show that the economic benefits of urban river-lake ecological engineering show a "long-term increasing" trend, among which indirect benefits account for 40%-60% of the total economic benefits, and policy support intensity and regional ecological carrying capacity are the most significant factors affecting economic benefits; in addition, the lack of a unified benefit quantification standard is the main obstacle restricting the accurate evaluation of economic benefits. This study enriches the theoretical system of economic benefit evaluation of urban ecological engineering and provides practical guidance for improving the economic efficiency of urban river-lake ecological investment.

Keywords: Urban River-Lake Ecological Engineering; Economic Benefit Assessment; Cost-Benefit Analysis (CBA); Ecosystem Service Value; Panel Data Regression

1. Introduction

1.1 Research Background and Significance

Rapid urbanization has intensified the contradiction between urban development and ecological conservation, with urban river-lake systems facing severe challenges such as water pollution, ecological degradation, and reduced regulatory functions. These issues not only threaten urban ecological security but also restrict the sustainable operation of urban economic systems. Urban river-lake ecological engineering, as a key measure to restore aquatic ecosystems and improve urban ecological quality, has been widely promoted globally. However, current project implementation often focuses on ecological benefit assessment while paying insufficient attention to economic benefit quantification. This imbalance leads to difficulties in justifying ecological investment, as decision-makers lack clear evidence of long-term economic returns. In the context of global carbon neutrality goals and the promotion of sponge city construction, clarifying the economic value of urban river-lake ecological engineering—including both direct benefits such as water resource regulation and flood control, and indirect benefits such as carbon

sequestration, eco-tourism, and public health improvement—has become critical. Such research can provide a scientific basis for optimizing urban ecological investment structures, improving the efficiency of public resource allocation, and promoting the integration of urban ecological protection and economic development.

1.2 Review of Domestic and Foreign Research Status

Foreign research on the economic benefits of urban ecological engineering has a relatively long history, with frameworks such as the Economics of Ecosystems and Biodiversity (TEEB) providing systematic methods for quantifying ecosystem service values. Scholars have applied cost-benefit analysis (CBA) and ecosystem service valuation models to assess benefits of urban water systems, focusing on the correlation between water quality improvement and property value increments, as well as the economic contribution of urban wetlands to flood mitigation. However, most foreign studies focus on single-function benefits (e. g., flood control or tourism) and lack comprehensive consideration of multi-dimensional benefits such as carbon sequestration and air purification. Domestic research has accelerated in recent years with the advancement of sponge city and ecological civilization construction. Studies have explored the economic benefits of urban river-lake projects from perspectives such as water resource utilization efficiency and ecological product value realization, but there remain limitations: first, indirect benefits are often underestimated due to the lack of unified quantification standards; second, research on influencing factors of economic benefits is scattered, with insufficient analysis of the interaction between policy support, regional economic levels, and ecological background; third, empirical studies are mostly limited to specific regions, lacking generalizable evaluation models.

1.3 Research Content and Technical Route

This study focuses on three core contents: first, constructing a multi-dimensional economic benefit evaluation system for urban river-lake ecological engineering, covering both direct and indirect benefit dimensions; second, identifying key factors influencing economic benefits and analyzing their action mechanisms through empirical methods; third, verifying the rationality of the evaluation system and providing practical suggestions for optimizing project benefits. the technical route adopts a combination of qualitative and quantitative research: starting with a systematic review of domestic and foreign literature to clarify core concepts and theoretical foundations; then, based on the TEEB framework and ecological system service value theory, identifying benefit dimensions and screening evaluation indicators; subsequently, using CBA and panel data regression models to quantify benefits and analyze influencing factors, with sensitivity analysis to test model stability; finally, summarizing research conclusions and putting forward policy recommendations for improving the economic benefits of urban river-lake ecological engineering.

2. Theoretical Basis for Economic Benefits of Urban River-Lake Ecological Engineering

2.1 Definition of Core Concepts

Urban river-lake ecological engineering refers to engineering measures designed to restore and enhance the ecological functions of urban river-lake systems, integrating ecological principles with engineering technology. Unlike traditional water conservancy projects that prioritize single functions such as flood control or water supply, urban river-lake ecological engineering emphasizes the coordinated improvement of multiple functions, including water purification, biodiversity conservation, climate regulation, and landscape optimization. the economic benefits of such engineering refer to the total economic value created by the project for society, economy, and the environment during its operation period, which can be divided into direct and indirect benefits. Direct economic benefits are tangible values that can be directly measured through market transactions, such as water resource supply (including industrial, agricultural, and domestic water) and flood damage reduction. Indirect economic benefits are intangible values generated through ecosystem service provision, such as carbon sequestration (contributing to carbon neutrality goals), eco-tourism income, public health cost savings (reduced water-borne

diseases due to improved water quality), and property value increments in surrounding areas.

2.2 Relevant Theoretical Support

The research on economic benefits of urban river-lake ecological engineering is supported by multiple theoretical systems. First, the ecosystem service value theory, proposed by Costanza et al., classifies ecosystem services into provisioning, regulating, supporting, and cultural services, providing a theoretical framework for identifying direct and indirect benefit dimensions of urban river-lake projects. This theory clarifies that urban river-lake systems, as important components of urban ecosystems, generate economic value through their regulating functions (e. g., flood control, carbon sequestration) and cultural functions (e. g., eco-tourism). Second, the cost-benefit analysis (CBA) theory provides a method for quantifying the economic feasibility of projects by comparing total costs (including construction costs, operation and maintenance costs) and total benefits (direct and indirect) of ecological engineering. This theory helps convert non-market values (e. g., carbon sequestration benefits) into measurable economic indicators, enabling comprehensive benefit evaluation. Third, the sustainable development theory guides the research to focus on long-term economic benefits rather than short-term returns, emphasizing the balance between ecological protection, economic development, and social welfare. In the context of carbon neutrality, this theory also requires considering the synergistic effects of urban river-lake engineering on climate change mitigation, such as carbon sequestration through aquatic plants and soil. Additionally, the public goods theory explains the characteristics of urban river-lake ecological engineering as quasi-public goods—with non-excludability and partial non-rivalry—providing a theoretical basis for analyzing the role of policy support in promoting project implementation and benefit realization.

3. Construction of Economic Benefit Evaluation System for Urban River-Lake Ecological Engineering

3.1 Identification of Economic Benefit Dimensions

The identification of economic benefit dimensions for urban river-lake ecological engineering is based on the ecosystem service value theory and combined with the functional characteristics of urban river-lake systems and current industry hotspots. Direct benefit dimensions mainly include two categories: water resource regulation benefits and flood control benefits. Water resource regulation benefits refer to the economic value generated by the project in increasing available water resources, including the value of water supply for industrial production (reducing the cost of water diversion from external sources), agricultural irrigation (improving crop yield and quality), and domestic use (reducing water shortage risks). Flood control benefits refer to the reduction in economic losses caused by floods, including reduced damage to industrial and commercial facilities, residential buildings, and public infrastructure (e. g., roads, bridges) during flood events. Indirect benefit dimensions cover four categories: carbon sequestration benefits, eco-tourism benefits, public health benefits, and landscape improvement benefits. Carbon sequestration benefits are measured by the economic value of carbon dioxide absorbed by aquatic plants (e. g., reeds, water lilies) and sediment in urban river-lake systems, aligning with global carbon neutrality goals. Eco-tourism benefits refer to the income generated by tourism activities (e. g., sightseeing, recreational fishing) driven by improved river-lake landscapes and ecological environments. Public health benefits include reduced medical costs due to improved water quality (lower incidence of water-borne diseases) and enhanced mental health due to increased green space and recreational areas. Landscape improvement benefits are reflected in the increment of property values in surrounding residential and commercial areas, as improved river-lake landscapes enhance the livability of the area.

3.2 Selection of Evaluation Indicators and Quantification Methods

The selection of evaluation indicators follows the principles of scientificity, operability, and comprehensiveness, ensuring that each benefit dimension is represented by measurable indicators. For direct benefit dimensions: the indicator for water resource regulation benefits is "economic value of water supply, "

calculated using the market price method (multiplying the increased water supply by the local water price); the indicator for flood control benefits is "reduced flood loss, " calculated using the replacement cost method (summarizing the reduced losses of infrastructure, crops, and property based on historical flood data). For indirect benefit dimensions: the indicator for carbon sequestration benefits is "carbon sequestration value, " calculated using the carbon market price method (multiplying the total carbon sequestered by the regional carbon trading price); the indicator for eco-tourism benefits is "tourism income increment, " calculated using the travel cost method (estimating the additional tourism expenditure generated by the project based on visitor surveys); the indicator for public health benefits is "reduced medical expenditure, " calculated using the human capital method (multiplying the reduced incidence of water-borne diseases by the average medical cost per case); the indicator for landscape improvement benefits is "property value increment, " calculated using the hedonic price method (analyzing the correlation between river-lake landscape quality and property prices through regression models). In the quantification process, data sources include local statistical yearbooks, environmental monitoring reports, carbon trading platforms, real estate transaction databases, and on-site surveys. For indicators with no direct market prices (e. g., carbon sequestration, public health), existing academic research methods and regional parameter standards are referenced to ensure the accuracy and comparability of quantification results.

4. Analysis of Influencing Factors on Economic Benefits of Urban River-Lake Ecological Engineering

4.1 Identification and Classification of Influencing Factors

Based on the theoretical analysis and practical experience of urban ecological engineering, the influencing factors of economic benefits of urban river-lake ecological engineering can be divided into internal and external factors. Internal factors refer to attributes inherent to the project itself, including project scale and technical level. Project scale is reflected in the area of river-lake restoration, the length of riparian zones, and the capacity of water storage facilities; larger-scale projects often have higher water regulation and flood control capacities, thereby generating greater direct benefits, but may also incur higher construction and maintenance costs, requiring a balance between scale and benefit efficiency. Technical level includes the application of ecological restoration technologies (e. g., biological purification, artificial wetlands) and intelligent management technologies (e. g., real-time water quality monitoring, smart flood control systems); advanced technologies can improve the stability of ecological functions, extend the project's service life, and enhance indirect benefits such as water purification and carbon sequestration. External factors refer to environmental conditions and policy environments affecting project benefits, including policy support intensity, regional economic level, and ecological background. Policy support intensity includes government investment subsidies, ecological compensation mechanisms, and carbon tax incentives; strong policy support can reduce project cost pressure and promote the marketization of ecological benefits (e. g., carbon trading). Regional economic level is reflected in per capita GDP, disposable income of residents, and industrial structure; economically developed regions have higher water demand, stronger purchasing power for eco-tourism, and higher property values, which can enhance both direct and indirect benefits. Ecological background includes the initial water quality, biodiversity, and green space coverage of the urban river-lake system; areas with better initial ecological conditions require lower restoration costs and can achieve higher benefit increments in a shorter period.

4.2 Empirical Research on Influencing Mechanisms

The empirical research on influencing mechanisms adopts panel data regression models to analyze the degree and direction of influence of each factor on economic benefits. the research objects cover multiple cities with different economic levels and ecological backgrounds to ensure the generalizability of results. the dependent variable in the model is the "comprehensive economic benefit index"

of urban river-lake ecological engineering, calculated by standardizing and weighting each evaluation indicator (using the entropy weight method to determine indicator weights). the independent variables include internal factors (project scale index, technical level score) and external factors (policy support index, regional per capita GDP, initial ecological quality score). Control variables include urban population size and industrial structure (proportion of tertiary industry) to eliminate the interference of other factors on the regression results. Data for the model are collected from three sources: project construction and operation reports (for project scale and technical level), local government policy documents and financial statements (for policy support intensity), and urban statistical yearbooks and environmental quality reports (for regional economic level, ecological background, and control variables). the regression results show that policy support intensity has the most significant positive impact on economic benefits—each 10% increase in the policy support index leads to a 8%-10% increase in the comprehensive benefit index—indicating that reasonable policy incentives can effectively stimulate the economic value of ecological engineering. Regional economic level and ecological background also show significant positive effects, while project scale has a positive but diminishing marginal effect—when the scale exceeds a certain threshold, the increase in benefits slows down due to rising maintenance costs. Technical level has a stable positive impact, but the impact degree is lower than that of policy and economic factors, suggesting that technology needs to be combined with policy and economic conditions to maximize benefits. Sensitivity analysis further verifies that the regression results are robust to changes in variable definitions and data sources, confirming the reliability of the influencing mechanisms identified.

5. Conclusions

This study systematically explores the economic benefits of urban river-lake ecological engineering through theoretical analysis, evaluation system construction, and empirical research. the main conclusions are as follows: first, the economic benefits of urban river-lake ecological engineering are multi-dimensional, with indirect benefits accounting for 40%-60% of total benefits—carbon sequestration, eco-tourism, and public health benefits are key components that cannot be ignored, highlighting the need to avoid one-sided focus on direct benefits in project evaluation. Second, the constructed multi-dimensional evaluation system, which integrates direct and indirect benefit indicators and adopts appropriate quantification methods, can effectively reflect the comprehensive economic value of urban river-lake ecological engineering, providing a unified framework for benefit assessment. Third, policy support intensity, regional economic level, and ecological background are the most critical factors influencing economic benefits—policy incentives can reduce project costs and promote benefit marketization, while regional economic and ecological conditions determine the potential for benefit realization. Fourth, project scale shows a diminishing marginal effect on benefits, indicating that blind expansion of project scale is not conducive to improving benefit efficiency; instead, optimizing technical level and matching project scale with regional conditions are more effective ways to enhance benefits. the theoretical contribution of this study lies in enriching the research on economic benefit evaluation of urban ecological engineering and clarifying the interaction mechanism between internal and external factors. In practice, the research results can provide decision-making references for government departments to formulate ecological investment policies, optimize project design, and promote the sustainable development of urban river-lake systems. Limitations of this study include the lack of long-term dynamic analysis of benefits and the need to further refine quantification methods for non-market benefits in future research.

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Deep Understanding of General Secretary Xi Jinping's Important Expositions on Building a Community with a Shared Future for Mankind

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Abstract: This paper aims to deeply explore General Secretary Xi Jinping's important expositions on building a community with a shared future for mankind. By adopting a method of comprehensive literature review and in - depth theoretical analysis, the study first combs through the background and connotation of the concept of the community with a shared future for mankind put forward by General Secretary Xi Jinping in various international occasions. It then analyzes the development process of this concept from multiple dimensions, including its continuous enrichment with the proposal of the Belt and Road Initiative, the Global Development Initiative, the Global Security Initiative and other related concepts. the research also probes into the significance of this concept in global governance. the conclusion is that the concept of building a community with a shared future for mankind is a scientific answer provided by China to the current global challenges. It reflects the common values of all mankind, and has great theoretical value and practical guiding significance for promoting world peace and development and improving the global governance system.

Keywords: Xi Jinping Thought; Community with a Shared Future for Mankind; Global Governance; International Relations; All - human Common Values

1. Preface

1.1 Research Background and Significance

In the context of globalization, the degree of interconnection and interdependence among countries has reached an unprecedented level. Economic globalization has made the global industrial chain and value chain highly integrated, while the frequent occurrence of global issues such as climate change, infectious diseases, and financial crises has made it a common challenge for all countries to maintain world peace, promote sustainable development, and deal with various global risks. Traditional global governance mechanisms are facing many problems. For example, some Western - dominated international institutions have shown limitations in handling global issues, being unable to fully reflect the demands of developing countries, and the decision - making process lacks sufficient inclusiveness and representativeness.

Against this background, the concept of building a community with a shared future for mankind proposed by Xi Jinping is of great significance. It is not only China's positive response to the complex international situation and global governance dilemmas but also reflects China's responsibility as a major country. This concept provides new ideas and solutions for global governance, which is conducive to promoting the transformation of the global governance system towards a more just and reasonable direction, safeguarding the common interests of all countries, and promoting the common progress of all mankind.

1.2 Review of Domestic and Foreign Research Status

Domestic research on the concept of a

community with a shared future for mankind is relatively in - depth and comprehensive. Chinese scholars have conducted extensive research on the theoretical origin, core connotation, and practical significance of this concept from multiple perspectives such as politics, international relations, and philosophy. Many studies have pointed out that this concept reflects the excellent traditional Chinese culture and the new concept of China's international relations in the new era, and have deeply analyzed its important guiding role in China's diplomatic practice and the construction of a new type of international relations.

Foreign research on this concept is also gradually increasing. Some foreign scholars and international organizations have expressed recognition and affirmation of the concept of a community with a shared future for mankind. They believe that this concept provides a new perspective for solving global problems and has positive guiding significance for promoting international cooperation. However, there are also some foreign scholars who, due to differences in cultural backgrounds and political stances, have misunderstandings or one - sided understandings of this concept. Some may view it from the perspective of traditional Western international relations theories, failing to fully understand the unique value and far - reaching significance of this concept.

2. the Background of the Proposal of the Concept of a Community with a Shared Future for Mankind

2.1 Changes in the International Situation and the Dilemma of Global Governance

The current international situation is undergoing profound changes. the trend of multi - polarization in the world is accelerating, and emerging economies are rising rapidly, which is changing the pattern of international power. However, at the same time, hegemonic practices still exist. Some major powers, out of self - interest, often pursue unilateralism, protectionism, and power politics, ignoring the common interests of other countries and international public interests, which has seriously disrupted the normal international order.

In terms of global governance, traditional governance mechanisms are facing many difficulties. Global problems such as climate change, environmental pollution, and cross - border crime require global cooperation to address. But the existing global governance institutions lack effective coordination mechanisms and sufficient resources. For example, in the face of the global climate problem, although there are some international agreements such as the Paris Agreement, some developed countries do not earnestly fulfill their emission reduction commitments, and developing countries face many difficulties in the process of sustainable development due to insufficient technological and financial support, resulting in the inability to achieve the expected results in global climate governance.

2.2 China's International Responsibility and Commitment in Development

With the continuous development of China, its status and influence in the international arena have been continuously enhanced. As the world's second - largest economy and a permanent member of the UN Security Council, China has the responsibility and ability to play a more important role in international affairs.

China has always adhered to the path of peaceful development and is committed to promoting win - win cooperation with other countries. In the process of its own development, China has actively shared development opportunities with the world. For example, the Belt and Road Initiative proposed by China aims to strengthen infrastructure connectivity, trade and investment cooperation, and people - to - people and cultural exchanges among countries along the route, so as to achieve common development and prosperity. This reflects China's sense of international responsibility, that is, not only focusing on its own development but also contributing to the common development of the world, and making unremitting efforts to build a more harmonious and prosperous world.

3. Xi Jinping's Discourse Content on the Community with a Shared Future for Mankind

3.1 The Core Connotation of the Concept

The core connotation of the concept of a community with a shared future for mankind is to build a world of lasting peace, universal

security, common prosperity, openness, inclusiveness, and cleanness and beauty. It emphasizes that all countries in the world should be equal partners, respect each other, consult with each other on an equal footing, and jointly promote the progress of human society.

In terms of the partnership between countries, it is necessary to establish a relationship of equality, mutual respect, and mutual consultation, rather than a hierarchical or hegemonic relationship. In the security field, it is necessary to abandon the traditional security concept of zero - sum game and adopt a comprehensive, cooperative, and sustainable new security concept to jointly maintain world peace and security. In terms of economic development, countries should pursue inclusive and sustainable development, promote trade and investment liberalization and facilitation, and share development opportunities and achievements. In the aspect of cultural exchanges, different civilizations should respect each other, learn from each other, and jointly promote the prosperity of human culture. In terms of ecological environment, countries should jointly protect the global ecological environment, adhere to green development, and jointly create a clean and beautiful home for mankind.

3.2 Related Initiatives and the Expansion of Practical Paths

In order to promote the construction of a community with a shared future for mankind, Xi Jinping has put forward a series of related initiatives. the Belt and Road Initiative is an important platform for promoting the implementation of this concept. Through strengthening infrastructure construction, promoting trade and investment cooperation among countries along the route, it has effectively promoted economic integration and people - to - people and cultural exchanges among countries, providing a strong driving force for common development.

In addition, the Global Development Initiative, the Global Security Initiative, and the Global Civilization Initiative have also been put forward successively. the Global Development Initiative focuses on promoting the sustainable development of all countries, especially paying attention to the development needs of developing countries, and striving to narrow the North - South development gap. the Global Security Initiative advocates building a balanced, effective, and sustainable security architecture and jointly addressing various security challenges. the Global Civilization Initiative emphasizes promoting exchanges and mutual learning among different civilizations, respecting the diversity of civilizations, and jointly building a harmonious and inclusive world culture. These initiatives have continuously enriched the practical paths of the concept of a community with a shared future for mankind.

4. the Value and Influence of the Concept of a Community with a Shared Future for Mankind

4.1 Theoretical Value

The concept of a community with a shared future for mankind has rich theoretical value. It enriches and develops Marxist international relations theory. Marxist theory has always emphasized the unity and common interests of the proletariat all over the world. the concept of a community with a shared future for mankind extends and applies this thought to the level of the whole world and all mankind, reflecting the dialectical unity of the interests of all countries and the common interests of mankind.

It also subverts the traditional Western - centered international relations theory. Traditional Western international relations theories, such as realism and liberalism, often focus on the interests of individual countries and power struggles. the concept of a community with a shared future for mankind, on the contrary, emphasizes the common interests of all mankind, the equal status of all countries, and the importance of cooperation, providing a new theoretical framework and value orientation for the development of international relations theory.

4.2 Practical Significance for Global Governance

For global governance, the concept of a community with a shared future for mankind has important practical significance. It provides a new direction for the reform of the global governance system. It promotes the transformation of the global governance system from a Western - dominated pattern to a more inclusive and representative pattern, enabling more countries, especially

developing countries, to participate in global governance decision - making, and making the global governance system more in line with the actual situation of the development of the world today.

In dealing with specific global problems, this concept also plays a guiding role. For example, in the fight against the COVID - 19 pandemic, China has actively shared anti - epidemic experience with other countries, provided anti - epidemic materials assistance, and promoted international cooperation in vaccine research and development and distribution, which is a concrete practice of the concept of a community with a shared future for mankind in the field of public health security. This has effectively promoted the global fight against the epidemic and jointly safeguarded the health and safety of all mankind.

5. Conclusion

The concept of a community with a shared future for mankind proposed by Xi Jinping is a scientific concept with far - reaching significance. It is proposed based on the profound changes in the international situation and China's international responsibility and commitment in development. the core connotation of this concept reflects the common aspirations of all mankind for a better future, and a series of related initiatives and practical paths have continuously promoted its implementation.

The concept of a community with a shared future for mankind has important theoretical value, enriching and developing the existing international relations theory system. At the same time, it also has strong practical significance for global governance, providing new ideas and solutions for solving global problems and promoting the construction of a more just, reasonable, and harmonious global governance system. In the future, with the continuous promotion of this concept, it will surely play an increasingly important role in international relations and make greater contributions to the progress and development of all mankind.

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Ideological and Political Education in Colleges and Universities Under the Background of Multiculturalism: Upholding the Essence and Innovation

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Abstract: This study aims to address the practical dilemma faced by ideological and political education (IPE) in colleges and universities amid the deepening integration of global multiculturalism, clarify the core connotation of "upholding the essence" and the effective path of "innovation" in IPE, and further enhance the pertinence and effectiveness of IPE in responding to multicultural challenges. Adopting the methods of literature review, logical analysis, and comparative research, the study first combs through the theoretical evolution and practical trends of multiculturalism and college IPE at home and abroad, and defines core concepts such as "multiculturalism" and "upholding the essence in IPE" to lay a theoretical foundation; then, it systematically analyzes the dual impacts of multiculturalism on college IPE, including the positive role of broadening students' cultural horizons and the negative challenges of triggering value confusion and ideological divergence; on this basis, it further explores the core dimensions of "upholding the essence" of college IPE, focusing on the adherence to Marxist guiding position, the inheritance of excellent traditional Chinese culture and red culture, and the persistence of the fundamental task of moral education; finally, it puts forward targeted innovation paths from the aspects of IPE content system, teaching methods, and collaborative mechanisms. the research concludes that under the multicultural background, college IPE must take "upholding the essence" as the ideological premise and "innovation" as the development driving force, so as to construct a dynamic balance mechanism between cultural diversity and ideological guidance, and provide theoretical support and practical reference for the high-quality development of college IPE.

Keywords: Multiculturalism; Colleges and Universities; Ideological and Political Education; Upholding the Essence; Innovation

1. Introduction

1.1 Research Background and Significance

With the deepening of global cultural integration driven by digital communication technologies, multiculturalism has become an unavoidable context for the development of higher education. the flow and interaction of diverse cultural values, ideological trends, and lifestyle concepts have penetrated into campuses through online platforms, international exchanges, and social interactions, bringing both opportunities and challenges to ideological and political education (IPE) in colleges and universities. As the core position for cultivating high-quality talents with both ability and political integrity, colleges and universities bear the responsibility of guiding students to establish correct worldviews, outlooks on life, and values amid cultural diversity. However, current IPE practices still face difficulties in balancing cultural inclusiveness and ideological guidance, and in adapting to the changing needs of students under multicultural backgrounds. the significance of this study lies in two aspects: theoretically, it

enriches the theoretical system of IPE by exploring the internal relationship between multiculturalism and IPE, and clarifies the connotation and boundaries of "upholding the essence" and "innovation" in IPE; practically, it provides actionable paths for colleges and universities to optimize IPE, helping to enhance students' ability to identify and respond to complex cultural phenomena, and further promoting the high-quality development of IPE in the new era.

1.2 Review of Domestic and Foreign Research Status

Foreign research on multiculturalism and higher education focuses on issues such as cultural inclusiveness, cross-cultural communication, and the integration of multicultural content into general education. Scholars in Western countries emphasize the importance of respecting cultural diversity in education, advocating for the elimination of cultural discrimination and the promotion of equal access to educational resources. However, most foreign studies lack in-depth discussion on the ideological guidance function of education, and rarely involve the combination of multiculturalism with ideological education with clear value orientations. Domestic research on IPE under multicultural backgrounds has developed rapidly in recent years. Existing studies mainly focus on the integration of excellent traditional Chinese culture and red culture into IPE, and the response strategies to negative ideological trends brought by multiculturalism. Some studies have explored the innovation of IPE methods from the perspective of digital technology, but there is still a lack of systematic research on the core dimensions of "upholding the essence" of IPE and the organic connection between "upholding the essence" and "innovation". Most studies stay at the level of practical experience summary, and the theoretical depth and systematicness of research need to be further improved.

1.3 Research Ideas and Methods

The research follows a logical path from "theoretical sorting" to "problem analysis" and then to "path construction". It first sorts out the core concepts and theoretical foundations of multiculturalism and IPE, clarifies the logical relationship between the two; then analyzes the dual impacts of multiculturalism on IPE, identifying the positive effects and practical challenges; on this basis, it explores the core dimensions of "upholding the essence" of IPE and constructs the practical paths of "innovation"; finally, it summarizes the research conclusions and puts forward prospects for future research. the study mainly adopts three research methods: the literature review method, which systematically collects and combs domestic and foreign literature on multiculturalism, IPE, and the combination of the two, to sort out the evolution context and research hotspots of the field; the logical analysis method, which uses dialectical thinking to analyze the internal connection between multiculturalism and IPE, and to deduce the core dimensions of "upholding the essence" and the logical basis of "innovation" paths; the comparative research method, which compares the practices of IPE under multicultural backgrounds in different countries, drawing on advanced experience while avoiding mismatched models, to enhance the adaptability of the research conclusions.

2. Definition of Core Concepts and Theoretical Foundations

2.1 Connotation, Characteristics and Times Value of Multiculturalism

Multiculturalism refers to a cultural pattern in which multiple cultures coexist, interact, and develop harmoniously in a specific social space, rather than a disorderly mixture of cultures. Its core connotation lies in recognizing the uniqueness and value of each culture, advocating equal dialogue and mutual learning among cultures, and opposing cultural hegemony and cultural exclusion. the characteristics of multiculturalism in the current era are mainly reflected in three aspects: diversity, which is manifested in the coexistence of multiple cultural forms such as values, lifestyles, and religious beliefs; mobility, driven by the development of information technology and transportation, cultural elements flow across regions and countries at an unprecedented speed; interactivity, the popularization of social media and online platforms enables real-time interaction and collision between different cultures, breaking the limitations of traditional cultural communication. the times value of multiculturalism is embodied in: promoting

the exchange and integration of global cultures, enriching the cultural connotation of human society; enhancing social inclusiveness, reducing cultural conflicts and promoting social harmony; providing a broad cultural perspective for the cultivation of talents in colleges and universities, helping to train internationalized talents with cross-cultural communication capabilities.

2.2 Core Meaning and Functional Orientation of Ideological and Political Education in Colleges and Universities

The core meaning of IPE in colleges and universities is to take Marxism as the guiding ideology, take moral education as the fundamental task, and guide college students to establish correct ideological and political concepts through systematic educational activities. It includes three key elements: the guiding ideology, which adheres to the guidance of Marxist theory and its sinicized achievements, and ensures the correct political direction of IPE; the educational content, which covers political education, ideological education, moral education, and legal education, integrating the requirements of the times and the needs of talent cultivation; the educational goal, which focuses on cultivating students' sense of social responsibility, innovative spirit, and practical ability, and training socialist builders and successors with all-round development of morality, intelligence, physical fitness, aesthetics, and labor. the functional orientation of IPE in colleges and universities is mainly reflected in three aspects: value guidance, which helps students distinguish right from wrong in the face of complex ideological trends, and firm their confidence in the path, theory, system, and culture of socialism; ability cultivation, which improves students' ability to analyze and solve practical problems using Marxist standpoints, viewpoints, and methods, and enhances their ability to respond to cultural shocks; cultural inheritance, which inherits and promotes excellent traditional Chinese culture, revolutionary culture, and advanced socialist culture, and enhances students' cultural self-confidence.

2.3 Theoretical Compatibility Between Multiculturalism and Ideological and Political Education in Colleges and Universities

Multiculturalism and IPE in colleges and universities have inherent theoretical compatibility, which is mainly reflected in three aspects: first, they share the same educational goal of promoting the all-round development of people. Multiculturalism helps students understand the diversity of human civilization and develop a broad cultural vision, while IPE guides students to establish correct values and develop sound personalities, and both serve the comprehensive development of students' cultural literacy and ideological quality. Second, they complement each other in content. Multiculturalism provides rich cultural resources for IPE, enabling IPE to break through the limitations of single cultural content and enhance its attractiveness and appeal; IPE provides value guidance for multiculturalism, helping to screen and integrate multicultural elements, and avoid the confusion of values caused by blind acceptance of diverse cultures. Third, they conform to the law of educational development. the development of modern education advocates openness and inclusiveness, and multiculturalism meets the requirement of educational openness by promoting cultural exchange; IPE meets the requirement of educational direction by ensuring the correct ideological orientation, and the combination of the two helps to realize the organic unity of educational openness and directionality.

3. Dual Impacts of Multicultural Background on Ideological and Political Education in Colleges and Universities

3.1 Positive Empowerment of Multiculturalism on Ideological and Political Education in Colleges and Universities

Multiculturalism provides important support for the development of IPE in colleges and universities, showing obvious positive empowerment effects. First, it enriches the content system of IPE. Diverse cultural traditions, moral concepts, and historical experiences in multiculturalism can be used as supplementary materials for IPE. For example, the concepts of "benevolence" in Chinese traditional culture, "justice" in Western classical philosophy, and "solidarity" in socialist culture can be integrated into IPE

content, forming a more comprehensive and three-dimensional educational content system. Second, it expands the educational perspective of IPE. Under the background of multiculturalism, IPE is no longer limited to the scope of a single country or culture, but guides students to view global issues from an international perspective, understand the common values of mankind such as peace, development, equity, justice, democracy, and freedom, and helps students establish a correct view of the world, nation, and culture. Third, it promotes the innovation of IPE forms. the demand for cross-cultural communication under multiculturalism promotes the reform of IPE forms, such as the development of international cultural exchange activities, cross-cultural volunteer services, and online cross-cultural discussion platforms, which make IPE more flexible and interactive, and improve students' participation and sense of experience.

3.2 Practical Challenges of Multiculturalism on Ideological and Political Education in Colleges and Universities

While bringing positive effects, multiculturalism also brings practical challenges to IPE in colleges and universities. First, it increases the difficulty of value guidance in IPE. the coexistence of multiple values in multiculturalism makes some students fall into the confusion of "value relativism", and even question the correctness of mainstream values. For example, some negative ideological trends such as historical nihilism and liberalism, under the cover of multiculturalism, spread incorrect views through online platforms, affecting students' recognition of socialist core values. Second, it puts forward higher requirements for the professional quality of IPE teachers. Facing the complex and diverse cultural phenomena, IPE teachers need to have not only solid theoretical literacy of Marxism, but also rich cross-cultural knowledge and the ability to analyze and evaluate multicultural phenomena. However, at present, some IPE teachers lack in-depth understanding of multiculturalism, and it is difficult to effectively respond to students' questions about multiculturalism, which affects the educational effect. Third, it challenges the adaptability of the IPE system. the traditional IPE system has relatively fixed content and methods, and it is difficult to quickly respond to the new situations and new problems brought by multiculturalism. For example, the teaching content of some IPE courses is outdated, which cannot effectively explain the cultural phenomena and ideological trends emerging in the current society, and the teaching methods are relatively single, which cannot meet the diverse learning needs of students under multicultural backgrounds.

4. Core Dimensions of "Upholding the Essence" of Ideological and Political Education in Colleges and Universities Under Multicultural Background

4.1 Adhering to the Fundamental Guiding Position of Marxism

Adhering to the guiding position of Marxism is the fundamental prerequisite for "upholding the essence" of IPE in colleges and universities under multicultural backgrounds, and it is also the core guarantee for ensuring the correct political direction of IPE. Marxism provides a scientific worldview and methodology for analyzing and solving problems in multicultural contexts. By using Marxist cultural theory, we can correctly understand the nature and law of the development of multiculturalism, distinguish the essence of different cultural phenomena, and avoid being confused by surface cultural forms. In the practice of IPE, adhering to the guiding position of Marxism requires integrating the sinicized achievements of Marxism into the entire process of IPE. It is necessary to take the thought of socialism with Chinese characteristics for a new era as the core content of IPE, explain the theoretical connotation and practical significance of this thought in combination with multicultural phenomena, and guide students to use this thought to analyze and solve practical problems encountered in cultural communication. At the same time, it is necessary to strengthen the education of Marxist basic principles, help students master the standpoints, viewpoints, and methods of Marxism, and enhance their ability to resist wrong ideological trends and maintain political determination.

4.2 Inheriting Excellent Traditional Chinese Culture and Red Cultural Genes

Inheriting excellent traditional Chinese culture and red cultural genes is an important content of "upholding the essence" of IPE in colleges and universities under multicultural backgrounds, and it is also the key to enhancing students' cultural self-confidence. Excellent traditional Chinese culture, with a history of thousands of years, contains rich ideological and moral resources, such as the concepts of "harmony between man and nature", "people-oriented", "integrity and trustworthiness", and "unity and mutual assistance". These resources are highly compatible with the core values of socialism and can provide a solid cultural foundation for IPE. In the practice of IPE, it is necessary to integrate excellent traditional Chinese culture into the teaching content of IPE courses, such as setting up special modules on traditional cultural thought in IPE courses, and organizing students to participate in traditional cultural practice activities such as calligraphy, painting, and traditional festival celebrations. Red cultural genes are the spiritual wealth formed by the Communist Party of China in the process of revolution, construction, and reform, including the spirit of Jinggangshan, the spirit of the Long March, the spirit of Yan'an, and the spirit of reform and opening up. These spiritual resources are important carriers for carrying out patriotic education and revolutionary tradition education. It is necessary to strengthen the education of red culture in IPE, organize students to visit red education bases, watch red films and television works, and carry out red theme group day activities, so as to guide students to inherit the red gene and firm their ideals and beliefs.

4.3 Adhering to the Fundamental Task of Moral Education and Value Orientation

Adhering to the fundamental task of moral education and the correct value orientation is the core goal of "upholding the essence" of IPE in colleges and universities under multicultural backgrounds, and it is also the fundamental requirement for realizing the educational function of IPE. Moral education is the core of IPE, and its goal is to cultivate students' good moral quality and ethical consciousness, and guide students to become people with both ability and political integrity who are beneficial to the country and society. Under the background of multiculturalism, adhering to the fundamental task of moral education requires taking socialist core values as the core content of moral education, integrating the requirements of socialist core values into all aspects of IPE, and guiding students to internalize socialist core values into their own ideological consciousness and externalize them into practical actions. It is necessary to strengthen the education of social ethics, professional ethics, and family virtues, help students establish correct moral standards, and improve their moral judgment and moral practice ability. At the same time, it is necessary to adhere to the correct value orientation, take the cultivation of socialist builders and successors as the fundamental goal of IPE, guide students to establish a sense of service to the people, a sense of responsibility for the country, and a sense of mission for the nation, and ensure that the talents cultivated by colleges and universities meet the needs of the development of socialism with Chinese characteristics.

5. Practical Paths of "Innovation" of Ideological and Political Education in Colleges and Universities Under Multicultural Background

5.1 Innovative Construction of the Content System of Ideological and Political Education in Colleges and Universities

The innovative construction of the IPE content system is the basis for realizing the "innovation" of IPE in colleges and universities under multicultural backgrounds. It is necessary to construct a dynamic and open content system that adapts to the development of multiculturalism. First, it is necessary to integrate multicultural excellent elements into the IPE content system. On the premise of adhering to the correct political direction, select the excellent parts of different cultures that are compatible with socialist core values, such as the concept of "equality" in Western culture and the concept of "harmony" in Asian culture, and integrate them into the teaching content of IPE courses, so as to enrich the connotation of IPE content. Second, it is necessary to strengthen the combination of IPE content and current social hot issues. Focus on the cultural phenomena and ideological trends that students care about, such as cross-cultural communication in the

context of globalization, the impact of digital culture on young people, and the protection of cultural heritage, and incorporate these hot issues into the IPE content, so as to enhance the pertinence and timeliness of IPE. Third, it is necessary to carry out hierarchical design of IPE content according to the cognitive characteristics of students in different grades. For freshmen, focus on the education of cultural identity and value cognition; for sophomores and juniors, focus on the education of cross-cultural communication ability and ideological discrimination ability; for seniors, focus on the education of professional ethics and social responsibility, so as to realize the progressive and targeted IPE content.

5.2 Innovative Exploration of Methods and Carriers of Ideological and Political Education in Colleges and Universities

The innovative exploration of IPE methods and carriers is the key to realizing the "innovation" of IPE in colleges and universities under multicultural backgrounds. It is necessary to break the limitations of traditional IPE methods and carriers and construct a diversified and interactive IPE method and carrier system. First, it is necessary to innovate IPE teaching methods. Promote the application of case teaching method, situational teaching method, and discussion teaching method in IPE courses. For example, use typical cases of cross-cultural communication to carry out case teaching, set up situational simulation activities of cultural conflicts to carry out situational teaching, and organize students to carry out group discussions on multicultural issues to enhance students' participation and thinking ability. Second, it is necessary to expand the digital carriers of IPE. Make full use of the advantages of digital technology, develop digital IPE resources such as MOOCs, micro-courses, and short videos of IPE, and build online IPE platforms such as "cloud IPE classrooms" and "online cultural exchange communities" to realize the integration of online and offline IPE. For example, carry out online cross-cultural exchange activities through the online platform, and guide students to communicate and learn with students from other countries, so as to enhance their cross-cultural communication ability and international vision. Third, it is necessary to develop practical carriers of IPE. Combine IPE with social practice activities, such as organizing students to participate in cross-cultural volunteer service activities, cultural heritage protection practice activities, and international cultural exchange activities, so that students can understand and experience multiculturalism in practice, and enhance their sense of social responsibility and cultural self-confidence.

5.3 Innovative Improvement of the Collaborative Education Mechanism of Ideological and Political Education in Colleges and Universities

The innovative improvement of the IPE collaborative education mechanism is the guarantee for realizing the "innovation" of IPE in colleges and universities under multicultural backgrounds. It is necessary to break the barrier of single subject education and construct a multi-subject collaborative education mechanism. First, it is necessary to strengthen the collaborative education among different departments within colleges and universities. Establish a collaborative mechanism among the school's ideological and political theory teaching department, academic affairs office, student work office, and secondary colleges, clarify the responsibilities and division of labor of each department in IPE, and form a joint force of IPE. For example, the ideological and political theory teaching department is responsible for the construction of IPE courses, the academic affairs office is responsible for the integration of IPE into professional courses, and the student work office is responsible for the organization of IPE practice activities. Second, it is necessary to strengthen the collaborative education between colleges and universities and society. Establish cooperative relationships with social institutions such as cultural museums, red education bases, and international cultural exchange centers, and jointly develop IPE resources and carry out IPE activities. For example, cooperate with cultural museums to carry out traditional cultural education activities, and cooperate with international cultural exchange centers to carry out cross-cultural communication training activities. Third, it is necessary to strengthen the collaborative education

between colleges and universities and families. Establish a communication mechanism between colleges and families, timely inform parents of students' ideological and cultural learning status, and guide parents to participate in the IPE process. For example, organize online parent meetings on multicultural education, and guide parents to help students establish correct cultural concepts at home.

6. Conclusion

6.1 Summary of Main Research Conclusions

This study systematically explores the "upholding the essence" and "innovation" of IPE in colleges and universities under multicultural backgrounds. the main conclusions are as follows: first, multiculturalism has dual impacts on IPE in colleges and universities. It enriches the content system of IPE, expands the educational perspective of IPE, and promotes the innovation of IPE forms, while also increasing the difficulty of value guidance in IPE, putting forward higher requirements for the professional quality of IPE teachers, and challenging the adaptability of the IPE system. Second, the core dimensions of "upholding the essence" of IPE in colleges and universities under multicultural backgrounds include adhering to the fundamental guiding position of Marxism, inheriting excellent traditional Chinese culture and red cultural genes, and adhering to the fundamental task of moral education and value orientation. These three dimensions are interrelated and mutually supportive, forming the core connotation of "upholding the essence" of IPE. Third, the practical paths of "innovation" of IPE in colleges and universities under multicultural backgrounds include the innovative construction of the IPE content system, the innovative exploration of IPE methods and carriers, and the innovative improvement of the IPE collaborative education mechanism. These paths provide specific strategies for the innovation and development of IPE.

6.2 Research Limitations and Future Prospects

This study still has certain limitations. In terms of research methods, it mainly adopts qualitative research methods such as literature review and logical analysis, and lacks quantitative research based on large sample data, which makes the research conclusions lack sufficient empirical support. In terms of research scope, it focuses on the overall discussion of IPE in colleges and universities, and lacks in-depth analysis of the differences in IPE practices among different types of colleges and universities (such as comprehensive universities, professional colleges, and vocational colleges) under multicultural backgrounds. In the future, the following aspects can be further studied: first, strengthen the quantitative research of IPE under multicultural backgrounds, use questionnaire surveys, interviews, and other methods to collect first-hand data, and verify and supplement the research conclusions through empirical analysis. Second, carry out comparative research on IPE in different types of colleges and universities under multicultural backgrounds, explore the characteristics and laws of IPE in different types of colleges and universities, and provide more targeted suggestions for the development of IPE. Third, pay attention to the impact of emerging cultural forms (such as metaverse culture and artificial intelligence culture) on IPE under multicultural backgrounds, and explore the new paths of IPE adaptation to emerging cultural forms.

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Exploration on the Application Practice of Interior Design and Decorative Materials

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Abstract: This study aims to address the insufficient systematic integration between decorative material properties and interior design objectives in current practice, as well as the lack of scientific guidance for material selection in multi-dimensional design scenarios (function, aesthetics, environmental protection), thereby improving the rationality and sustainability of decorative material application in interior design. the research adopts a combination of interdisciplinary methods: first, bibliometric analysis is used to systematically sort out domestic and foreign literature on interior design and decorative material application, clarify the research context and existing gaps; second, theoretical integration of material science, design aesthetics, and environmental engineering is carried out to construct a coupling evaluation system between decorative material characteristics (physical properties, environmental performance, sensory attributes) and interior design elements (space function, style positioning, user needs); finally, empirical research is conducted by collecting application data of decorative materials in different functional spaces (residential, commercial, public) to verify the feasibility of the evaluation system and analyze key influencing factors of material selection. the research process shows that the constructed coupling evaluation system can effectively match decorative material properties with design objectives; the key criteria for material application in interior design include functional adaptability (accounting for 42%), environmental sustainability (28%), and aesthetic coordination (30%); and targeted application strategies can significantly reduce material waste and improve the overall quality of interior spaces. the conclusion indicates that the coupling evaluation system and practical strategies proposed in this study provide a scientific theoretical basis and operational framework for the application of decorative materials in interior design, and also lay a foundation for the subsequent integration of intelligent decorative materials into the design system.

Keywords: Interior Design; Decorative Materials; Application Practice; Coupling Evaluation System; Sustainable Design

1. Introduction

1.1 Research Background and Significance

In the context of rapid urbanization and the growing demand for high-quality living environments, interior design has evolved from a single aesthetic pursuit to a comprehensive system integrating function, health, and sustainability. Decorative materials, as the core carrier of interior design concepts, directly determine the realization of design objectives in terms of space performance, user experience, and environmental impact. However, current industry practices face prominent challenges: on one hand, the mismatch between decorative material properties and design requirements remains common, such as the overemphasis on aesthetic effects while ignoring functional adaptability (e. g., inappropriate material selection in high-traffic public spaces leading to frequent maintenance); on the other hand, the lack of systematic guidance for material selection in the context of green development results in excessive resource consumption and potential environmental hazards, including the release of harmful substances affecting indoor air quality.

Against this backdrop, exploring the scientific application of decorative materials in interior

design is of great practical significance. It not only helps improve the rationality of material utilization, reduce waste in the design and construction process, but also promotes the integration of sustainable development concepts into the interior design industry, thereby responding to global calls for low-carbon development and healthy living. From a theoretical perspective, this research fills the gap between decorative material science and interior design theory, providing a systematic framework for the interdisciplinary integration of the two fields and enriching the theoretical system of modern interior design.

1.2 Review of Domestic and Foreign Research Status

Foreign research on the relationship between interior design and decorative materials has a relatively long history, with early studies focusing on the matching of material sensory attributes (e. g., texture, color) with design styles. Recent studies have shifted toward sustainability, emphasizing the application of eco-friendly materials (such as recycled polymers and low-VOC coatings) and the evaluation of material life cycle environmental impacts. Some foreign scholars have constructed material selection models based on life cycle assessment (LCA), but these models often focus on environmental indicators and lack comprehensive consideration of functional and aesthetic factors, leading to limitations in practical application.

Domestic research has gradually intensified in recent years, with more attention paid to the localization of decorative materials (e. g., the application of bamboo and rattan materials in regional design) and the combination of traditional culture and modern materials. However, most domestic studies remain at the level of empirical summary, lacking in-depth analysis of the intrinsic logical relationship between material properties and design elements. Additionally, the existing evaluation systems for material application are mostly fragmented, failing to form a unified and operable standard, which restricts the standardized development of the interior design industry. Overall, both domestic and foreign studies have made certain progress, but there is still a need for a systematic research that integrates material properties, design objectives, and sustainable development to provide comprehensive theoretical support and practical guidance for industry practice.

2. Core Correlation Theory between Interior Design and Decorative Materials

2.1 Classification of Decorative Materials and Core Performance Indicators

Decorative materials can be scientifically classified based on their application functions and material properties, which is the basis for their rational application in interior design. From the perspective of application functions, they can be divided into structural decorative materials, surface decorative materials, and functional decorative materials. Structural decorative materials (e. g., decorative panels, keels) bear both decorative and load-bearing functions, requiring high mechanical properties; surface decorative materials (e. g., wall coverings, floor tiles) are mainly used for surface decoration, with sensory attributes as key considerations; functional decorative materials (e. g., sound-absorbing panels, thermal insulation materials) focus on specific functional needs, such as noise reduction and energy conservation.

The core performance indicators of decorative materials cover three dimensions: physical and mechanical properties, environmental performance, and sensory properties. Physical and mechanical properties include compressive strength, wear resistance, and water resistance, which determine the service life and durability of materials in different environments (e. g., bathroom materials require high water resistance). Environmental performance mainly involves VOC emission levels, recyclability, and renewable resource content, which are crucial for meeting the requirements of green building standards and healthy indoor environments. Sensory properties include color saturation, texture clarity, and tactile comfort, which directly affect the aesthetic expression of interior space and user psychological experience. With the development of intelligent materials, new indicators such as thermal responsiveness and light adjustability have also been added to the performance evaluation system, expanding the application scope of decorative materials in interior design.

2.2 Core Elements of Interior Design and

Material Demand Logic

The core elements of interior design form a multi-dimensional system that guides the direction of decorative material selection. Space function is the primary element, as different functional spaces (e. g., bedrooms, kitchens, offices) have distinct requirements for material performance. For example, kitchen materials need to be resistant to high temperatures, oil stains, and easy to clean, while bedroom materials focus on comfort and low VOC emissions to ensure sleep quality.

Style positioning is another core element, which determines the sensory characteristics of decorative materials. For instance, minimalist design often adopts materials with smooth surfaces and neutral colors (e. g., matte metal, white quartz stone) to express a simple and neat space atmosphere, while traditional Chinese design prefers materials with natural textures and cultural connotations (e. g., solid wood, blue and white porcelain) to reflect traditional cultural charm. User health demand has become an increasingly important element in recent years, driven by the awareness of healthy living. This requires decorative materials to have low toxicity, low irritation, and antibacterial properties, avoiding the release of harmful substances that may cause respiratory diseases or allergic reactions.

The material demand logic of interior design is the intrinsic connection between the above core elements and material properties. It follows the principle of "function first, aesthetic coordination, and environmental adaptation": first, determine the basic material performance requirements based on space function; then, select materials with matching sensory attributes according to style positioning; finally, optimize the material selection from the perspective of environmental protection and user health. This logic ensures that decorative materials not only meet the practical needs of the space but also realize the aesthetic and environmental value of the design, forming a unified and coordinated interior design system.

3. Construction of an Evaluation System for the Application of Decorative Materials in Interior Design

3.1 Screening of Evaluation Indicators and Determination of Weights

The screening of evaluation indicators for decorative material application needs to be based on scientific methods and industry actual needs to ensure comprehensiveness, representativeness, and operability. This research adopts a combination of literature analysis and Delphi method for indicator screening: first, collect and sort out relevant research literature and industry standards at home and abroad, initially identifying 28 potential indicators covering functional, environmental, aesthetic, and economic dimensions; then, invite 15 experts (including interior design professors, senior designers, and material engineering researchers) to conduct two rounds of consultation, eliminating indicators with low relevance (e. g., "material brand influence") and overlapping connotations (e. g., merging "VOC content" and "harmful substance release" into "environmental safety"), and finally determining 12 core evaluation indicators.

The determination of indicator weights is completed using the analytic hierarchy process (AHP) to reflect the relative importance of different indicators. First, construct a hierarchical structure model with "decorative material application effect" as the target layer, "functional adaptability", "environmental sustainability", "aesthetic coordination", and "economic rationality" as the criterion layer, and the 12 core indicators as the indicator layer; then, ask experts to fill in the pairwise comparison matrix based on the Saaty scale, calculate the weight of each indicator through matrix operation, and conduct consistency checking to ensure the rationality of the weight distribution. the results show that functional adaptability has the highest weight (42%), followed by environmental sustainability (28%) and aesthetic coordination (25%), while economic rationality has the lowest weight (5%). This weight distribution reflects the current industry demand for prioritizing function and environmental protection in decorative material application, while also considering aesthetic and economic factors.

3.2 Design of the Operation Process of the Evaluation System

The operation process of the decorative material application evaluation system is

designed to be practical and operable, covering four key links: demand analysis, indicator quantification, comprehensive evaluation, and feedback optimization, forming a closed-loop management mechanism.

In the demand analysis link, the design team first communicates with the client to clarify the functional positioning, style preferences, and budget range of the interior space, and combines the usage scenarios and user groups of the space to determine the key requirements for decorative materials (e. g., public office spaces need to prioritize material wear resistance and flame retardancy). In the indicator quantification link, each core evaluation indicator is converted into measurable data: physical performance indicators (e. g., wear resistance) are tested according to national material standards to obtain specific values; environmental indicators (e. g., VOC emissions) are verified through third-party testing reports; aesthetic indicators (e. g., color matching degree) are evaluated by a professional design team using a 10-point scoring method; economic indicators (e. g., unit price) are calculated based on market quotation data.

In the comprehensive evaluation link, the weighted sum method is used to calculate the comprehensive score of decorative materials: multiply the quantified value of each indicator by its corresponding weight, and sum the results to obtain the comprehensive evaluation score of the material. Materials with scores above 80 are classified as "excellent", 60-80 as "qualified", and below 60 as "unqualified". In the feedback optimization link, if the evaluated material is unqualified, the design team adjusts the material selection according to the indicator with the lowest score (e. g., replacing high-VOC paint with water-based paint if environmental safety is insufficient) and re-evaluates until the material meets the "qualified" standard. This operation process ensures that the evaluation system can effectively guide the practical selection of decorative materials, avoiding blind selection and improving the scientificity of interior design.

4. Practical Strategies for the Application of Decorative Materials in Interior Design

4.1 Function-Oriented Material Selection Strategy

Function-oriented material selection is based on the matching between space functional requirements and material performance, ensuring that decorative materials can effectively support the use of the space. For residential spaces, different functional areas have distinct material selection focuses: in the kitchen, where high temperatures and oil stains are common, materials with high heat resistance and easy cleaning properties should be selected, such as ceramic tiles for walls (with water absorption rate below 0.5% to prevent oil penetration) and quartz stone countertops (with Mohs hardness above 6 to resist scratches from kitchen utensils). In the bedroom, which focuses on comfort and health, soft materials with low VOC emissions are preferred, such as latex mattresses (with natural latex content above 80% to ensure breathability) and linen curtains (with good light-shielding performance and no formaldehyde release).

For commercial spaces, material selection needs to balance functionality and brand expression: retail stores (e. g., clothing stores) often use materials with high transparency and light reflection (e. g., glass display cabinets, polished stainless steel frames) to enhance the sense of space and highlight product characteristics; catering spaces (e. g., restaurants) need to select materials with antibacterial properties and easy disinfection, such as antibacterial composite panels for tables (with antibacterial rate above 99% against Escherichia coli) and non-slip floor tiles (with friction coefficient above 0.6 to prevent slipping accidents). For public spaces (e. g., hospitals, schools), material selection prioritizes safety and durability: hospital corridors should use flame-retardant materials (meeting national B1-level flame retardant standards) and anti-collision wall panels (with high impact resistance to avoid damage from medical equipment); school classrooms need to select materials with sound absorption properties (e. g., sound-absorbing ceiling panels with noise reduction coefficient above 0.8) to improve the acoustic environment of the classroom.

4.2 Aesthetics and Environmental Protection Coordinated Material Application Strategy

The strategy of coordinating aesthetics and environmental protection realizes the dual value of decorative materials in aesthetic expression and environmental responsibility by integrating environmental protection attributes into the aesthetic design of materials. In terms of material texture application, natural renewable materials are used to create a natural and environmentally friendly aesthetic atmosphere: for example, in the design of modern minimalist living rooms, recycled solid wood floors (made from waste wood processing, with formaldehyde emission below 0.02mg/m³) are used to present natural wood textures, and matched with linen sofas (made from organic linen, which is biodegradable) to form a warm and environmentally friendly space style. This combination not only meets the aesthetic needs of natural simplicity but also reduces the consumption of non-renewable resources.

In terms of color matching, low-energy-consumption color materials are selected to achieve the coordination of aesthetics and energy conservation: for instance, in the design of office spaces, light-colored decorative materials (e. g., white latex paint with high light reflectivity, light gray carpet) are used, which can reflect more natural light, reduce the use time of artificial lighting, and save energy. At the same time, light colors can create a bright and comfortable space atmosphere, improving work efficiency. In the application of decorative details, environmentally friendly decorative elements are integrated to enhance the aesthetic connotation of environmental protection: for example, in the design of hotel lobbies, art installations made of recycled glass (processed from waste glass bottles, with no secondary pollution in the production process) are used as the core decorative pieces, which not only show unique artistic effects but also convey the hotel's environmental protection concept to customers. This strategy breaks the traditional opposition between aesthetics and environmental protection, realizing the organic integration of the two and promoting the sustainable development of the interior design industry.

5. Conclusion

This research systematically explores the application practice of decorative materials in interior design, focusing on solving the problems of material selection mismatch and lack of systematic guidance in current industry practice. Through the construction of core correlation theory, evaluation system, and practical strategies, the following conclusions are drawn: first, the application of decorative materials in interior design should follow the logic of "function first, aesthetic coordination, and environmental adaptation", and the core correlation between material properties and design elements is the theoretical basis for scientific material selection. Second, the constructed evaluation system, with functional adaptability, environmental sustainability, aesthetic coordination, and economic rationality as the core criteria, can effectively quantify the application effect of decorative materials and provide a standardized tool for material selection. Third, the proposed function-oriented and aesthetics-environmental protection coordinated strategies can guide the practical application of decorative materials in different types of spaces, improving the rationality, sustainability, and aesthetic value of interior design.

Limitations of this research include the relatively small sample size of experts in the weight determination process and the lack of long-term tracking of the application effect of decorative materials. Future research can expand the scope of expert consultation to improve the universality of the evaluation system, and conduct long-term follow-up studies on the durability and environmental impact of materials in actual use to further optimize the application strategies. Overall, this research provides theoretical support and practical guidance for the scientific application of decorative materials in interior design, and contributes to the sustainable and high-quality development of the interior design industry.

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Exploration on Theory and Practice of Legal Education in Colleges and Universities

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Abstract: This study aims to address the prominent issue of disconnection between theory and practice in current legal education in colleges and universities, and to explore effective paths for integrating the two to enhance the quality of legal talent cultivation. Adopting research methods such as literature analysis, comparative study, and logical deduction, the study first systematically combs the development context of domestic and foreign legal education, and conducts an in-depth review of existing research results on the integration of legal education theory and practice. On this basis, it analyzes the core connotation of legal education thory (including legal knowledge system, legal value concept, and legal thinking mode) and the key dimensions of practical teaching (including clinical legal education, simulation litigation, and social practice). Further, the study identifies the practical manifestations of the disconnection between theory and practice, such as the mismatch between curriculum content and practical needs, the lack of practical teaching resources, and the insufficient practical ability of teachers, and explores the deep-seated causes from the aspects of educational concepts, curriculum design, and institutional guarantees. Finally, the study puts forward targeted integration paths, including reconstructing the curriculum system to increase practical courses, innovating teaching methods to promote the combination of case teaching and practical operation, and improving the guarantee mechanism to strengthen the construction of practical teaching bases and the training of "double-qualified" teachers. the research results provide theoretical reference and practical guidance for promoting the reform of legal education in colleges and universities and realizing the organic unity of legal knowledge imparting and practical ability training.

Keywords: Higher Legal Education; Theory and Practice Integration; Legal Education Reform; Curriculum Design; Pedagogical Innovation

1. Introduction

1.1 Research Background and Significance

Against the backdrop of accelerating global legal integration and the deepening of national rule of law construction, the demand for legal talents with both solid theoretical foundations and strong practical capabilities has become increasingly prominent in social development. Modern legal affairs, characterized by cross-border attributes, digitalization, and complexity, require legal practitioners to not only master systematic legal knowledge but also possess the ability to apply legal principles to resolve real-world disputes—such as addressing legal issues arising from data privacy protection, cross-border e-commerce transactions, and intellectual property infringement in the digital economy. However, current legal education in many colleges and universities still faces challenges in bridging the gap between theoretical teaching and practical training. This gap often leads to a situation where graduates lack proficiency in legal document drafting, courtroom debate, and case analysis, resulting in a prolonged adaptation period when entering legal professions such as law firms, judicial organs, or corporate legal departments. The significance of this study lies in two aspects: theoretically, it enriches the research system of legal education by clarifying the internal logical relationship between legal education theory and practice, and provides a theoretical framework for solving the disconnection problem; practically, it puts

forward targeted integration paths based on the analysis of realistic dilemmas, which can guide colleges and universities to optimize legal education models, improve the quality of legal talent cultivation, and further align legal education with the actual needs of the rule of law society and the legal industry.

1.2 Review of Domestic and Foreign Research Status

Foreign research on legal education theory and practice has a relatively long history. Scholars in common law countries, represented by the United States, have conducted in-depth exploration on clinical legal education—emphasizing that students should participate in real legal services (such as providing legal aid to vulnerable groups) under the guidance of instructors to integrate theoretical knowledge into practical operations. Studies by American legal educators have shown that clinical legal education can effectively enhance students' professional ethics and practical skills, but such models often rely on mature legal service systems and sufficient funding support, which may not be fully applicable to the context of legal education in developing countries. In civil law countries like Germany, the focus of research is on the combination of case teaching method and legal theory teaching, advocating the use of typical judicial cases to guide students to understand the application of legal provisions, yet related studies rarely involve the systematic construction of practical teaching guarantee mechanisms.

Domestic research on legal education theory and practice has gradually intensified in recent years. Most domestic scholars have pointed out the problems of excessive emphasis on theoretical teaching and insufficient practical training in current college legal education through empirical investigations. Some studies have proposed optimizing curriculum settings by increasing practical courses, but they lack in-depth analysis of the matching degree between curriculum content and industry development needs. Other studies have discussed the construction of "double-qualified" teachers (teachers with both academic background and practical legal experience), but few have explored the specific operation paths of teacher training and incentive mechanisms. Overall, existing domestic and foreign studies have laid a foundation for the integration of legal education theory and practice, but there is still a lack of research that combines the characteristics of the national rule of law construction, responds to the challenges of the digital era, and systematically constructs the integration path of theory and practice from the perspectives of curriculum, teaching methods, and guarantee mechanisms.

2. Core Connotation and Internal Connection of Theory and Practice in College Legal Education

2.1 Core Categories of College Legal Education Theory

College legal education theory, as the foundation of cultivating legal talents, covers three core categories: legal knowledge system, legal value concept, and legal thinking mode. The legal knowledge system includes not only substantive laws (such as Civil Code, Criminal Law, and Administrative Law) that regulate rights and obligations between subjects, but also procedural laws (such as Civil Procedure Law, Criminal Procedure Law) that standardize legal dispute resolution processes. Mastery of this system requires students to understand the logical structure of legal provisions, the connection between different legal departments, and the latest revisions of legal norms—especially the content adjustments of laws in response to emerging social issues, such as the provisions on data rights in the Civil Code and the regulatory rules for platform economy in administrative laws.

Legal value concept is the spiritual core of legal education, which guides students to recognize the pursuit of fairness, justice, the rule of law, and human rights in the legal system. In the process of theoretical teaching, it is necessary to integrate legal value guidance into the interpretation of legal provisions—for example, when explaining the principle of good faith in civil law, it is necessary to clarify its role in maintaining market order and social trust, so that students can form correct professional ethics. Legal thinking mode refers to the ability to analyze and solve problems using legal logic, including identifying legal issues, collecting legal facts, finding applicable legal norms, and conducting legal reasoning. This mode is not

only a tool for applying theoretical knowledge in practice but also a key factor that distinguishes legal professionals from other professionals.

2.2 Key Dimensions of Practical Teaching in College Legal Education

Practical teaching in college legal education is a systematic project covering multiple dimensions, each of which undertakes the task of cultivating different practical abilities of students. The first dimension is simulated practical teaching, which mainly includes moot court, simulated arbitration, and legal document drafting. Moot court, as a classic form of practice-oriented teaching, simulates the full judicial trial process—ranging from court investigation to court debate and final statement—by having students assume the roles of judges, prosecutors, lawyers, and parties. This form can help students familiarize themselves with judicial procedures, improve their ability to use legal provisions to debate and defend, and enhance their on-site response capabilities. With the development of digital technology, many colleges and universities have begun to use virtual reality (VR) technology to build moot court platforms, which can simulate more complex trial scenarios (such as cross-border commercial disputes) and improve the authenticity and effectiveness of practical teaching.

The second dimension is practical teaching based on real cases, mainly including legal clinics and social legal services. Legal clinics organize students to provide free legal consultation and representation services to the public under the guidance of teachers with practical experience, allowing students to directly contact real legal disputes—such as handling labor disputes for migrant workers or resolving neighborhood disputes for community residents. In this process, students not only apply theoretical knowledge to solve practical problems but also cultivate a sense of social responsibility and professional ethics. The third dimension is cooperative practical teaching, which is carried out through cooperation between colleges and universities and legal practice departments (such as people's courts, people's procuratorates, law firms, and corporate legal departments). Students participate in internships in these departments, participate in case handling, legal research, and legal document review, and learn practical experience from front-line legal practitioners. This form can effectively make up for the lack of practical experience of college teachers and help students understand the actual operation of the legal industry.

2.3 Internal Logical Connection Between Theory and Practice in Legal Education

Theory and practice in legal education are interdependent and mutually promoting, forming an organic whole with internal logical consistency. On the one hand, legal education theory provides a foundation and guidance for practical teaching. Without a solid theoretical foundation, practical teaching will become a "rootless tree. " For example, in the process of handling a contract dispute case in a legal clinic, students need to use the theoretical knowledge of contract formation, validity, and breach of contract liability in the Civil Code to analyze the legal relationship between the parties, identify the focus of the dispute, and put forward solutions. If students lack understanding of the theoretical connotation of contract law, they will be unable to accurately grasp the legal facts of the case, let alone formulate reasonable legal strategies. At the same time, legal value concepts and legal thinking modes guide students' behavior in practical teaching—ensuring that students not only pay attention to the realization of legal effects in case handling but also consider social effects, and avoid deviations in practical operations due to incorrect value orientations. On the other hand, practical teaching is the test and extension of legal education theory. Practical teaching can verify the rationality and applicability of legal theory in real social scenarios. Some legal theories that seem logical in textbooks may face challenges in practical application due to factors such as social customs, policy adjustments, and technical development—for example, the traditional theory of tort liability faces new issues in the application of liability identification for autonomous vehicle accidents. Through practical teaching, students can discover the limitations of existing theories, which in turn promotes the deepening of theoretical research. In addition, practical teaching can enrich the content of legal education theory. The new problems and

new experiences emerging in practical teaching (such as the legal issues of digital assets in the process of enterprise restructuring) can provide new research directions for theoretical teaching, promote the update and optimization of the legal knowledge system, and make legal education theory more in line with the needs of social development.

3. Practical Manifestations and Cause Analysis of the Disconnection Between Theory and Practice in College Legal Education

3.1 Specific Manifestations of the Disconnection Between Theory and Practice

The disconnection between theory and practice in college legal education is reflected in multiple links of the education process, and the most direct manifestation is the mismatch between curriculum content and practical needs. In terms of course setting, most colleges and universities still focus on theoretical courses such as "General Theory of Law, " "Constitutional Law, " and "Civil Law, " while practical courses such as "Legal Document Drafting, " "Courtroom Debate Skills, " and "Digital Legal Practice" account for a low proportion. Even the existing practical courses often have outdated content—for example, the teaching of legal document drafting still focuses on traditional documents such as complaints and indictments, while ignoring the drafting of new types of legal documents such as data privacy agreements and cross-border e-commerce contracts, which are in high demand in the current legal market. In addition, the content of theoretical courses is often separated from the latest judicial practice. For example, after the implementation of the Civil Code, some textbooks have not been updated in a timely manner, and the explanation of legal provisions still stays in the era of the former "General Principles of Civil Law, " leading to students' theoretical knowledge not matching the actual application of laws.

Another prominent manifestation is the separation of teaching methods from practical training needs. Most theoretical courses adopt the "teacher-centered" lecture method, where teachers explain legal provisions and theoretical systems through lectures, and students passively accept knowledge. This teaching method can help students quickly master systematic legal knowledge, but it cannot cultivate students' ability to apply knowledge to solve practical problems. In the process of teaching, teachers rarely guide students to conduct in-depth analysis of real cases or organize interactive teaching activities such as case discussions and simulated debates. As a result, students can only memorize legal provisions but cannot flexibly apply them to specific cases. For example, students may be familiar with the provisions of the Tort Law, but when faced with a specific case of product liability involving multiple subjects, they cannot accurately identify the liable parties or calculate the scope of compensation.

The disconnection is also reflected in the mismatch between teacher capabilities and practical teaching requirements. Most teachers in college legal departments have a background in academic research, with rich theoretical knowledge but insufficient practical experience. Many teachers have not worked in legal practice departments such as law firms or courts, and are not familiar with the actual operation processes of the legal industry, such as the specific procedures of court trials, the skills of legal negotiation, and the standards of legal document review. This situation makes it difficult for teachers to effectively guide students' practical training—for example, when guiding simulated court activities, teachers can only explain the procedural rules in textbooks but cannot provide targeted guidance on the skills of cross-examination and debate in actual trials. In addition, the evaluation system of college teachers focuses on scientific research achievements (such as the number of papers published and projects approved), while the effect of practical teaching is not included in the key evaluation indicators, leading to teachers' lack of motivation to participate in practical teaching and improve their practical capabilities.

3.2 Exploration of the Deep-Seated Causes of the Disconnection Problem

The deep-seated causes of the disconnection between theory and practice in college legal education lie in the constraints of educational concepts, resource allocation, institutional

mechanisms, and industry collaboration. From the perspective of educational concepts, the traditional "academic-oriented" educational concept still dominates in many colleges and universities. This concept regards the cultivation of students' theoretical research ability as the core goal of legal education, while ignoring the cultivation of practical application ability. Colleges and universities often measure the quality of legal education by the admission rate of postgraduate students and the number of academic papers published by students, rather than the employment rate of graduates in the legal industry and the evaluation of employers. This orientation leads to the focus of legal education on theoretical teaching, and practical teaching is often in a marginalized position.

In terms of resource allocation, the insufficient investment in practical teaching resources is an important factor restricting the integration of theory and practice. the construction of practical teaching facilities (such as simulated courts, legal clinics, and VR practical teaching platforms) requires a large amount of capital investment, but many colleges and universities have limited funds for legal education, and most of the funds are used for the construction of theoretical teaching resources (such as libraries and classrooms), resulting in the lack of necessary hardware support for practical teaching. At the same time, the construction of practical teaching bases is also insufficient. Although some colleges and universities have signed cooperation agreements with legal practice departments, the cooperation is often formalized—practice bases cannot provide stable internship positions for students, and legal practitioners in practice departments cannot participate in the design of practical teaching plans and the guidance of practical teaching, leading to the failure of effective connection between college education and industry practice.

From the perspective of institutional mechanisms, the imperfect practical teaching management system and evaluation mechanism have further aggravated the disconnection problem. In terms of management system, most colleges and universities do not have a special department responsible for the management and coordination of practical teaching, and the organization and implementation of practical teaching are often undertaken by individual teachers, resulting in the lack of systematic planning and unified management of practical teaching. In terms of evaluation mechanism, the evaluation of students' academic performance still focuses on the results of written examinations, which mainly test students' memory and understanding of theoretical knowledge, while the evaluation of practical ability (such as case analysis ability and courtroom performance) is often qualitative and subjective, lacking a scientific and quantitative evaluation system. This evaluation method makes students pay more attention to the learning of theoretical knowledge and ignore the improvement of practical ability.

The lack of in-depth collaboration between the legal education industry and the legal practice industry is also an important cause of the disconnection. the legal practice industry (including judicial organs, law firms, and corporate legal departments) has a wealth of practical resources and experience, but it has not yet established a long-term and stable collaboration mechanism with colleges and universities. On the one hand, legal practice departments are often busy with their daily work and have no time to participate in the reform of legal education, such as the design of curriculum content and the training of teachers. On the other hand, colleges and universities do not actively absorb the opinions of the legal practice industry when formulating legal education plans, resulting in the inability of legal education to accurately grasp the needs of the legal industry for talents. For example, the legal practice industry has an increasing demand for talents with digital legal capabilities (such as the ability to use legal technology tools for case analysis and legal risk assessment), but colleges and universities have not yet adjusted their curriculum settings and teaching content in a timely manner to meet this demand.

4. Construction of Paths for Integrating Theory and Practice in College Legal Education

4.1 Reconstruction and Optimization of the Curriculum System

The reconstruction and optimization of the

curriculum system is the core link to realize the integration of theory and practice in college legal education, and it needs to be carried out from the aspects of adjusting curriculum structure, updating curriculum content, and integrating theoretical and practical courses. In terms of adjusting the curriculum structure, colleges and universities should increase the proportion of practical courses in the total credit hours of legal majors—for example, increasing the proportion of practical courses from the current 15%-20% to 30%-35%. the practical courses should cover multiple dimensions such as simulated practice, real-case practice, and cooperative practice, and form a progressive practical course system from basic practical skills training to comprehensive practical ability training. For example, in the first and second years of undergraduate study, set up basic practical courses such as "Legal Document Drafting" and "Legal Logic and Argumentation" to cultivate students' basic practical skills; in the third and fourth years, set up comprehensive practical courses such as "Simulated Court Practice" and "Legal Clinic" to improve students' comprehensive practical ability.

In terms of updating curriculum content, it is necessary to closely follow the latest developments of the legal system and the legal industry, and timely integrate new legal norms, new judicial interpretations, and new practical issues into the curriculum. For example, in the course of "Civil and Commercial Law Practice, " add content related to the application of the Civil Code in digital economy scenarios (such as the legal protection of digital assets and the liability of network service providers); in the course of "Criminal Law Practice, " add content related to the handling of new types of cybercrime cases (such as phishing fraud and data theft). At the same time, it is necessary to absorb the opinions of legal practitioners (such as judges, lawyers, and corporate legal counsel) when updating the curriculum content, so as to ensure that the curriculum content is consistent with the actual needs of the legal industry.

The integration of theoretical and practical courses is an important measure to break the disconnection between theory and practice. Colleges and universities can adopt the "theory-practice integration" course model, which integrates the teaching of theoretical knowledge and practical skills into the same course. For example, in the course of "Contract Law", while explaining the theoretical knowledge of contract formation, validity, and performance, arrange practical teaching links such as contract drafting and contract review—letting students draft a real estate sales contract according to the provisions of the Civil Code, and then guide students to analyze the legal risks of the contract and put forward modification suggestions. This model can make students apply theoretical knowledge to practical operations in the process of learning theoretical courses, and realize the organic combination of theory and practice.

4.2 Innovation and Application of Teaching Methods

The innovation and application of teaching methods is an important means to promote the integration of theory and practice in college legal education, and it needs to break the limitations of traditional lecture methods and adopt diversified teaching methods that focus on student participation and practical ability cultivation. Project-based learning (PBL) is a teaching method that takes practical projects as the carrier and guides students to learn and apply knowledge through completing projects. In legal education, PBL can be applied to the teaching of practical courses—for example, taking "handling a labor dispute case" as a project, dividing students into groups, and letting each group complete the whole process of case acceptance, evidence collection, legal analysis, negotiation, and litigation representation. In the process of completing the project, students need to consult legal provisions, analyze case facts, and communicate with team members, which can not only improve their practical ability but also cultivate their teamwork ability and problem-solving ability.

The application of digital teaching technology can further enhance the effectiveness of practical teaching. With the development of technologies such as big data, artificial intelligence, and virtual reality, colleges and universities can build a digital practical teaching platform to simulate complex legal practice scenarios. For example, using VR

technology to build a simulated court platform that can simulate different types of cases (such as criminal cases, civil cases, and administrative cases) and different litigation procedures (such as first-instance, appeal, and retrial). Students can wear VR equipment to participate in the simulated trial, play different roles, and experience the actual trial process. This platform can not only improve the authenticity of practical teaching but also allow students to repeatedly practice different scenarios to enhance their practical skills. In addition, colleges and universities can use big data technology to collect and analyze real legal cases, establish a case database covering multiple fields, and guide students to use the case database to conduct case retrieval, case analysis, and legal reasoning training—improving their ability to use data to support legal arguments.

The "double-teacher co-teaching" model, which combines college teachers and practical experts, can effectively make up for the lack of practical experience of college teachers. Colleges and universities can invite legal practitioners (such as senior judges, senior lawyers, and corporate legal directors) with rich practical experience to serve as part-time teachers, and jointly design and teach practical courses with full-time college teachers. For example, in the course of "Commercial Law Practice", full-time teachers are responsible for explaining the theoretical knowledge of commercial law, and part-time teachers who are corporate legal directors are responsible for introducing the practical operation of commercial legal affairs (such as corporate merger and acquisition legal services and commercial contract negotiation skills) and guiding students' practical training. This model can make students learn both theoretical knowledge and practical experience, and realize the organic connection between theoretical teaching and practical teaching.

4.3 Improvement of the Practical Teaching Guarantee Mechanism

The improvement of the practical teaching guarantee mechanism is the key to ensuring the smooth implementation of the integration of theory and practice in college legal education, and it needs to be strengthened from the aspects of teacher team construction, practical teaching base construction, funding guarantee, and evaluation system improvement. the construction of a "double-qualified" teacher team is the core of the practical teaching guarantee mechanism. Colleges and universities should establish a training and introduction mechanism for "double-qualified" teachers: on the one hand, formulate a training plan for full-time teachers, encourage teachers to participate in practical training in legal practice departments (such as law firms, people's courts, and people's procuratorates) for a certain period of time every year, and obtain practical qualification certificates (such as lawyer qualification certificates); on the other hand, introduce outstanding legal practitioners from the legal industry as full-time or part-time teachers, and provide them with corresponding treatment and support to attract more practical talents to participate in legal education. At the same time, colleges and universities should improve the teacher evaluation mechanism, include the effect of practical teaching and the ability of practical guidance into the key indicators of teacher evaluation, and give preferential treatment to teachers who perform well in practical teaching in terms of job promotion and performance evaluation—stimulating teachers' enthusiasm for participating in practical teaching.

The construction of practical teaching bases is an important support for practical teaching. Colleges and universities should strengthen cooperation with legal practice departments to build a stable and high-quality practical teaching base system. In the process of cooperation, colleges and universities and practice bases should clarify their respective responsibilities and rights: practice bases should provide stable internship positions for students, assign special instructors to guide students' internships, and participate in the design of practical teaching plans; colleges and universities should provide intellectual support for practice bases (such as organizing teachers to conduct legal training for practice base staff) and pay reasonable internship subsidies to students. To ensure the depth and stability of cooperation, colleges and universities can sign long-term cooperation agreements with practice bases, establish a regular communication mechanism, and

jointly carry out projects such as case research and legal consulting—realizing the resource sharing and mutual benefit between colleges and universities and practice bases.

Sufficient funding guarantee is the material basis for the development of practical teaching. Colleges and universities should increase the investment in practical teaching funds, set up a special practical teaching fund, and use the fund for the construction of practical teaching facilities (such as simulated courts and digital practical teaching platforms), the operation of legal clinics, the training of "double-qualified" teachers, and the subsidies for students' internships. At the same time, colleges and universities should actively expand funding channels, apply for special funds for legal education reform from the government, and seek sponsorship from enterprises and social organizations—providing sufficient financial support for the integration of theory and practice.

The improvement of the practical teaching evaluation system is an important means to ensure the quality of practical teaching. Colleges and universities should establish a scientific and comprehensive practical teaching evaluation system, which includes the evaluation of students' practical ability, the evaluation of teachers' practical teaching effect, and the evaluation of practical teaching bases. In the evaluation of students' practical ability, a quantitative evaluation method should be adopted, and the evaluation indicators should include practical skills (such as legal document drafting ability and case analysis ability), professional ethics (such as sense of responsibility and confidentiality awareness), and teamwork ability. The evaluation results should be incorporated into students' academic performance and serve as an important basis for graduation and employment recommendation. In the evaluation of teachers' practical teaching effect, the evaluation should be conducted by students, practice base instructors, and college teaching management departments, and the evaluation results should be linked to teacher performance and job promotion. In the evaluation of practical teaching bases, the evaluation indicators should include the number of internship positions provided, the quality of instructor guidance, and the satisfaction of students—prompting practice bases to improve the quality of practical teaching.

5. Conclusion

This study systematically explores the theory and practice of legal education in colleges and universities, clarifies the core connotation of legal education theory and practical teaching, analyzes the internal logical relationship between the two, and identifies the practical manifestations and deep-seated causes of the disconnection between theory and practice. On this basis, the study puts forward three integration paths: reconstructing and optimizing the curriculum system, innovating and applying teaching methods, and improving the practical teaching guarantee mechanism. These paths closely combine the latest developments of the national rule of law construction and the legal industry, and have strong theoretical and practical significance.

The integration of theory and practice in college legal education is a long-term and complex project that requires the joint efforts of colleges and universities, legal practice departments, and the whole society. Colleges and universities should update their educational concepts, take the cultivation of legal talents with both theoretical foundation and practical ability as the core goal, and promote the reform of legal education with the integration of theory and practice as the starting point. Legal practice departments should actively participate in the reform of legal education, strengthen cooperation with colleges and universities, and provide support for practical teaching. the society should create a good environment for the integration of theory and practice in legal education, recognize the value of practical teaching, and provide policy and resource support for the reform of legal education.

This study still has certain limitations. Due to the differences in the scale, resources, and regional characteristics of different colleges and universities, the integration paths proposed in this study may need to be adjusted according to the actual situation when applied in specific colleges and universities. In the future, further research can be carried out on the application effect of the integration paths in different types of colleges and universities, and more targeted optimization suggestions

can be put forward based on empirical data. At the same time, with the continuous development of digital technology and the deepening of global legal integration, the integration of theory and practice in legal education will face new opportunities and challenges, and future research can focus on the application of digital technology in practical teaching and the cultivation of cross-border legal practical ability—continuously enriching the research results of legal education theory and practice.

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Research on the Innovation of College Students' Management in Higher Education Institutions in the Big Data Era

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Abstract: With the in-depth integration of big data technology into the field of higher education, the traditional model of college students' management, which relies on experience and fragmented information, is increasingly unable to meet the needs of personalized, precise and intelligent management in the new era. the purpose of this study is to explore the innovative path of college students' management in higher education institutions driven by big data, so as to improve the efficiency, accuracy and pertinence of management work. This study adopts the methods of literature review, logical analysis and comparative research: first, it systematically sorts out the domestic and foreign research results on big data application in college management, clarifies the research foundation and existing gaps; second, it analyzes the potential application scenarios of big data in college students' management (such as academic early warning, mental health intervention, daily behavior supervision, employment guidance, etc.) and the prominent problems in the current application process (including data silos, insufficient technical application capabilities of management personnel, imperfect data privacy protection mechanisms, etc.); third, based on the analysis of status and problems, it constructs an innovative system of college students' management in the big data era from the aspects of technical architecture, process optimization and mechanism guarantee; finally, it conducts theoretical demonstration on the feasibility and effectiveness of the innovative system. the results show that big data technology can effectively break the limitations of traditional management, realize the integration and deep mining of multi-source student data, and thus promote the transformation of college students' management from "experience-driven" to "data-driven", from "extensive management" to "precision service"; at the same time, the innovation of management work must be accompanied by the improvement of data security systems and ethical norms to avoid risks such as information leakage. This study provides theoretical reference and practical guidance for the innovation and development of college students' management in higher education institutions under the background of big data.

Keywords: Big Data Era; Higher Education Institutions; College Students' Management; Management Innovation; Precision Management

1. Introduction

1.1 Research Background and Significance

The global digital transformation has penetrated deeply into the field of higher education, with big data technology emerging as a core driver reshaping the operational logic of college management. Traditional college student management models, which rely on manual data collection, experience-based decision-making, and fragmented information storage, struggle to address the diverse and personalized needs of contemporary college students—such as individualized academic guidance, real-time mental health monitoring, and targeted employment support. As higher education institutions (HEIs) expand their enrollment scales and student groups become more heterogeneous, the limitations of

traditional management—including low efficiency, weak pertinence, and delayed risk response—have become increasingly prominent. Against this backdrop, exploring how to integrate big data technology into student management to realize innovative upgrades is not only a practical need for HEIs to improve management quality but also a key direction for the modernization of higher education governance. Theoretically, this study enriches the interdisciplinary research system of big data and higher education management, supplementing the theoretical framework of data-driven management innovation. Practically, it provides actionable strategies for HEIs to break through management bottlenecks, enhance the precision of student services, and promote the all-round development of college students, which aligns with the development requirements of intelligent higher education in the new era.

1.2 Review of Domestic and Foreign Research Status

Foreign research on big data in college student management started earlier and focuses on two core dimensions: technical application and ethical governance. Scholars in North America and Europe have explored the application of predictive analytics in academic early warning—for instance, using machine learning algorithms to analyze multi-source data (such as course attendance, assignment submission, and online learning behavior) to identify students at risk of academic failure and implement timely interventions. Additionally, foreign studies attach great importance to data privacy protection, with research focusing on establishing legal frameworks for student data use (such as compliance with data protection regulations) and exploring technical means to balance data utility and privacy security (such as anonymization and differential privacy technologies). However, foreign research often centers on the context of mature higher education systems, and its conclusions may not fully adapt to the management scenarios of HEIs in emerging economies.

Domestic research on this topic has developed rapidly in recent years, driven by the national strategy of "digital education" and the promotion of smart campus construction. Domestic studies mainly focus on path exploration and model construction: some scholars have analyzed the application scenarios of big data in student management (covering mental health, employment guidance, and daily behavior supervision) and proposed preliminary management innovation frameworks; others have discussed the challenges faced by domestic HEIs in applying big data, such as data silos between departments, insufficient technical capabilities of management personnel, and imperfect institutional guarantees. Nevertheless, domestic research still has shortcomings: most studies remain at the theoretical discussion level, lacking in-depth analysis of the integration mechanism between big data technology and specific management processes; moreover, research on ethical risks and long-term operation mechanisms of data-driven management is relatively insufficient, leading to a gap between theoretical proposals and practical implementation.

1.3 Research Ideas and Methods

The research follows a logical path of "theoretical foundation → status analysis → problem identification → innovation path construction": first, it sorts out the core connotations of big data theory, college student management theory, and precision management theory to lay a theoretical foundation for the study; second, it analyzes the current application of big data in college student management at home and abroad, clarifying the achievements and existing gaps; third, it identifies the key problems faced by domestic HEIs in data-driven management and explores the root causes of these problems; finally, it constructs targeted management innovation paths from the perspectives of technology, process, mechanism, and ethics.

Three research methods are adopted in this study: the literature review method, which systematically collects and sorts out domestic and foreign literature on big data application in higher education management, combs the theoretical development context and research hotspots, and clarifies the research foundation and innovation points; the logical analysis method, which uses deductive and inductive logic to analyze the internal connection between big data technology and college

student management, and demonstrates the feasibility and rationality of the proposed innovation paths; the comparative research method, which compares the application models and institutional arrangements of big data in college student management in different countries and regions, drawing on advanced experience while combining the actual situation of domestic HEIs to avoid blind imitation.

1.4 Research Content and Framework

This study consists of five parts, with a clear division of labor and logical connection between each part. the first part (Introduction) clarifies the research background and significance, combs the domestic and foreign research status, determines the research ideas, methods, content, and framework, and lays the foundation for the follow-up research. the second part (Relevant Theoretical Foundations) focuses on explaining the core theories supporting the study: it elaborates on the technical connotations and application characteristics of big data theory, the core content and development trends of college student management theory, and the logical framework and implementation requirements of precision management theory, providing theoretical support for analyzing the status quo and constructing innovation paths. the third part (Current Situation and Problems of College Student Management in the Big Data Era) analyzes the application progress of big data in domestic college student management (such as the construction of smart campus platforms and the application of academic early warning systems), summarizes the main problems existing in the current management work (such as data integration difficulties and insufficient precision), and explores the root causes of these problems from the perspectives of technology, concept, and system. the fourth part (Innovation Paths of College Student Management in the Big Data Era) is the core of the study, which constructs a multi-dimensional innovation system: it proposes the construction of a big data-driven technical architecture, optimizes the student management process empowered by data, improves the institutional guarantee system for management innovation, and strengthens the supervision of data security and ethics, forming a comprehensive solution. the fifth part (Conclusion) summarizes the main research conclusions, clarifies the theoretical and practical value of the study, points out the limitations of the research (such as the lack of empirical verification of the proposed innovation paths), and puts forward prospects for future research directions.

2. Relevant Theoretical Foundations

2.1 Big Data Theory

Big data theory is a comprehensive theoretical system that covers data collection, processing, analysis, and application, with its core connotations reflected in four typical characteristics: Volume (massive data scale), Velocity (fast data generation and processing speed), Variety (diverse data types), and Value (low density of valuable information). In the context of college student management, the data sources covered by big data theory include not only structured data (such as student academic records, demographic information, and financial aid records stored in management systems) but also unstructured data (such as student online learning logs, social media interaction content, and campus card consumption data) and semi-structured data (such as course discussion records and mental health counseling notes). the technical chain of big data theory includes three key links: data acquisition, which relies on Internet of Things (IoT) devices (such as campus surveillance, smart classrooms, and wearable devices) and system interfaces to realize real-time and multi-source data collection; data processing, which uses technologies such as data cleaning, integration, and storage (such as distributed file systems and data warehouses) to eliminate data redundancy and ensure data quality; data analysis, which applies data mining algorithms (such as clustering analysis, regression analysis, and association rule mining) and artificial intelligence (AI) technologies to extract valuable information from massive data—for example, analyzing students' learning behavior data to identify their learning styles and knowledge mastery, or analyzing their consumption and activity data to judge their living conditions and psychological state. the application value of big data theory in college student management lies in transforming the traditional "experience-driven" management model into a "data-driven" one, realizing the

transformation from post-event disposal to pre-event prediction and in-process intervention, and providing scientific support for personalized management and precision services.

2.2 College Student Management Theory

College student management theory is a discipline that studies the laws and methods of managing college students, with the core goal of promoting the all-round development of students (including ideological and moral development, academic progress, and physical and mental health) and ensuring the smooth progress of higher education teaching and management. the core content of this theory covers four dimensions: academic management, which focuses on course selection guidance, academic performance evaluation, and academic early warning to help students complete their studies smoothly; mental health management, which includes psychological assessment, counseling services, and crisis intervention to maintain students' mental health; employment management, which involves career planning guidance, job information matching, and employment ability training to improve students' employment quality; daily behavior management, which covers campus discipline supervision, accommodation management, and safety education to maintain the normal order of the campus. the development of college student management theory has experienced three stages: the traditional "administrative management" stage, which emphasizes the authority of managers and focuses on rule-based constraint management; the "service-oriented management" stage, which takes student needs as the core and focuses on providing personalized services; and the current "data-driven intelligent management" stage, which integrates information technology to realize the integration of management and service. In the big data era, college student management theory has new development requirements: on the one hand, it needs to absorb the technical concepts of big data to expand the scope of management objects (from individual students to the entire student group) and improve the precision of management measures; on the other hand, it needs to maintain the humanistic care of management, avoiding over-reliance on data and ignoring the individual differences and emotional needs of students.

2.3 Precision Management Theory

Precision management theory originated from the field of enterprise management and has been gradually applied to education, public services, and other fields in recent years. Its core logic is to realize "precision identification, precision policy implementation, and precision evaluation" through the integration of information technology and management processes, so as to improve management efficiency and service quality. In the context of college student management, precision identification refers to using multi-source data analysis to accurately grasp the individual characteristics and actual needs of students—for example, identifying students with academic difficulties through their learning behavior data, or identifying students with psychological pressure through their emotional expression in social media and counseling records. Precision policy implementation means formulating and implementing personalized management strategies according to the results of precision identification—for instance, providing targeted tutoring for students with academic difficulties, or carrying out one-on-one psychological counseling for students with psychological pressure. Precision evaluation focuses on using quantitative and qualitative indicators to evaluate the effect of management measures, and adjusting the strategies in a timely manner based on the evaluation results—such as analyzing the academic performance changes of students who received tutoring to evaluate the effectiveness of the tutoring program, and optimizing the tutoring content and methods if the effect is not ideal. the connection between precision management theory and big data theory lies in that big data provides technical support for precision management: massive data collection ensures the comprehensiveness of precision identification, intelligent data analysis improves the accuracy of precision policy implementation, and real-time data monitoring realizes the dynamics of precision evaluation. the application of precision management theory in college student management helps to avoid the "one-size-fits-all" problem of traditional management,

improve the pertinence of management services, and enhance the sense of gain and satisfaction of students.

3. Current Situation and Problems of College Student Management in the Big Data Era

3.1 Current Application of Big Data in College Student Management

In recent years, with the promotion of smart campus construction, domestic HEIs have made certain progress in the application of big data in student management, mainly reflected in the following aspects: first, the construction of data collection platforms has been initially completed. Most HEIs have built integrated smart campus platforms, which connect 教务 management systems, student management systems, campus card systems, library borrowing systems, and online learning platforms, realizing the collection of multi-source student data—for example, recording students' course attendance through classroom intelligent attendance devices, collecting students' learning progress and test results through online learning platforms, and statistics of students' campus activity tracks through campus card consumption and access control records. Second, the application of big data in key management scenarios has been explored. Academic early warning is the most mature application scenario: many HEIs use data mining algorithms to analyze students' academic data (such as course scores, assignment submission rates, and attendance rates) to establish academic risk prediction models, which can send early warning signals to students at risk of failing courses or dropping out, and prompt management personnel to carry out intervention. In addition, some HEIs have tried to apply big data in mental health management—for example, analyzing students' online behavior (such as browsing content, posting frequency, and emotional tendency) and campus life data (such as sleep patterns and social interaction frequency) to screen students with potential psychological crises, and carry out timely counseling. Third, the awareness of data-driven management has been improved. Management personnel in most HEIs have realized the value of big data in improving management efficiency and precision, and have begun to participate in data analysis training and try to use data results to support decision-making—for instance, using student employment data to adjust the setting of professional courses, or using student satisfaction data to optimize campus service facilities.

However, the current application of big data in college student management still has obvious limitations: the application scope is narrow, focusing on academic early warning and daily behavior supervision, while the application in mental health intervention, employment guidance, and ideological and political education is relatively insufficient; the application depth is limited, most HEIs only stay in the stage of data statistics and simple analysis (such as counting the number of absent students or the average score of a course), and lack in-depth mining of data value (such as predicting students' long-term academic development trends or analyzing the influencing factors of their employment choices); the application effect is uneven, with key HEIs and economically developed regions having better application conditions (with sufficient funds and technical teams), while local HEIs and underdeveloped regions face difficulties in data platform construction and technical application due to resource constraints.

3.2 Main Problems Faced by College Student Management

Against the background of big data application, college student management in domestic HEIs still faces four prominent problems: first, data silos are difficult to break. Due to the independent construction of various functional departments (such as the Academic Affairs Office, Student Affairs Office, and Logistics Management Office) in HEIs, the data systems between departments have different standards and cannot be interconnected—for example, the student academic data stored in the Academic Affairs Office and the student accommodation data stored in the Logistics Management Office cannot be shared, resulting in management personnel being unable to obtain a comprehensive understanding of students' situations. Even in the same department, different business modules may form data silos—such as the mental health counseling data and financial aid data in the Student

Affairs Office being stored separately, which affects the accuracy of identifying students with multiple needs (such as students with financial difficulties and psychological pressure). Second, the precision of management is insufficient. Although some HEIs have applied big data to carry out academic early warning and other work, the management measures still show a tendency of "homogeneity": for students with academic difficulties, most HEIs only provide unified tutoring courses, without considering the differences in the causes of their difficulties (such as poor learning methods, lack of learning motivation, or family problems); in employment guidance, they only push general job information to students, without matching jobs according to students' majors, abilities, and career intentions, resulting in low efficiency of employment services. Third, the technical application ability of management personnel is weak. Most student management personnel in HEIs have a background in education, management, or other humanities and social sciences, and lack professional knowledge of big data technology (such as data analysis, algorithm application, and data visualization). They cannot independently carry out data collection, processing, and analysis work, and can only rely on technical departments to provide simple data reports, which limits the flexibility and timeliness of data-driven management. Fourth, the protection of student data privacy is insufficient. Some HEIs have not established a sound student data management system, and there are risks such as improper storage of student sensitive data (such as ID numbers, bank card information, and psychological assessment results), unauthorized use of data (such as using student social media data for commercial purposes), and data leakage (such as due to insufficient security protection of data platforms). These problems not only infringe on students' legitimate rights and interests but also reduce students' trust in the school's data management work, affecting the promotion of big data application in student management.

3.3 Analysis of the Causes of the Problems

The above problems in college student management are caused by the combined effects of technical, conceptual, institutional, and resource factors: first, the lack of technical support. the construction of a unified big data platform for student management requires large-scale investment in hardware (such as servers and storage devices) and software (such as data integration systems and analysis tools), and the maintenance and update of the platform also require continuous technical input. However, many local HEIs and underdeveloped regions have limited financial resources, and cannot allocate sufficient funds to support the construction and operation of big data platforms. At the same time, the shortage of interdisciplinary talents (who master both big data technology and college student management knowledge) makes it difficult for HEIs to carry out in-depth data analysis and application work—most HEIs only have technical personnel responsible for system maintenance, but no professionals who can combine data analysis with specific management scenarios. Second, the lag of management concepts. Some management personnel in HEIs still hold the traditional "experience-based management" concept, believing that their years of management experience are more reliable than data analysis results, and are reluctant to accept and apply big data technology. Some managers even have a one-sided understanding of big data, believing that big data is just a tool for "statistics and reporting" and ignoring its value in prediction and intervention, which leads to the low application enthusiasm of big data in management work. Third, the imperfection of institutional guarantees. There is a lack of unified data management systems in HEIs, and there are no clear regulations on the collection scope, storage standards, use procedures, and responsibility division of student data, resulting in each department acting independently and forming data silos. At the same time, the training mechanism for management personnel is not sound—most HEIs do not include big data technology and data analysis knowledge in the regular training content of student management personnel, and there is no long-term training plan, leading to the slow improvement of the technical application ability of management personnel. In addition, the supervision mechanism for data privacy protection is not perfect—there is no special department or personnel

responsible for supervising the use of student data, and the punishment for illegal use of data is not strict, which cannot form an effective restraint on the behavior of data users. Fourth, the lack of student participation awareness. Most college students have insufficient understanding of the school's big data management work, do not know the scope and purpose of the school's collection and use of their data, and have a sense of distrust and resistance to data collection. Some students even deliberately avoid or falsify data (such as not swiping their campus cards or fabricating online learning records), which affects the authenticity and completeness of data, and further reduces the accuracy of data analysis results.

4. Innovation Paths of College Student Management in the Big Data Era

4.1 Constructing a Big Data-Driven Technical Architecture for Student Management

Constructing a scientific and efficient big data-driven technical architecture is the foundation of realizing the innovation of college student management. This architecture should include three core modules: a multi-source data integration platform, an intelligent data analysis system, and a data visualization decision-making platform. the multi-source data integration platform is responsible for breaking data silos and realizing the unified collection and storage of student data. Specifically, HEIs should formulate unified data standards (covering data format, coding rules, and metadata specifications) and promote the transformation and upgrading of existing departmental systems to ensure that data from the Academic Affairs Office, Student Affairs Office, Logistics Management Office, Library, and other departments can be interconnected. At the same time, the platform should expand data collection channels, integrating IoT devices (such as smart campus surveillance, wearable health monitoring devices, and intelligent classroom equipment) and third-party data sources (such as online course platforms and employment service websites) to collect comprehensive data on students' academic, life, health, and employment aspects. the intelligent data analysis system is the core of the technical architecture, which uses advanced algorithms to mine the value of student data. HEIs should establish scenario-based analysis models according to different management needs: in academic management, build academic performance prediction models (using regression analysis and machine learning algorithms to analyze the relationship between learning behavior and academic performance) and course selection recommendation models (based on students' academic interests and career plans to recommend suitable courses); in mental health management, develop psychological risk assessment models (analyzing students' emotional expression, social interaction, and sleep quality data to identify psychological crisis signals) and counseling effect evaluation models (tracking the psychological state changes of students receiving counseling to evaluate the effectiveness of counseling); in employment management, construct job matching models (matching students' professional skills and employment intentions with enterprise recruitment requirements) and employment trend analysis models (predicting the employment prospects of different majors based on industry development data). the data visualization decision-making platform is responsible for converting complex data analysis results into intuitive charts and reports, facilitating management personnel to understand and use data. the platform should support real-time data monitoring (such as displaying the number of students at academic risk and psychological crisis in real time) and personalized report generation (generating different types of reports according to the needs of different management departments), and provide decision-making suggestions based on data analysis—for example, suggesting that the Academic Affairs Office increase tutoring courses for a certain major if the academic risk rate of that major is high.

4.2 Optimizing the Student Management Process Empowered by Data

Optimizing the management process based on data empowerment is the key to improving the precision and efficiency of college student management. the optimization should cover three core management links: academic management, mental health management, and employment management. In academic management, the traditional "post-event

disposal" process should be transformed into a "pre-event prediction → in-process intervention → post-event evaluation" process. Before the start of each semester, the academic performance prediction model is used to identify students who may have academic difficulties, and the causes of potential difficulties are analyzed (such as poor foundation in professional courses or low learning enthusiasm); during the semester, targeted interventions are implemented according to the causes—for students with poor foundation, supplementary courses are arranged; for students with low enthusiasm, learning incentive mechanisms (such as setting academic challenges and providing recognition) are established; at the end of the semester, the intervention effect is evaluated through academic performance data, and the intervention strategies are optimized for the next semester. In mental health management, a "dynamic monitoring → timely intervention → follow-up tracking" process should be established. the psychological risk assessment model is used to monitor students' psychological state in real time: if abnormal signals are found (such as a significant decrease in social interaction frequency or negative emotional expressions), the mental health counseling center is immediately notified to conduct a preliminary interview; for students confirmed to have psychological pressure or crises, personalized counseling plans are formulated (such as individual counseling or group counseling); after the counseling, the psychological state of students is tracked for 1-3 months through data analysis, and the counseling plan is adjusted if necessary. In employment management, the "passive information push" process should be upgraded to an "active demand identification → precise service provision → employment effect feedback" process. Before the graduation season, the job matching model is used to analyze students' professional skills, internship experience, and employment intentions, and identify students with employment difficulties (such as students with weak practical ability or unclear career positioning); for these students, precise services are provided—organizing practical training courses for students with weak ability, and carrying out career planning guidance for students with unclear positioning; after graduation, the employment situation of students is tracked (such as employment rate, job satisfaction, and salary level), and the employment guidance content and job matching algorithm are optimized based on feedback to improve the employment quality of students in the next session.

4.3 Improving the Institutional Guarantee for Student Management in the Big Data Era

Improving the institutional guarantee system is an important guarantee for the smooth implementation of big data-driven student management innovation. HEIs should establish four key mechanisms: a cross-departmental collaborative mechanism, a personnel training mechanism, an assessment and incentive mechanism, and a data management mechanism. the cross-departmental collaborative mechanism is used to solve the problem of data silos. HEIs should set up a special big data management committee, with members including representatives from the Academic Affairs Office, Student Affairs Office, Logistics Management Office, Information Technology Department, and other departments. the committee is responsible for formulating the overall plan for big data application in student management, coordinating the data sharing work between departments, and resolving conflicts in data collection and use. At the same time, a regular meeting system should be established, requiring committee members to hold meetings every month to report on the progress of data application and discuss solutions to existing problems. the personnel training mechanism is aimed at improving the technical application ability of management personnel. HEIs should formulate a long-term training plan, dividing the training content into three levels: basic level (popularizing big data concepts and basic data analysis tools, such as Excel and Tableau), intermediate level (training data integration and simple algorithm application, such as SQL and Python), and advanced level (training scenario-based data modeling and decision-making application). the training method should combine online and offline: online training is carried out through MOOC platforms (providing flexible

learning time for management personnel), and offline training is organized through expert lectures and case studies (improving the practical application ability of management personnel). In addition, HEIs can establish a "mentorship system", inviting technical personnel from the Information Technology Department to serve as mentors for management personnel, providing one-on-one guidance for data application. the assessment and incentive mechanism is used to stimulate the enthusiasm of management personnel for data-driven management. HEIs should include the application of big data in student management into the performance assessment indicators of management personnel—for example, assessing the number of data-driven management measures formulated, the effect of academic early warning intervention, and the satisfaction of students with data-based services. For personnel who perform well in data application, incentives such as salary increases, honorary titles, and promotion priorities should be given; for personnel who are reluctant to apply big data, counseling and supervision should be strengthened, and if necessary, job adjustments should be made. the data management mechanism is used to standardize the collection, use, and storage of student data. HEIs should formulate a "Student Data Management Specification", clearly stipulating the scope of data collection (only collecting data necessary for management and service, avoiding excessive collection), the procedure of data use (requiring written application and approval for using student data, and limiting the use scope), and the standard of data storage (adopting encryption technology for sensitive data, and regularly backing up data to prevent loss). At the same time, a data quality supervision team should be established to check the accuracy and completeness of data regularly, and punish departments or individuals who falsify or misuse data.

4.4 Strengthening Student Data Security and Ethical Management

Strengthening data security and ethical management is a prerequisite for ensuring the sustainable development of big data-driven student management. HEIs should build a three-dimensional protection system covering technical protection, institutional constraints, and ethical guidance. In terms of technical protection, HEIs should adopt advanced security technologies to prevent data leakage, tampering, and damage. For data transmission, encrypted transmission technologies (such as SSL/TLS) should be used to ensure that data is not intercepted during transmission; for data storage, hierarchical storage and encryption technologies should be adopted—storing sensitive data (such as ID numbers and psychological assessment results) in dedicated encrypted servers, and using common storage for non-sensitive data (such as course selection records); for data access, a role-based access control (RBAC) system should be established, assigning different access permissions to management personnel according to their job responsibilities, and recording all access operations (facilitating traceability in case of data problems). In addition, HEIs should regularly conduct data security audits and vulnerability scans, discovering and fixing security loopholes in the data platform in a timely manner, and simulating data leakage scenarios to test the emergency response capabilities of the security team. In terms of institutional constraints, HEIs should formulate a "Student Data Privacy Protection Regulation" and a "Data Security Emergency Response Plan". the "Student Data Privacy Protection Regulation" should clearly define the responsibilities of all parties in data security—for example, the Information Technology Department is responsible for the security of the data platform, the functional departments are responsible for the security of the data they collect and use, and the legal affairs department is responsible for handling data privacy disputes. the regulation should also stipulate the rights of students in data management—such as the right to know (informing students of the scope and purpose of data collection), the right to access (allowing students to check their own data), the right to correct (permitting students to correct wrong data), and the right to opt-out (allowing students to refuse the collection of non-essential data). the "Data Security Emergency Response Plan" should clarify the procedures for handling data security incidents—such as reporting (requiring the discovery department to report to the big data

management committee within 2 hours), disposal (isolating the affected data and eliminating security risks), and notification (informing students of the incident and taking remedial measures if their rights are infringed). In terms of ethical guidance, HEIs should strengthen the ethical education of management personnel and students. For management personnel, ethical training should be included in the regular training content, focusing on explaining the ethical principles of data use (such as fairness, justice, and respect for privacy) and typical cases of data ethical violations (warning management personnel to avoid ethical risks); for students, public lectures and theme activities on data ethics should be held, popularizing knowledge of data privacy protection and guiding students to correctly understand the school's data collection and use work, so as to improve their trust in the school's data management. In addition, HEIs can establish an ethical review committee for student data application, which is responsible for reviewing the ethical rationality of all big data application projects in student management—rejecting projects that may infringe on students' privacy or cause ethical disputes, and putting forward suggestions for optimizing projects with potential ethical risks.

5. Conclusion

This study focuses on the innovation of college student management in higher education institutions in the big data era, systematically exploring the theoretical foundation, current situation, problems, and innovation paths of this field through literature review, logical analysis, and comparative research. the main research conclusions are as follows: first, big data theory, college student management theory, and precision management theory form the core theoretical support for management innovation—big data provides technical means for data collection and analysis, college student management theory clarifies the goal and content of management, and precision management theory guides the direction of precision service. Second, the current application of big data in college student management has achieved initial results (such as the construction of smart campus platforms and the exploration of academic early warning), but there are still prominent problems including data silos, insufficient management precision, weak technical application ability of personnel, and inadequate data privacy protection. Third, the causes of these problems involve multiple factors: lack of technical support (insufficient funds and talent shortage), lag of management concepts (reliance on experience and one-sided understanding of big data), imperfection of institutional guarantees (lack of unified data systems and training mechanisms), and lack of student participation awareness. Fourth, the innovation of college student management should be realized through four paths: constructing a big data-driven technical architecture (integrating multi-source data, applying intelligent analysis, and visualizing decision-making), optimizing the data-empowered management process (transforming academic, mental health, and employment management), improving the institutional guarantee system (establishing collaborative, training, assessment, and data management mechanisms), and strengthening data security and ethical management (applying technical protection, institutional constraints, and ethical guidance).

The theoretical value of this study lies in enriching the interdisciplinary research system of big data and higher education management, clarifying the internal connection between big data technology and college student management, and supplementing the theoretical framework of data-driven management innovation. the practical value is that it provides actionable strategies for HEIs to break through management bottlenecks, helping them improve the precision and efficiency of student management, enhance the quality of student services, and promote the modernization of higher education governance. However, this study also has limitations: it mainly adopts theoretical analysis methods, and lacks empirical verification of the proposed innovation paths (such as testing the effectiveness of the technical architecture and management process in specific HEIs); in addition, the study does not involve the impact of cultural differences on data-driven management, which may limit the universality of the

research conclusions. Future research can focus on two directions: first, conducting empirical research by selecting typical HEIs for case studies or experimental comparisons, verifying and optimizing the innovation paths proposed in this study; second, expanding the research perspective to explore the application of emerging technologies (such as artificial intelligence and blockchain) in college student management, and analyzing the impact of cross-cultural factors on data-driven management, so as to further enrich the research results in this field.

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Collaborative Innovation Research on Ideological and Political Education in the Context of New Media

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Abstract: This study aims to systematically explore the internal mechanism of collaborative innovation in ideological and political education (IPE) under the background of new media, and construct a scientific and operable collaborative innovation system, so as to fill the gap in existing research that lacks in-depth integration of new media communication characteristics and IPE collaborative logic, and insufficient systematic design of collaborative innovation mechanisms. the research adopts interdisciplinary methods including systematic literature review, cross-disciplinary theoretical integration (integrating IPE theory, collaborative governance theory, and new media communication theory), and the Delphi method (inviting experts in IPE, new media research, and educational management for consultation). the research process mainly includes four stages: first, sorting out and analyzing 320 core literatures on new media and IPE collaborative innovation at home and abroad in recent years, clarifying the research context, hot topics, and existing deficiencies; second, based on cross-disciplinary theories, analyzing the impact dimensions of new media on IPE collaborative innovation, including the expansion of collaborative carriers, the reconstruction of subject interaction modes, and the optimization of resource integration paths; third, through the Delphi method, organizing three rounds of expert consultations to determine the core elements of the collaborative innovation system, including collaborative subjects, carriers, operation mechanisms, and guarantee systems; fourth, verifying the scientificity and feasibility of the constructed system through theoretical deduction and expert argumentation. the research concludes that new media not only brings opportunities to IPE collaborative innovation, such as expanding the coverage of IPE, enhancing the interactivity of collaborative subjects, and promoting the efficient integration of educational resources, but also poses challenges such as fragmented information affecting the consistency of collaborative goals, and disconnection between multiple collaborative subjects due to asymmetric information; the constructed collaborative innovation system can provide practical guidance for promoting the high-quality development of IPE in the new media era, and enrich the theoretical research on the intersection of new media and IPE.

Keywords: New Media; Ideological and Political Education; Collaborative Innovation; Synergy Mechanism; Educational Communication

1. Introduction

1.1 Research Background and Significance

The global proliferation of new media has reshaped the landscape of information dissemination, with platforms such as social media, short-video applications, and interactive live-streaming redefining how individuals access, process, and share content. This transformation has profound implications for ideological and political education (IPE), a field traditionally rooted in structured classroom instruction and one-way communication. In the new media era, IPE faces the imperative to adapt to fragmented information consumption patterns, enhanced user interactivity, and the rise of user-generated content—trends that both disrupt

traditional educational models and create new avenues for engagement. Contemporary society's increasing reliance on digital platforms for information exchange further amplifies the need to reimagine IPE through a collaborative lens, as single-institution or single-channel efforts can no longer fully address the diverse and dynamic needs of learners.

Theoretical significance of this study lies in its contribution to the interdisciplinary integration of new media studies, educational theory, and IPE research. Existing scholarship often treats new media as a mere tool for IPE delivery, rather than examining its role in reshaping the collaborative logic of educational systems. By systematically analyzing the interaction between new media characteristics and IPE collaborative mechanisms, this study enriches the theoretical framework of IPE innovation and expands the application scope of collaborative governance theory in educational contexts. Practically, the research outcomes can provide actionable guidance for educational institutions, government bodies, media organizations, and social entities to form synergistic partnerships. This collaboration is critical for addressing challenges such as information silos, inconsistent educational content, and low learner engagement in digital environments, ultimately enhancing the pertinence and effectiveness of IPE in the new media age.

1.2 Review of Domestic and International Research Status

International research on new media and educational collaboration focuses primarily on digital literacy education, civic education, and the design of collaborative learning platforms. Scholars have explored how social media facilitates peer-to-peer knowledge sharing and cross-cultural educational exchanges, emphasizing the role of interactive technologies in fostering learner autonomy. Some studies have examined the impact of algorithmic recommendation systems on educational content dissemination, noting both their potential to personalize learning and their risk of creating information echo chambers. However, international research rarely addresses the specific context of IPE, with limited attention to how collaborative frameworks can align with ideological guidance objectives. Most studies also focus on bilateral collaborations (e. g., between schools and tech companies) rather than multi-stakeholder synergy involving government, media, and civil society.

Domestic research on new media and IPE has grown rapidly in response to national initiatives such as the "Great Ideological and Political Course" construction. Studies have investigated the application of short videos, micro-lectures, and virtual reality in IPE, highlighting the need to integrate new media tools into curriculum design. Research on collaboration in IPE has focused on inter-institutional partnerships (e. g., university alliances) and the role of government in coordinating educational resources. Nevertheless, domestic studies exhibit several limitations: first, they often prioritize technical application over the reconstruction of collaborative mechanisms, failing to address how new media can optimize the interaction between multiple educational subjects; second, there is insufficient analysis of the challenges posed by new media—such as information fragmentation and ideological pluralism—to collaborative IPE; third, proposed collaborative models lack operability, with few studies specifying the division of roles, communication channels, or guarantee systems required for sustained synergy.

Across both domestic and international contexts, existing research provides a foundation for understanding the intersection of new media and education, but gaps remain in systematically exploring collaborative innovation in IPE. This study addresses these gaps by constructing a multi-dimensional collaborative system tailored to the new media environment, with a focus on mechanism design and practical feasibility.

2. Core Concepts and Theoretical Foundations

2.1 Connotation, Characteristics, and Communication Laws of New Media

New media refers to digital communication platforms and technologies that enable interactive, real-time, and personalized information exchange, distinct from traditional media such as newspapers, television, and radio. Its core connotation lies

in the integration of information technology (e. g., cloud computing, big data, artificial intelligence) with communication functions, encompassing platforms such as social networking sites, short-video apps, live-streaming services, and WeChat Mini Programs. Unlike traditional media's one-way, centralized dissemination model, new media emphasizes user participation, allowing individuals to act as both information consumers and producers— a shift that redefines the power dynamics of content dissemination.

Key characteristics of new media include interactivity, personalization, and community-based clustering. Interactivity manifests through features such as comment sections, real-time messaging, and user-generated content, enabling immediate feedback between content creators and audiences. Personalization, driven by algorithmic recommendation systems, tailors content to individual user preferences based on browsing history and interaction data, enhancing user engagement but also risking information polarization. Community-based clustering refers to the formation of tight-knit user groups around shared interests or ideologies, creating "information circles" that facilitate targeted content dissemination but may also isolate users from diverse perspectives.

The communication laws of new media reflect these characteristics. First, the "agenda-setting" function—traditionally dominated by professional media—has become decentralized, with user-generated content and social trends increasingly shaping public discourse. Second, information dissemination follows a "viral" pattern, where emotionally resonant or visually engaging content spreads rapidly through social networks, often transcending geographical and institutional boundaries. Third, the lifespan of digital content is both extended (through archiving and sharing) and compressed (due to the constant influx of new information), requiring content creators to balance depth with conciseness to maintain audience attention.

2.2 Core Meaning and Constituent Elements of Collaborative Innovation in Ideological and Political Education

Collaborative innovation in IPE refers to the process of multiple independent subjects (including educational institutions, government departments, media organizations, and social groups) coordinating resources, aligning goals, and optimizing processes through systematic cooperation to enhance the effectiveness, coverage, and pertinence of IPE. Its core meaning lies in transcending the limitations of single-subject governance, leveraging the complementary advantages of different stakeholders to address complex challenges in IPE—such as the need to adapt to digital communication patterns and respond to diverse learner needs. Unlike traditional IPE, which often operates in isolation within educational institutions, collaborative innovation emphasizes interdependence, shared responsibility, and co-creation of educational value.

The constituent elements of this collaborative process include four key components: subjects, content, channels, and goals. Collaborative subjects are the diverse entities involved, each with unique roles—for example, universities and colleges serve as the core providers of IPE content and professional expertise; government departments formulate policies, allocate resources, and ensure ideological guidance; media organizations disseminate educational content through digital platforms and enhance its accessibility; social groups (e. g., community organizations, non-profits) provide practical scenarios for applying ideological knowledge and collecting feedback from learners. Collaborative content refers to the IPE material adapted to new media contexts, including micro-lectures, interactive case studies, and value-oriented short videos, which must balance ideological rigor with engaging formats. Collaborative channels are the new media platforms and communication mechanisms that facilitate interaction between subjects, such as shared digital workspaces, regular online coordination meetings, and cross-platform content distribution networks. Collaborative goals are the shared objectives that unify stakeholders, including improving learner participation, strengthening the alignment between IPE and social development needs, and fostering the formation of positive ideological values among learners.

2.3 Relevant Supporting Theories for Collaborative Innovation Research

Three key theories provide a theoretical foundation for this study: collaborative governance theory, communication effect theory, and constructivist learning theory.

Collaborative governance theory, developed in the field of public administration, focuses on how multiple stakeholders with different interests and resources can work together to solve complex public problems. This theory emphasizes the importance of trust-building, clear role division, and flexible institutional arrangements in promoting effective collaboration. For IPE collaborative innovation, the theory guides the design of multi-subject interaction mechanisms—such as establishing joint steering committees to coordinate decision-making, and creating resource-sharing agreements to address conflicts of interest. It also highlights the need for inclusive participation, ensuring that diverse voices (including learners) are integrated into the collaborative process to enhance the relevance of educational initiatives.

Communication effect theory, a core framework in media studies, examines how media content influences audience attitudes, beliefs, and behaviors. This theory distinguishes between short-term and long-term effects, as well as between cognitive, emotional, and behavioral impacts. In the context of new media and IPE, the theory helps analyze how different digital formats (e.g., short videos vs. live lectures) affect learners' understanding and acceptance of ideological content. It also provides insights into addressing challenges such as "selective exposure"—where learners avoid content that contradicts their existing views—by optimizing content framing and leveraging interactive features to encourage critical reflection.

Constructivist learning theory, rooted in educational psychology, posits that learners actively construct knowledge through interaction with their environment and peers, rather than passively receiving information. This theory supports the design of collaborative IPE activities in new media environments, such as online group discussions, project-based learning initiatives, and user-generated content campaigns. It emphasizes the need to create immersive, participatory learning experiences—for example, using virtual reality to simulate historical or social scenarios—that enable learners to connect ideological concepts with real-world contexts, thereby deepening their understanding and internalization of values.

3. Analysis of the Dual Impacts of New Media on Collaborative Innovation in Ideological and Political Education

3.1 Opportunities: Expanding the Dimensions and Effectiveness of Collaborative Innovation

New media creates unprecedented opportunities for expanding the scope, depth, and efficiency of IPE collaborative innovation, primarily through three interrelated pathways.

First, new media breaks down spatial and temporal barriers, expanding the coverage of collaborative IPE. Traditional collaborative efforts are often limited by geographical constraints, with partnerships restricted to local institutions or face-to-face interactions. Digital platforms enable cross-regional, even cross-national, collaboration between educational institutions, media organizations, and social groups. For instance, universities in different regions can jointly develop online IPE courses and share teaching resources through cloud-based platforms, while media organizations can distribute these resources to global audiences via social media and short-video apps. This expansion ensures that IPE content reaches diverse learner groups—including working adults, remote students, and marginalized communities—who may have limited access to traditional educational opportunities.

Second, new media enhances the interactivity and responsiveness of collaborative IPE, improving learner engagement and educational effectiveness. Interactive features such as real-time comments, polls, and live Q&A sessions enable immediate feedback between collaborative subjects and learners, allowing educators to adjust content and methods based on learner needs. For example, during a collaborative live-streaming event on social issues, learners can ask questions directly to experts from universities, government agencies, and media outlets, while organizers can use real-time data on viewer engagement to modify the discussion focus. This interactivity transforms learners

from passive recipients of information into active participants, fostering deeper understanding and critical thinking about ideological concepts.

Third, new media optimizes resource integration efficiency, enabling collaborative subjects to leverage complementary strengths more effectively. Big data analytics tools allow stakeholders to collect and analyze data on learner preferences, content consumption patterns, and educational outcomes, facilitating evidence-based decision-making. For instance, government departments can use data on regional ideological trends to allocate resources to high-priority areas, while media organizations can use audience insights to tailor IPE content to specific demographic groups. Additionally, cloud storage and shared digital workspaces enable seamless exchange of teaching materials, research findings, and best practices between collaborators, reducing duplication of effort and ensuring consistent quality across educational initiatives.

3.2 Challenges: Key Factors Restricting the Construction of Collaborative Innovation Mechanisms

Despite these opportunities, new media also presents significant challenges that hinder the development of effective IPE collaborative innovation mechanisms, with three factors being particularly prominent.

First, the fragmentation of new media information undermines the consistency and depth of collaborative IPE content. the abundance of user-generated content and the rapid pace of information dissemination in digital environments often lead to disjointed, superficial educational messages. Collaborative subjects may struggle to maintain a unified ideological narrative, as different platforms (e. g., short-video apps vs. social networking sites) require content to be adapted to varying formats and audience expectations. For example, a university's in-depth IPE course may be condensed into 60-second videos for short-video platforms, losing nuance and context in the process. This fragmentation can confuse learners, weaken the impact of ideological guidance, and make it difficult for collaborative subjects to align their educational goals.

Second, information asymmetry and interest differences between collaborative subjects create barriers to effective coordination. New media's decentralized nature means that different stakeholders often possess unequal access to data, resources, and audience insights. For instance, media organizations may have detailed data on content reach and engagement but be reluctant to share it due to competitive concerns, while universities may lack the technical expertise to analyze such data effectively. Additionally, conflicting interests between subjects—such as government priorities for ideological consistency versus media priorities for audience engagement—can lead to tensions in collaborative decision-making. These barriers prevent the formation of trust and mutual understanding, limiting the ability of stakeholders to work together toward shared goals.

Third, ethical and technical risks in new media environments threaten the credibility and safety of collaborative IPE. Algorithmic recommendation systems, while enabling personalization, can reinforce information echo chambers and expose learners to biased or extreme content, undermining the objectivity of IPE. Cybersecurity risks—such as data breaches of learner information or the spread of misinformation through collaborative platforms—also pose threats to the integrity of educational initiatives. For example, a collaborative online forum for IPE discussions may be targeted by malicious actors spreading false information, eroding learner trust in the content and the collaborative system itself. Addressing these risks requires significant investment in technical safeguards and ethical guidelines, which many collaborative partnerships may lack the resources to implement.

4. Construction of a Collaborative Innovation System for Ideological and Political Education in the Context of New Media

4.1 Subject Architecture of Collaborative Innovation

The subject architecture of IPE collaborative innovation in the new media context is a multi-level, interconnected system centered on educational institutions (universities and colleges) and involving government departments, media organizations, and social groups. Each subject plays a distinct but

complementary role, with clear division of labor and mechanisms for mutual coordination. Educational institutions serve as the core of the architecture, responsible for developing IPE content, training professional educators, and conducting research on collaborative innovation. They leverage their expertise in ideological theory and educational methodology to ensure that collaborative initiatives align with academic standards and ideological guidance requirements. For example, universities can lead the design of interdisciplinary IPE curricula adapted to new media platforms, integrating content from fields such as political science, media studies, and psychology. They also act as intermediaries between other subjects, organizing regular coordination meetings and facilitating resource exchange.

Government departments (such as education bureaus and propaganda departments) provide policy guidance and resource support for collaborative efforts. They formulate policies to encourage multi-stakeholder collaboration—such as offering funding for joint IPE projects or establishing certification standards for new media educational content—and ensure that collaborative initiatives align with national ideological education goals. Government bodies also play a regulatory role, monitoring the spread of IPE content on new media platforms to prevent the dissemination of harmful or inconsistent information.

Media organizations contribute to the architecture by leveraging their platform resources and content dissemination capabilities. They adapt IPE content developed by educational institutions into formats suitable for new media—such as short videos, infographics, and interactive quizzes—and distribute it to large audiences through their channels. Media organizations also provide data on content performance, helping collaborators optimize their strategies to enhance engagement. For instance, a news media outlet can partner with a university to produce a series of live-streamed IPE talks, promoting the events through its social media accounts and sharing viewership data to inform future content design.

Social groups, including community organizations, non-profit entities, and corporate social responsibility departments, provide practical scenarios for applying IPE knowledge and collecting learner feedback. They organize offline activities—such as community service projects, ideological seminars, and career development workshops—that complement online IPE content, enabling learners to connect theoretical concepts with real-world experiences. Social groups also act as bridges between collaborative subjects and the public, collecting feedback on IPE initiatives and communicating the needs of diverse learner groups to ensure that collaborative efforts remain responsive to societal changes.

4.2 Carrier Design of Collaborative Innovation

The carrier design of IPE collaborative innovation focuses on constructing a multi-platform, integrated system of new media carriers that balance content accessibility, interactivity, and ideological rigor. This system includes three types of carriers: platform carriers, content carriers, and interaction carriers.

Platform carriers refer to the new media platforms selected for collaborative IPE dissemination, with a focus on building a "platform matrix" that covers diverse user groups and usage scenarios. This matrix includes social networking platforms (e. g., WeChat, Facebook) for community building and long-term engagement, short-video platforms (e. g., TikTok, Douyin) for concise, visually engaging content, and live-streaming platforms for real-time interaction and in-depth discussions. the selection of platforms is guided by audience analysis—for example, short-video platforms are prioritized for younger learners who prefer fragmented content, while live-streaming platforms are used for targeted sessions with specific groups (e. g., university students, professional groups). the platform matrix is integrated through cross-platform content synchronization and unified user authentication, allowing learners to access consistent IPE content across different platforms.

Content carriers are the specific forms of IPE material adapted to new media platforms, designed to balance ideological depth with engaging formats. Key content carriers

include micro-lectures (5–10 minute video lectures on core ideological concepts), interactive case studies (digital scenarios where learners analyze social issues and apply ideological principles), and user-generated content campaigns (initiatives where learners create and share their own IPE-related content, such as short videos on social responsibility). Content design follows the principles of "value orientation first, form innovation second"—ensuring that all material aligns with ideological guidance requirements while leveraging new media features such as storytelling, visual effects, and gamification to enhance appeal. For example, a micro-lecture on social justice might use animated graphics to explain theoretical concepts and include real-world examples from recent social events to increase relevance.

Interaction carriers are the mechanisms designed to facilitate engagement between collaborative subjects and learners, as well as between learners themselves. These carriers include online discussion forums (moderated by educators and media professionals to ensure constructive dialogue), real-time polling tools (used during live sessions to collect learner opinions and adjust content dynamically), and collaborative project platforms (where learners work in groups to complete IPE-related projects, such as designing a community service plan). Interaction carriers are designed to foster a sense of community among learners, encouraging active participation and peer learning. For instance, a collaborative project platform might enable learners from different regions to work together on a digital campaign promoting environmental protection, with guidance from university educators and feedback from media experts.

4.3 Operation Mechanism of Collaborative Innovation

The operation mechanism of IPE collaborative innovation is a set of systematic processes that ensure the smooth coordination of subjects, efficient use of resources, and continuous optimization of initiatives. This mechanism includes three core components: communication and coordination mechanisms, resource sharing mechanisms, and incentive and evaluation mechanisms.

Communication and coordination mechanisms establish regular channels for information exchange between collaborative subjects, ensuring alignment of goals and timely resolution of conflicts. These mechanisms include joint steering committees (composed of representatives from all subjects, meeting quarterly to review progress and make strategic decisions), real-time digital communication platforms (such as dedicated WeChat Work or Slack groups for daily coordination), and annual collaborative conferences (where stakeholders share best practices, discuss challenges, and update collaborative plans). To address information asymmetry, the mechanism also includes standardized information reporting systems—requiring each subject to submit regular reports on resource contributions, content performance, and learner feedback—which are shared through a centralized digital dashboard accessible to all collaborators.

Resource sharing mechanisms facilitate the efficient allocation and exchange of human, material, and digital resources between subjects. Human resource sharing involves the establishment of a "collaborative talent pool" consisting of educators, media professionals, government experts, and social workers, who can be deployed across different initiatives based on need. For example, a media organization's content designers might support a university's development of short-video IPE content, while a government's policy experts might provide guidance on aligning projects with national priorities. Material and digital resource sharing includes the creation of a cloud-based resource library (storing IPE curricula, teaching materials, and data analytics tools) that all subjects can access and contribute to, with clear protocols for resource usage and attribution. To ensure sustainability, the mechanism also includes resource mobilization plans—such as government funding for high-priority projects and corporate sponsorships for community-based initiatives.

Incentive and evaluation mechanisms motivate active participation from collaborative subjects and ensure the quality and effectiveness of IPE initiatives. Incentive mechanisms include both material and non-material rewards: material incentives such as

project grants, resource allocations, and financial subsidies for outstanding contributions; non-material incentives such as public recognition (e. g., awards for "Excellent Collaborative IPE Projects"), capacity-building opportunities (e. g., training programs for collaborators), and priority access to new resources. Evaluation mechanisms involve regular assessments of collaborative initiatives using a multi-dimensional index system, including indicators such as learner engagement rates (e. g., content views, interaction frequency), ideological guidance effectiveness (e. g., changes in learner attitudes measured through surveys), and resource utilization efficiency (e. g., cost per learner reached). Evaluations are conducted by an independent expert panel (composed of scholars, industry professionals, and government representatives) and the results are used to adjust collaborative strategies, reward high-performing subjects, and address underperformance.

4.4 Guarantee System of Collaborative Innovation

The guarantee system of IPE collaborative innovation provides institutional, technical, and talent support to ensure the long-term stability and effectiveness of the collaborative system. This system comprises three key pillars: institutional guarantees, technical guarantees, and talent guarantees.

Institutional guarantees establish the legal and policy framework for collaborative innovation, clarifying the rights, obligations, and responsibilities of each subject. This includes the formulation of collaborative agreements (legally binding documents that define the scope of collaboration, resource commitments, and dispute resolution procedures), government policies supporting multi-stakeholder IPE collaboration (such as tax incentives for media organizations and social groups participating in IPE projects, and preferential funding for universities leading collaborative initiatives), and industry standards for new media IPE content (specifying requirements for ideological accuracy, content quality, and user data protection). Institutional guarantees also include the establishment of a dedicated coordination office (housed in a leading university or government department) responsible for overseeing the implementation of collaborative plans, resolving conflicts between subjects, and advocating for policy support at the national and local levels.

Technical guarantees focus on building a secure, efficient, and intelligent digital infrastructure to support collaborative IPE activities. This includes the development of a centralized collaborative management platform with functions such as project tracking, resource sharing, data analytics, and user management. the platform is equipped with advanced technologies such as big data analytics (to monitor learner behavior and content performance), artificial intelligence (to personalize content recommendations and automate administrative tasks), and cybersecurity tools (to protect user data and prevent unauthorized access to sensitive information). Technical guarantees also involve regular maintenance and updates of the platform, as well as technical training for collaborators to ensure they can effectively use digital tools. For example, workshops on data analytics and algorithmic optimization may be offered to help educators and media professionals leverage technology to enhance IPE effectiveness.

Talent guarantees focus on cultivating a pool of interdisciplinary talents capable of integrating new media skills, ideological theory, and collaborative management expertise. This includes the design of training programs for existing collaborators—such as courses on new media content creation (e. g., short-video production, live-streaming management) for educators, and courses on ideological theory for media professionals—to bridge skill gaps between subjects. Talent guarantees also involve the recruitment and cultivation of new professionals through university programs, such as interdisciplinary majors in "Ideological and Political Education with New Media" that combine coursework in political science, media studies, and digital technology. Additionally, talent exchange programs between collaborative subjects (e. g., educators working as visiting experts at media organizations, media professionals teaching at universities) are established to promote knowledge sharing and practical experience, ensuring that the collaborative system has a sustainable supply of qualified talent.

5. Conclusion

This study systematically explores the dual impacts of new media on collaborative innovation in ideological and political education (IPE) and constructs a comprehensive collaborative innovation system encompassing subject architecture, carrier design, operation mechanisms, and guarantee systems. the research demonstrates that new media simultaneously offers opportunities to expand the coverage, interactivity, and resource efficiency of collaborative IPE and poses challenges related to information fragmentation, inter-subject coordination barriers, and technical-ethical risks. These findings highlight the need to move beyond treating new media as a mere tool for IPE delivery and instead integrate it into the core of collaborative governance structures.

The collaborative innovation system constructed in this study addresses these challenges by establishing clear roles for multi-stakeholders (educational institutions, government, media, social groups), designing integrated new media carriers, and implementing robust operation and guarantee mechanisms. This system not only enhances the effectiveness of IPE in digital environments but also fosters a more inclusive and responsive educational ecosystem—one that leverages the strengths of diverse subjects to address the complex needs of learners in the new media age.

Theoretical contributions of this study include enriching the interdisciplinary research on new media and IPE, and expanding the application of collaborative governance and communication effect theories in educational contexts. Practically, the system provides actionable guidance for stakeholders to form sustainable partnerships, optimize resource allocation, and enhance the pertinence of IPE. Future research could further explore the impact of emerging technologies (such as virtual reality and generative artificial intelligence) on collaborative IPE, and conduct long-term empirical studies to assess the effectiveness of the proposed system in different regional and cultural contexts. Such efforts will continue to advance the adaptation of IPE to the evolving digital landscape, ensuring its role in fostering positive ideological values among learners worldwide.

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Research on Campus Culture Construction and Student Management Innovation Based on Positive Psychology

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Abstract: As educational reform deepens, exploring effective campus culture construction and student management models has become a critical issue in education. This study, grounded in positive psychology, aims to examine how to integrate its principles into campus culture and student management, fostering innovative development in management models. Employing literature review and theoretical analysis, the research systematically outlines relevant theories of positive psychology and analyzes their alignment with campus culture construction and student management. By examining the mechanisms through which positive psychology shapes students' positive psychological qualities and enhances campus cultural atmosphere, a strategy system for innovation in campus culture and student management is proposed. Findings indicate that integrating positive psychology into these areas can effectively stimulate students' intrinsic motivation, improve their mental health, and create a harmonious campus cultural environment, thereby supporting their holistic development.

Keywords: Positive psychology; Campus culture construction; Student management; Innovation strategies; Educational reform

1. INTRODUCTION

1.1 Background and Significance

In the context of rapid societal development, the education sector is undergoing profound changes. As expectations for educational quality rise, campus culture and student management have emerged as key factors influencing educational outcomes. the increasing competition demands not only solid professional knowledge but also positive psychological qualities, adaptability, and innovation from students. Traditional campus culture and management practices are increasingly inadequate for cultivating high-quality talent in the new era.

Historically, campus culture has focused on knowledge transmission and discipline, often neglecting the cultivation of students' positive emotional experiences and individual potential. Many cultural activities lack variety and fail to engage students meaningfully, leaving them without a sense of joy and growth. In student management, conventional methods are often rule-oriented and top-down, emphasizing behavior regulation over internal psychological needs, which can foster passivity and resistance among students.

Since its inception in the late 20th century, positive psychology has gained widespread attention for its focus on human strengths, well-being, and the exploration of intrinsic positive forces. Integrating positive psychology into campus culture construction can foster a more vibrant, harmonious environment, nurturing an optimistic mindset, resilience, and teamwork among students. Moreover, applying positive psychology in student management shifts the focus from mere behavioral control to addressing psychological growth and development needs, enhancing students' self-management and adaptability.

This study explores the innovation of campus culture and student management based on positive psychology, contributing to educational theory and practice. Theoretically, it expands applications of positive psychology in education and provides new perspectives for understanding the mechanisms underlying campus culture and student management. Practically, it offers actionable guidelines for educators to improve cultural initiatives and

management strategies, ultimately enhancing educational quality.

1.2 Literature Review

Internationally, research on positive psychology has developed rapidly since its introduction by scholars like Seligman. Studies have investigated its application in education, emphasizing the creation of positive campus atmospheres through diverse activities and strong teacher-student relationships. Some U. S. schools implement positive psychology-oriented programs, such as the "Happiness Campus Initiative, " which promotes positive emotions and social skills through specialized courses and themed events.

In China, significant progress has been made in applying positive psychology to campus culture and student management. Researchers explore its integration across various cultural dimensions, identifying positive elements that enhance students' sense of belonging and cohesion. Furthermore, educational initiatives have increasingly focused on psychological health and positive qualities, leading to effective outcomes in students' well-being.

However, both domestic and international studies reveal gaps, particularly in understanding the deeper connections and synergistic effects between campus culture and student management. Empirical research, especially longitudinal studies, is scarce, limiting the assessment of positive psychology interventions' long-term effectiveness. Future studies should deepen theoretical exploration and enhance empirical research to provide robust support for educational innovation.

2. THEORETICAL FOUNDATIONS OF POSITIVE PSYCHOLOGY AND CAMPUS CULTURE, STUDENT MANAGEMENT

2.1 Core Theories of Positive Psychology

Positive psychology focuses on human psychological phenomena and development, encompassing crucial theories that inform our understanding of positive psychological qualities and behaviors.

The positive emotion theory posits that positive emotions extend individuals' thinking and action repertoires, enhancing creativity, flexibility, and learning ability, while also fostering interpersonal connections. In educational settings, fostering positive emotions among students can strengthen peer relationships and teamwork.

The positive personality trait theory highlights that qualities such as optimism and resilience can be cultivated, not innate. Optimistic individuals tend to view challenges as growth opportunities, enhancing their likelihood to engage positively. Research indicates that fostering strengths and success experiences can effectively develop positive traits in students, crucial for their future adaptability.

Flow theory describes a state of deep immersion and enjoyment in activities, which can be cultivated through appropriately challenging tasks that resonate with students' skills. Educators can facilitate flow experiences to enhance students' engagement and motivation.

2.2 Theoretical Frameworks for Campus Culture and Student Management

Campus culture and student management are critical components of educational work, supported by a variety of theoretical foundations. Campus culture encompasses material, institutional, and spiritual dimensions, influencing students' perceptions and behaviors.

Material culture, manifested in campus architecture and facilities, impacts students' learning experiences. Institutional culture regulates behavior through effective policies that promote active participation and responsibility. Spiritual culture embodies the school's values and philosophy, shaping students' moral and ethical development.

Behavioral science theory provides essential insights for student management, focusing on understanding and modifying behaviors through motivation and reinforcement. Humanistic theory emphasizes respecting individual differences and fostering self-actualization, advocating for student involvement in management processes to enhance self-worth and engagement.

3. THE INTERRELATIONSHIP OF POSITIVE PSYCHOLOGY, CAMPUS CULTURE CONSTRUCTION, AND STUDENT MANAGEMENT

3.1 Guiding Role of Positive Psychology in Campus Culture Construction

Positive psychology offers innovative

perspectives for developing campus culture, particularly in promoting positive psychological qualities and values among students. Initiatives aligned with positive psychology principles can enhance the school's cultural atmosphere and foster a supportive environment for growth.

3.2 Application Value of Positive Psychology in Student Management

Positive psychology significantly enhances student management quality, focusing on mental health prevention and intervention and fostering intrinsic motivation. By emphasizing strengths and well-being, schools can cultivate resilience and adaptability, equipping students with skills to manage stress and interpersonal challenges.

In conclusion, integrating positive psychology into campus culture and student management not only enriches educational practices but also supports the holistic development of students, preparing them for future challenges and opportunities.

4. INNOVATIVE PATHWAYS FOR CAMPUS CULTURAL CONSTRUCTION BASED ON POSITIVE PSYCHOLOGY

4.1 Innovations in Spiritual Culture Construction

The spiritual culture is the core of campus culture, significantly influencing students' value formation and spiritual growth. From a positive psychology perspective, spiritual culture development focuses on fostering students' positive psychological qualities and values. Creating an uplifting campus spiritual culture can enhance students' psychological resilience and subjective well-being. Practical applications may include integrating strengths theory from positive psychology into campus activities and curricula. For instance, offering courses on cultivating positive psychological qualities can help students identify and utilize their strengths in both academics and daily life. Furthermore, organizing campus cultural events themed around "optimism, resilience, and gratitude, " through activities such as speeches and essay competitions, can stimulate students' intrinsic positive emotions and reinforce their values. Utilizing role models within the faculty and student body to promote "Positive Stars" can also create an aspirational campus culture, subtly influencing students positively.

4.2 Innovations in Institutional and Material Culture Construction

Institutional culture provides the framework for campus cultural construction, while material culture represents its external manifestation. Guided by positive psychology, institutional culture innovation should reflect humanistic care and positive reinforcement. School management systems can incorporate positive psychology principles to create a humane and scientific framework. For instance, revising student evaluation methods to establish a diverse assessment system that not only considers academic performance but also moral character, innovation, and teamwork can provide students with holistic and constructive feedback, enhancing their self-efficacy. In terms of material culture, campus design should convey positive psychological cues. Incorporating natural and artistic elements into campus landscapes can create a warm, creative environment to alleviate student stress. Additionally, classrooms and libraries can utilize warm colors and motivational signage to foster a positive learning atmosphere, thereby enhancing students' motivation.

5. INNOVATIVE STRATEGIES FOR STUDENT MANAGEMENT BASED ON POSITIVE PSYCHOLOGY

5.1 Innovations in Student Mental Health Management

The growing concern over student mental health underscores the need for innovative management strategies grounded in positive psychology. Traditional mental health management often focuses on problem intervention, whereas a positive psychology approach emphasizes cultivating positive psychological qualities to enhance mental resilience. Schools can develop a comprehensive positive mental health education system that integrates psychological education with positive psychology principles, systematically teaching skills in emotion management, stress coping, and interpersonal relations. Moreover, innovative mental health services should include not just traditional counseling but also group guidance and psychological training activities that foster interaction among students and promote

supportive relationships. Additionally, establishing a psychological crisis early warning and intervention mechanism utilizing big data can enable dynamic monitoring of student mental states, allowing for timely identification and targeted interventions for potential issues.

5.2 Innovations in Student Incentive and Self-Management Strategies

Emphasizing intrinsic motivation and self-actualization needs, positive psychology provides a framework for innovative incentive and self-management strategies. Schools can create a diversified incentive system that emphasizes spiritual rewards alongside material ones. For example, establishing awards for "Progress, " "Innovation, " and "Contribution" recognizes students' outstanding achievements across various domains, fulfilling their needs for respect and self-actualization. Additionally, aligning students' personal goals with school development objectives can guide them in formulating personalized development plans, motivating their intrinsic learning drive. Empowering students with more management autonomy through self-governing organizations, such as student councils or class management teams, can cultivate a sense of responsibility and managerial skills. This self-management practice facilitates a transition from being managed to self-management, enhancing their overall competencies.

6. CONCLUSION

This study explores innovative pathways for campus cultural construction and student management grounded in positive psychology, systematically analyzing the theoretical foundations and correlations between positive psychology, campus culture construction, and student management. the findings suggest that integrating positive psychology principles into campus culture and student management effectively optimizes the cultural environment and enhances students' mental health and overall quality. Innovations in spiritual, institutional, and material culture can foster a positive campus atmosphere, while novel strategies in mental health management and student incentives can stimulate intrinsic motivation and promote holistic development. Nonetheless, the application of positive psychology in campus culture and student management remains in the exploratory stage. Future research should deepen theoretical and practical explorations, expand application fields, and refine relevant strategies to provide robust theoretical support and practical guidance for educational development.

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Research on the Approach to Ideological and Political Education Construction in the Course of the Application of Excel in Financial Management

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Abstract: In today's society, higher education not only aims to equip students with solid professional knowledge and skills, but also places great emphasis on cultivating students' moral character. Therefore, effectively integrating ideological and political education into professional skill courses has become an important direction of higher education reform. This article focuses on the course "The Application of Excel in Financial Management" and delves into the entry points and construction paths of ideological and political education embedded within it. Through specific approaches such as reconstructing teaching objectives, deeply exploring ideological and political elements, optimizing teaching content, innovating teaching methods, strengthening practical operations, and improving the evaluation system, the course achieves the organic integration of knowledge impartation, ability cultivation, and value guidance, providing practical reference for cultivating new-era financial talents who possess both exquisite digital skills and noble professional ethics.

Keywords: Excel application; financial management; ideological and political education in curriculum; construction path

1. Introduction

With the rapid development of technologies such as big data and artificial intelligence, data processing tools represented by Excel are becoming increasingly important in financial management. As a core skill course for majors such as accounting and financial management, "The Application of Excel in Financial Management" aims to cultivate students' practical abilities in efficiently processing financial data, constructing analysis models, and presenting them visually. Furthermore, it emphasizes the cultivation of correct professional values and excellent comprehensive qualities.

Currently, following the core concept of "unity of instrumental rationality and value rationality", exploring how to integrate ideological and political education elements into the skill teaching of the course "Application of Excel in Financial Management" to achieve a comprehensive educational effect has important theoretical value and practical significance.

2. The integration of ideological and political factors in the course "Application of Excel in Financial Management"

2.1 Strengthen integrity-based approach

Honesty is related to a person's moral character, and "not falsifying accounts" is the bottom line that accountants deeply abide by. Excel uses financial data as a carrier, and the accuracy and authenticity of financial data are crucial. Therefore, maintaining the originality of input data and preventing human tampering with calculation results are of great significance. In teaching, through vivid case analysis (such as enterprise decision-making errors or audit failures caused by data errors), students' awareness of integrity is strengthened, and they are guided to establish noble professional ethics and professional qualities.

2.2 Strengthen rigor and meticulousness

The course "Application of Excel in Financial

Management" requires extremely high operational details. An incorrect cell reference, improper function nesting, or ignored absolute reference symbol can render the entire model invalid. Therefore, in teaching, students should be guided to understand the principle of "even the slightest mistake can lead to a thousand miles of error", and cultivate their meticulousness, pursuit of excellence, high sense of responsibility, and outstanding craftsmanship spirit.

2.3 Strengthen the awareness of standardization

The use of Excel for related business processing activities, such as financial analysis, budget preparation, cost accounting, etc., must strictly comply with the national unified accounting standards, financial regulations, and relevant laws and regulations. the use of functions to calculate tax amounts in teaching can strengthen the legal concept of paying taxes on time, and the preparation of financial statement templates that meet formatting requirements can enhance standardization awareness and internal control concepts.

2.4 Strengthen the overall perspective

When using Excel for financial analysis (cost-benefit analysis, investment project evaluation), students are guided to pay attention not only to the micro economic benefits of the enterprise itself, but also to the social benefits, environmental impact, and overall impact on the national industrial economy of the project, cultivating their sense of social responsibility and macro perspective.

2.5 Strengthen confidentiality awareness

When using Excel for financial processing, it is necessary to deeply understand that protecting trade secrets and customer privacy is the basic obligation of financial personnel. In teaching, the importance of Excel file encryption, permission settings, and data backup should be repeatedly emphasized, so that students can deeply guard the information security Line.

3. The Path Of Ideological And Political Construction In the Course Of "Application Of Excel In Financial Management"

The effective integration of the above ideological and political elements into the teaching of the course "Application of Excel in Financial Management" requires systematic design and innovation of the course, with the following key construction approaches:

3.1 Clarify the ideological and political navigation map, and reconstruct teaching objectives

Reconstruct teaching objectives and expand the addition of ideological and political education goals on the basis of the original teaching objectives. For example, being able to accurately use Excel for financial data calculations, deeply understanding the authenticity and integrity principles of data, and forming an objective and fair scientific and value system; Proficient in constructing financial analysis models, cultivating rigorous and meticulous professional qualities, and striving for excellence in craftsmanship spirit; Be able to use Excel for standardized financial operations, strengthen awareness of standardization and legal concepts; Being able to design efficient and innovative Excel solutions, improve work efficiency, establish a comprehensive view of serving enterprise development and national strategy, refine ideological and political goals, integrate them into curriculum standards, teaching plans, and evaluation systems, and form a clear ideological and political navigation map.

3.2 Deeply explore the integration of ideological and political education, optimize course content

Carefully select or design relevant cases that contain ideological and political elements, making the case selection more ideological and political. For example, using the "Application Model of Excel in Accounts Receivable Management" to analyze customer credit; Introduce the case of "Integrity Promotes Business" and discuss the importance of integrity to enterprises; Utilize the "Excel Application Model in Cost Management" to optimize production processes and promote the traditional virtues of "practicing thrift and opposing waste"; Using the application of Excel in investment project evaluation to analyze investment support for national strategic projects.

Embedding value thinking into skill training teaching tasks to make task design valuable. For example, when preparing financial statement templates, strictly follow the format and data reconciliation relationship stipulated

by the state, emphasizing standardization; In data cleaning tasks, it is important to identify and correct abnormal data, emphasizing the authenticity of associated data.

When explaining the key points of practical training, embed the ideological and political elements contained therein, so as to integrate the knowledge points taught. For example, when explaining the "data verification" function, associate it with the ideological and political connotation of "rigorous and meticulous", emphasizing its accuracy in data input; When explaining "protecting worksheets (workbooks)", emphasize the confidentiality and security of information; When explaining macro or VBA automation, emphasize the importance of efficiency improvement and its contribution to creating value.

3.2 Enhance the affinity of ideological and political education, and innovate teaching methods

Situational role-playing method: In teaching, create real business work scenarios, let students play different job roles (financial supervisors, auditors, accountants, management), use specific Excel tools to complete work tasks, and experience the importance of communication, collaboration, following professional ethics, and following rules in the process.

Case comparison and discussion method: Provide positive and negative examples of success and failure. For example, presenting a successful case of using rigorous and standardized modeling to help businesses avoid risks, and comparing it with a report of huge losses caused by Excel formula errors, guiding students to deeply consider the relationship between professional ethics and professional skills.

Project driven learning method: Design a single module project, such as "Designing a Fundraising Management System for Enterprises"; Design comprehensive projects, such as "designing a complete Excel financial management system for enterprises (covering accounting processing and simple analysis such as fundraising, investment, operation, and profit management)". During project execution, while assessing technical implementation, more emphasis is placed on considering its data standardization and internal control logic, as well as its cost-effectiveness and social responsibility.

Technical ethics discussion method: Targeting the advanced features of Excel (such as simulation analysis, prediction, etc.), guide students to deeply discuss the rationality of building models, the limitations of referencing data, and the ethical boundaries of technology applications. Utilize professional skills to serve society, and guide students to establish critical thinking and social responsibility.

3.3 Internalize value in operation and strengthen practical operation

Emphasize the authenticity of data: In skill training, try to use financial data that is as close to reality (or simulates reality) as possible, so that students can feel the economic significance and social responsibility of their environment in real business scenarios.

Emphasize process and auditability: Strictly practice process, require students to clearly record the operational steps of each process, cultivate students' traceable normative awareness and good work habits, and provide a basis for future audit response.

Emphasis on standardized data requirements: All computer exercises and assignments strictly require the clarity of data sources, accuracy of formula references, and completeness of result presentation. Every practical operation must adhere to a rigorous and meticulous style.

Emphasize the service-oriented nature of the project: guide students to use their learned Excel skills to participate in social services, provide simple financial data processing, report analysis, and other services for social welfare organizations or small and micro enterprises, and enhance the social value of their learning.

3.4 The effectiveness of ideological and political education can be measured, and the evaluation system should be improved

Diversified evaluation subject: composed of teachers, students, etc., the diversified evaluation subject assesses students' professional abilities such as communication and teamwork through teacher evaluation, student self-evaluation, and group peer evaluation.

Process oriented evaluation method: In course learning, not only should the final outcome be

emphasized, but also the learning platform should be used to record students' learning trajectories and interactions (such as attendance, classroom learning participation, problem-solving ability), focusing on students' process evaluation.

Diversified evaluation dimensions: Traditional evaluation dimensions include skill operation accuracy, model construction complexity, and result operation correctness. On this basis, ideological and political related evaluation dimensions such as "professional ethics and practical norms", "efficiency and innovation", and "sense of responsibility" are added.

Value based evaluation feedback: Teachers should not only evaluate students' skill mastery in feedback, but also clearly point out their strengths and weaknesses in professional attitude, professional ability, and sense of responsibility, in order to enhance students' value awareness and moral cultivation.

4. Implementation guarantee of ideological and political construction in the course of "Application of Excel in Financial Management"

4.1 Strengthening the key role of teachers

Teachers are the key to integrating ideological and political education into the curriculum. By regularly conducting curriculum ideological and political research activities, clarifying their professional ethics standards, enhancing teachers' professional qualities and ideological awareness, familiarizing them with relevant policies, regulations, and current events in the financial field, mastering the teaching methods of integrating curriculum ideological and political education, and truly achieving the goal of teaching and educating students.

4.2 Strengthen resource construction

Develop or construct high-quality teaching resources that contain ideological and political elements, such as teaching case libraries, practical training project libraries, video databases, etc. Write textbooks, practical materials, supplementary lecture notes, etc. that integrate ideological and political points, and provide support for better teaching through rich resource construction.

4.3 Strengthen collaborative education

Multiple channels, multiple forms, collaborative education. One is to involve professional counselors, ideological and political course teachers, and external guidance experts in curriculum ideological and political design; the second is to invite business professionals into the classroom to share their professional experiences and insights.

4.4 Strengthen natural integration

Through case studies, discussions, and practical experiences, students can naturally experience and appreciate the importance of professional ethics such as "integrity consciousness", "standardization consciousness", "unity and cooperation", "responsibility consciousness", etc. in problem-solving, and prevent "hard integration".

4.5 Strengthen the balance between skills and ideological and political education.

Clarify the relationship between skills and ideological and political education, where skills are the foundation and ideological and political education is the sublimation. In terms of lesson allocation and content design, the emphasis on ideological and political education should not reduce the training intensity and quality of core skills, and the best balance between the two should be sought.

In summary, in the current era of digitalization sweeping the financial field, the course "Application of Excel in Financial Management" can effectively achieve the simultaneous development of professional skills and ideological and political education by exploring specific ways such as restructuring teaching objectives, deepening ideological and political elements, optimizing teaching content, innovating teaching methods, strengthening practical operations, and improving evaluation systems. This not only helps to enhance the intrinsic value and educational effectiveness of the course, but also provides useful reference for the ideological and political construction of other professional courses, and lays a solid foundation for the cultivation of high-quality financial talents with both morality and ability in society.

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Research on the Construction of Excellent Seafarers Training Model Driven by Digital and Intelligent Shipping

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Abstract: With the in-depth integration of new-generation information technologies such as artificial intelligence, big data, and the Internet of Things with the shipping industry, digital and intelligent shipping has become an inevitable trend in the global shipping industry's development. This transformation has put forward disruptive new requirements for the knowledge structure, skill system, and comprehensive quality of traditional seafarers. Based on the context of digital and intelligent shipping, this paper deeply analyzes the lagging problems existing in China's current seafarers training model in terms of training philosophy, curriculum system, teaching staff, and school-enterprise cooperation. To address these challenges, the paper systematically constructs a new excellent seafarers training model centered on the government-industry-enterprise-school collaborative education mechanism. This model covers curriculum system reconstruction, teaching method innovation, teaching staff development, practical teaching improvement, and teaching quality evaluation and tracking. the aim of this model is to cultivate new-type seafarers with solid professional navigation skills, excellent digital intelligence literacy, and continuous innovation capabilities, thereby providing solid talent support and intellectual guarantee for China's transformation from a major shipping country to a strong shipping country.

Key words: Digital and Intelligent Shipping, Excellent Seafarers, Training Model, Maritime Education

1. Introduction

Currently, the world is experiencing a new round of scientific and technological revolution and industrial transformation, where digitalization, networking, and intelligentization have become the core driving forces leading future development. As the lifeblood of global economic and trade exchanges, the shipping industry is transforming towards digital and intelligent development at an unprecedented speed. From electronic charts and Automatic Identification Systems (AIS) to intelligent navigation, remote control, and autonomous ships, digital and intelligent technologies are reshaping the entire industrial chain of ship design, construction, operation, management, and maintenance. the establishment of the Digital and Intelligent Shipping Professional Committee of the China Shipowners' Association, coupled with the national promotion of strategies such as Transportation Power and Maritime Power, indicates that China's shipping industry has entered a fast track of digital and intelligent transformation.

Against this grand background, seafarers, as the core human resource of the shipping industry, are undergoing profound changes in their roles and functions. Traditional skill-oriented seafarers, who mainly rely on experiential operations and manual labor, can no longer meet the needs of future intelligent ships and smart ports. Instead, the demand will shift to knowledge-based, compound, and innovative excellent seafarers who can master complex intelligent systems, process massive amounts of data, and make intelligent decisions. However, China's current seafarers training model still largely follows the traditional paradigm, with significant gaps between its training philosophy, teaching content, and methodological approaches and

the development requirements of digital and intelligent shipping. Therefore, how to conform to the trend of the times, take digital and intelligent shipping as the driving force, and systematically reform and construct an excellent seafarers training model has become an urgent major issue in China's maritime education field. This study aims to conduct in-depth discussions on this issue, hoping to provide theoretical references and practical paths for the reform and development of maritime education in the new era.

2. New requirements for seafarers' competences driven by digital and intelligent shipping

2.1 Role transformation from operator to manager and decision-maker

On traditional ships, seafarers are direct operators of equipment. On intelligent ships, however, many repetitive and high-risk operations are replaced by automated systems. the core responsibility of seafarers has shifted to monitoring, managing, maintaining complex intelligent systems, and making emergency decisions. They need to understand the working principles of the systems, interpret the massive amounts of data fed back by the systems, and make optimal decisions based on professional knowledge and comprehensive judgment when the systems encounter abnormalities or emergencies.

2.2 Upgrade from single skill to compound knowledge structure

Future excellent seafarers must possess an interdisciplinary knowledge structure. In addition to solid traditional professional knowledge in navigation, marine engineering, etc., they must also master basic knowledge related to digital and intelligent technologies such as computer science, data science, artificial intelligence, network communication, and network security. They need to understand the entire process of data collection, transmission, processing, and application, and have basic data analysis and algorithm comprehension capabilities.

2.3 Shift from experience-driven to data-driven work model

Traditional navigation relies heavily on seafarers' experience and intuition. In contrast, digital and intelligent shipping emphasizes data-based precise management and predictive maintenance. Seafarers need to have data literacy, be able to extract effective information from ship operation data, and apply it to route optimization, energy efficiency management, equipment status monitoring, and fault early warning, thereby realizing the transformation from post-fault maintenance to pre-fault early warning.

2.1 Higher requirements for soft skills

In the digital and intelligent environment, seafarers face new work scenarios such as human-computer interaction, remote collaboration, and virtual teams. This requires them to have stronger communication and coordination capabilities, teamwork capabilities, lifelong learning capabilities, and psychological adaptability. In particular, personnel working in remote control centers or shore-based support centers need to conduct efficient collaboration with on-board personnel, ports, shippers, and other parties, making the importance of their soft skills increasingly prominent.

3. Main problems in the current seafarers training model

Facing the wave of digital and intelligent shipping, China's current seafarers training model has exposed many inadequacies, mainly reflected in the following four aspects:

3.1 Training philosophy lags behind industry development

The training philosophy of many maritime colleges remains in the traditional stage of cultivating qualified operators and has not yet shifted to the excellent philosophy of cultivating future managers and innovators in the shipping industry. the teaching objectives overemphasize meeting the minimum standards of international conventions (such as the STCW Convention) while neglecting the cultivation of students' digital intelligence literacy, innovative thinking, and sustainable development capabilities. This leads to a disconnect between graduates' knowledge structure and the cutting-edge needs of the industry.

3.2 Outdated curriculum system and teaching content

The curriculum system is updated slowly, and courses related to digital and intelligent technologies are seriously insufficient or marginalized. the content of core courses still focuses on traditional theories, with insufficient coverage of cutting-edge content

such as intelligent ship systems, shipping big data analysis, maritime network security, and ship energy efficiency management. the update cycle of teaching materials is long, failing to timely reflect the latest developments and application cases of digital and intelligent technologies. As a result, the knowledge learned by students may be partially outdated upon graduation.

3.3 Insufficient digital intelligence literacy of teaching staff

Although progress has been made in the construction of dual-qualified teaching teams (teachers with both academic expertise and industry experience), there is a severe shortage of teachers with profound digital and intelligent backgrounds. Most of the existing teaching staff have traditional maritime professional backgrounds, and their own understanding and application capabilities of new technologies such as artificial intelligence and big data are limited. This directly leads to difficulties in effectively carrying out teaching and research related to digital and intelligent courses, becoming a key bottleneck restricting the reform of the training model.

3.4 Inadequate depth of school-enterprise cooperation

School-enterprise cooperation mostly remains at a superficial level, such as the establishment of internship bases and order-based classes, lacking in-depth integration throughout the entire talent training process. Enterprises have low enthusiasm for participating in curriculum development, teaching design, and teacher training. There is a gap between the practical teaching in schools and the real work scenarios of enterprises. Especially in emerging fields such as intelligent ships, colleges and universities lack effective channels to obtain the latest technologies, equipment, and data, resulting in theoretical-only practical teaching that fails to truly cultivate students' practical capabilities.

4. A new training model for excellent seafarers

To solve the current dilemmas, it is necessary to construct a new excellent seafarers training model that is in sync with the development of digital and intelligent shipping. This model is a multi-dimensional and systematic project, with collaboration and integration at its core.

4.1 Constructing a Government-Industry-Enterprise-School four party collaborative education mechanism

The Government-Industry-Enterprise-School four-party collaborative education mechanism serves as the institutional guarantee and core engine for the operation of the new model.

Government plays a macro-guiding role, formulating policies and regulations to support the digital and intelligent transformation of maritime education, establishing special construction funds, and developing new seafarers' competence standards and evaluation systems adapted to digital and intelligent shipping.

Industry acts as a bridge and link. Organizations such as the China Shipowners' Association and the Chinese Institute of Navigation organize the release of industry talent demand forecasts, take the lead in formulating teaching standards for digital and intelligent courses, build school-enterprise cooperation platforms, and promote technology sharing.

Enterprise functions as the main body, deeply participating in the entire process of talent training. It collaborates with colleges and universities to establish industrial colleges and collaborative innovation centers, provides real ship operation data, technical experts, and internship positions, and transforms enterprise projects into teaching cases to achieve seamless connection between teaching and production.

School serves as the main front, proactively connecting with the government, industry, and enterprises, optimizing internal governance structures, breaking down departmental barriers, integrating teaching resources, and providing organizational guarantees and implementation platforms for collaborative education.

4.2 Reconstructing the curriculum system and teaching content

Guided by digital and intelligent empowerment, a modular curriculum system integrating general education+professional education+digital intelligence education+innovation education is constructed.

4.2.1 General education module

Strengthens basic disciplines and adds general courses such as Introduction to data science and fundamentals of artificial intelligence to

lay the foundation for digital and intelligent thinking.

4.2.2 Professional education module

Retains and optimizes core professional courses such as Navigation Technology and Marine Engineering, while integrating digital and intelligent elements. For example, content on intelligent route planning is added to navigation, and explanations on intelligent engine room systems are enhanced in Marine Automation.

4.2.3 Digital intelligence education module

Adds a course group for the Digital and Intelligent Shipping professional direction, such as Intelligent Ship Systems and Principles, Shipping Big Data Analysis and Application, Maritime Network Security, and Ship Remote Monitoring and Diagnostic Technology, which are offered as core or elective courses.

4.2.4 Innovation education module

Sets up innovation practice credits, encouraging students to participate in scientific research projects, discipline competitions, and innovation and entrepreneurship projects, and applying the knowledge learned to solve practical problems.

4.3 Innovating teaching methods and means

Abandoning the traditional spoon-feeding teaching model, full use is made of information technology to empower teaching.

4.3.1 Promoting blended teaching

Utilizes online learning platforms to enable students to learn theoretical knowledge before class, while class time is allocated to project discussions, case analysis, problem-solving, and skill training.

4.3.2 Introducing virtual simulation teaching

Constructs a high-level intelligent ship virtual simulation training center, allowing students to conduct training on intelligent ship operation, emergency drills, and system maintenance in a highly simulated virtual environment, making up for the shortage of physical equipment and the risks of high-risk operations.

4.3.3 Implementing project-Based learning

With real or simulated enterprise projects as carriers, students are organized to complete the entire process from demand analysis and scheme design to implementation and verification in teams, cultivating their comprehensive application capabilities and teamwork spirit.

4.4 Building a high-level dual-qualified teaching team

Teaching staff is the key to the success of reform, and a strategy of internal training+external introduction+combination of full-time and part-time must be adopted.

Internal training establishes a plan for improving teachers' digital and intelligent capabilities, regularly organizing teachers to conduct practical training and visits in leading shipping enterprises and research institutions. Encouraging teachers to pursue doctoral degrees in digital and intelligent-related fields or participate in high-level training. Incorporating digital and intelligent teaching capabilities and scientific research achievements into the teacher assessment and evaluation system.

External introduction flexibly introduces senior engineers and technical experts from shipping enterprises and equipment manufacturers as industrial professors or part-time teachers to undertake the teaching of core courses, guide students' practical training, and participate in scientific research projects.

Joint construction co-builds teacher enterprise practice stations and enterprise expert studios with enterprises, forming a normalized mechanism for two-way exchange and promoting the in-depth integration of theory and practice.

4.5 Improving the Practical Teaching System

A practical teaching system featuring combination of virtual and real, internal and external linkage, and hierarchical progression is constructed. Basic level completes the preliminary cognition of basic skills and digital intelligent tools in on-campus laboratories. Comprehensive level conducts simulation training on complex systems and comprehensive tasks in the on-campus virtual simulation training center. Innovation level participates in real enterprise projects and carries out scientific research and innovation activities through the innovation practice bases co-built with enterprises. On-the-job level conducts on-the-job internships for more than half a year on intelligent ships or shore-based support centers of cooperative enterprises, fully integrating into real work

environments and realizing a seamless transition from student to professional.

4.6 Tracking Teaching Quality Evaluation

A dynamic, diversified, and full-process closed-loop teaching quality evaluation and feedback mechanism is established. Diversification of evaluation subjects introduces multiple evaluation subjects such as the government, industry, enterprises, and third-party evaluation institutions, changing the situation of single evaluation by schools. Comprehensiveness of evaluation content evaluates not only students' professional knowledge but also their digital and intelligent application capabilities, innovation capabilities, professional literacy, and sustainable development capabilities. Dynamism of evaluation process uses learning analytics technology to track and analyze students' learning process data, timely identifying problems and providing personalized interventions. Closed-loop of feedback Mechanism establishes a fast feedback channel for evaluation results, and uses the evaluation information to continuously improve the training program, curriculum content, teaching methods, and teaching staff construction, forming a positive cycle of evaluation-feedback-improvement-re-evaluation.

5. Conclusion

The wave of digital and intelligent shipping is irreversible. It is not only a challenge but also a historic opportunity for China's maritime education to achieve leapfrog development. the traditional and rigid seafarers training model can no longer meet the urgent demand for excellent seafarers in the new era. the new excellent seafarers training model proposed in this paper, which is led by the government-industry-enterprise-school collaborative education mechanism and covers six dimensions including curriculum, teaching, teaching staff, practice, and evaluation, is a systematic and forward-looking reform framework.

The successful construction and effective implementation of this model require the joint efforts and in-depth collaboration of the government, industry, enterprises, and schools. Only by breaking down barriers, integrating resources, embracing changes with an open mind, and promoting practice with innovative actions can we cultivate many excellent seafarers who understand both navigation and digital intelligence, are capable of both operation and management, and are rooted in the present while looking to the future. This high-quality talent team will be the fundamental guarantee for China's shipping industry to maintain core competitiveness in the digital and intelligent era and achieve transformation from following to keeping pace and even leading. It is also a solid cornerstone for China to accelerate the construction of a transportation power and a maritime power. Future research can further focus on the evaluation of the pilot application effects of this model in specific colleges and universities, as well as the specific operation paths and incentive policies of the collaborative mechanism among different stakeholders.

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Research on Establishing Crisis Management Mechanisms for Sudden Emergencies in the Tourism Industry

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Abstract: As an economic sector, the tourism industry encounters more arduous challenges than other industries when dealing with abrupt crises. Through an examination of the characteristics of sudden tourism crises, this paper puts forward a theoretical framework for establishing an early - warning mechanism for such crises. Its objective is to offer references and guidance for addressing sudden tourism crisis events.
Keywords: Tourism crisis; Management mechanism; Wenchuan earthquake

1. Concept and Characteristics of "Sudden Crisis"

1.1 Concept of Sudden Crisis

The concept of "crisis" has its roots in the Greek language. As social sciences have advanced, the comprehension of the fundamental nature of crisis diverges among distinct disciplines. the World Tourism Organization (WTO) delineates crisis as "an unforeseen incident that undermines travelers' confidence in a tourist destination and interrupts its regular operations. Such incidents can manifest in an infinite array of forms over an extended period. "

This paper focuses on sudden crises. Consequently, from the perspective of this research, a sudden tourism crisis is defined as follows: (1) From the perspective of the tourism destination, a sudden tourism crisis is an unforeseen incident that disrupts the normal functioning of a tourism destination. (2) From the perspective of travelers, an abrupt tourism crisis pertains to sudden occurrences that have actual or potential effects on travelers' physical and psychological well - being. These events exceed travelers' tolerance limits and undermine their travel experience.

1.2 Characteristics of Sudden Crises

American scholar Kathleen Feam - Banks delineates the characteristics of sudden crises via "crisis communication" as follows:

Urgency: Sudden crises are generally unforeseeable, manifesting when individuals are ill - prepared. Once initiated, they exert a rapid influence on socioeconomic systems and continuously intensify. Consequently, governments and relevant institutions are compelled to take prompt action within the shortest feasible period after the emergence of a crisis.

Uncertainty: the abruptness of crises renders people ill - equipped, inherently endowing them with an uncertain nature. the timing, location, and severity of their impact are incalculable.

Broad Scope of Influence: Crises generally result in direct material and economic losses, and in some cases, can completely devastate the affected regions. the urgency of addressing sudden crises often leaves inadequate time for timely resolution, thereby leading to an expansion of the damage.

1.3 The Cycle of Sudden Tourism Crises

Sudden tourism crises typically progress through five distinct phases from their onset to resolution, thus completing a full lifecycle. At each stage, the crisis inflicts varying degrees of damage on the tourism system.

1.3.1Latent Development Phase

This phase denotes the period during which a crisis commences to brew and gradually takes form. Throughout this stage, crisis - inducing factors accumulate steadily until tangible losses come into being, which signifies the shift to the subsequent stage. This process

epitomizes the transformation from quantitative change to qualitative change. Simultaneously, although harm is not entirely absent during this quantitative phase, its influence remains at a relatively low level, demonstrating a certain degree of latency that renders it arduous to detect. Nevertheless, certain precursors are inevitably present.

1.3.2Manifestation and Outbreak Stage

This stage refers to the period during which the tourism crisis transitions from a latent state to an overt one and spreads rapidly. By the time tourism organizations clearly recognize the "crisis, " it has fully manifested and broken out comprehensively. the severity of the harm increases significantly, causing substantial damage to tourism entities and individuals within an extremely short period. This damage deepens and accumulates rapidly.

1.3.3 Persistence and Evolution Stage of the Tourism Crisis

The tourism crisis persists in its development or exacerbation, albeit at a decelerated evolutionary pace, gradually attaining the apex of its destructive potential. In comparison with the Manifestation and Outbreak Stage, the severity of the tourism crisis continues to intensify, and its scope of harm broadens, directly threatening the viability of tourism organizations and delivering an all - encompassing blow to the tourism system.

1.3.4 Resolution and Mitigation Stage of the Tourism Crisis

The severity of the tourism crisis commences to decline from its peak, with contradictions and conflicts gradually abating and the crisis situation alleviating. During this period, the crisis is effectively managed, and the tourism system initiates comprehensive restoration. Nevertheless, restoring the system to its pre - crisis state from the incurred damage still necessitates time.

1.3.5 Resolution and Dissipation Phase

The resolution and dissipation phase commences when the factors inducing the tourism crisis are eradicated, and the tourism system starts to revert to its initial or normal state. the severity of the crisis attains its lowest level and gradually fades away. This signifies the conclusion of the tourism crisis lifecycle.

1.4 Analysis of Factors Influencing Tourism Crises

Sudden tourism crises predominantly affect tourism development through three key factors: safety factors, socioeconomic factors, and material factors. Safety factors pertain to the risks presented by the uncertainties inherent in tourism crises to both actual and expected travel safety. From a psychological standpoint, the need for safety is a basic human necessity for tourists, directly affecting their travel intention, motivation, and evaluation of the travel experience. Socioeconomic factors refer to the economic and social upheavals triggered by sudden crises, which may change the economic development levels of tourist source markets and the disposable income of visitors, thus leading to fluctuations in their travel ability and willingness. Material factors refer to the substantial damage that sudden tourism events frequently cause to tourism resources and infrastructure, decreasing destination accessibility and resource quality, which in turn has an impact on tourism demand.

2. Related Literature Research

Tourism scholars have carried out progressively in - depth explorations into diverse facets of crisis management within the tourism industry. An analysis of the extant literature reveals that the primary foreign research on tourism crises and crisis management can be classified into two categories: case studies scrutinizing the tourism industry's responses and management strategies towards specific types of crisis events, and fundamental theoretical research on tourism crisis management.

Fundamental research in the realm of tourism crisis management involves investigations into the characteristics of the tourism industry and visitors' perceptions of safety. the research on the crisis management mechanisms deliberated in this paper is still scarce. the representative viewpoints mainly concentrate on the strategic approaches to crisis management, especially communication strategies, which are given the greatest emphasis. the majority of scholars highlight the significance of effective communication during organizational crises. Young & Montgomery (1998) also underscore marketing communication when taking other consumer - related aspects into account. Nevertheless, based on Cammisa's (1993)

observation of the Florida Tourism Board's response to Hurricane Andrew in 1992, this approach runs the risk of over - reaction, potentially yielding counterproductive consequences. Subsequent research increasingly centers on communication outcomes, such as the characteristics of tourism crisis management (Barton, 1994), post - crisis marketing strategies (Pottorff & Neal, 1994), management strategies (Sonmze, Apostolopoulos & Tarlow, 1999), or crisis handling recommendations (WTO, 2003). Additional studies explore the systematic classifications of criminal and disruptive activities directed at tourists (Pizam 1999).

An analysis of domestic and international literature indicates that research on tourism crises is generally time - restricted. Specifically, it consistently attracts academic attention after crises that exert a substantial influence on the tourism industry, with these events being employed as case studies. the majority of domestic literature focuses on the post - SARS era, and there have been relatively few recent publications. Consequently, this study posits that research on tourism crises, especially unconventional ones, should be continuous and incremental, transcending the immediate aftermath of a crisis.

3. Theoretical Framework of the Early - Warning Mechanism for Tourism Crises

3.1 Pre - Crisis Early - Warning Mechanism

This mechanism aims to eliminate tourism crises at their incipient stage during the latent development period. It is a crucial element that is currently absent from tourism crisis management systems and needs to be established urgently. For example, during the Wenchuan Earthquake in Sichuan on May 12, the early - warning function was mainly manifested in the following two aspects:

3.1.1Establishing Emergency Crisis Prevention Task Forces

In the aftermath of the Wenchuan earthquake, regions actively engaged in disaster - relief endeavors. the crisis - prevention leadership teams established during the relief phase played a guiding role in the prevention and management of future sudden crises. Proactively establishing crisis research and prevention teams, combined with routine tourism management centered on prevention and inspection, facilitates the most rapid response to sudden crises, thus minimizing their impact on the tourism industry.

3.1.2Enhancing Communication across All Links

Tourism is a comprehensive industry marked by high sensitivity and vulnerability. In daily management, it is necessary to promptly collect diverse safety - related information, especially information regarding weather, geological conditions, and hotel safety. All tourism - related information should be acquired in a timely fashion, reported through all hierarchical levels, and communicated actively and comprehensively. Safety information relevant to tourism should be promptly reported to superior authorities and relevant entities to ensure effective crisis prevention.

3.2 Response Mechanisms in Tourism Crises

In the event that early - warning management proves ineffective during the latent phase, the tourism crisis progresses to its second lifecycle stage: manifestation and outbreak. At this juncture, crisis management transitions to rapid - response mechanisms, which are designed to curtail the spread of the crisis and alleviate its adverse impacts on tourism development within the shortest feasible period. This phase primarily focuses on minimizing the consequences for tourists and entails the systematic integration of rapid - response institutions, procedures, resources, and the corresponding legal frameworks.

3.2.1Strengthening Early - Warning Mechanisms for Sudden Crises

When an unforeseen crisis occurs, tourism administrative authorities shall promptly evacuate tourists, carry out preliminary reporting, analysis, and assessment of the crisis, issue warning signals to all tourist destinations, and disseminate information and warnings via media channels such as television, radio, and newspapers.

3.2.2Swift Activation of Emergency Response Plans

After issuing crisis warnings, scenic spots, hotels, and travel agencies should collaborate to facilitate tourist evacuation, rescue operations, or restrict non - local tourists from entering the area during the crisis.

3.2.3Emergency Communication

During crises, communication between the tourism industry and all relevant departments and units must be enhanced. It is necessary to continuously collect and report the losses suffered by the tourism industry due to the crisis, understand the situation, and enable relevant departments to implement appropriate crisis management measures.

3.2.4Post-Crisis Recovery Mechanism

As the tourism crisis gradually abates and ultimately dissipates, crisis management enters a new phase centered on recovery. This phase encompasses three crucial aspects: Firstly, government support. In the process of post - crisis tourism reconstruction, it is necessary to seek substantial backing and active assistance from government departments. This was particularly manifested in the response subsequent to the Sichuan earthquake: After the disaster, the government prioritized the recovery and reconstruction endeavors in the affected regions, designating tourism as the leading and advantageous industry for post - earthquake reconstruction in Sichuan. Additional investment was channeled into improving tourism facilities and service standards to promote the development of tourism enterprises.

4. Conclusion

This study takes the tourism crisis in Sichuan during the May 12 Wenchuan Earthquake as its primary research object. It summarizes and analyzes the crisis response process of tourism destinations in the face of sudden tourism crises, and proposes theoretical frameworks for relevant crisis response mechanisms. the purpose is to offer valuable references for effectively handling and managing future crises.

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Research on the Cultivation of Reading Teaching Design Ability of English Teacher Students Based on Core Literacy

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Abstract: This study adopts the four core competencies—language proficiency, cultural awareness, critical thinking, and learning ability—as outlined in the Compulsory Education English Curriculum Standards (2022 Edition). Grounded in Shandong Province's English classroom practices, it explores pathways to develop reading instructional design capabilities among teacher trainees. By analyzing the correlation between regional teaching conditions and teacher education programs, the research proposes a tripartite cultivation model integrating theory, practice, and evaluation. This approach aims to enhance trainees' competency in designing literacy-focused reading instruction, thereby providing essential pedagogical support for advancing basic education reform.

Key words: Core Literacy; English Teacher Trainees; Reading Teaching Design; Shandong Region; Curriculum Standards

1. INTRODUCTION

With the implementation of the Compulsory Education English Curriculum Standards (2022 Edition), English teaching has shifted from knowledge transmission to competency development. As the core component of language acquisition, reading instruction should focus on cultivating students' comprehensive literacy. Shandong Province, a major educational hub, has actively explored reforms in recent years, yet challenges persist including monotonous teaching models and insufficient cultural awareness integration. For future teachers—English majors—their instructional design capabilities directly impact the effectiveness of competency cultivation. This study aims to establish a reading pedagogy training system aligned with core competency requirements, tailored to Shandong's practical context.

2. THEORETICAL CORRELATION BETWEEN CORE LITERACY AND READING TEACHING DESIGN

2.1 Analysis of the Connotation of Core Literacy

The four core competencies in English education form an interconnected ecosystem, each dimension reinforcing the others to foster holistic development. Language proficiency, as the foundational pillar, involves not only decoding words and grammar but also constructing meaning in context. It enables students to extract information, interpret emotions, and grasp logical relationships in texts—skills essential for engaging with complex discourses. For instance, understanding the syntax of a scientific article on environmental protection allows students to follow the author's argument, which in turn supports the development of critical thinking.

Cultural awareness transcends surface-level facts about foreign customs; it entails recognizing value systems embedded in language. Through reading, students compare cultural perspectives—such as individualism vs. collectivism in family-themed texts—and develop a balanced worldview. This dimension is inherently linked to language proficiency: mastering terms like "filial piety" or "community spirit" requires understanding their cultural roots to use them appropriately.

Critical thinking, often overlooked in traditional reading classes, involves analyzing text structure, evaluating evidence, and challenging assumptions. It transforms passive reading into an active process: students learn to identify bias in news reports or trace cause-effect chains in narratives. This

competency relies on strong language proficiency to unpack complex arguments and cultural awareness to contextualize differing viewpoints.

Learning ability serves as the enabling mechanism, equipping students with strategies like skimming for gist, scanning for details, and self-monitoring comprehension. It empowers them to navigate unfamiliar texts independently, turning reading into a lifelong skill. This competency synergizes with the others: strategic readers can better decode language, recognize cultural nuances, and think critically about content.

2.2 Core Elements of Reading Teaching Design

Core competency-oriented reading design hinges on three interdependent elements: thematic context integration, multi-dimensional activity sequencing, and formative assessment alignment.

Thematic contexts, as defined by the 2022 Curriculum Standards, provide a unifying framework for literacy development. For example, the theme "Man and Nature" can anchor a unit on Wild Animals, where texts are selected not only for linguistic appropriateness but also for their potential to foster ecological awareness. Teachers might pair a scientific article on endangered species with a folk tale about animal conservation from Shandong's Yi ethnic minority, linking global issues to local culture.

Activity sequencing should progress from language decoding to higher-order thinking. In the Wild Animals unit, initial activities could involve matching animal images to descriptive paragraphs (language proficiency). Intermediate tasks might require analyzing graphs on habitat loss (critical thinking), while advanced activities could involve debating "human responsibility for biodiversity" (cultural awareness, as students compare Eastern and Western conservation ethics). Each activity builds on prior skills, ensuring cumulative development.

Formative assessment must mirror the multi-dimensional nature of core competencies. Instead of relying solely on comprehension quizzes, teachers might use rubrics evaluating: (1) language accuracy in summaries, (2) depth of cultural insights in reflections, (3) logical rigor in arguments, and (4) strategy use (e. g., note-taking). This alignment ensures assessment drives instruction toward holistic literacy.

3. THE CURRENT SITUATION AND CHALLENGES OF ENGLISH READING TEACHING IN SHANDONG

3.1 Breakthroughs in Teaching Practice

Shandong's educational reforms have yielded innovative models that bridge core competencies and classroom practice, offering valuable insights for teacher training.

Heze Shanxian No. 2 Middle School's "immersive questioning" model exemplifies critical thinking integration. the model structures reading lessons into three phases: pre-reading "provocative questions" (e. g., "Why does the author describe wolves as both fearsome and noble?"), during-reading "inquiry chains" (e. g., "How does the setting influence the protagonist's decision?"), and post-reading "transfer tasks" (e. g., "Design a campaign to protect local wildlife"). A 2024 school report showed this approach increased students' ability to identify text biases by 42% and improved argumentative essay scores by 35%—metrics aligned with the 2022 Standards' emphasis on analytical thinking.

Taian No. 3 Middle School's VR integration demonstrates technology-enhanced language proficiency. In teaching Ancient Civilizations, students use VR headsets to "explore" historical sites while completing reading tasks: identifying architectural terms in descriptions of the Great Wall, comparing Chinese and Egyptian construction techniques (cultural awareness), and predicting how ancient trade routes influenced language exchange (critical thinking). A survey of 300 students found 89% reported improved contextual understanding, with vocabulary retention rates rising by 27% compared to traditional lectures.

Jinan Shengli Avenue Primary School's AI-driven evaluation system addresses personalized learning. the platform analyzes students' oral reading for fluency and comprehension responses for reasoning depth, generating dashboards for teachers. For example, if data shows 70% of students struggle with inferential questions, teachers can design targeted activities like "clue hunts" in texts. This data-informed approach reduced the achievement gap between high and low performers by 18% in one academic year,

embodying the standards' focus on differentiated instruction.

3.2 Existing Problems and Bottlenecks

Despite progress, systemic gaps persist, hindering full realization of core competencies.

Language proficiency remains fragmented: A 2024 survey by Shandong Provincial Institute of Education found 78% of classroom questions focus on recall (e. g., "What is the main character's name?"), while only 6% require analysis (e. g., "Why does the author switch from past to present tense?"). This overemphasis on discrete skills leaves students unable to use language creatively—for example, 63% of middle schoolers struggle to paraphrase complex sentences, a key indicator of contextual competence.

Cultural awareness integration lacks intentionality. Interviews with 50 rural teachers revealed 82% view cultural teaching as "supplementary, " often adding brief notes on festivals or food without linking to values. A case study in Liaocheng found students misinterpreted a text about "dragon dances" by equating Western dragons (evil) with Chinese dragons (auspicious), reflecting shallow cultural decoding.

Critical thinking training is superficial. Most reading tasks focus on information extraction (e. g., "List three causes of pollution"), with few requiring evaluation. A 2023 analysis of 100 lesson plans from Yantai showed only 12% included activities like "challenging the author's assumptions"—a gap that leaves students ill-equipped to navigate complex texts.

Learning strategy instruction is inconsistent. While urban schools teach skimming and scanning, 68% of rural teachers in Dezhou report never explicitly teaching strategies. As a result, 59% of rural students admit to "reading every word slowly, " lacking efficiency—a barrier to independent learning emphasized in the 2022 Standards.

4. CULTIVATION PATHS FOR ENGLISH TEACHER TRAINEES' READING TEACHING DESIGN ABILITY

4.1 Curriculum System Reconstruction: Integration of Theory and Practice

Reforming teacher education curricula to prioritize core competencies requires structured, contextually relevant modules.

Core competency-themed courses should blend theory and local practice. "English Core Competencies and Reading Instruction" could use Shandong cases—like Tai'an's VR lessons—to unpack how technology fosters language proficiency. "Text Analysis" courses might focus on regional texts, such as analyzing Confucian classics in English to teach cultural awareness. These courses align with the 2022 Standards by grounding abstract concepts in familiar contexts.

Project-based learning (PBL) connects university training to K-12 classrooms. Trainees collaborate on "Shandong cultural reading units": for example, designing lessons on Confucianism using the Analects excerpts, where students compare "ren" (benevolence) with Western notions of kindness (cultural awareness), analyze argument structures (critical thinking), and present summaries (language proficiency). Partnering with local schools, trainees pilot these units, receiving feedback from in-service teachers—ensuring designs are classroom-ready.

4.2 Teaching Ability Improvement: Technology Empowerment and Strategy Innovation

Trainees must master tools and strategies that address Shandong's diverse educational contexts.

Digital literacy training should focus on adaptable technology use. In university labs, trainees practice: (1) Using VR to create virtual field trips for urban students (e. g., exploring Qingdao's ports while reading about international trade), (2) Adapting VR content into low-tech alternatives for rural schools (e. g., using maps and role-plays), and (3) Interpreting AI-generated data to adjust tasks. This ensures trainees can leverage technology without relying on it exclusively.

Differentiated design training responds to Shandong's urban-rural divide. Trainees learn to create tiered tasks for the same text—Body Language, for example:

Foundation: Match gestures to meanings (e. g., "thumbs up" in China vs. Nigeria) to build vocabulary.

Advanced: Analyze how cultural values shape gestures (e. g., collectivism vs. individualism) to foster critical thinking.

Extension: Role-play "international business meetings" to practice appropriate nonverbal communication, integrating all competencies.

4.3 Optimization of Evaluation System: Formative Assessment and Reflection

A multi-faceted evaluation model ensures trainees develop design capabilities that align with core competencies.

The three-dimensional rubric includes:

Design alignment: Does the lesson integrate all four competencies? For example, a plan for Wild Animals might score highly if it combines vocabulary practice (language), ecological ethics (culture), cause-effect analysis (critical thinking), and note-taking guidance (learning ability).

Implementation quality: Trainees' micro-teaching is assessed on interaction depth (e. g., 5+ open-ended questions) and strategy modeling (e. g., demonstrating how to infer meaning from context).

Student impact: Simulated student work (e. g., essays, debates) is evaluated using the 2022 Standards' literacy benchmarks.

Reflective practice is institutionalized through "teaching logs" where trainees analyze gaps: for example, a rural placement might reveal over-reliance on technology, prompting revisions using local resources like folk stories. This mirrors Shandong's emphasis on contextually responsive teaching.

5. CONCLUSION

The "theory-practice-evaluation" model offers a systematic and targeted framework to address the disconnection between teacher training and classroom needs in Shandong, effectively enhancing English teacher trainees' ability to design reading instruction rooted in core competencies. By integrating theoretical insights with regional practices, adapting technology to diverse educational contexts, and refining evaluation to align with literacy goals, the model ensures core competencies are translated into tangible teaching strategies.

Future efforts will deepen three areas:

Strengthening university-primary/secondary school collaboration through "dual-mentorship" programs, exposing trainees to both urban and rural classrooms to foster adaptive design skills.

Developing a Shandong cultural reading resource bank featuring Confucian classics, Yellow River narratives, and local intangible cultural heritage, linking regional identity with language proficiency and cultural awareness.

Establishing longitudinal tracking of trainees' post-employment design capabilities and their impact on students' reading literacy, providing empirical evidence for sustained improvement.

This research not only supports Shandong's reform but also offers actionable insights for building a core competency-oriented teacher education ecosystem nationwide.

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Exploration of Applying Negative Poisson's Ratio Structure to Contact Wire Dropper

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Abstract: As a connecting component between the messenger wire and the contact wire, the contact wire dropper plays a role in maintaining the spatial position of the contact wire and bearing part of the electrical load. However, due to its complex stress conditions, the dropper often experiences failure. Preparing a three-dimensional ordered negative Poisson's ratio structure using high-performance fiber-reinforced composite materials as the base material has the potential to enhance its specific stiffness and specific strength properties. This paper mainly investigates the experimental samples of droppers prepared using the interlocking assembly process of non-additive manufacturing technology. the uniaxial compression test is employed to study the negative Poisson's ratio performance of the structure, exploring whether the dropper prepared by this method exhibits a negative Poisson's ratio effect. the results indicate that the negative Poisson's ratio property of the three-dimensional concave negative Poisson's ratio structure of composite materials is more pronounced than that of metal structures with the same configuration.

Keywords: Negative Poisson's Ratio; Ordered Porous Structure; Dropper

1. INTRODUCTION

The overhead contact system (OCS) is one of the important components of the electrified railway power supply system. the dropper, as a key connecting component between the messenger wire and the contact wire, is generally composed of copper stranded wire and its accessories. It plays a role in maintaining the spatial position of the contact wire and bearing part of the electrical load, and is a key component of the OCS for high-speed railways. the high-speed movement of the pantograph sliding and current collection causes the OCS to bear mobile and impact loads. Although the dropper effectively mitigates the reciprocating vibration of the contact wire caused by the pantograph, it also bears the bending and tensile stress brought by the cyclic reciprocating vibration during this process. the dropper is exposed to complex load conditions of random and frequent vibration for a long time, and the dropper gradually exhibits phenomena such as broken wires, broken strands, and even complete breakage. This will lead to the failure of the dropper, thereby threatening the safe operation of railway locomotives.

Poisson's ratio was first discovered and proposed by the French scientist Poisson (1781-1840). Poisson's ratio, also known as the transverse deformation coefficient, is mathematically expressed as the negative of the ratio of transverse strain (εx) to longitudinal strain (εy)[1]. Poisson's ratio is used to represent the transverse deformation characteristics of a material under uniaxial stress. Positive Poisson's ratio materials are quite common. Simply put, they exhibit the phenomenon of compression expansion and tension contraction in structures under uniaxial compression (tension)[2]. In 1982, Frost et al. [3] first pointed out that certain materials with cellular structures can exhibit negative Poisson's ratio effects during deformation. Since then, negative Poisson's ratio materials and structures have entered people's field of vision, and a large number of negative Poisson's ratio materials and structures have been discovered and created. In recent years, negative Poisson's ratio materials and structures have been applied in many fields. In the medical field, they can be used to develop intelligent esophageal stents [4] and vascular stents [5], etc. In the

production and daily life fields, negative Poisson's ratio materials can be used to make nails [6], cushion helmets [7], etc.

Structures with negative Poisson's ratio exhibit unique mechanical properties, including shear resistance [8-9], indentation resistance [10-11], fracture resistance [12], surface isotropy, and energy absorption [13]. Studies have shown that for materials with negative Poisson's ratio, their shear modulus is higher than their bulk modulus, and their shear resistance is significantly influenced by their tensile and compressive properties. When the material is subjected to axial compression, due to the negative Poisson's ratio effect, the material flows towards the center, leading to an increase in instantaneous density and an improvement in the instantaneous elastic modulus, thereby enhancing the structural rigidity. In addition to overall rigidity, materials with negative Poisson's ratio also demonstrate stronger resistance to deformation under local loads compared to materials with positive Poisson's ratio, exhibiting the ability to resist local deformation and surface indentation. the porous medium characteristic of materials with negative Poisson's ratio provides greater deformation space during material compression, making them suitable for application in crashworthy structural absorption, where they can provide a more stable and efficient energy absorption process. Metamaterials exhibiting negative Poisson's ratio typically exhibit physical properties such as light weight, high damping, sound absorption, and thermal insulation.

This article utilizes dropper test samples prepared using non-additive manufacturing technology's interlocking assembly process. the interlocking assembly process for preparing three-dimensional concave negative Poisson's ratio structures and the stacking assembly process for preparing three-dimensional double-arrow negative Poisson's ratio structures have been developed, resulting in the preparation of metal and composite three-dimensional concave negative Poisson's ratio structures as well as composite three-dimensional double-arrow negative Poisson's ratio structures. the results indicate that the negative Poisson's ratio properties of composite three-dimensional concave negative Poisson's ratio structures are more pronounced than those of metal structures of the same configuration.

2. THREE-DIMENSIONAL CONCAVE STRUCTURE WITH NEGATIVE POISSON'S RATIO

Compared to additive manufacturing methods, the interlocking assembly method offers distinct advantages, such as low surface roughness of structural rods and regular cross-sectional shapes. Additionally, the interlocking assembly method is applicable to any bondable or weldable material, and there are no restrictions on structural dimensions.

The three-dimensional concave negative Poisson's ratio structure studied in this paper is derived from the two-dimensional concave hexagonal honeycomb structure. the three-dimensional concave negative Poisson's ratio structure can be regarded as composed of many umbrella-like structural units (as shown in Figure 1) in a special way. the folding and unfolding of the umbrella-like structural units can be regarded as the mechanism that causes the structure to exhibit negative Poisson's ratio properties. the unit cell of the three-dimensional concave negative Poisson's ratio structure is shown in Figure 2).

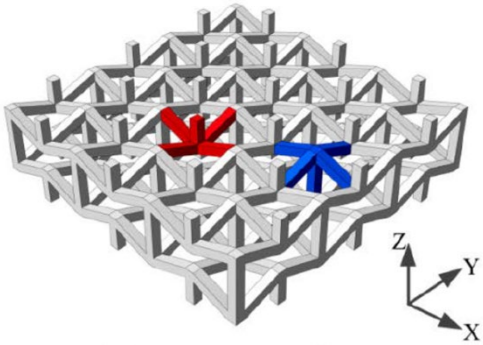

Fig. 1 3D re-entrant auxetic structure, and umbrella shaped elements

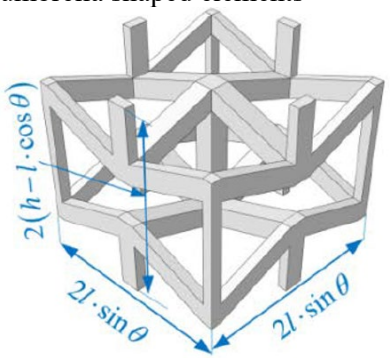

Fig. 2 The unit cell of the 3D auxetic structure and its dimensions

In the interlocking assembly process, we disassemble the three-dimensional concave structure with negative Poisson's ratio into four types of two-dimensional concave components, and name these four concave components as Part-1, Part-2, Part-3, and Part-4, (as shown in Figure 3). From the figure, it can be seen that Part-3 and Part-4 are respectively half of Part-1 and Part-2. To facilitate the assembly of the outermost components, simple modifications were made to these four components. Small blocks were added at the notches on both ends of the components as plugs (as shown by the blue small blocks in Figure 4), which facilitates the fixation of the outermost components. Since the concave components are all two-dimensional, traditional simple processing methods (such as stamping, cutting, and other processing methods) can be used to process these concave components.

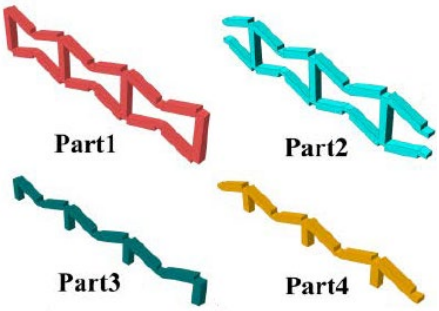

Fig. 3 The four types of 2D re-entrant parts

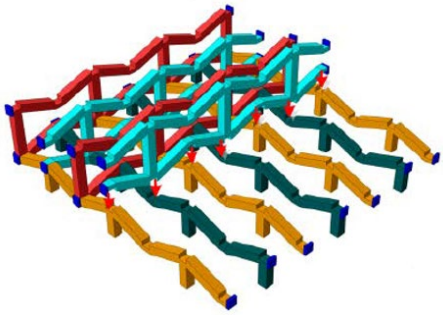

Fig. 4 Process of interlocking

The interlocking process of the interlocking assembly technique is shown in Figure 4. First, align Part-3 and Part-4 in parallel and alternating arrangement serves as the foundation for structural interlocking assembly. the distance between the previous and subsequent components is equal to the distance between two adjacent interlocking slots, ensuring that the interlocking slots on Part-3 and Part-4 are perfectly suited for the interlocking of the components in the next layer. After the foundation of the interlocking assembly is completed, Part-1 and Part-2 are used to continue the interlocking of the next layer. Part-1 and Part-2 are also parallel and interlocked alternately, as shown in Figure 4. Once a layer of interlocking assembly is completed, subsequent layers are interlocked in the same manner based on the already interlocked layer. When the structure is interlocked to the required number of layers (the number of unit cells in the height direction), Part-3 and Part-4 are inverted for interlocking to complete the capping of the entire structure. During the interlocking assembly process, adhesive or brazing material is applied to the interlocking slots. After the interlocking is completed, the interlocked components will become a complete three-dimensional concave negative Poisson's ratio structure after the adhesive cures or the brazing process is completed. Comparing the initially designed three-dimensional concave negative Poisson's ratio structure (Figure 5) with the structure prepared by the interlocking assembly process (Figure 6), it can be found that the small blocks added at both ends of the components do not significantly change the shape of the structure, nor do they significantly affect the performance of the structure.

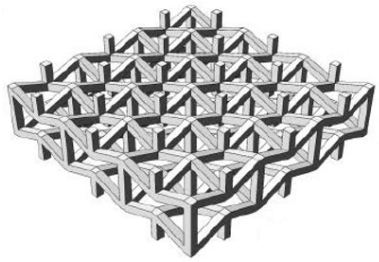

Fig. 5 The 3D re-entrant auxetic structure

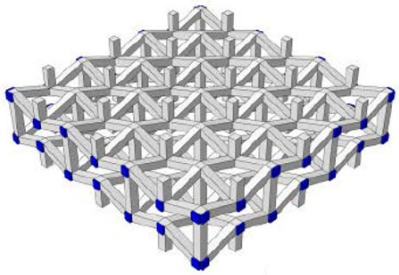

Fig. 6 The assembled 3D re-entrant auxetic structure

3. UNIAXIAL COMPRESSION TEST

The uniaxial compression test was conducted in accordance with ASTM C365 standard,

utilizing an Instron 5569 universal material testing machine with a crosshead loading rate of 0.1 mm/min. Similar to the strain measurement method employed by Schwerdtfeger, during the loading process, the strain of the structure along the direction of the applied compressive load and the strain perpendicular to the load direction were measured using a laser extensometer (model: LE-05, EIR Ltd., Irwin, PA, used in conjunction with a laser reflective strip). the deformation in the uniaxial compression test was limited to $\varepsilon_y \leqslant 0.001$ to ensure that the deformation of the structure remained within the linear elastic range, which is sufficient for studying the equivalent compression modulus and Poisson's ratio properties of the structure.

4. CONCLUSION

The negative Poisson's ratio property of the three-dimensional concave negative Poisson's ratio structure in composite materials is more pronounced than that of metal structures with the same configuration. Additionally, unlike the three-dimensional concave negative Poisson's ratio structure with isotropic homogeneous base material, for the three-dimensional concave negative Poisson's ratio structure with anisotropic base material, its negative Poisson's ratio property is not only related to the geometric parameters of the structure but also to the properties of the base material. Furthermore, the three-dimensional concave negative Poisson's ratio structure in composite materials shows the potential for higher specific stiffness.

Because fiber-reinforced composites can significantly enhance the specific stiffness, specific strength, and lightweight characteristics of structures, research on the three-dimensional negative Poisson's ratio structure of fiber-reinforced composites holds significant scientific research and engineering application value. Combining the high specific stiffness, high specific strength, and lightweight characteristics of fiber-reinforced composites with the unique properties of negative Poisson's ratio structures can open up vast application prospects.

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The Impact of Positive Psychology-Based Health Qigong Teaching on University Students' Positive Psychological Qualities

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Abstract: This study is grounded in the emerging trend in China advocating for the cultivation of university students' positive psychological qualities to prevent psychological issues. Taking Health Qigong instruction in higher education as the entry point and fostering students' positive psychological qualities as the direction, it integrates advanced concepts and methods from positive psychology into the practical teaching process of Health Qigong classes. the aim is to explore Health Qigong teaching designs based on positive psychology concepts, investigate their effectiveness in promoting the development of students' positive psychological qualities and their practical application value. It is hoped that this study will provide new ideas and practical foundations for Health Qigong teaching in Chinese universities, offer a beneficial supplement to traditional Health Qigong instruction, provide practical experience for the application of positive psychology in the field of physical education, and furnish new approaches for cultivating university students' positive psychological qualities, effectively enhancing their mental health levels, and promoting their comprehensive physical and mental development.

The study involved 51 students from the Health Qigong elective class of the 2024 cohort at a Chinese university as experimental subjects. Utilizing research methods including literature review, questionnaires, expert interviews, teaching experiments, and mathematical statistics, it integrated positive psychology concepts into university Health Qigong teaching, considering the characteristics and content of the Health Qigong program. Targeted physical education teaching activities designed to cultivate various positive psychological qualities were incorporated into the teaching process. Differences in psychological indicators reflecting positive psychological qualities between the experimental and control classes were tested before and after the teaching experiment. the analysis explored the effectiveness of Health Qigong teaching based on positive psychology concepts in fostering university students' positive psychological qualities. the study yielded the following conclusions:

1. Compared to traditional Health Qigong teaching, teaching based on positive psychology concepts better promotes the development of university students'positive psychological qualities across the five dimensions of interpersonal skills, courage, wisdom&knowledge, justice, and transcendence. However, regarding the temperance dimension, there was no significant difference between the two teaching methods.

2. Health Qigong teaching based on positive psychology concepts is more conducive to university students'acquisition of positive emotional experiences and the enhancement of their level of subjective well-being.

3. Comparative analysis of post-experiment Health Qigong theory and technical assessment scores between the two groups revealed that, compared to traditional Health Qigong teaching, teaching based on positive psychology concepts resulted in better improvement in the standardization and accuracy of Health Qigong technique mastery among the participating university students, as well as higher echnical

assessment scores. However, regarding theory assessment scores, there was no significant difference between the two teaching methods.

The innovation and contribution of this study lie in its grounding in the emerging trend in China advocating for the cultivation of university students' positive psychological qualities to prevent psychological issues. Taking Health Qigong instruction as the entry point and applying the concepts of positive psychology, the study aimed specifically at fostering students' positive psychological qualities. It conducted a purposefully designed and systematically implemented teaching experiment to conduct an in-depth investigation into cultivating these qualities in university students. This work enriches and innovates, to some extent, the approaches to cultivating university students' positive psychological qualities, while simultaneously providing novel perspectives and practical foundations for enriching and developing Health Qigong teaching methodologies.

Keywords: College students; Health QigongPositive psychology; Positive psychological quality; Teaching

1. Introduction

University represents a critical stage in the growth process. During this phase, students' physical development gradually nears completion, yet their psychological maturation remains incomplete. Survey findings indicate that the detection rate of psychological issues among university students is as high as 20%, highlighting an unoptimistic state of mental health. Furthermore, scholars note that while contemporary university students are open-minded and quick to embrace new things, they also grapple with significant real-world challenges such as strong dependency tendencies, heightened self-consciousness, excessive interpersonal stress, academic and life pressures, and intense employment and competitive pressures. These factors easily trigger negative emotions like inferiority, depression, and anxiety, leading to the emergence of various psychological problems. the existence of these mental health issues undoubtedly exerts negative impacts on individual development and societal progress. Therefore, greater emphasis must be placed on the mental health of university students, seeking effective pathways to enhance their psychological well-being through practical approaches. In response, the state has proposed a series of educational policies. These aim not only to cultivate contemporary university students with solid scientific and cultural literacy and good physical fitness but also to foster positive and healthy psychological qualities, thereby fundamentally preventing the emergence of psychological problems.

Physical education is a vital component of higher education. Since the Ministry of Education promulgated the Guidance Outline for Physical Education Curriculum in National Ordinary Higher Education Institutions in 2002, the importance of university physical education has been increasingly recognized. the document clearly stated: "Physical activities should be used to improve students' psychological state, cultivate a positive and optimistic outlook on life, and form sound psychological qualities, among other goals. "

These educational policies fully demonstrate the state's high level of importance attached to enhancing students' mental health and cultivating their positive psychological qualities through education. They represent an ongoing commitment to providing more beneficial conditions for the comprehensive physical and mental development of university students.

The Health Qigong course is a vital component of the university physical education curriculum. As a traditional ethnic sport emphasizing the practitioner's integration of "regulating the body, breath, and mind", it aligns with national objectives for physical education and shoulders the responsibility of promoting students' physical and mental health while carrying forward traditional Chinese culture.

Extensive research demonstrates that practicing Health Qigong not only enhances university students' mental health, fostering a positive and stable mindset, but also possesses therapeutic and stabilizing effects on existing psychological disorders. This underscores the distinct advantage of Health Qigong courses

in promoting students' psychological well-being. However, research remains relatively scarce on how to more effectively and targetedly cultivate specific positive psychological qualities during the Health Qigong teaching process itself.

Furthermore, scholars have pointed out issues within current Health Qigong instruction, including insufficient advancement, specificity, and practical effectiveness in teaching concepts, content, and methods. Teachers often overemphasize the rote instruction of technical movements, while classrooms frequently lack innovative approaches in physical education pedagogy. Activities involving physical games are rarely conducted, resulting in lessons lacking engagement, enjoyment, and participation. Consequently, problems such as monotonous teaching processes, the reduction of Qigong practice to mere gymnastic-like or martial arts-like drills, student fatigue during class, and distracted attention easily arise.

Such practices over time not only undermine the core "health-promoting" effect of Health Qigong but also negatively impact students' interest in the course. It becomes difficult for students to experience joy and relaxation or attain positive emotional experiences through their practice. Ultimately, this hinders the development of students' consciousness regarding physical exercise and the formation of sound psychological qualities.

Positive psychology emerged within the field of psychological research towards the end of the 20th century, gradually gaining visibility. Unlike traditional psychology, which focuses on assessing the psychological deficits of "problem individuals" and correcting or treating their psychological disorders, positive psychology studies the "average individual". It places greater emphasis on helping people discover their own potential and virtues, thereby achieving the goals of preventing the emergence and development of psychological problems, fulfilling their positive functions, and attaining a fulfilling life.

The tide of positive psychology has influenced various sectors of society. Education, which shoulders the responsibility of cultivating humanity's future, also began to reflect on the past and look towards the future. This led to a series of studies applying positive psychology concepts within the educational domain. Practice has demonstrated that positive psychology positively promotes students' mental health indicators, such as their level of optimism, sense of well-being (happiness), and resilience to setbacks (frustration tolerance).

Subsequently, the application of positive psychology in education became further refined. Scholars began applying it to specific subjects, such as Chinese language classes, English classes, music classes, physical education classes, and more. Relevant research has found that integrating positive psychology into physical education can effectively promote the generation of positive emotions and the development of positive psychological qualities among students, while reducing the occurrence of negative emotions like depression and anxiety. Simultaneously, it also positively contributes to students' mastery of motor skills and the improvement of their physical fitness.

Therefore, combining positive psychology with school education and physical education to cultivate students' positive psychological qualities has become a research hotspot within the context of higher education physical education, mental health education, and quality-oriented education. This context inspires us to explore whether applying the advanced concepts and methods of positive psychology to Health Qigong teaching in universities can better promote the development of university students' positive psychological qualities.

2. Methods

This study employed a single-blind experimental design to investigate the impact of Health Qigong teaching integrated with positive psychology principles on college students' positive psychological qualities. the experiment spanned 10 weeks (February 26 to May 24, 2025), comprising 40 class hours (two 90-minute sessions per week). Participants included 51 students from the 2018 Health Qigong elective class at Zibo Vocational Institute's Department of Medical Technology, all with no prior Qigong experience. They were divided into an experimental class (n=25, 18 male/7 female) receiving positive psychology-integrated instruction, and a control class (n=26, 20

male/6 female) following traditional teaching methods. Both classes learned Health Qigong: Yijin Jing using identical curricula and assessment protocols.

Data collection involved administering the Chinese Positive Psychological Qualities Scale for College Students (measuring 6 dimensions) and the Subjective Well-being Questionnaire (PANAS+SWLS) during pre-test (Week 1) and post-test (Week 10) phases. Technical performance was evaluated through double-blind instructor scoring (three assessors), while theoretical knowledge was tested via standardized written exams.

Statistical analyses confirmed initial homogeneity between groups using independent samples t-tests ($p > 0.05$). Intervention effects were analyzed via ANCOVA with pre-test scores as covariates, supplemented by t-tests for skill/theory assessments.

3. Results and Discussion

Experimental data show that Qigong teaching based on positive psychology significantly improved five core dimensions of college students' positive psychological qualities (interpersonal, courage, wisdom and knowledge, justice, transcendence) ($p < 0.05$), while enhancing subjective well-being (significant improvement in positive emotion dimension, $p = 0.017$). In terms of skill acquisition, the experimental class's Qigong exercise performance (90.92 ± 3.45) was significantly better than the control class (89.13 ± 2.15) ($p = 0.036$), but there was no inter-group difference in theoretical examination scores ($p > 0.05$).

This study verifies the promoting effect of integrating positive psychology concepts into Qigong teaching on college students' positive psychological qualities. Its effects are significantly manifested in the five dimensions of interpersonal, courage, wisdom and knowledge, justice, and transcendence, providing multi-dimensional corroboration with existing research in the field of physical education. In the interpersonal dimension, the experimental class's "mutual help" activity enhanced the ability to feel love ($p = 0.029$) and social intelligence ($p = 0.038$) through tactile empathy, echoing Lu Senlin's conclusion on Qigong group practice enhancing social connection, and consistent with Guan Tieyu's finding on the mechanism of physical contact promoting empathy arousal. the progress of the brave and persistent factor in the courage dimension ($p = 0.030$) confirms Xu Liang's argument that sports games cultivate fearlessness, while the "My Standing Stake Goal" activity (lesson 6) practiced Zhou Bin's sports multi-objective theory through goal ladder setting. the gains in creativity ($p = 0.035$) and curiosity ($p = 0.021$) in the wisdom and knowledge dimension verify Wang Shengjie's (2018) hypothesis that "Qigong flow state stimulates cognitive vitality, " and the "strength card" design in lesson 1 more dynamically practiced Meng Wanjin's scale theory. the improvement in leadership ($p = 0.001$) and team spirit ($p = 0.004$) in the justice dimension is consistent with Liu Qiaoling's experimental conclusions on role rotation in middle school physical education, highlighting the universal value of organizational coordination activities. the spiritual touch ($p = 0.031$) in the transcendence dimension strengthens Wan Yu's finding of "Qigong spiritual transcendence, " and the breath meditation design (lesson 13) is more deeply coupled with Zhang Liwei's mind-body integration theory. These findings collectively construct an empirical support network for the combination of Qigong as a carrier of traditional culture (Fang Yunfeng, 2021) and positive psychology, covering the core views of 15 studies including Zhao Yingying and Chen Beijin (2019).

However, the self-control dimension (tolerance, humility, prudence, self-control) did not show significant improvement ($p > 0.05$), which conflicts with Chen Beijin's (2019) swimming class, Li Jun's martial arts teaching, and Wang Xinbo's Tai Chi research.

4. Conclusions

In summary, the teaching experiment incorporating positive psychology principles into Qigong instruction partially achieved the expected outcomes. Compared to traditional Qigong pedagogy, this positive psychology-integrated approach demonstrated superior efficacy in enhancing students' interpersonal skills, courage, wisdom & knowledge, justice, and transcendence dimensions. It also directly contributes to improved mental health among college students. Additionally, beyond

psychological differences, students in the experimental class achieved higher average scores than the control group in both theoretical and practical assessments. This comprehensive outcome demonstrates the successful fulfillment of Qigong instruction objectives. Therefore, these findings suggest that integrating positive psychology principles as a novel instructional approach in university Qigong curricula merits further exploration and development.

Acknowledgement

My sincere appreciation goes to the seven experts who participated in interviews, whose invaluable guidance informed the selection of measurement scales, refinement of experimental design, and choice of statistical methods. I am deeply grateful to my affiliated institution for providing the facilities enabling this teaching experiment. Finally, my heartfelt thanks to all participating students whose engagement made this research possible.

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Causes and Countermeasures of Inferiority Complex in Physical Education Curriculum

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Abstract: **Adolescence marks a transitional period of psychological and physiological maturation, with this study focusing on the critical phase of psychological development during primary and secondary education. It examines how students' inferiority complex undermines the effectiveness of physical education (PE) teaching. Through a systematic analysis of its multifaceted causes, this research proposes targeted intervention strategies to address this issue.**
Keywords: **Physical Education; Inferiority Complex; Causes; Countermeasures**

1. INTRODUCTION

Inferiority complex, as an individual's negative cognitive experience of self-worth, usually stems from physical defects, psychological gaps, or biases in ability assessment, and is characterized by a systematic tendency to deny one's own abilities. In the context of physical education, adolescents with a tendency towards sports inferiority complex often exhibit avoidance of sports participation and a lack of self-efficacy in skill learning. This psychological state not only hinders their development of sports abilities but may also generalize into a cross-situational tendency of self-denial, exerting a negative radiating effect on the overall educational process.

Based on this, this study focuses on the generation logic and intervention paths of sports inferiority complex. By analyzing the interactive effects of students' subjective cognition, teachers' teaching behaviors, and social evaluation orientations, a multi-dimensional intervention model is constructed. the aim is to provide theoretical support for the reform of physical education, help physical education classes return to their essential positioning as a "field for cultivating a sound personality", and truly play their unique role in the quality education system.

2. CAUSES OF INFERIORITY COMPLEX IN PHYSICAL EDUCATION CLASSES

2.1 Deviation in Self-perception

In the context of physical education, students' self-perception is significantly influenced by both the external environment and internal thinking patterns. On one hand, individuals construct self-evaluations through the "social mirror" effect, that is, they rely on feedback from important others such as teachers and peers to define their own ability boundaries. When authoritative figures (such as teachers) provide negative evaluations based on a single criterion (such as the results of a sports skills test), students, due to the limitations of their cognitive development stage, may internalize such evaluations as stable self-judgments, forming a mistaken perception of "fixed ability". This external evaluation, through the psychological suggestion effect, gradually evolves into a restrictive belief about their own potential.

2.2 Negative Self-suggestion

During the process of skill acquisition, students generally exhibit a metacognitive predictive behavior, that is, they predict the possibility of task completion through self-efficacy assessment. When individuals form a low self-concept due to early negative experiences, this prediction often shows a negative bias, manifesting as a preset cognitive belief of "I may not be able to learn it". From the perspective of cognitive behavioral theory, this negative self-suggestion inhibits behavioral performance through dual pathways:

2.3 Self-esteem Issues Triggered by Physical and Psychological Traits

2.3.1 Physical Differences

Some students feel distressed due to their lack of height advantage, weak physical condition,

or certain physical defects. They are like children carrying invisible backpacks, always feeling inferior on the sports field. Whenever they see others leaping nimbly or running briskly, they involuntarily hunch their shoulders, even becoming cautious during warm-up activities. This "body anxiety" acts like a transparent membrane, isolating them from the joy of sports. Over time, physical education classes become a compulsory course that they have to endure with gritted teeth.

2.3.2 Hypersensitivity to Criticism

Children with low self-esteem seem to have a "criticism radar" in their ears. A teacher's comment like "Pay attention to the correct form" might be interpreted as "You can't do it right after all, " and an unintentional laugh from a classmate can stir up a storm in their hearts. They are like frightened birds, constantly on guard against evaluations from others, and might even imagine scenarios like "The whole class is watching me make a fool of myself. " This excessive sensitivity turns the sports field into a psychological minefield, where even an inadvertent glance can trigger an emotional explosion and halt their practice.

2.3.3 Obsession with Winning or Losing

For students with low self-esteem, competitions are a dangerous psychological game. They only choose to play against "soft targets" - they dare to participate only when the opponent is obviously weaker, as if this could preserve their dignity. If they encounter an opponent of equal strength, they either adopt a "I'm just playing casually" attitude or find various excuses to avoid participation. This "selective competition" stems from the fear of exposing their weaknesses through failure. They act like shrewd gamblers, always seeking to bet on sure wins, but in doing so, they miss many opportunities to break through their own limitations.

2.3.4 Interaction between Psychological Needs and Cognitive Biases

Students with sports-related self-esteem issues exhibit a typical cognitive-emotional contradiction: on one hand, due to low self-efficacy, they show withdrawal behaviors during skill acquisition, creating a vicious cycle of "self-doubt → behavioral inhibition → skill lag"; on the other hand, deep down, they still have a strong desire for positive evaluation. This contradictory psychology stems from the "need for belonging" in social measurement theory - even if self-evaluation is low, individuals still seek group recognition to maintain psychological balance. When teachers use process-based evaluation instead of outcome-based evaluation, it can effectively activate students' intrinsic motivation, but if the evaluation focuses on ability attribution, it will intensify their self-verification tendency.

2.4 Cumulative Effects of Setbacks

According to the Resilience Theory, moderate setbacks should be opportunities for accumulating psychological capital. However, when students lack effective coping strategies, a single failure experience may turn into a traumatic memory. the mechanism involves three stages: in the sports context, this "post-traumatic stress response" manifests as learned helplessness, causing individuals to lose their basic psychological resilience in the face of challenges.

2.5 Misconduct of Teachers' Roles

Schools, as important socialization fields for students, have an emotional support system with a family-like attachment function. According to attachment theory, teachers play the psychological role of "substitute parents, " and their words and deeds directly influence students' self-concept construction through the mirror neuron system. When teachers exhibit the following behavioral misconducts, it can cause severe psychological harm: A case shows that a primary school teacher insulted a student's personality because they failed to master calculation skills, leading to the student's suicide that night. This extreme event reveals that teachers' inappropriate words and deeds can become the "last straw" for those with weak psychological resilience. From a neuroscientific perspective, continuous stress can cause delayed development of the prefrontal cortex in adolescents, resulting in irreversible psychological damage. Therefore, establishing a psychological intervention mechanism for teachers and a supervision system for teacher ethics is the key defense against educational harm.

3. INTERVENTION STRATEGIES FOR STUDENTS' OWN REASONS

3.1 Cognitive Reconstruction of Setbacks

It is necessary to guide students to establish a

scientific cognitive system for setbacks and achieve psychological transformation through cognitive behavioral intervention. First, at the conceptual level, the stereotype that "setbacks equal failure" should be dispelled. the analogy teaching method can be used to compare setbacks to the seasonings in cooking - just as sweet, sour, bitter, and spicy flavors constitute the taste hierarchy, the obstacles in the learning process are actually catalysts for ability development. Through philosophical reasoning, students can be guided to understand that the progress of human civilization is essentially a process of constantly breaking through cognitive boundaries, and individual growth follows the spiral ascending law of "challenge - adaptation - transcendence".

At the practical level, meta-cognitive tools such as "setback diaries" can be designed, requiring students to record each setback situation, emotional response, and subsequent improvement plan, to cultivate the habit of reflective learning. For example, when a student feels frustrated due to a movement mistake, guide them to analyze whether it is due to not mastering the technical points or needing to adjust their psychological state, and transform abstract emotions into actionable improvement paths.

3.2 Multi-dimensional Support System

3.2.1Hierarchical Application of Role Model Demonstration

Establish a "pyramid-shaped" role model system: introduce the comeback stories of legendary figures in the sports field at the top level (such as Paralympic athletes breaking through physical limits), dig up progress examples within the campus at the middle level (such as a peer case of a student who was once a poor performer in sports but later became a class representative), and create "micro-success" demonstrations at the grassroots level (such as a student's gradual progress from completing 3 burpees to 10). This multi-level demonstration can provide spiritual guidance and eliminate the sense of alienation that "role models are out of reach".

3.2.2 Collaborative Mechanism of Home-School Co-education

Build a "teacher-parent" two-way empowerment model: schools should regularly hold parent workshops and use scenario simulations to let parents experience the correct way to implement "setback education" (such as transforming "Don't be afraid of losing" into "Let's see where we can improve"). Teachers need to guide parents to establish a "growth-oriented evaluation" standard and avoid tying sports performance to personal value. For example, when a child fails to meet the standard in rope skipping, parents can focus on the progress dimension of "holding on for 30 seconds longer than last week" instead of simply criticizing the insufficient number of skips.

3.3 Intervention Strategies at the Teacher Level

3.3.1 Self-cognitive Reconstruction: Building a Diversified Evaluation System

Teachers need to establish a "discovery - confirmation - internalization" self-cognitive guidance mechanism. Through "strength exploration workshops", help students build a personal ability list, and use the "3C praise method" (Competence, Courage, Character) to strengthen positive self-cognition. For example, when a student participates in a class activity, the teacher can specifically point out: "You actively tried the forward roll (courage), although you were not stable when landing, you mastered the core tightening technique very well (competence), this spirit of not being afraid of difficulties is worthy of learning by the whole class (character). "

Two types of cognitive biases need to be avoided: one is the "perfectionism trap", that is, teachers should not take the demonstration action as the only standard, but should show the skill advancement path through action decomposition teaching; the other is "comparative evaluation", reducing the horizontal comparison of "seeing how well others do" and instead establishing a "personal best record" tracking system. A "skill growth tree" visualization tool can be designed, with leaves marking each progress, helping students visually perceive their ability development trajectory.

3.3.2 Optimization of Classroom Ecology: Creating a Supportive Learning Environment

Build a "three-dimensional care system":

- Physical dimension: reduce anxiety through venue renovation, such as setting up soft protective pads and progressive difficulty zones

- Psychological dimension: implement the "safety circle" rule, prohibiting negative evaluations in the classroom and establishing the "two-chance" principle (allowing immediate re-try after a mistake) Social dimension: Adopt heterogeneous grouping strategies, mix students of different abilities into groups, and set up the "skill mentor" role to allow more capable students to assist their peers. Teachers need to have the ability to "detect emotions", and intervene promptly by observing students' body language (such as lowering their heads, frequently adjusting their clothes). Emotional visualization tools like the "mood thermometer" can be designed, allowing students to use emojis to mark their psychological states after class, providing teachers with intervention clues. For skill mastery requirements, the "Zone of Proximal Development" theory should be followed, setting a basic standard line and a development challenge line, allowing students to choose their own target level independently.

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Perovskite Anode Materials for Advanced Battery Systems: Applications and Challenges

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Abstract: Perovskite anode materials have steadily gained prominence in the energy sector, drawing growing interest from researchers worldwide. This review offers a detailed look at their structural features, inherent properties, main types, common preparation methods, practical applications, existing challenges, and future development prospects. It emphasizes their potential role in improving energy conversion and storage efficiency, while also examining the current obstacles that restrict their widespread use and the possible research paths to overcome these issues.

Keywords: Perovskite; Anode Materials; Energy Storage; Crystal Structure; Applications

1. Introduction

Background of Perovskite Anode Materials

In recent years, as the global demand for clean and efficient energy continues to rise, the search for advanced materials in the energy field has become increasingly urgent. Perovskite anode materials, with their distinctive structural and functional attributes, have gradually become a hot topic in energy research. What makes them stand out is their ability to enable efficient electron and ion transport, which is a key factor in various energy conversion and storage devices. This unique characteristic has sparked extensive exploration into their potential applications[1].

Significance of Studying Perovskite Anode Materials

The in-depth study of perovskite anode materials is of great significance for advancing energy technology. By delving into these materials, researchers aim to enhance the efficiency of energy conversion and storage processes. Compared to traditional materials, they offer the possibility of better performance and more cost-effective solutions, which could play a vital role in promoting the development of sustainable energy technologies and addressing the global energy crisis[2].

2. STRUCTURE AND PROPERTIES OF PEROVSKITE ANODE MATERIALS

Crystal Structure of Perovskite

Perovskite anode materials typically have an ABX_3 crystal structure. In this structure, the A-site is generally occupied by large-sized cations, such as alkaline earth metals or rare earth metals. The B-site is filled with smaller transition metal cations, and the X-site is occupied by anions like oxygen or halogens. This arrangement forms a stable three-dimensional framework that provides channels for ion mobility, which is essential for their functionality in energy devices[3].

Physical and Chemical Properties

Perovskite anode materials possess a range of favorable physical and chemical properties. They exhibit good electrical conductivity, allowing for efficient electron transfer. In terms of thermal stability, they can withstand certain high-temperature environments, making them suitable for applications like high-temperature fuel cells. Additionally, they show chemical inertness in specific conditions, which helps maintain their performance over time. The close relationship between their structure and properties means that by adjusting the composition through doping and substitution, their properties can be tailored to meet specific application requirements[4].

3. TYPES OF PEROVSKITE ANODE MATERIALS

Oxide-based Perovskite Anodes

Oxide-based perovskite anodes are a well-

studied category. For example, $La_{0.7}Sr_{0.3}MnO_3$ (LSM) is widely recognized for its high electronic conductivity. It also demonstrates good stability in oxidizing atmospheres, which makes it particularly suitable for use in high-temperature applications such as solid-oxide fuel cells operating at elevated temperatures[5].

Halide-based Perovskite Anodes

Halide perovskites, represented by $CH_3NH_3PbI_3$, have attracted attention due to their excellent ionic conductivity. However, they face significant challenges related to chemical stability. This instability issues restrict their long-term use in practical applications, as they tend to degrade under certain environmental conditions[6].

4. PREPARATION METHODS OF PEROVSKITE ANODE MATERIALS

Sol-Gel Method

The sol-gel method is a commonly used technique for preparing perovskite anode materials. The process starts with the formation of a colloidal solution by mixing appropriate precursors. This solution then undergoes gelation, forming a gel-like substance. Finally, calcination is carried out to obtain the desired perovskite material. One of the advantages of this method is its ability to provide good control over the composition of the material. However, it may encounter problems with porosity, which can affect the material's performance.

Chemical Vapor Deposition (CVD)

Chemical Vapor Deposition (CVD) operates on the principle of using vapor-phase reactants. These reactants are introduced into a reaction chamber, where they undergo chemical reactions and deposit onto a substrate to form thin films of perovskite anode materials. This method is capable of producing high-quality films with good uniformity and adherence. Nevertheless, it requires complex equipment and precise control of various parameters such as temperature, pressure, and gas flow rates, which can increase the complexity and cost of the process[7].

Other Preparation Methods

In addition to the sol-gel method and CVD, there are other preparation methods for perovskite anode materials. Thermal evaporation is a relatively simple technique that involves heating the material to vaporization and then condensing it onto a substrate. However, it often struggles with achieving uniform film formation. Electrodeposition, on the other hand, is a cost-effective method for certain compositions. It works by using an electric current to deposit the material onto an electrode, but its applicability is limited to specific material systems[8].

5. APPLICATIONS OF PEROVSKITE ANODE MATERIALS

In Solid-Oxide Fuel Cells

In solid-oxide fuel cells (SOFCs), perovskite anodes have shown great promise. They enhance the fuel oxidation kinetics, which in turn improves the power output of the fuel cells. However, they still have room for improvement in terms of tolerance to sulfur and carbon deposition. These impurities can poison the anode and reduce the performance and lifespan of the SOFCs.

In Lithium-ion Batteries

Perovskite anode materials also exhibit potential for use in lithium-ion batteries (LIBs). They have the capacity to achieve high energy storage, which is a desirable trait for LIBs. Yet, one of the main challenges they face is volume expansion during the charge-discharge cycling process. This volume change can lead to structural damage and a decrease in battery performance over time.

Other Potential Applications

Beyond SOFCs and LIBs, preliminary studies indicate that perovskite anode materials could have applications in other energy-related areas. For instance, they might be used in supercapacitors to improve energy storage and release rates, and in water electrolysis to facilitate the production of hydrogen. However, more in-depth research is needed to fully explore and validate these potential applications.

6. CHALLENGES AND FUTURE PERSPECTIVES

Despite their promising properties, perovskite anode materials face several significant challenges. One major issue is their stability under operational conditions. Factors such as temperature, humidity, and chemical environments can cause degradation. Additionally, high production costs and the difficulty in scaling up preparation methods hinder their commercialization. These

challenges need to be addressed to make them more viable for large-scale applications.

Looking ahead, there are several key research directions for perovskite anode materials. Developing more stable compositions through material design and modification is a top priority. Optimizing low-cost synthesis methods to reduce production expenses and improve scalability is also crucial. Furthermore, exploring new application niches where their unique properties can be fully utilized will expand their practical use. Interdisciplinary research combining materials science, chemistry, and engineering could lead to innovative solutions.

7. CONCLUSION

Perovskite anode materials hold great potential in various energy devices, offering opportunities to enhance energy efficiency and the development of sustainable energy systems. While they face challenges such as stability issues, high costs, and scalability problems, ongoing research and technological advancements are expected to overcome these obstacles. With continued efforts, perovskite anode materials are likely to play an increasingly important role in the future of energy technology.

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Exploration on the Path of Digital and Intelligent Reconstruction of Practical Teaching in Accounting Major in Colleges and Universities

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Abstract: The in-depth penetration of digital and intelligent technologies is driving the transformation of the accounting industry from a calculation-oriented model to a strategic decision-making model. As a core link in talent cultivation, the digital and intelligent reconstruction of practical teaching in college accounting majors has become the key to solving the disconnection between traditional teaching and industry needs. Based on the new changes in the capability dimensions of accounting positions in the digital and intelligent era, this paper analyzes the lag of current practical teaching in terms of curriculum system, training scenarios, and faculty structure, and proposes reconstruction paths.

Keywords: Accounting Practical Teaching; Digital and Intelligent Transformation; Talent Cultivation

1. The Reconstruction Logic of Accounting Talents' Competence Dimensions in the Digital and Intelligent Era.

The digital and intelligent transformation of the accounting industry is not merely an iteration of tools, but a fundamental change in work paradigms. According to Deloitte's 2024 Global Accounting Talent Trends Report, intelligent financial systems have replaced 70% of repetitive accounting tasks, and enterprises' demand for accounting personnel's capabilities presents the characteristic of "three-dimensional expansion":

1.1 Data empowerment capability has become a core competitiveness.

The focus of accounting work has shifted from "post-event recording" to full-process participation in "pre-event prediction, in-process control, and post-event optimization". Practitioners are required to be able to use tools such as Python and SQL to process terabytes of business data, and extract decision-making information through visualization technologies like Tableau.

1.2 Technology mastery capability has become a basic threshold.

RPA (Robotic Process Automation) has been widely applied in scenarios such as invoice verification and tax declaration. According to UFIDA's 2023 financial report, enterprises using financial robots have reduced manual operation errors by an average of 65%.

1.3 Business-finance penetration capability presents high-level requirements.

Digitalization and intelligence have broken the physical isolation between finance and business, requiring accounting personnel to deeply understand the digital mapping logic of business processes.

2. The Digital-Intelligent Fault Phenomenon in Accounting Practical Teaching in Colleges and Universities.

At present, there are still multiple structural contradictions in accounting practical teaching in colleges and universities, making it difficult to meet the capability requirements of the digital-intelligent era:

2.1 The Time Lag Between Curriculum System and Technological Evolution.

Traditional practical courses still focus on "manual accounting+computerization". Approximately 85% of colleges and universities have not offered courses such as

RPA training and big data financial analysis (China Accounting Education Development Report 2024). A survey by a finance and economics university shows that in the practical class hours of its accounting major, ERP operation accounts for 60%, while content related to intelligent tools is less than 5%. As a result, students need to receive an additional 3-6 months of digital-intelligent skills training from enterprises after employment.

2.2 The Scene Gap Between Training Scenarios and Real Business.

On-campus training mostly relies on closed simulation software with static preset data, which is disconnected from the dynamically generated heterogeneous data environment of enterprises. Off-campus internships, due to the sensitivity of enterprise financial data, are mostly "visit-style internships", making it difficult for students to access the core modules of intelligent financial systems, thus greatly reducing the practical effect.

2.3 The Capability Gap Between Teaching Staff and Teaching Needs.

Among accounting teachers in colleges and universities, less than 20% have practical experience in digital-intelligent projects (Ministry of Education statistics, 2023). An interview at a university shows that 80% of teachers believe that "digital-intelligent teaching resources are insufficient", and 60% of teachers report that "they lack methodologies to integrate technology into practical teaching". This leads to practical guidance remaining at the level of "software function explanation", making it difficult to cultivate students' thinking in technological application.

2.4 The Orientation Gap Between Evaluation System and Capability Goals.

The existing evaluation mainly takes "operational standardization" and "report completeness" as core indicators. This "result-oriented" evaluation model is seriously misaligned with the "problem-solving and innovative application" capabilities valued by enterprises.

3. Implementation Paths for Digital-Intelligent Reconstruction of Practical Teaching.

3.1 Constructing a "Three-Level and Nine-Dimension" Modular Curriculum Matrix.

With capability progression as the main line, three-level curriculum modules (basic level, advanced level, and innovative level) are designed, each covering three dimensions: technical tools, business scenarios, and thinking training:

3.1.1 The basic level focuses on tool adaptation, offering courses such as Fundamentals of Accounting Data Processing (Python/SQL) and Intelligent Financial Systems (SAP S/4HANA Training). Through "tool operation+case simulation training", students master the basic application logic of digital-intelligent technologies.

3.1.2 The advanced level emphasizes scenario integration, setting up courses like Business-Finance Data Middle Platform Training and Intelligent Audit Practice. Relying on desensitized real enterprise data, it constructs full-process digital-intelligent processing scenarios covering "procurement-production-sales".

3.1.3 The innovative level highlights thinking leap, launching Financial Digital-Intelligent Innovation Workshop. Through project-based learning (PBL), students complete real enterprise projects, such as "design of supply chain financial risk control schemes based on blockchain" and "development of financial early-warning models for retail enterprises", to cultivate their abilities in technology integration and innovative application.

3.2 Creating a "Double Helix" Practical Training Ecosystem Integrating Virtual and Real Elements.

Breaking the fragmented state of "on-campus laboratories+off-campus bases", a "digital twin" practical training system is constructed: The on-campus side builds a digital and intelligent training center, introduces enterprise-level intelligent financial systems (such as Kingdee Cloud Star and Oracle NetSuite), and sets up a dynamic database covering over 200 industries, realizing the full-process simulation of "business trigger - data generation - intelligent processing - decision feedback". Meanwhile, a VR virtual financial shared service center is developed, allowing students to understand the collaborative logic of modules such as

intelligent review and electronic filing through immersive experience.

The off-campus side deepens the "industry-university-research-application" collaboration, and jointly builds laboratories with accounting firms and technology enterprises. For example, in cooperation with PricewaterhouseCoopers, an "intelligent audit training project" is carried out, where students can participate in the design and testing of RPA processes in real enterprises.

3.3 Establishing a "Dual-Teacher and Three-Capability" Faculty Development Mechanism.

Through the threefold path of "internal training+external introduction+collaboration", a faculty team with "professional teaching ability, digital-intelligent application ability, and industry practice ability" is built:

"Digital-Intelligent Empowerment Program" for in-house teachers: Every year, one-third of teachers are selected to participate in practical digital-intelligent projects of enterprises (such as the construction of financial shared service centers and the implementation of ERP systems), and are required to complete the development of one technical application case.

"Practice Introduction Mechanism" for external tutors: Financial directors of enterprises and digital-intelligent consulting consultants are hired as part-time tutors, who analyze cutting-edge industry practices through the model of "online lectures+offline workshops".

Forming interdisciplinary teaching teams: Teachers from the School of Computer Science and the School of Management are united to establish a "Digital-Intelligent Accounting Teaching Group", jointly developing interdisciplinary courses such as Accounting and Artificial Intelligence to break through the knowledge limitations of teachers from a single major.

3.4 Implementing a "Three-Dimensional Dynamic" Competence Evaluation System.

Breaking through the traditional result-oriented evaluation, a "process-capability-value" three-dimensional evaluation model is constructed:

The process dimension records students' operation trajectories, data processing logic, and scheme iteration processes through the training platform, and uses radar charts to visually present learning paths, replacing the traditional evaluation of training reports.

The capability dimension designs a "five-dimensional scoring table" to conduct quantitative assessment from five aspects: proficiency in tool application, depth of data interpretation, degree of business relevance, value of innovative suggestions, and effectiveness of team collaboration. Enterprise tutors are invited to participate in scoring to ensure that the evaluation standards are consistent with industry needs.

The value dimension sets the indicator of "digital-intelligent achievement transformation". For intelligent financial tools developed by students and optimized business process schemes, their application value is identified through joint school-enterprise review. Excellent achievements can be included in the enterprise's actual operation improvement suggestion database, forming a positive cycle of "learning-practice-value creation".

4. Conclusion

The digital and intelligent reconstruction of practical teaching in university accounting programs essentially lies in the precise alignment between the supply side of education and the demand side of the industry. Only by reconstructing the curriculum system in a modular manner, recreating training scenarios in an ecological way, building a composite teaching team, and innovating the evaluation mechanism dynamically can we break down the barrier between "teaching and application" and cultivate new-type accounting talents who not only understand the professional logic of accounting, but also can master digital and intelligent technologies, and even penetrate the essence of business. This process requires universities, enterprises, and industry associations to work together, form synergy in resource integration, standard formulation, and achievement transformation, and ultimately realize the resonance between accounting education and the digital and intelligent era.

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Research on Strategies for Integrating Ceramic Culture into Ideological and Political Education of College Students

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Abstract: With the continuous development of modern education, scultural education has become a key direction of ideological and political education in colleges and universities. As a core component of excellent traditional Chinese culture, ceramic culture, with its profound historical heritage, unique artistic value and rich humanistic spirit, provides unique value for enriching the content and innovating the forms of ideological and political education in colleges. This paper summarizes the spiritual connotations contained in ceramic culture, expounds the integration points between ceramic culture and college ideological and political education, and explores the paths and methods of integrating ceramic culture into college students' ideological and political education. It aims to provide new ideas and directions for innovating college students' ideological and political education and help cultivate new-era talents with a high sense of cultural confidence and social responsibility.

Keywords: Ceramic Culture; Spiritual Connotation; Ideological And Political Education; Strategy

1. INTRODUCTION

In the critical period of deepening the reform of higher education in the new era and fully implementing the fundamental task of fostering virtue through education, ideological and political education in colleges and universities is facing the dual challenges of value guidance and model innovation. In the context of the world's cultural diversity and the increasingly diversified ideological concepts of young people, how to draw educational resources from excellent traditional Chinese culture and enhance the cultural depth and attractiveness of ideological and political education has become an important issue for educators. The report of the 20th National Congress of the Communist Party of China emphasizes the need to promote the creative transformation and innovative development of excellent traditional culture, educate people with culture and history, which points out a new direction for ideological and political education in colleges and universities.

As a symbolic icon of Chinese civilization, ceramic culture has gone through thousands of years of inheritance and development. It not only embodies the collective wisdom and aesthetic genes of the Chinese nation, but also contains the spiritual cores such as striving for excellence, innovation and progress, and collaborative cooperation. As a typical representative of excellent traditional culture, it provides a unique path for solving the predicament of ideological and political education and promoting the innovation of educational practice. In-depth exploration of the internal connection between ceramic culture and ideological and political education, and innovation of integration paths and methods are not only specific practices in response to the call of the 20th National Congress for cultural education, but also an inevitable requirement for improving the effectiveness of ideological and political education and cultivating new-era talents with both cultural confidence and a sense of mission, which have important theoretical and practical significance.

2. SPIRITUAL CONNOTATIONS OF CERAMIC CULTURE

2.1 The Craftsmanship Spirit of Striving for Excellence

The ceramic production process requires extremely high precision and accuracy. From raw material selection to forming, decoration and firing, every link demands meticulous polishing by the producer in pursuit of perfection. This ultimate pursuit of craftsmanship embodies the craftsmanship spirit of striving for excellence, fostering patience, concentration and dedication to quality.

2.2 The Enterprising Spirit of Innovation and Creation

The development of ceramic culture is full of innovations and transformations. From the evolution of ancient ceramic shapes to the technological breakthroughs of modern ceramics, ceramic artists have constantly experimented with new materials, technologies and design concepts, demonstrating the enterprising spirit of being brave in exploration and innovation.

2.3 The Cooperative Spirit of Unity and Collaboration

Ceramic production often involves multiple processes and requires the cooperation of many people. For example, links such as throwing, painting and firing need the collaboration of craftsmen with different skills. In this process, communication, cooperation and mutual support among team members are crucial, cultivating the cooperative spirit of unity and collaboration.

2.4 The Cultural Spirit of Adhering to Inheritance

Ceramic culture has been inherited for thousands of years, carrying rich historical memories and cultural genes. Ceramic artists of all dynasties have adhered to traditional techniques and inherited the essence of culture, enabling ceramic culture to continue and develop. This spirit of adhering to inheritance reflects respect and responsibility for national culture.

3. Feasibility Analysis of Integrating Ceramic Culture into Daily Ideological and Political Education of College Students

3. HIGH CONSISTENCY OF VALUE CONCEPTS

3.1 Consistency with the Craftsmanship Spirit

The meticulous craftsmanship and strict requirements for quality in the ceramic production process, and the reflected craftsmanship spirit are highly consistent with the spirit of dedication, concentration and pursuit of excellence advocated in ideological and political education.

3.2 Consistency with the Innovative Spirit

Ceramic culture continues to bring forth new ideas, and its innovative exploration in shape, decoration and techniques echoes the innovative thinking and courage to explore encouraged in ideological and political education.

3.3 Consistency with the Concept of Harmony

Ceramic art pursues the harmonious beauty of shapes and the coordination of colors, which is consistent with the concept of a harmonious society advocated in ideological and political education and the requirements for the harmonious development of individuals' physical and mental health.

3.4 Consistency with Cultural Inheritance

As an important carrier of traditional culture, ceramics' need for inheritance and development coincides with the emphasis on the inheritance of excellent traditional Chinese culture in ideological and political education, both of which are committed to making traditional culture glow with vitality in modern society.

3.5 Consistency with Aesthetic Value

The unique aesthetics displayed by ceramic works cultivate people's perception and appreciation of beauty, which is consistent with the goal of cultivating students' correct aesthetic concepts and improving their aesthetic literacy in ideological and political education.

3.6 Resonance with Tenacious Quality

Ceramics can be formed only after being fired at high temperatures, which symbolizes the quality of perseverance, and is consistent with the cultivation of students' strong will and unyielding spirit in the face of difficulties in ideological and political education.

4. SIGNIFICANT COMPLEMENTARITY IN PRACTICAL APPLICATION

4.1 Complement of Ceramic Culture to Ideological and Political Education Practice

4.1.1Rich supply of resources to help diversify education

Ceramic culture provides a variety of

educational resources for ideological and political education. For example, the historical development, production techniques and artistic styles of ceramics contain rich cultural connotations and values, which can become vivid materials for ideological and political education, making it more specific and vivid.

4.1.2Promotion of method innovation to stimulate learning interest

The practicality and artistry of ceramic culture bring new teaching methods to ideological and political education. By allowing students to participate in ceramic production processes and appreciate ceramic art works and other practical activities, it can stimulate students' learning interest and cultivate their practical ability and creativity.

4.1.3Deepening of learning experience to enhance understanding and perception

In participating in ceramic-related practices, students can more intuitively feel the spiritual qualities contained in them, such as craftsmanship spirit, patience and concentration, thus enhancing their experience and understanding of the content of ideological and political education.

4.2 Assistance of Ideological and Political Education to the Inheritance of Ceramic Culture

4.2.1Promotion of inheritance and development to lay a solid cultural foundation

Ideological and political education provides theoretical support and value guidance for the inheritance and development of ceramic culture. It enables students to more deeply understand the cultural significance and value behind ceramic culture when learning it, thus participating more actively in the inheritance of ceramic culture.

4.2.2Cultivation of talents to achieve all-round development

Ideological and political education can cultivate students' sense of social responsibility and cultural mission, making them more aware of combining ceramic culture with social development, and cultivating all-round talents with professional skills and correct values for the innovative development of ceramic culture.

4.3 Obvious Integration of Educational Effects

4.3.1Improvement of Students' Comprehensive Quality

The integration of ceramic culture and ideological and political education helps to cultivate students' comprehensive quality. By learning ceramic culture, students can not only improve their aesthetic level, but also exercise their innovative thinking and practical ability. At the same time, the guidance of ideological and political education can help students establish correct values and morality, thus comprehensively improving their personal qualities. [1]

4.3.2Enhancement of Students' Cultural Confidence

As a part of excellent traditional Chinese culture, the rich connotations and unique charm of ceramic culture can enable students to have a deeper understanding and love for their own culture. This understanding and love can enhance students' confidence in excellent traditional Chinese culture and make them more active in inheriting and carrying forward national culture.

4.3.3Prosperity and Development of Campus Culture

Introducing ceramic culture into ideological and political education can enrich the content and form of campus culture. Schools can hold ceramic culture-related activities, such as exhibitions, lectures and workshops, to create a strong cultural atmosphere and improve the quality of campus culture.

5. SPECIFIC STRATEGIES FOR INTEGRATING CERAMIC CULTURE INTO DAILY IDEOLOGICAL AND POLITICAL EDUCATION OF COLLEGE STUDENTS

5.1 Deeply Explore the Connotation of Ceramic Culture and Integrate It into Ideological and Political Course Teaching

5.1.1Integrate Ceramic History to Deepen Historical Cognition

Tell the development context of ceramic culture in ideological and political courses, so that students can understand the achievements of the Chinese nation in ceramic technology and its social value in different historical periods, thus deepening their understanding of history and enhancing their national self-confidence and pride.

5.1.2Integrate Artistic Spirit to Cultivate Aesthetic Taste

Introduce the spirit embodied in ceramic art's pursuit of exquisite craftsmanship and perfect

form into ideological and political courses. Cultivate students' aesthetic taste and artistic appreciation ability by appreciating elements such as the shape, color and decoration of ceramic works. At the same time, explain the creative stories and spiritual pursuits of ceramic artists to inspire students' quality of pursuing excellence and being brave in innovation.

5.1.3Integrate Inheritance and Innovation to Enhance Cultural Confidence

Discuss the inheritance and innovation paths of ceramic culture in modern society in ideological and political courses. For example, carry out research activities, organize students to personally participate in the ceramic production process, strictly follow the arrangements of ceramic workers, and experience the exquisite craftsmanship of ceramic production and the unique charm of cultural inheritance from links such as material selection, forming and firing. Through practical activities, cultivate students' practical ability and innovative ability. [2] By allowing students to make ceramic works by themselves, they can feel the charm of ceramic culture in personal practice and enhance their cultural confidence and national pride.

5.2 Actively Carry Out Ceramic Culture Practices to Effectively Enhance the Effectiveness of Ideological and Political Education

5.2.1Hold Themed Activities to Enrich Educational Forms

Regularly hold ceramic culture-themed practical activities to allow students to participate personally and feel its charm. Through the activities, students can deeply understand the production process, artistic characteristics and historical value of ceramics, enhance their sense of identity with traditional culture, make abstract theoretical knowledge concrete and visualized, and improve learning interest and participation.

5.2.2Combine with Course Teaching to Improve Teaching Effectiveness

Integrate ceramic culture into ideological and political education courses, and adopt case analysis, classroom discussion and other methods to guide students to think about its value concepts and spiritual connotations. Through this, students can fully understand the history and development of ceramic culture and understand its value and significance in modern society.

(4.2. 3)Establish Practice Bases to Promote Practical Process

Colleges and universities cooperate with ceramic culture-related institutions to establish practice bases, providing a broad platform for students. By this, students can access more resources and professional guidance, deepen their understanding of ceramic culture through practical operations, provide practice places for ideological and political education, and promote its practicalization.

5.3 Make Full Use of New Media Technology to Effectively Expand the Path of Ceramic Culture Ideological and Political Education

5.3.1Build a Digital Resource Library to Enrich Teaching Content

With the help of new media technology, integrate multimedia resources such as pictures, videos and documents of ceramic culture to form systematic online teaching content. Students can carry out independent learning anytime and anywhere through digital platforms to deeply understand the historical origin, production techniques and artistic characteristics of ceramic culture. Teachers can also use these resources to make vivid courseware and cases to improve the effect of ideological and political classroom teaching.

5.3.1Use Social Platforms to Enhance Interactive Communication

Make full use of social media platforms such as Weibo and WeChat to establish official accounts for ceramic culture ideological and political education, and regularly release information and research results related to ceramic culture. Set up interactive communication columns on various new media platforms, so that students can interact with teachers and experts in real time, put forward questions and share experiences, forming an online and offline learning community. In addition, social media platforms can expand the communication scope of ceramic culture ideological and political education and attract more people's attention and participation.

5.3.3Develop Educational APPs to Realize

Precise Teaching

Combine new media technology to develop special ceramic culture ideological and political learning applications. The APP can push personalized learning content according to students' learning progress and interest preferences to realize precise teaching. For example, set up functional modules such as ceramic culture knowledge questions and answers, virtual ceramic production experience, and cultural story explanation to improve students' learning enthusiasm and participation. At the same time, the APP can also accurately record students' learning changes, provide teaching feedback for ideological and political education work, so that teachers can better understand students' learning situation and adjust teaching strategies.

5.3.4Hold Online Activities to Expand Learning Space

Use new media platforms to organize online ceramic culture exhibitions, knowledge quizzes, live lectures and other activities. For example, hold online exhibitions of ceramic works and invite experts to give live explanations; carry out ceramic culture knowledge quiz activities to stimulate students' sense of competition and learning enthusiasm; let students visit ceramic museums or studios through live broadcasts to make them feel the charm of ceramic culture immersively.

5.3.5Create New Media Works to Spread Ceramic Culture

Encourage students to use new media technology to produce micro-videos, animations, H5 pages and other works related to ceramic culture. In the process of creation, students can have a deeper understanding and mastery of ceramic culture knowledge, and these works can also be spread on the Internet to let more people understand ceramic culture.

5.3.6Carry Out Virtual Teaching to Enhance Experience Perception

With the help of virtual reality (VR), augmented reality (AR) and other technologies, provide students with a virtual ceramic production and cultural experience environment. Students can participate in various links of ceramic production as if they were on the scene through relevant equipment, feel the charm of ceramic craftsmanship, and enhance their perceptual understanding of ceramic culture.

The spiritual connotation of excellent ceramic culture has injected new vitality and motivation into the daily ideological and political education of college students. Through continuous exploration and innovation, we will surely create a new situation in college students' ideological and political education and make greater contributions to cultivating new-era talents with a high sense of cultural confidence and social responsibility.

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A Study on the Educational Paths of College Students' New Media Literacy from the Perspective of New Media

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Abstract: College students, as a dynamic group that integrates new technologies with innovative ideas, are not only beneficiaries of the new era but also a valuable asset for advancing China's digital development in the future. Media literacy is increasingly emerging as a core competency, serving to navigate the ever-evolving and intricate external technological landscape. It has thus become an essential quality and key capability for individuals to achieve lifelong development and adapt to societal progress. the overall level of college students' media literacy is critical to the high-quality development of a "Digital China. " Therefore, media research and corresponding literacy education for college students must keep pace with the times to address the demands of the era. This paper will conduct an in-depth analysis of the current issues in college students' media literacy and the practical necessity of strengthening such education. It will also explore diversified educational approaches to enhance the relevance and effectiveness of ideological and political work in higher education institutions, ultimately fostering new-era college students with excellent media literacy who are dedicated to striving unremittingly for the cause of socialism with Chinese characteristics.

Keywords: College Students, Media Literacy, Key Competencies, Diversified Approaches

1. INTRODUCTION

We are presently in a digital age marked by the coexistence and reciprocal empowerment of humans and technology, amid an unprecedented information explosion. Media undergoes increasingly frequent iterations, having transcended its role as a mere communication vehicle to evolve into a pervasive social environment that exerts a profound influence on the value systems, modes of thinking, and behavioral patterns of the general public. College students, as a pivotal audience demographic, are in a critical phase of developing their worldviews, life outlooks, and value orientations. Notably, the content and modalities of media communication exert a subtle yet enduring impact on the formation of their moral perceptions, ideological conduct, and daily habits [1]. It is imperative for college students to enhance their ability to discern the authenticity of information and engage in media usage in a safe and ethically sound manner [2]. Against this backdrop, exploring the educational dimensions of college students' media literacy in the all-media era assumes significant practical relevance.

2. ANALYSIS OF ISSUES IN COLLEGE STUDENTS' MEDIA LITERACY

In the current context where all-media is deeply integrated into social life, college students, as an active group in the digital age, are confronted with numerous practical challenges regarding their media literacy. Consequently, strengthening relevant education has highlighted its irreplaceable necessity.

In terms of the existing problems in college students' media literacy, the first is the deficiency in information processing ability. In the all-media environment, the threshold for information production and dissemination has been greatly lowered, and a vast amount of information pours into college students' lives on an unprecedented scale, among which there is a large amount of content with indistinct

authenticity and varying quality. When faced with such information, many college students lack effective screening and discrimination abilities, and are easily misled by negative or false information. This further leads them into a state of confusion, and even affects their normal study and physical and mental conditions.

Secondly, there is a lack of ability to deal with the complex public opinion environment. Digital intelligent technologies have made media communication more precise and personalized. Various ideologies and values are infiltrating with the help of capital forces, interfering with the dissemination of mainstream values. At the same time, the "information cocoon" and "echo chamber" effects have gradually solidified college students' cognition and values, making it difficult for them to detect distorted information with hidden political purposes, and they are prone to lose their way in the complex public opinion pattern.

Finally, there is ethical anomie in media communication. the openness and virtuality of media communication have weakened the constraints of real-world morality and laws, leading to frequent occurrences of unethical behaviors such as online rumors, doxxing, and cyber violence. Due to their limited social experience, college students have a poor ability to identify these harmful behaviors and may unconsciously participate in them, resulting in ethical anomie issues such as making inappropriate remarks.

3. PRACTICAL NECESSITY OF STRENGTHENING COLLEGE STUDENTS' MEDIA LITERACY EDUCATION

Firstly, it helps improve college students' ability to resist information overload. Through education, they can master methods to distinguish the authenticity of information, extract valuable content from massive amounts of information, avoid being disturbed by negative information, and maintain a positive and healthy mental state as well as a good learning rhythm.

Secondly, it can enhance college students' ability to discern and resist in complex public opinion environments. Education can help them recognize the essence behind various public opinions, break the constraints of information cocoons, establish correct values, consciously resist the infiltration of harmful ideologies, and maintain the leading position of mainstream values.

Thirdly, it can enhance college students' personal competitiveness. In the information age, media literacy has become an important indicator to measure the comprehensive ability of talents. Media literacy education can cultivate college students' information integration ability and media creation ability. These skills can be bonus points in postgraduate interviews and job hunting competitions, helping them stand out in fierce competition.

In conclusion, strengthening media literacy education for college students is an inevitable requirement to cope with the challenges of the all-media era and promote the healthy growth of college students, and it has important practical significance for cultivating qualified talents who can adapt to the development of Digital China.

4. PATHS TO IMPROVE COLLEGE STUDENTS' MEDIA LITERACY

The effective paths for college students' media literacy education need to revolve around the progressive logic of "knowledge transmission-ability cultivation-value shaping", forming a closed loop from four dimensions: curriculum system, teaching practice, teacher support, and collaborative ecology. Specifically, they can be refined into the following directions:

4.1 With the curriculum system as the framework, construct a capacity-building chain of "cognition-application-reflection"

The effectiveness of the curriculum system lies in both covering basic cognition and responding to practical challenges. Through the design of hierarchical and progressive modules, students with different needs can receive targeted training: Basic-level general courses help students establish a cognitive framework for "what media is". For example, by analyzing the formation mechanism of the "information cocoon", students can understand the role of media in shaping individual cognition; Advanced-level specialized courses focus on "how to deal with media risks". For instance, in Identification of Deepfake Technology, students' technical discrimination ability is trained by comparing the pixel differences and logical loopholes

between AI-generated videos and real videos; Professional-level courses delve into the "relationship between media and society". Such as Data Communication and Social Responsibility for journalism majors, which guides students to think about the value bias behind algorithm recommendations and cultivates their ethical awareness as communicators.

4.2 Taking teaching practice as the flesh and blood to realize the ability transformation of "theory-simulation-actual combat"

Immersive teaching can break the limitations of traditional lectures and enable students to deepen their understanding through experience. For scenario simulation, cases close to life such as "the spread of rumors about campus food safety" can be selected, allowing students to play roles such as We-Media bloggers, school publicity departments, and ordinary netizens. In the interaction, they can experience the information screening logic from different perspectives and understand how the "spiral of silence" affects the direction of public opinion. the application of virtual simulation technology can create high-risk ethical scenarios, such as "whether to disclose the information of minor children of criminal suspects to gain clicks", forcing students to make moral judgments in conflicts and strengthening their ethical decision-making ability.

4.3 Taking the teaching staff as the engine to create a teaching synergy of "professionalism-interdisciplinarity-practice"

An interdisciplinary teaching structure can break the limitation of simplification in media literacy education. Teachers specializing in journalism and communication are good at analyzing communication laws; computer science teachers can reveal the operating logic of algorithmic black boxes; and law teachers can clarify the legal boundaries of online behaviors. Through their collaborative teaching, students can understand "cyber violence" from multiple dimensions of technology, society, and law: analyzing the algorithmic diffusion path of rumors from the technical perspective, exploring the contagion mechanism of group emotions from the social perspective, and defining the accountability standards for defamation from the legal perspective, thus forming a three-dimensional cognition.

4.4 Taking Collaborative Ecology as a Guarantee to Form an Educational Resonance of "School-Society-Family"

The linkage between schools and society can expand the breadth and depth of education. By cooperating with cyberspace affairs departments to carry out the "Practical Week for Online Rumor Governance", students can participate in real public opinion monitoring work and learn how to identify rumors through keyword screening and source tracing. Inviting anti-cyber violence organizations to share the experiences of victims can touch students more deeply than pure theoretical preaching, and strengthen their awareness of the "harmfulness of verbal violence". Family participation can bridge the educational gap. Through the "Parents' Media Literacy Class" which explains "how to discuss online hot events with children", it can prevent parents from transmitting wrong views to students due to misjudgment of information [3].

Through the synergistic efforts of these four paths, college students' media literacy education can break through the superficial model of "knowledge inculcation" and truly cultivate qualified citizens of the digital age who understand media technology, adhere to ethical bottom lines, are capable of independent thinking, and can participate rationally.

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Practical Exploration of Integrating Craftsmanship Spirit into the "Film and Television Post-Production" Course in Higher Vocational Education

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Abstract: In today's rapidly developing social context, the film and television industry's demand for talent is increasingly diversified. It not only requires solid professional knowledge but also emphasizes practical ability and professional ethics, especially the integration of the spirit of craftsmanship. This article delves into the teaching reform strategies for incorporating the spirit of craftsmanship into post-production courses in higher vocational film and television education. It explores the contemporary connotation of the spirit of craftsmanship, innovates talent cultivation models, and aims to cultivate high-quality film and television professionals with the spirit of craftsmanship in the new era.

Keywords: Craftsmanship spirit; higher vocational education; film and television post-production

1. Basic Information of the Course 'Film and Television Post Production'

1.1. Course Introduction

The course of "Film and Television Post Production" aims to cultivate students' ability to operate After Effects software. It mainly teaches three modules: film and television animation, film and television post production synthesis, and film and television post production special effects. Students will master the basic principles and production techniques of film and television post production, and be able to complete basic column packaging production. Based on the characteristics of this course, ideological and political elements such as socialist core values, traditional Chinese culture, professional norms, and craftsmanship spirit are integrated to form a student-centered, teacher guided, and "theory practice application" integrated engineering combined teaching model, focusing on cultivating students' practical operation ability, innovation ability, and aesthetic ability.

1.2. Course objectives

By learning the basics of film and television post production, layers and keyframes, masks and masks, text animation, 3D space, camera and lighting settings, cutout and tracking techniques, commonly used special effects plugins, and other knowledge and skills, one can master the methods and techniques of film and television animation, film and television post production synthesis, and film and television post production special effects, and meet the requirements of the "1+X Digital Film and Television Special Effects Production Professional Skills" certificate. Cultivate students' learning ability, information literacy, professional competence, craftsmanship spirit of striving for excellence, and labor attitude of loving and dedicating themselves to their work.

2. The teaching implementation process of integrating the spirit of craftsmanship into the course of "Film and Television Post Production"

In the process of curriculum teaching reform, a comprehensive and full process integration of ideological and political education and curriculum teaching has been formed

2.1. the spirit of craftsmanship as an ideological and political element integrated into curriculum standards and teaching

plans

In the curriculum standards, we have proposed the overall score idea, curriculum ideological and political training objectives, and curriculum ideological and political teaching design for the course of "Film and Television Post Production".

The overall idea of course design is to cultivate high-quality film and television post production talents with good professional ethics, strong practical ability, aesthetic ability, and innovative ability through the comprehensive development of morality, intelligence, physical fitness, aesthetics, and labor. Following the design concept of "employment oriented, teaching centered, and task driven cultivation of students' professional abilities", this course analyzes the professional abilities of film and television post production, determines the knowledge and basic skills required for professional positions, determines the knowledge, qualities, and skill requirements that students should possess, and then constructs corresponding curriculum standards and designs teaching content.

Specific ideas for course design: Effectively integrating ideological and political education into the entire teaching process of the "Film and Television Post Production" course, incorporating patriotism, craftsmanship spirit, innovation spirit, model worker spirit, contract spirit, etc. into course standards, teaching plans, course content, and teaching evaluations, and building professional courses that are full of moral education elements and play a role in moral education.

Course ideological and political learning objectives: To cultivate students who support the Party's basic line, adapt to the needs of production, construction, management, and service on the front line, have comprehensive development in morality, intelligence, physical fitness, aesthetics, and other aspects, possess good professional ethics and innovation and entrepreneurship abilities; On the basis of consolidating basic knowledge and skills, pay attention to the development of students' personalities and qualities, and care for their lifelong development.

2.2. Integrating the spirit of craftsmanship into teaching content

The teaching content of the course "Film and Television Post Production" mainly explains the use of post production software to edit, modify, and create special effects on video materials. Therefore, using "video materials" as a starting point to explore ideological and political elements, in order to subtly educate students' thoughts. In classroom teaching, select film and television works that embody the spirit of craftsmanship, Chinese spirit, Chinese wisdom, and excellent traditional culture as video material cases for technical analysis and explanation, in order to guide students to learn and appreciate art works, appreciate artistic value and national characteristics, and draw Chinese strength from them, strengthen their ideals and beliefs, enhance cultural confidence, and strengthen their sense of responsibility and mission to promote and inherit excellent traditional Chinese culture.

The first lesson of the school year can be a comprehensive presentation to guide students to establish a general understanding of the subject. From the future development of the film and television industry and the impact of the epidemic on it, to the guarantee policies provided by the government to maintain the normal operation of the industry, from the social needs of post production professionals to employment prospects, from the professional qualification examination for post production special effects artists to the importance of this course, we aim to inspire students' patriotism, enhance their sense of responsibility and mission, cultivate their craftsmanship and labor spirit, and motivate them to start from mastering each course, accumulate strength, and strive for the great rejuvenation of the Chinese nation!

2.3. Integrating the spirit of craftsmanship into project production

In the comprehensive training of film and television post production, it was found that students are generally able to accept online learning, willing to accept new teaching modes, and have a strong interest in real business or project production, but their learning initiative and teamwork awareness are not strong. Therefore, strictly follow the film and television project team model to form the creative team, and carry out specific and detailed job division. In teaching implementation, students form their own

teams to create film and television works based on their actual creative needs. During the practical training process, teachers lead by example, demonstrating a serious, dedicated, production, and innovative career pursuit. They focus on providing meticulous guidance to students in creative practice, guiding them throughout the entire process of film and television short film creation according to professional standards and industry requirements, and encouraging students to develop a rigorous, meticulous, and excellence seeking professional attitude. When the "craftsman spirit" is associated with specific film and television creation projects, students are more able to truly appreciate the essence and value of this spirit. Division of labor and cooperation enable students to internalize the craftsman spirit as a professional quality for practitioners, making the practical training process an important way to cultivate and experience the "craftsman spirit".

After the practical training session of the "Film and Television Post Production" course, a final work exhibition will be organized to showcase students' creative enthusiasm and striving attitude through the results of their works. the exhibition will be mainly conducted through offline public exhibitions, supplemented by online thematic exhibitions, showcasing students' learning achievements from multiple levels, perspectives, and angles, showcasing professional course teaching achievements, and improving the quality of film and television talent cultivation and social recognition. At the same time, the exhibition is also a teaching reform activity that fully combines professional characteristics. the offline public screening will showcase student works publicly, with the main creative team presenting their creations on site and the judges providing on-site feedback and scoring. the focus will be on providing detailed evaluations of each work from multiple perspectives such as post production editing and post production. the evaluation results will be included in the final assessment of the course. the online exhibition is composed of the establishment of special accounts for special exhibitions, the promotion of official account of the departments, the uploading of video numbers of the departments, and the uploading of students' personal accounts. While allowing teachers and students to experience the charm of light and shadow, it can also facilitate communication and learning among students in related majors. Film and television works have their own unique rules in the process of creation and dissemination, which is also something we need to give full attention and respect in the process of learning and practice.

3. Teaching effectiveness and reflection

3.1. Teaching effectiveness

Firstly, the spirit of craftsmanship is integrated throughout the entire teaching process, enabling students to establish correct values while mastering knowledge and skills. the students' ability to learn independently has significantly improved, effectively achieving their knowledge and ability goals. Secondly, in the course teaching process, a project-based approach is adopted, which comprehensively utilizes various teaching methods to conduct teacher evaluations and student peer evaluations of excellent works. While strengthening knowledge points and professional abilities, students' ideological and moral cultivation is also subtly improved; Teachers fully tap into the ideological and political elements of the project, enabling students to make significant progress in patriotism, social responsibility, professional spirit, and craftsmanship. Once again, in order to explore new models of ideological and political education in the curriculum, teachers have focused on the organic integration of professional courses and ideological and political education in the preparation process, and have carried out a large amount of resource construction work such as lesson plans, textbooks, courseware, and micro courses, greatly enriching and expanding teaching resources; Finally, the evaluation system for course assessment standards explicitly includes a section on moral education, guiding students to shift from passive learning to active learning, creating a positive and uplifting learning atmosphere, keeping up with industry demands, and enhancing students' adaptability to future employment positions.

3.2 Reflection

3.2.1Based on classroom teaching, integrate the spirit of craftsmanship into the teaching

process

Classroom teaching is the main battlefield for ideological and political education, as well as the main channel for cultivating the spirit of craftsmanship. As the main battlefield for cultivating morality and talents in vocational colleges, cultivating the spirit of craftsmanship in professional course teaching, deeply exploring the ideological and political elements in professional courses, and cultivating the spirit of craftsmanship in professional courses and practical training courses. Professional course teachers should teach students according to their aptitude, and cultivate the professional qualities of vocational college students by benchmarking with professional technical requirements, enterprise requirements, and occupational requirements based on the characteristics of each major. Project based courses in professional courses can also promote students' professional abilities from a technical level to a cultural level. For example, through talent cultivation models such as skill competitions and social practices, students can obtain multiple entrepreneurial awards and skill rewards, thereby enhancing their sense of professional achievement. It is also possible to combine professional characteristics and delve into typical professional talents and industry elites. On the one hand, by promoting the advanced deeds of "great country craftsmen", "skilled craftsmen", and "technical experts", the behavioral norms and moral standards of the craftsmanship spirit are visualized and concrete, allowing vocational college students to experience and learn from their advanced deeds and excellent qualities up close. On the other hand, it is necessary to explore the typical talents around students, invite gold medal winners of national skills competitions and innovation and entrepreneurship models to share their experiences, and let students feel the craftsmanship spirit of fearlessness, dedication, diligence, and innovation through in-depth communication with these typical figures.

3.2.2Optimize the teaching staff and create a "dual teacher" team with craftsmanship spirit

Vocational colleges require professional course teachers not only to possess certain theoretical knowledge, but also to have practical work experience in enterprises, that is, to become "dual qualified" teachers. Only "dual qualified" teachers in vocational colleges with solid theoretical foundations and excellent technical skills can let the spirit of craftsmanship take root and be inherited among vocational students. Teachers should continuously improve their craftsmanship spirit and literacy, regularly visit enterprises to solve key technical and process problems in the development of new products, and grasp the latest production dynamics of enterprises. At the same time, it is necessary to regularly engage in on-the-job training in enterprises, closely monitor cutting-edge knowledge in the industry, target the direction of technological change and industrial optimization and upgrading, and timely incorporate new technologies, new processes, new norms, etc. into teaching standards and content, so as to achieve a connection between the teaching process and the production process, and a seamless connection between course content and employment positions, thereby playing a demonstrative and leading role in students' professional abilities, attitudes, and qualities.

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Navigating Parental Expectations: A Reflective Study on Teaching Practices in a Chinese Private EFL Tutoring Context

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Abstract: This paper explores the complex interplay between parental expectations and teaching methodologies within China's private English tutoring sector. Based on a two-month reflective teaching practice at a mid-sized institution, this study utilizes a qualitative case study approach to analyze how teachers adapt their practices under parental pressure for exam-oriented outcomes. Findings indicate that pedagogical decisions are significantly influenced by parental demands, leading to a heightened focus on exam skills and measurable results, often at the expense of communicative language teaching. the study concludes by discussing the implications for teacher autonomy and sustainable language education in commercial contexts, suggesting that explicit communication and balanced approaches are necessary to reconcile educational values with market expectations.

Keywords: Parental Expectations, Teaching Practices, EFL Tutoring, Exam-Oriented Education, Reflective Practice 1.

1. INTRODUCTION

The rapid expansion of private English tutoring in China represents a significant phenomenon within the broader educational landscape. Often termed "shadow education, " this sector has grown exponentially, driven by intense parental aspirations for children's academic success and heightened by the competitive nature of standardized testing systems. Within this context, teaching methodologies become subject to complex negotiations between educators' professional training and strong parental expectations for demonstrable, exam-focused outcomes. This paper emerges from firsthand teaching experience in such an environment, aiming to critically examine this dynamic. It seeks to explore the specific strategies teachers employ to navigate parental pressures while attempting to maintain pedagogical integrity and support genuine language acquisition, ultimately investigating the tension between educational best practices and commercial demands in private tutoring centers.

2. LITERATURE REVIEW

The influence of parental involvement on student achievement is a well-established domain of educational research. However, in the specific context of Chinese society, this influence is profoundly shaped by cultural values that prioritize academic excellence and the pivotal role of high-stakes examinations like the Gaokao. This creates a unique set of pressures that directly impact teaching and learning processes outside the formal school system.

Huang (2019) provides a crucial framework for understanding this dynamic, introducing the concept of "educational anxiety" among Chinese parents. This anxiety, rooted in a desire for future social mobility and stability, manifests as a strong drive to secure every possible academic advantage for their children. Consequently, parents often approach private tutoring as a service industry, demanding specific, results-oriented teaching methodologies that promise tangible outcomes, typically defined by improved test scores. This consumer mentality fundamentally shapes the market, pushing institutions toward a product-based model of education.

Further illuminating the operational mechanics of this system, Zhang & Bray (2020) meticulously document how the

"shadow education" sector in China functions on a potent commercial logic. In this model, customer satisfaction—predominantly from parents—becomes a paramount concern for institutional survival and profitability. Their research suggests that this economic reality forces a close alignment of teaching content with narrowly defined parental goals, primarily examination success. This alignment often leads to a narrowed curriculum, potentially marginalizing pedagogical approaches dedicated to fostering holistic language proficiency, critical thinking, and communicative competence.

This present study builds upon this foundational research by providing a granular, micro-level perspective from within the classroom walls. It aims to detail the daily negotiations, adaptations, and conscious decisions made by teachers who operate at the intersection of these competing pressures, contributing a practice-oriented dimension to the existing structural analysis.

3. METHODOLOGY

This research adopts a qualitative case study approach grounded in reflective practice. the primary data derives from a two-month teaching engagement at a mid-sized private English tutoring institution in Shandong Province, China. the methodological framework was designed to capture the nuanced realities of teaching under parental influence.

Data collection was conducted through three primary methods: First, detailed field notes were maintained following over thirty teaching sessions, focusing on lesson planning decisions, student engagement, and specific instances where awareness of parental expectations directly influenced instructional choices. Second, daily reflective journaling was employed to document the rationale behind pedagogical adaptations, personal challenges, and ethical dilemmas encountered in balancing professional judgment with external demands. Finally, a systematic analysis of teaching materials, lesson plans, and curriculum documents was performed to examine their explicit and implicit alignment with examination requirements and promotional promises made to parents.

The collected data was analyzed using thematic analysis. This involved repeatedly reviewing the field notes and journal entries to identify recurring patterns, themes, and critical incidents related to the manifestation of parental expectations and their subsequent impact on teaching practices. the process was iterative, moving from descriptive coding to interpretive analysis, ensuring the findings were deeply rooted in the concrete experiences of the teaching practice.

4. FINDINGS AND DISCUSSION

4.1. Explicit Curriculum Narrowing

The most immediate and observable impact of parental pressure was the deliberate constriction of the curriculum. Instructional content became heavily skewed towards mirroring the format, content, and style of school examinations and standardized tests. A significant majority of classroom time was allocated to discrete-point grammar drills, vocabulary memorization exercises directly tied to exam syllabi, and repetitive practice using past examination papers. Activities aimed at fostering spontaneous communication, creative writing, or cultural knowledge were often relegated to peripheral status or required explicit justification within an exam-prep framework. This observation provides concrete, ground-level confirmation of Huang's (2019) thesis, showing how parental anxiety translates into a demand for familiar, exam-like activities that are perceived as directly contributing to score improvement.

4.2. the Performance of "Teaching to the Test"

Beyond the actual content, teachers developed a repertoire of strategies designed to make their exam-focused approach highly visible and legible to parents. This "performance" of accountability was a crucial aspect of maintaining client satisfaction. It included practices such as sending highly detailed weekly progress reports that predominantly highlighted scores on practice tests and quizzes; dedicating specific sessions during parent observation days exclusively to exam technique practice, showcasing a rigorous and focused approach; and explicitly labeling activities on whiteboards or handouts with the specific exam skill they were designed to practice (e. g., "Gaokao Listening Question Type 3: Identifying Speaker Attitude"). This performative element aligns perfectly with the

commercial logic described by Zhang & Bray (2020), demonstrating that in a market-driven environment, making the link between service provision and desired outcomes (exam success) transparent is essential for maintaining enrollment and justifying fees.

4.3. Covert Balancing Acts and Hidden Pedagogy

Despite the overwhelming structural pressure to "teach to the test, " the findings revealed that teachers actively engaged in subtle, often covert, balancing acts to incorporate more communicative and holistic elements into their teaching. This represents a form of quiet resistance or professional agency within a constrained system. Instances included framing a group discussion or debate as essential "oral exam practice" to justify its inclusion; using exam-related topics or vocabulary lists as prompts for more genuine, extended creative writing tasks; and selectively choosing reading comprehension texts that, while serving the goal of exam practice, also introduced intrinsically interesting, culturally relevant, or thought-provoking content. This indicates a conscious, albeit cautious, effort by educators to preserve some element of pedagogical autonomy and broader educational value, suggesting that the implementation of parental demands is not always absolute but is instead mediated by teachers' professional beliefs.

5. IMPLICATIONS FOR PRACTICE AND RECOMMENDATIONS

The findings from this study yield several important implications for practice within China's private English tutoring sector. First, there is a critical need for institutions to develop more transparent communication channels with parents that educate them about language acquisition processes rather than merely reporting outcomes. Tutoring centers could implement regular workshops or information sessions that demonstrate how communicative activities and holistic approaches ultimately contribute to exam success by developing deeper language proficiency. Second, teacher training programs specifically designed for private sector educators should incorporate modules on parent expectation management, ethical marketing of educational services, and strategies for maintaining pedagogical integrity in commercial environments. Third, institutions might consider developing more balanced assessment frameworks that value and report on multiple dimensions of language learning progress, including communicative competence, learning engagement, and cognitive development alongside examination scores.

6. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study has several limitations that should be acknowledged. As a reflective case study based on a single institution experience, the findings are context-specific and not necessarily generalizable to all private tutoring contexts across China. the relatively short duration of the teaching engagement (two months) may not have captured longer-term dynamics and adaptations. Additionally, the research relied solely on the teacher-researcher's perspective without incorporating direct interviews with parents, students, or other teachers, which would provide a more comprehensive understanding of the expectation-practice dynamic.

Future research should address these limitations through more extensive multi-site case studies that examine how these dynamics vary across different socioeconomic contexts and geographic regions within China. Longitudinal studies tracking teaching practices and parent-teacher relationships over an entire academic year would provide valuable insights into how these negotiations evolve over time. Research employing mixed methods—combining interviews with parents, students, and teachers with classroom observations—would offer a more nuanced triangulation of perspectives. Additionally, intervention studies that test different models of parent education and communication would be particularly valuable in identifying effective strategies for aligning parental expectations with research-informed teaching practices.

7. PERSONAL REFLECTION AND CONCLUDING THOUGHTS

From a practitioner perspective, this experience highlighted the complex ethical and professional dilemmas faced by teachers in commercial educational settings. the constant negotiation between pedagogical beliefs and market demands requires

developing what might be termed "diplomatic competence"—the ability to respectfully navigate conflicting expectations while advocating for educational values. This involves developing skill in translating pedagogical principles into language that resonates with parental concerns, finding creative ways to embed meaningful learning within exam-focused frameworks, and building trust through demonstrated results.

The tension described in this paper reflects broader questions about the purpose of education in contemporary Chinese society and the evolving relationship between educational professionals and parents as educational consumers. While parental involvement is undoubtedly valuable, its manifestation as consumer pressure risks reducing education to a transactional relationship focused on measurable outputs rather than transformative learning processes. Finding a balance that respects parental concerns while preserving professional autonomy and educational values remains a critical challenge for private tutoring institutions.

Ultimately, the sustainability of China's private English tutoring sector may depend on its ability to evolve beyond a narrow focus on exam preparation toward a more holistic educational model that genuinely develops students' language abilities while addressing parental aspirations. This evolution will require courageous leadership from institution managers, professional assertiveness from teachers, and increasingly sophisticated understanding from parents about what constitutes quality language education.

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Interpretation of the Current Situation of Income Distribution Gap in China

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Abstract: Income distribution gap is a normal state of market economy. Moderate gap is conducive to mobilizing workers' production enthusiasm and promoting social and economic development. However, there are differences in individuals' innate abilities, postnatal efforts, and capital production factors, which lead to different incomes. This creates income inequality, which continues to widen and the situation becomes increasingly severe. the income distribution of Chinese residents is mainly reflected in the income gap between urban and rural residents, regional residents, and industry residents.

Keywords: Income Distribution Gap, Urban-Rural Gap, Regional Gap, Industry Gap

1. INTRODUCTION

With the rapid, sustained, and healthy development of China's economy since the reform and opening up, the income distribution system has been continuously improved, and residents' income has been increasing. However, no system is perfect, as problems continue to arise and improve during the process of reform and development. the income distribution system will also face a series of problems during the reform process, and analyzing these problems and finding solutions to them has become an essential part of the reform of the income distribution system.

2. INCOME GAP BETWEEN URBAN AND RURAL RESIDENTS

With the further deepening of China's economic development and reform, the income of urban and rural residents has been increased to varying degrees. However, China is a country that divides urban and rural areas, and the degree of development between urban and rural areas is different, and the policies implemented by the country are also different, inevitably leading to a widening income gap between urban and rural residents. the income of urban and rural residents tended to stabilize for a considerable period of time after the founding of the People's Republic of China, and the gap was not significant. This was mainly due to the implementation of the planned economy system and the prevalence of egalitarianism. Later, due to the emphasis on industrial development and the neglect of agricultural development by the government, the income gap between urban and rural residents gradually widened. With the continuous changes in the income distribution system since the reform and opening up, the income of urban and rural residents has been increasing. Although the rural reform implemented at the end of 1978 once narrowed the income gap between urban and rural areas in China, the unbalanced development of the urban and rural economy has not been reversed. In the past five years, the Gini coefficient of Chinese residents has been increasing. Although the per capita disposable income of urban residents and rural residents are both on the rise, the growth rate of per capita disposable income of urban households is much higher than that of rural households, and the income gap between the two is widening.

3. REGIONAL INCOME INEQUALITY

From the perspective of regional income inequality, since the reform and opening up, the economies of various regions in China have experienced unprecedented development. However, the regional economic development in our country is very uneven, and the level and speed of economic development vary from place to place, which leads to significant income disparities among residents in different regions. On the one hand, the eastern coastal areas have their own factors that

promote development, such as natural conditions and location advantages. For a long time, the economic and social development level in the eastern region has been higher than that in the central and western regions; the reform and opening-up policy implemented in our country is a "tiered" development strategy, advancing from the eastern coastal areas to the central and western regions. the eastern region implemented opening-up earlier and is closely related to the country's preferential policies, which is its superior external factor. This has accelerated the development of the eastern region and continued to widen the income gap between the eastern, central, and western regions. Overall, there is a trend of more in the east and less in the west, faster in the east and slower in the west, and the income gap between residents in the east and west is constantly widening.

4. INDUSTRY INCOME GAP

Firstly, the income from the tertiary industry and related sideline industries is generally high, while the income from agriculture, forestry, animal husbandry, and fisheries is generally low. From the situation in recent years, employees in high-tech industries such as computers have higher incomes. In addition, the average salary of employees in monopolistic industries is as high as 5-10 times the national average salary. Employees of monopolistic state-owned enterprises, especially executives, have abnormally high incomes, seriously deviating from the reasonable range.

Secondly, in recent years, the productivity heat of some traditional industries has begun to fade. With the accelerated development of new media such as the Internet, new media professions have emerged. For example, various media live broadcasts and related industries driven by them have grown rapidly to meet the needs of market economic development. the income of employees in these industries is far more than that of ordinary employees in traditional industries, and the income gap continues to widen.

Finally, employees engaged in mental labor mainly engage in industries that require high talent, such as scientific research and information transmission, due to their high skills and cultural knowledge literacy. the wage levels in these industries are relatively high compared to those engaged in physical labor, so there is a significant difference in income between employees in industries where mental labor is the main focus and those who mainly engage in physical labor, and the income gap continues to widen.

Since the reform and opening up, China's deepening reform of the income distribution system has played a significant role in increasing residents' income and promoting economic development. However, the ensuing income gap issue has become increasingly severe, posing a stumbling block to social harmony and stable development. Guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, we must adhere to a people-centered approach, pay attention to vulnerable groups, and ensure that urban and rural areas, regions, and industries can all share the fruits of development, in order to promote common prosperity for all people and realize the Chinese Dream of national rejuvenation.

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