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Integrated Study on Ship Exhaust Gas Treatment and Fuel Conversion Technologies

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Abstract: With the increasing urgency of global climate change and environmental protection, the shipping industry, as a significant source of greenhouse gases and air pollutants, faces stringent environmental regulations and technical challenges. This study aims to explore effective integration strategies for exhaust gas treatment and fuel conversion technologies to achieve enhanced environmental sustainability and energy efficiency. Through a comprehensive literature review and analysis of technological trends, the study evaluates mainstream exhaust gas treatment methods (e.g., desulfurization, denitrification, and particulate capture) and alternative fuel options (e.g., LNG, biofuels, and hydrogen). A thermodynamic modeling and multi-objective optimization approach is employed to develop an integrated model, followed by numerical simulations to assess the performance of various integration schemes in terms of emission reduction efficiency, economic feasibility, and technical viability. Results indicate that the synergy between exhaust gas treatment and fuel conversion significantly reduces emissions of air pollutants and greenhouse gases, with clean fuels like LNG and hydrogen demonstrating high feasibility and economic benefits in integrated solutions. Furthermore, the study highlights the necessity of optimizing integration designs by considering factors such as ship type, operational region, and cost to maximize both environmental and economic outcomes. the findings provide theoretical guidance and technical support for the low-carbon transition and sustainable technological development of the shipping industry.

Keywords: Ship Exhaust Treatment; Fuel Conversion; Integrated Optimization; Emission Reduction; Sustainable Development

1. INTRODUCTION

1.1 Research Background and Significance

As a crucial carrier of the global economy, ships play an indispensable role in trade and transportation. However, ship exhaust emissions have become a significant source of air pollution worldwide. According to the International Maritime Organization (IMO), pollutants such as sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emitted by ships account for 13% and 15% of global atmospheric pollutant emissions, respectively. Sulfur-containing exhaust gases not only lead to the formation of acid rain but also pose severe threats to air quality in coastal and port areas. Additionally, the shipping industry is considered a major contributor to greenhouse gas emissions, with an average annual carbon dioxide (CO_2) emission share of nearly 3%. Therefore, effectively addressing ship exhaust emissions and promoting cleaner fuels have become critical issues in the global environmental protection field.

With increasingly stringent environmental regulations, such as the IMO 2020 global sulfur cap that reduced the sulfur emission standard for ships to 0.5% m/m, and the carbon neutrality goals outlined in the Paris Agreement, the shipping industry is being compelled to accelerate the development and application of environmental protection technologies. At the same time, growing societal attention to environmental preservation has driven the development and utilization of cleaner fuels, becoming a focal point in the industry. Through the synergistic

application of exhaust treatment technologies and fuel conversion technologies, it is possible to not only significantly reduce the environmental impact of shipping operations but also promote sustainable industry development while balancing economic and environmental benefits.

1.2 Review of Research Status Domestically and Internationally

In recent years, significant progress has been made in the fields of ship exhaust treatment and fuel conversion both domestically and internationally. In foreign research, European and American countries, with their strong environmental awareness and economic capabilities, have taken the lead in studying and testing technologies such as low-sulfur fuel oil, liquefied natural gas (LNG)-powered ships, and hydrogen fuel cell ships. For example, Norway is a leader in zero-emission ship technology, with its hydrogen fuel ferry "MF Hydra" successfully operating commercially [1]. In the field of exhaust treatment, large shipping companies in Europe and the United States widely adopt technologies such as wet scrubbers and selective catalytic reduction (SCR) to treat exhaust gases, significantly reducing ship pollutant emissions.

In China, the government has actively promoted green ports and green ships since the 13th Five-Year Plan. the China State Shipbuilding Corporation, in collaboration with related research institutions, has focused on developing low-sulfur fuels, LNG dual-fuel-powered ships, and shore power technology at ports. Moreover, China has made notable breakthroughs in fields such as particulate matter capture technology, such as the development and application of dry desulfurization devices, providing strong support for domestic ship environmental protection technologies. However, compared to international leading standards, China still faces gaps in technology integration and standardization. Strengthening international cooperation and technology introduction is necessary to enhance its technological capabilities and competitiveness.

1.3 Research Objectives and Content

Based on the above background, this study aims to systematically evaluate the current status and challenges of ship exhaust treatment and fuel conversion technologies. By constructing an integrated optimization model, this research explores the environmental protection effects and economic performance under the synergy of these two approaches. the research content includes: (1) analyzing the basic principles and application status of exhaust treatment and fuel conversion technologies; (2) constructing an integrated framework for exhaust treatment and fuel conversion technologies and conducting numerical simulations; (3) evaluating the performance of different technology combinations in terms of emission reduction efficiency and economic feasibility; and (4) providing scientific evidence and practical recommendations for the low-carbon transition and environmental technology development in the shipping industry.

2. OVERVIEW OF SHIP EXHAUST TREATMENT TECHNOLOGIES

2.1 Desulfurization Technology

Ship exhaust contains large amounts of sulfur dioxide (SO_2), primarily produced by the oxidation reactions of sulfur compounds during the combustion of high-sulfur heavy fuel oil. Desulfurization technologies can be categorized into three types: wet desulfurization, dry desulfurization, and seawater desulfurization. Wet desulfurization is currently the most widely used technology, utilizing calcium hydroxide or sodium hydroxide solutions to react chemically with SO_2 in the exhaust gas, generating calcium sulfate precipitates to achieve desulfurization. According to data released by DNV GL, the application rate of wet scrubbers in the global shipping market exceeds 85% [2].

In contrast, dry desulfurization offers advantages such as simple equipment and no wastewater discharge. It uses solid adsorbents (e. g., activated carbon or alumina) to adsorb SO_2 and produce sulfates. However, dry desulfurization has relatively low desulfurization efficiency and requires frequent replacement of adsorbents, making it suitable only for small and medium-sized ships. Seawater desulfurization technology directly utilizes the alkalinity of seawater to absorb SO_2, generating harmless compounds that are discharged along with seawater. This

technology is highly dependent on the ecological environment of seawater regions and is limited in application to inland and coastal areas. However, it is cost-effective and suitable for large-scale ships.

2.2 Denitrification Technology

Nitrogen oxides (NO_x) are another major pollutant in ship exhaust, primarily generated during high-temperature combustion processes involving nitrogen oxidation reactions. Selective Catalytic Reduction (SCR) is internationally recognized as a highly efficient denitrification technology. It involves injecting a reducing agent (e. g., ammonia or urea solution) into the exhaust gas, which, under the action of a catalyst, reduces NO_x to nitrogen and water. According to IMO statistics, the denitrification efficiency of SCR technology can exceed 90% [3].

Besides SCR technology, low-temperature plasma technology has also gained attention in recent years. This technology uses high-energy electrons in an electric field to decompose nitrogen oxides, achieving low-temperature and high-efficiency denitrification. Although still in the experimental research stage, its low energy consumption and lack of secondary pollution offer potential for future development.

2.3 Particulate Matter Capture Technology

Particulate matter (PM) in ship exhaust primarily originates from the incomplete combustion of fuel and lubricating oil. Particulate matter capture technologies include electrostatic precipitators, bag filters, and cyclone separators. Electrostatic precipitators use high-voltage electric fields to charge particulate matter, which is then separated by electric field adsorption, achieving a capture efficiency of over 95%. This technology is suitable for medium- and large-sized ships, although its equipment costs are relatively high. Bag filters intercept particulate matter in exhaust gas through multi-layer filters, offering simple structure and easy maintenance, making them suitable for retrofitting small- and medium-sized ships.

In recent years, emerging particulate matter capture technologies have shown potential, such as nanomaterial-enhanced adsorption techniques and acoustic wave vibration-based particle separation methods. These technologies have demonstrated strong application potential in laboratory settings, but their stability and reliability in real-world ship environments require further validation.

3. OVERVIEW OF MARINE FUEL CONVERSION TECHNOLOGY

The cleanliness of ship fuel is one of the key ways to realize the sustainable development of ship industry. Although traditional heavy oil fuels have high energy density and economy, their high sulfur content and complex chemical composition lead to a large number of pollutants and greenhouse gas emissions. Therefore, the development and application of clean fuels has become the hot direction of the current industry development. At present, technologies such as liquefied natural gas, biofuels and hydrogen fuel have shown great application potential at different levels.

3.1 Liquefied natural gas technology

Liquefied natural gas (LNG), with its low sulfur, low nitrogen oxide emissions and low carbon emissions, has become one of the most competitive technologies in the Marine fuel conversion process. LNG fuel is mainly composed of methane, and its carbon dioxide emissions during combustion are reduced by about 20-30% compared with traditional heavy oil, and the emissions of sulfur oxides and particulate matter can be almost completely eliminated [1]. In addition, LNG fuel technology has a higher degree of maturity and commercialization than other fuel alternatives, and has achieved large-scale promotion and application in the world.

In recent years, many countries and regions have actively promoted the development of LNG-powered ships. For example, European countries such as Norway, the Netherlands and Germany have introduced policies to support port infrastructure and encourage shipowners to adopt LNG fuel. Currently, more than 200 LNG-fueled merchant vessels are in operation worldwide, including container ships, ro-ro ships and tankers [1]. In China, for example, CNOOC and COSCO Shipping have jointly developed a number of LNGN-powered container ships and built LNG refueling stations in major domestic ports such as Shanghai and Shenzhen to support the switching of ship fuels.

Although LNG fuel performs well in terms of environmental performance, it still faces

several challenges in its application. For example, the cryogenic environment required for LNG storage and transportation leads to high infrastructure costs, while methane leakage may also adversely affect climate change [2]. In the future, the development of LNG technology will require further optimization of storage equipment and fuel efficiency, while strengthening the monitoring and treatment of methane leaks.

3.2 Biofuel technology

Biofuels are renewable fuels made from biomass feedstocks such as vegetable oils, animal fats or agricultural waste. Compared with fossil fuels, biofuels have the characteristics of carbon neutrality, that is, the carbon dioxide produced by their combustion can be absorbed through the growth process of raw materials, so as to achieve the balance of atmospheric carbon emissions. Common Marine biofuels include Biodiesel and Bioethanol.

In the world, the research and application of biofuels have gradually gained attention. For example, international shipping giant Maersk Group has pioneered the use of biodiesel as a power source in some of its ships and reported a reduction of about 15 percent in its CO2 emissions. At the same time, port cities such as Singapore are actively promoting commercial refueling services of biofuels to meet the demand for green shipping in the region [3]. It is worth noting that the high compatibility of biofuels can be directly used in existing diesel engines without large-scale modifications to the ship's power system, thus reducing the cost of technology switching.

Nevertheless, the availability of feedstock and production costs for biofuels limit their large-scale adoption. the heavy use of crops as raw materials may pose a threat to food security, in this regard, the development of non-food crops and waste as raw materials of the second generation of biofuel technology has become an important direction of future research.

3.3 Hydrogen fuel and ammonia fuel technology

Hydrogen fuel and ammonia fuel are considered to be an important technological path to achieve "zero carbon emissions" shipping. Hydrogen as a high energy density of clean fuel, its combustion process does not produce carbon dioxide, only water vapor. However, the storage and transportation technology of hydrogen fuel is highly complex, and its low temperature liquefaction and high pressure storage equipment put new requirements on ship design. In addition, at present, hydrogen production mainly relies on fossil energy, and the "green hydrogen" technology of hydrogen production by electrolysis of water has not yet achieved large-scale economic production.

Due to its zero carbon emission potential and high storage stability, ammonia-$_3$ (NH_3) has gradually entered the field of vision of researchers in recent years. the main challenge of ammonia as a fuel is its toxicity and low combustion efficiency. At present, Japan, South Korea and other countries have started the technical test work of ammonia fuel-powered ships, and breakthroughs in this field are expected to provide new options for future green shipping [3].

Overall, the application of hydrogen fuel and ammonia fuel is still in the stage of technological exploration and testing, and it is difficult to achieve large-scale commercialization in the short term. However, with the increase of the proportion of renewable energy and the breakthrough of storage and transportation technology, its position in the future Marine fuel market will be further enhanced.

4. INTEGRATED TECHNICAL FRAMEWORK OF MARINE WASTE GAS TREATMENT AND FUEL CONVERSION

4.1 Basic Principles of integration technology

The integration of Marine exhaust gas treatment technology and fuel conversion technology aims to maximize environmental and economic benefits through the synergistic effect of the two types of technologies. For example, the installation of SCR denitrification equipment on ships using LNG fuel can further reduce the level of nitrogen oxide emissions from ships. By combining the particle capture technology with biofuels, the emission of particulate matter and hydrocarbons in exhaust gas can be effectively reduced.

The core of the integration technology is to optimize the compatibility of the two types of

technology, including the compatibility between the operating parameters of the exhaust gas treatment equipment and the combustion characteristics of the new fuel. For example, LNG fuel burns at a lower temperature and produces less nitrogen oxide, so the operating temperature of the catalyst can be reduced in the SCR denitrification unit, thereby saving energy and operating costs. In addition, the modular design of the exhaust gas treatment equipment also helps to achieve flexible adaptation with a variety of fuels, improving the stability of the ship's performance.

4.2 Construction of technology integration model

In order to analyze the emission reduction effect and economy of different technology combinations, an integrated model of exhaust gas treatment and fuel conversion technology was constructed by using thermodynamic modeling and multi-objective optimization methods. the model mainly includes the following modules:

Fuel combustion process simulation: According to the chemical structure and calorific value of the fuel, the pollutant generation and energy release efficiency in the combustion process are predicted.

Modeling of exhaust gas treatment process: mathematical equations are used to describe the operation process of desulfurization, denitrification and particulate matter capture equipment, and the removal rate of pollutants in exhaust gas is calculated.

Cost and benefit assessment: fuel costs, equipment investment and operation and maintenance costs are considered comprehensively, and social cost models are introduced to evaluate the comprehensive economy of different technology combinations.

Optimization algorithm: Based on multi-objective optimization method, balance emission reduction benefits and economic costs, and optimize the technology combination scheme under different ship types and sailing conditions.

Through the construction of integrated technology model, it can provide scientific decision-making basis for shipowners and designers in the ship design stage, so as to realize the green transformation and efficient management of the ship industry.

5. OPTIMIZATION DESIGN AND METHOD OF INTEGRATED MODEL

The integration of Marine waste gas treatment and fuel conversion technology needs scientific modeling and optimization methods to achieve the best balance between environmental benefits and economic benefits. Therefore, the integrated model design based on thermodynamic principle and multi-objective optimization method is particularly important. This methodology can not only describe the complex physicochemical process quantitatively, but also find the optimal solution of the combination of techniques under various constraints.

5.1 Thermodynamic modeling methods

The core of Marine waste gas treatment and fuel conversion technology lies in the thermodynamic process of fuel combustion and pollutant generation and treatment. Through the establishment of thermodynamic model, the energy conversion, pollutant generation and the working state of treatment equipment in the combustion reaction process can be accurately measured. In the process of thermodynamic modeling, the combustion characteristics of fuel, the operation characteristics of waste gas treatment equipment and the thermodynamic balance of the whole system are the main research objects. The first step of model design is to model the combustion process in the combustion chamber. the chemical reaction equations of fuel combustion will show significant differences for different fuel types. For example, when liquefied natural gas (LNG) is burned, the main products are carbon dioxide and water vapor, while the tail gas produced by traditional heavy oil combustion contains a large number of sulfur oxides and particles in addition to the above components. By simulating the equilibrium constant, reaction heat and pollutant generation of combustion reaction of various fuels, the tail gas composition of different fuels can be accurately predicted. the literature shows that the amount of carbon dioxide released by LNG combustion is about 20%-30% less than that of conventional fuel oil, while sulfur

oxides and particulate matter can be almost completely eliminated [1].

The second step is the thermodynamic modeling of waste gas treatment equipment. the operation process of desulfurization device, SCR (selective catalytic reduction) denitration device and particle catcher all involve complex chemical reaction and heat and mass exchange process. For example, in the wet desulfurization tower, the sulfur dioxide in the tail gas is absorbed by calcium hydroxide solution to generate calcium sulfate precipitation; In SCR denitration system, urea solution is decomposed into ammonia gas at high temperature, and the reduction reaction with nitrogen oxide occurs on the catalyst surface to produce nitrogen and water. the reaction heat, absorption heat and heat transfer effects in these processes need to be characterized by thermodynamic equations.

After the unit modeling of the combustion and exhaust gas treatment process is completed, the thermodynamic balance of the whole system needs to be considered comprehensively. In the course of ship operation, the energy transfer between main engine combustion and exhaust gas treatment equipment is a dynamic balance process. For example, SCR devices have high requirements for exhaust gas temperature, and in order to ensure denitration efficiency, the exhaust gas may need to be reheated, and this process will increase energy consumption. Through thermodynamic modeling, this equilibrium state can be optimized to reduce unnecessary energy waste.

5.2 Multi-objective optimization method

The integrated design of Marine exhaust gas treatment and fuel conversion technology involves the tradeoff of multiple objectives and constraints. These targets typically include pollutant reduction efficiency, fuel economy, equipment investment and operating costs, and system stability. Therefore, multi-objective optimization method becomes an effective tool to solve this problem.

The key of multi-objective optimization is to establish the objective function and constraint conditions. the objective function can be constructed from the calculation results of the above thermodynamic model. For example, pollutant reduction targets can be defined as total removal rates of sulfur dioxide, nitrogen oxides and particulate matter, fuel economy targets can be defined as unit energy costs, and equipment operational stability can be quantified by parameter fluctuation ranges. Constraints usually include ship design conditions, fuel suitability and regulatory requirements. For example, the International Maritime Organization's (IMO) 2020 sulfur Limit Order, which requires sulfur oxide emission concentrations below 0.5% m/m, will act as a constraint to limit the range of technical options.

Through the comprehensive analysis of the objective function and constraints, a variety of optimization algorithms can be used to solve the problem. Genetic Algorithm (GA) is widely used because of its ability to deal with nonlinear and multi-objective problems efficiently. By simulating the process of biological evolution, the algorithm selects the near-optimal solution step by step. Another common method is Particle Swarm Optimization (PSO), which finds the global optimal solution with a fast convergence rate by simulating crowd behavior. the application of these optimization algorithms can effectively evaluate the comprehensive performance of different technology combinations and provide scientific basis for design decisions.

6. NUMERICAL SIMULATION AND PERFORMANCE EVALUATION

Through numerical simulation technology, the actual operating state of the integrated system of Marine exhaust gas treatment and fuel conversion can be simulated in a virtual environment, and its performance can be comprehensively evaluated. This method can not only reduce the experimental cost, but also compare and analyze various technical schemes in a short time.

6.1 Simulation parameters and boundary condition setting

The accuracy of numerical simulation depends on the selection of input parameters and the setting of boundary conditions. In the integrated simulation of Marine waste gas treatment and fuel conversion technology, the input parameters usually include the chemical composition of fuel, the working state of the combustion chamber, the operating

parameters of the exhaust gas treatment equipment and the design condition of the ship. For example, the chemical composition of the fuel directly determines the composition of the exhaust gas and the amount of pollutants generated, while the combustion temperature and pressure affect the combustion efficiency and energy release.

The setting of boundary conditions should fully consider the actual situation of ship operation. For example, the ship's course, speed, ambient temperature and humidity are all important factors that affect the simulation results. For different fuel and technology combinations, the boundary conditions need to be adjusted to ensure the reliability of the simulation results. For example, when simulating the integrated system of LNG fuel and SCR denitrification equipment, the exhaust gas temperature needs to be set at 350-450 ° C to meet the operating temperature requirements of the SCR catalyst.

6.2 Performance Evaluation of the Integration Solution

After the completion of the numerical simulation, the effect of different technical schemes can be quantitatively analyzed through the performance evaluation index. These indicators mainly include environmental performance, economic performance and technical feasibility.

Environmental performance is measured by emission indicators. For example, the removal rates of sulfur dioxide, nitrogen oxides and particulate matter, as well as greenhouse gas emission reductions, are assessed. Simulation results show that the combination of LNG fuel and SCR denitrification equipment can reduce nitrogen oxide emissions by more than 90%, while achieving near-zero emissions of sulfur dioxide and particulate matter [2].

Economic performance is mainly reflected in fuel costs, equipment investment and operating costs. For example, LNG fuel has a slightly higher cost per unit of energy than conventional fuels, but it has significant advantages in terms of emissions reduction and regulatory compliance. By introducing a social cost model, the impact of pollutant emissions on the environment and public health can be further quantified, thus assessing the combined economics of different technological options.

Technical feasibility is assessed by the stability of equipment operation, suitability and impact on the overall design of the ship. For example, when simulating the combination of particle capture technology and biofuels, special attention needs to be paid to the effect of the pressure drop of the capture equipment on the ship's propulsion system.

Through the above simulation and evaluation, it can provide scientific decision-making basis for shipowners and designers to help them achieve the best balance between environmental benefits and economic benefits in the choice of technology.

7. RESULTS AND DISCUSSION

Through modeling and performance evaluation, the integrated approaches of ship exhaust gas treatment and fuel conversion technologies exhibit diverse characteristics in emission reduction and economic feasibility. This section discusses the findings from two perspectives: emission reduction performance and economic and technical feasibility.

7.1 Emission Reduction Performance of Different Integrated Approaches

Integrated technologies for exhaust treatment and fuel conversion show significant differences in emission reduction. For example, a combination of LNG (liquefied natural gas) fuel and SCR (Selective Catalytic Reduction) achieves notable reductions in pollutants. Simulations indicate that LNG combustion nearly eliminates SO_2 emissions, reduces NO_x emissions by over 90% with SCR, and significantly lowers particulate matter. This approach complies with the IMO 2020 sulfur cap and has been widely adopted in practice.

In contrast, biofuels excel in reducing CO_2 emissions. Since CO_2 from biofuel combustion is considered "short-cycle carbon, " it theoretically does not increase atmospheric carbon levels. Simulations demonstrate that biofuels reduce CO_2 emissions by approximately 50% compared to conventional heavy fuel oils, with near-zero SO_2 and particulate emissions. However, NO_x emissions remain higher, necessitating additional technologies like SCR to address this issue.

For zero-emission initiatives, hydrogen and ammonia fuels hold promise. Hydrogen

combustion primarily produces water vapor, emitting no CO_2, SO_x, or particulates, while ammonia combustion generates nitrogen and water vapor. However, hydrogen may produce trace NO_x without catalysts, and ammonia faces challenges such as combustion stability and ammonia slip, which can release toxic gases. Further optimization of combustion and exhaust treatment is required to enhance their practical application.

The comparative analysis highlights that no single technology can address all emission reduction needs. Practical applications must consider ship type, regulatory requirements, and economic factors to select the optimal combination.

7.2 Economic and Technical Feasibility

From an economic perspective, costs vary greatly among technologies. LNG, as a mature clean fuel, costs about 1.2 times more than heavy fuel oil, with high initial investments in storage and supply systems. However, its high energy efficiency and avoidance of environmental penalties result in lower long-term operational costs. the cost recovery period for a medium-sized LNG-powered ship is approximately 5-7 years, making it suitable for long-term investments.

Biofuels face cost challenges due to raw material supply and production scale. For example, biodiesel production costs are typically 1.5 times higher than conventional diesel. However, its high compatibility with existing engines minimizes initial investment. Stable supply chains, particularly for second-generation biofuels derived from agricultural waste, could reduce costs in the future.

Hydrogen and ammonia fuels involve more complex economic considerations. Hydrogen production, storage, and transport require significant energy and advanced technology, resulting in unit energy costs 2-3 times higher than conventional fuels. Low-density hydrogen also demands more storage space, posing design challenges. Nevertheless, advances in renewable energy and electrolysis could lower green hydrogen costs. Ammonia has lower storage costs but faces issues like low combustion efficiency and high retrofitting expenses.

In terms of technical feasibility, LNG is highly commercialized, with proven operational stability and safety. Biofuels also show good adaptability, requiring minimal engine modifications. Hydrogen and ammonia, however, remain in experimental stages, requiring further research on combustion performance, exhaust treatment, and equipment durability.

8. CONCLUSIONS

This study evaluated the emission reduction, economic, and technical feasibility of integrated exhaust gas treatment and fuel conversion technologies. Results indicate that single technologies are insufficient to meet comprehensive emission reduction goals, while integrated approaches optimize performance. LNG, with its maturity and strong emission reduction capacity, is the mainstream clean fuel choice. Biofuels, owing to their renewability and adaptability, show promise in specific applications. Hydrogen and ammonia represent future directions for zero-emission shipping but require further validation of their economic and technical feasibility.

In exhaust treatment, combining desulfurization, denitrification, and particulate capture significantly enhances pollutant removal. Optimizing operational parameters improves efficiency and cost-effectiveness while meeting regulatory requirements.

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Exploration of the Integrated Application of Computer Technology and Information Management

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Abstract: The integration of computer application technology and information management is a critical research area in the context of digital transformation. This study investigates the combined use of these technologies in various scenarios and analyzes their impact on improving management efficiency and decision-making quality in enterprises. Through a combination of literature review and data analysis, the study systematically reviews the current development of computer technology and core theories of information management, constructing a theoretical framework for their integration. By modeling and analyzing multi-domain application cases, it explores optimization mechanisms for data collection, processing, storage, and analysis, and validates the feasibility of combining intelligent algorithms with information management theories in practice. Results demonstrate that the integration of computer technology and information management significantly enhances data processing efficiency, optimizes resource allocation, and supports strategic decision-making. This study provides a scientific basis for designing and implementing enterprise information management systems, offering theoretical support for innovative applications of computer technology in management and a reference for digital transformation in information management.

Keywords: Computer Technology; Information Management; Integrated Application; Digital Transformation; Enterprise Management

1. INTRODUCTION

1.1 Research Background and Significance

As global digitalization accelerates, the integration of computer application technology and information management has become a pivotal driver of digital transformation across industries. Computer technologies offer robust computational capabilities and technical support for efficient data processing, while information management ensures optimal resource allocation through systematic planning and decision-making. In today's complex market environment, with surging data volumes and growing demand for real-time, efficient decision-making, the integration of these two fields has emerged as a focal point for research. Their synergy can significantly enhance efficiency in data processing, resource allocation, and strategic planning, providing scientific support for decision-making processes.

Recent advancements in technologies such as artificial intelligence, big data, and blockchain have unlocked unprecedented potential for computer applications. For instance, IDC (International Data Corporation) reported that global data volume reached nearly 175 zettabytes in 2023, yet less than 2% of this data has been effectively utilized, indicating a lag in efficient data management technologies [1]. Addressing how to integrate computer technology with information management to maximize the value of massive datasets and support societal development has become a pressing theoretical and practical challenge.

1.2 Literature Review

International research on the integration of computer technology and information management began earlier, particularly in developed countries. In the United States, breakthroughs in information management have demonstrated that data-driven decision-making can improve operational efficiency by 35% compared to traditional methods [2]. Europe leads in developing intelligent

information management systems, focusing on mechanisms for integrating diverse data sources. Recently, international studies have emphasized the balance between technological innovation and security standards in integration practices.

In China, significant progress has also been made, although research primarily focuses on theoretical discussions and technical aspects, such as the compatibility of data mining techniques with business management processes [3]. However, in-depth studies on integration practices, such as application model designs, effectiveness evaluations, and pathways for technological optimization, remain underdeveloped. This gap highlights both challenges and opportunities for future research in the field.

2. THEORETICAL FOUNDATIONS OF INTEGRATION

2.1 Development and Key Technologies of Computer Applications

The evolution of computer application technology has transitioned from traditional computation to intelligent systems. From standalone program applications to cloud computing, artificial intelligence, and the Internet of Things (IoT), computer technologies have fundamentally transformed data processing. Cloud computing has gained prominence for its efficiency and scalability, big data technologies have enabled the analysis of massive unstructured datasets, and artificial intelligence leverages machine learning and deep learning algorithms to detect patterns in data.

Key technologies include:

1. Distributed Computing: Supports decentralized processing of large-scale data.
2. Database Advancements: Enables the coexistence of NoSQL and relational databases for various applications.
3. Algorithm Optimization: Enhances data analysis efficiency, utilizing models like random forests and convolutional neural networks.

These advancements provide a solid foundation for innovation in information management.

2.2 Core Theories and Frameworks of Information Management

Information management focuses on the acquisition, storage, processing, and utilization of information, aiming to optimize information flow and maximize value. Foundational theories, such as Shannon's information entropy and the data value chain model, are widely used in practice. Modern information management integrates knowledge from fields including management, economics, and computer science, forming a systematic theoretical framework.

Core tasks in information management involve data collection, classification, storage, and analysis, which rely on implementing efficient workflows. For instance, enterprises increasingly adopt ERP (Enterprise Resource Planning) systems and BI (Business Intelligence) tools to optimize information management. Studies indicate that companies with structured information management frameworks reduce resource waste by about 20%, underscoring their critical role in driving development [5].

2.3 Necessity and Theoretical Basis for Integration

The integration of computer application technology and information management stems from their complementary functionalities. While computer technologies provide powerful data processing capabilities, information management enhances efficiency and standardization through systematic methodologies. Theoretical support for integration includes:

Systematic application of IT in management processes.

Optimization of information flow through technology to improve decision-making accuracy and timeliness.

3. APPLICATION MODELS FOR INTEGRATION

3.1 Data Collection and Processing

Data collection and processing form the foundation of information management and are central to integration. Computer technologies enable large-scale real-time data collection through sensors, web scraping, and interface integration, while information management provides systematic standards for data classification and processing. For example, in smart manufacturing, sensors capture machine operation data, which is pre-

processed via edge computing devices and subsequently uploaded to the cloud for in-depth analysis. Studies show that implementing such models improves production efficiency by over 25% [6].

3.2 Data Storage and Management

Data storage is the backbone of information management systems. As data volumes grow, traditional storage methods face capacity and efficiency challenges. Modern computer technologies provide solutions such as distributed storage systems and decentralized storage through blockchain technology. Distributed storage addresses diverse data format requirements, while blockchain ensures data security and traceability through encryption and multi-node storage.

3.3 Data Analysis and Decision Support

Data analysis and decision support represent the ultimate objectives of integration. AI algorithms and big data platforms are increasingly embedded in decision support systems. For instance, deep learning models can analyze sales data to predict market demand trends, providing a scientific basis for strategic decision-making. Research indicates that companies using intelligent decision support systems achieve an 18% improvement in sales forecast accuracy and enhanced risk management capabilities [7].

4. IMPLEMENTATION PATHWAYS FOR THE INTEGRATION OF COMPUTER TECHNOLOGY AND INFORMATION MANAGEMENT

4.1 Design and Optimization of Technical Architecture

A well-designed and continuously optimized technical architecture is fundamental to integrating computer technology and information management. A layered architecture is commonly adopted by enterprises, dividing data collection, processing, storage, and analysis into distinct layers to ensure modular cooperation. This approach reduces system complexity and enhances scalability and maintainability.

Cloud computing facilitates dynamic resource allocation and elastic expansion through virtualization. Big data platforms, such as Hadoop and Spark, enable efficient data storage and retrieval, while AI-powered deep learning frameworks support intelligent information management. Optimizations include enhancing data transmission efficiency through edge computing, reducing network latency, and alleviating server load. Security measures such as blockchain are increasingly applied to ensure immutable and secure data storage. Industry-specific module customization is another critical optimization direction.

4.2 Development and Integration of Information Management Systems

The information management system is the core carrier of integration, encompassing steps such as demand analysis, platform selection, functional design, and maintenance. Demand analysis identifies system pain points and determines the intersection of technology and management. Platform selection balances performance and cost; for example, cloud-based solutions lower initial costs, while custom systems suit enterprises with high customization needs.

Integration emphasizes system compatibility and standardized data interfaces. Unified data protocols enable seamless integration of disparate systems, such as ERP platforms, ensuring modules like finance, logistics, and production share data, thereby enhancing efficiency. User-friendly interfaces and data visualization tools improve usability, and accompanying training programs ensure effective system adoption.

4.3 Innovation and Challenges in Integrated Applications

Technological innovation drives deeper integration. AI algorithms, such as natural language processing, automate the classification and analysis of unstructured data, while machine learning uncovers patterns in historical data for predictive insights. For instance, AI-assisted diagnostic systems in healthcare improve diagnostic efficiency and accuracy.

Challenges arise in three areas:

Technical: Balancing data security and processing efficiency, optimizing algorithms to meet real-time demands.

Organizational: Overcoming inter-departmental differences in data standards and workflows.

Cost: Hardware/software investment and training expenses may burden small and medium-sized enterprises.

5. EVALUATION OF INTEGRATION EFFECTS

5.1 Enhancements in Management Efficiency

Integration enhances management efficiency by accelerating data processing, optimizing resource allocation, and automating workflows. Studies show enterprises using big data and AI achieve 30-50% faster data processing compared to traditional methods [1]. Transparency in information flow eliminates departmental silos, improving collaboration.

In supply chain management, real-time monitoring of logistics via sensors combined with swift scheduling reduces transportation time, cutting costs and boosting customer satisfaction.

5.2 Improvements in Decision-Making Quality

Integration supports high-quality decision-making through accurate data analysis and clear information presentation. For example, a retail enterprise using AI to analyze sales data identified demand surges for specific products, enabling timely inventory adjustments and avoiding shortages or overstocking.

Risk management also benefits, as earlier identification of potential risks allows proactive measures. For instance, financial institutions use integrated systems to assess customer credit risks, improving loan management.

5.3 Evaluation Methods and Key Metrics

Evaluating integration effects requires a scientific indicator system, including:

- Data Processing Efficiency: Measured by data volume processed per unit time.
- Resource Utilization: Assessed by system hardware resource usage.
- Decision Accuracy: Quantified by the gap between outcomes and targets.

Evaluation methods include comparative analysis (e. g., against non-integrated enterprises) and case studies to provide insights for optimization.

6. CONCLUSION AND FUTURE OUTLOOK

6.1 Research Conclusions

The integration of computer technology and information management offers a new pathway for improving enterprise management efficiency and decision-making quality. Through robust technical architecture, deep system integration, and continuous technological innovation, integration significantly enhances data collection, storage, and analysis. It effectively addresses inefficiencies and opacity in traditional information management, creating substantial economic and social value.

6.2 Future Research Directions

Future research should focus on advanced technologies like quantum computing for information management. Cross-industry implementation strategies are also worth exploring. Balancing data sharing with privacy protection amid global concerns will be a critical topic. Additionally, developing cost-effective, high-performance solutions for small and medium-sized enterprises will have significant practical implications.

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Exploring Occupational Burnout and Strategies for Work Environment Improvement Among Healthcare Professionals

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Abstract: This study examines the causes of occupational burnout among healthcare professionals and its relationship with the work environment, proposing strategies to alleviate burnout and enhance both efficiency and mental well-being. A mixed-methods approach, combining questionnaire surveys and structured interviews, was employed across multiple healthcare institutions to collect data on key factors influencing burnout and their correlations with workplace characteristics. Quantitative analysis assessed the relationships between dimensions of burnout—emotional exhaustion, depersonalization, and reduced personal accomplishment—and work environment variables such as organizational support, workload, colleague relationships, and career development opportunities. Additionally, literature reviews and expert interviews were conducted to formulate systemic interventions, including workflow optimization, enhanced psychological support, and fostering a positive organizational culture. Results indicated that high workloads and inadequate organizational support are primary contributors to burnout, whereas improvements in supportive workplace factors significantly reduce burnout levels and enhance job satisfaction. This research offers theoretical and practical guidance for healthcare institutions aiming to mitigate burnout, promoting both the well-being of healthcare professionals and the sustainable development of the medical sector.

Keywords: Occupational Burnout; Healthcare Professionals; Work Environment; Mental Health; Improvement Strategies

1. INTRODUCTION

1.1 Research Background and Significance

Burnout, first introduced by psychologist Freudenberger in 1974, is a state of chronic stress accumulation. In recent years, healthcare professionals have faced increasing challenges—including high-intensity workloads, strained doctor-patient relationships, and overwhelming responsibilities during the pandemic—making burnout a critical global public health concern [1]. Burnout not only severely affects the physical and mental health of healthcare professionals but also compromises the quality of care and patient satisfaction, posing threats to the sustainable development of the healthcare sector. Particularly in China, where healthcare reforms have intensified workloads beyond the global average, the issue deserves heightened attention.

1.2 Literature Review

International research on burnout predominantly focuses on its conceptualization, mechanisms, and intervention strategies. the Maslach Burnout Inventory (MBI), which measures burnout across three dimensions—emotional exhaustion, depersonalization, and reduced personal accomplishment—is the most widely used tool [1]. Studies conducted in the U. S. and Europe indicate that over 50% of healthcare professionals experience moderate to severe burnout [2]. In contrast, research in China began later but has gradually transitioned from theoretical exploration to practical intervention, driven by strained doctor-patient relations and healthcare

reforms. Domestic studies show that burnout rates among Chinese healthcare professionals reach as high as 60.5%, significantly higher than other industries [3]. However, there is limited in-depth analysis of multidimensional correlations and intervention strategies in domestic research.

1.3 Research Objectives and Methods

This study aims to systematically analyze the causes of burnout among healthcare professionals and its interactions with the work environment, developing targeted strategies for improvement. A mixed-methods approach was adopted, combining questionnaires to collect key burnout data and structured interviews for in-depth insights. Statistical methods were employed to analyze correlations between burnout dimensions and workplace variables, while literature reviews informed the construction of a systemic intervention framework to provide theoretical and practical guidance for healthcare institutions.

2. THEORETICAL FOUNDATIONS OF BURNOUT AMONG HEALTHCARE PROFESSIONALS

2.1 Concept and Definition of Burnout

Burnout is a psychological syndrome triggered by prolonged exposure to high-pressure environments, characterized by emotional exhaustion, cognitive detachment, and diminished sense of accomplishment [1]. It reflects an individual's psychological defense mechanism when internal resources are insufficient to cope with relentless external demands. Recently, researchers have recognized burnout as not just an individual issue but a systemic phenomenon influenced by work environments, social support, and professional culture.

2.2 Dimensions and Manifestations of Burnout

Maslach's three-dimensional model identifies emotional exhaustion as the core symptom, signifying prolonged emotional depletion; depersonalization as a detached and indifferent attitude toward work; and reduced personal accomplishment as dissatisfaction with one's professional efficacy [1]. Among healthcare professionals, these symptoms manifest as coldness toward patients, declining professional ethics, and diminished job satisfaction, adversely affecting not only their well-being but also patient care quality and outcomes.

2.3 Specific Characteristics of Burnout in Healthcare Professionals

Burnout among healthcare professionals has unique occupational traits. the high-risk and complex nature of healthcare exposes professionals to sustained pressure. A 2022 WHO report noted that during the COVID-19 pandemic, approximately 70% of healthcare workers reported emotional exhaustion [2]. the implications of burnout extend beyond individual levels, potentially leading to resource inefficiencies and delays in patient care, making it a more pressing and multifaceted issue compared to other professions.

3. ANALYSIS OF THE CAUSES OF BURNOUT AMONG HEALTHCARE PROFESSIONALS

3.1 Workplace Factors

The work environment is a significant external trigger for burnout, encompassing workload, resource allocation, and physical conditions. Studies indicate that healthcare professionals often work over 60 hours per week, with shift schedules and night duties exacerbating physical and mental strain [2]. Resource shortages or uneven distribution hinder task efficiency, fostering frustration and emotional exhaustion. Additionally, high-pressure environments such as ICUs and emergency departments carry an elevated risk of burnout.

3.2 Organizational Structure and Management

Organizational design and management practices influence burnout significantly. Hierarchical but inefficient communication structures in healthcare organizations often alienate staff, undermining their sense of belonging. Research shows that burnout levels increase significantly in the absence of organizational support [1]. Furthermore, poorly designed performance evaluation systems may compel staff to prioritize metrics over personal well-being, exacerbating burnout.

3.3 Individual Psychology and Social Support

Psychological factors such as perfectionism and self-imposed high expectations are

internal contributors to burnout. Healthcare professionals often hold themselves to high standards, and failing to meet these can result in frustration. A lack of family and social support also exacerbates burnout. Studies confirm that familial support significantly alleviates emotional exhaustion, while robust social support systems reduce burnout incidence [3].

4. IMPACT OF THE WORK ENVIRONMENT ON BURNOUT AMONG HEALTHCARE PROFESSIONALS

4.1 High Workload and Time Pressure

High workloads have become increasingly prominent due to rising patient numbers driven by aging populations and shifting disease patterns. According to the China Health and Family Planning Statistical Yearbook (2021), patient visits in tertiary hospitals have increased by over 30% in the past decade, while the growth in healthcare staff lags behind [1]. This imbalance forces healthcare professionals to shoulder excessive workloads, creating both physical and psychological challenges.

In practice, healthcare professionals must manage not only clinical responsibilities but also patient communication, medical documentation, and research tasks. Emergency and ICU staff often work over 70 hours weekly [2]. Prolonged exposure to such high-intensity conditions significantly elevates emotional exhaustion, potentially leading to depersonalization and diminished self-efficacy.

Time pressure is another critical factor. Due to overwhelming patient volumes, professionals often allocate less than 10 minutes per consultation during peak periods. This conflict between rapid decision-making and resource constraints leaves little room for emotional recovery, compounding burnout [3].

4.2 Role of Organizational Support and Peer Relationships

Organizational support is a crucial buffer against burnout. Effective organizational support provides resource security, emotional backing, and trust. However, many healthcare institutions in China lack robust organizational culture and streamlined communication systems, leaving staff feeling alienated. A national survey of 3, 000 healthcare professionals reported that 40% perceived insufficient organizational support, particularly during disputes or emergencies [4].

High-quality peer relationships also mitigate burnout. Healthcare work relies heavily on teamwork, and strong collaboration alleviates individual stress and fosters a sense of belonging. Conversely, internal competition or resource conflicts, often driven by flawed performance systems, may exacerbate burnout [5].

4.3 Career Development Opportunities and Compensation

Career development opportunities influence healthcare professionals' sense of achievement and motivation. For younger professionals, prospects for promotion and professional growth are central to career satisfaction. Although initiatives like standardized residency training have enhanced skills, limited pathways for promotion in some departments result in frustration and waning enthusiasm. In contrast, developed countries like the U. S. and Germany have established robust career management systems, such as mentorship programs and career planning, to support professional advancement [6].

Compensation significantly impacts job satisfaction. In China, the mismatch between healthcare professionals' high-intensity, specialized work and their income levels remains a concern, particularly in primary care settings where wages and benefits are inadequate. This disparity heightens burnout rates [7].

5. STRATEGIES FOR MITIGATING BURNOUT AMONG HEALTHCARE PROFESSIONALS

5.1 Optimizing Workflow and Task Allocation

To alleviate heavy workloads, improving workflow efficiency and rational task distribution is essential. Many healthcare institutions have adopted digital management systems to streamline administrative tasks. For example, electronic medical record systems can reduce manual documentation and repetitive work, freeing up valuable time for physicians and nurses [8]. Additionally,

establishing multidisciplinary teams to share medical responsibilities and delegating non-clinical tasks to support staff can effectively reduce the burden on healthcare professionals.

5.2 Enhancing Psychological Support and Stress Management

To improve healthcare professionals' mental health, institutions should establish robust psychological support systems. Regular mental health screenings can identify high-risk individuals and provide timely psychological counseling. Some hospitals have introduced dedicated psychological support teams to offer one-on-one counseling and group debriefing sessions for stress relief. Furthermore, stress management workshops can equip healthcare professionals with effective tools to handle emotional and psychological challenges.

5.3 Fostering a Positive Organizational Culture and Incentive Mechanisms

Building a positive organizational culture is a critical step in addressing burnout. Healthcare institutions can organize team-building activities and case discussions to strengthen employees' sense of belonging and collective pride. In terms of incentives, institutions should design fair and balanced performance evaluation systems that avoid overemphasizing financial metrics. Diversified incentive measures, such as recognition awards and career development opportunities, can also enhance job motivation among healthcare professionals.

5.4 Promoting Career Development and Continuing Education

Career development is a key source of job satisfaction. Institutions should offer continuing education programs and opportunities for international training to boost professional confidence. Transparent promotion mechanisms and equitable career pathways can further enhance employees' sense of achievement and job satisfaction.

6. CONCLUSION

This study analyzed the causes of burnout among healthcare professionals and its relationship with the work environment, highlighting the significant impact of factors such as high workloads, insufficient organizational support, and limited career development opportunities. Proposed strategies, including workflow optimization, enhanced psychological support, and fostering a positive organizational culture, provide practical solutions for mitigating burnout. These findings offer both theoretical insights and practical guidance for healthcare institutions to reduce burnout and enhance the well-being of healthcare professionals, contributing to the sustainable development of the healthcare sector.

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The Dissemination and Impact Mechanisms of Photographic Art in the Era of Social Media

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Abstract: With the widespread adoption of social media, the dissemination and impact mechanisms of photographic art have undergone profound transformations. This study explores the dynamic characteristics of photographic art dissemination within the context of social media and its multifaceted influence on social culture, audience behavior, and artistic value. Employing a combination of literature review and theoretical modeling, the study outlines dissemination pathways for photographic content within the social media ecosystem and examines the roles of technology, platform algorithms, and user interactions in shaping these processes. Drawing on communication, sociology, and aesthetics theories, a mechanism model is developed to illustrate how photographic art achieves widespread dissemination and emotional resonance among audiences via social media. Furthermore, the study analyzes the restructuring of power dynamics between creators and audiences in the social media context, highlighting the implicit influence of algorithm-driven selective dissemination and thematic bias. Results reveal that while social media's interactivity and broad reach have diversified the dissemination of photographic art, they also pose challenges such as content oversimplification and diminished artistic depth. These changes not only reshape the perception of aesthetic value in photography but also introduce new challenges for artistic creation and the dissemination environment. This research provides theoretical insights into the evolving trends of photographic art in the social media era and offers practical recommendations for sustainable development for creators and platforms.

Keywords: Social Media; Photographic Art; Dissemination Mechanism; Impact Analysis; Cultural Transformation

1. INTRODUCTION

1.1 Research Background and Significance

The proliferation of social media, coupled with advancements in digital technology, has transformed the dissemination of photographic art, offering both unprecedented opportunities and challenges. Photography has shifted from traditional exhibition and print-based mediums to an online ecosystem dominated by platforms like Instagram, Facebook, Weibo, and Xiaohongshu. These platforms enable rapid global reach for photographic works, fundamentally altering both the dissemination methods and the contextual perception of artistic value. Notably, social media has democratized photography, encouraging ordinary users to create and share works through smartphones and digital tools, leading to a shift from "elite monopoly" to "popular participation."

Social media also imbues photographic art dissemination with immediacy and interactivity. Users actively engage with works via comments, likes, and shares, fostering a participatory dissemination mechanism between creators and audiences. However, algorithm-driven content distribution and mass participation have raised concerns over declining content quality and artistic value. Thus, exploring the dissemination mechanisms and societal impacts of photographic art in the social media era is of both theoretical and practical significance, contributing to a deeper understanding of the platform ecology and informing future artistic and cultural practices.

1.2 Literature Review

Existing domestic and international research into the relationship between social media and photographic art dissemination is expanding. Internationally, scholars like Thomas have

identified social media as a critical medium that reshapes dissemination pathways and audience selection through platform algorithms [1]. Smith et al. emphasized the impact of user-generated content (UGC), noting its role in lowering creative barriers while challenging traditional standards of professionalism [2]. Domestically, scholars such as Li Ming have examined how local platforms' cultural characteristics and technological logic contribute to unique dissemination features in China, contrasting with Western platforms [3]. However, most studies remain theoretical, lacking systematic modeling and empirical analysis of dissemination mechanisms or their broader sociocultural implications.

1.3 Research Objectives and Methodology

This study aims to systematically identify factors influencing the dissemination of photographic art on social media, analyze its mechanisms, and explore its sociocultural impacts. Employing a combination of literature analysis and theoretical modeling, the study integrates theories from communication, sociology, and aesthetics to construct a framework for understanding the dissemination and impact mechanisms of photographic art in the social media era. The findings are expected to provide theoretical insights and practical recommendations for both creators and platform managers.

2. FACTORS INFLUENCING THE DISSEMINATION OF PHOTOGRAPHIC ART ON SOCIAL MEDIA

2.1 Technological Advancements and Ecosystem Reshaping

Technological progress is a core driver of transformation in photographic art dissemination. The ubiquity of smartphones with high-resolution cameras and advanced photo-editing software, such as Adobe Lightroom and Photoshop, empowers non-professional users with near-professional capabilities. The deployment of 5G networks further accelerates real-time sharing, enhancing both efficiency and accessibility.

The dissemination ecosystem has also diversified, shifting from professional-centric models to participatory dissemination by amateur creators. This democratization fosters content diversity but also polarizes discussions on artistic value. While social media enriches audience experiences, it raises concerns over diluted artistic depth and uniqueness.

2.2 Algorithm-Driven Content Recommendation

Unlike traditional media, social media dissemination is heavily influenced by algorithmic recommendation systems. These algorithms analyze user behavior, preferences, and social connections to deliver personalized content. While this enhances efficiency, it also limits audience exposure. For instance, Instagram algorithms prioritize visually striking content, often at the expense of experimental works with deeper significance [4]. This selective dissemination potentially narrows artistic diversity and biases thematic representation.

2.3 User Interaction and Community Dynamics

Social media transforms users from passive audiences to active participants. Engagement behaviors—such as likes, comments, and shares—expand the reach of photographic works and influence creators' directions. Some photographers adapt their styles or themes to cater to audience feedback, aiming for higher interaction rates. Additionally, interest-based communities foster niche cultures, such as "macro photography" or "urban exploration," enhancing emotional connections between creators and audiences while encouraging the emergence of micro-cultural phenomena.

3. DISSEMINATION MECHANISMS OF PHOTOGRAPHIC ART IN THE SOCIAL MEDIA ERA

3.1 Diversified and Decentralized Dissemination Pathways

Social media redefines dissemination paths, moving beyond professional exhibitions and publications to decentralized networks where user sharing plays a central role. This diversification enables photographic works to reach varied audiences through multiple formats, including photo-text combinations, short videos, and live streams, creating new possibilities for dissemination.

3.2 Immediacy and Visual-Centric Dissemination

The immediacy of social media enables photographic works to achieve rapid global

dissemination, allowing audiences to engage with contemporary creations in real time. This immediacy also strengthens photography's integration with social events, such as disaster reporting or significant occurrences. Furthermore, social media's reliance on visual content positions photographic art as a central medium, broadening its audience reach and cultural impact.

3.3 The Rise of User-Generated Content (UGC)

UGC has emerged as a defining feature of photographic art dissemination. Ordinary users contribute to the creative landscape by sharing their works, enriching artistic diversity and offering fresh perspectives. However, the widespread adoption of UGC raises concerns over content homogenization and quality control, presenting new challenges to the sustainability of dissemination mechanisms.

4. SOCIOCULTURAL IMPACTS OF PHOTOGRAPHIC ART IN THE SOCIAL MEDIA ERA

4.1 Lower Barriers to Creation and the Trend of Democratization

The convergence of digital technology and the openness of social media platforms has significantly reduced the technical barriers to creating photographic art. Modern smartphones equipped with high-resolution cameras and AI algorithms allow users to capture high-quality images with minimal effort. Moreover, accessible image editing tools like Snapseed and VSCO empower amateur creators to refine their works. Social media platforms, with their massive user base, offer an expansive space for showcasing photography, reducing reliance on traditional venues such as galleries or exhibitions.

This shift has driven the "de-elitization" of photographic art, transforming it from a domain dominated by professionals to an activity accessible to all users. For instance, Instagram users upload approximately 6,600 images per minute, with most contributions coming from non-professionals [1]. This inclusivity brings photography closer to everyday life, as ordinary users imbue mundane scenes with artistic value through shared content.

However, the democratization of photography does not necessarily translate to elevated artistic standards. While accessibility has popularized photography, it has also led to content homogenization. Many creators prioritize short-term appeal to align with platform algorithms, often at the expense of artistic depth and innovation. This trend raises questions about the long-term development of photographic art.

4.2 Shaping Mainstream Values and Public Discourse

Social media has enhanced the capacity of photographic art to spark public discourse and influence mainstream values. Photography serves as a powerful medium for visualizing social issues, such as environmental protection, gender equality, and social justice, making these topics more relatable and emotionally resonant.

For example, visual storytelling has been leveraged by environmental organizations to highlight global climate change, capturing public attention through impactful imagery. Similarly, in China, photography projects addressing rural education disparities have catalyzed discussions on educational equity. Social media's broad reach and interactivity amplify the effectiveness of such initiatives, fostering deeper societal engagement.

Nevertheless, while photographic art excels at promoting mainstream values, the algorithmic amplification of visually impactful yet unverified content can introduce biases or distort public discourse. Balancing artistic freedom with social responsibility remains a critical challenge in the dissemination of photographic art on social media.

4.3 The Impact of Content Generalization on Artistic Depth

The technological and algorithmic dynamics of social media pose challenges to the depth of artistic creation. Platforms prioritize engagement metrics, favoring visually stimulating, entertaining, and instantaneous content. Consequently, works requiring deeper contemplation or contextual understanding often struggle for visibility.

Experimental photography, for instance, often emphasizes intricate concepts and techniques that demand a reflective audience. However, such works typically receive less exposure compared to vibrant, straightforward visuals. Studies indicate that social media posts with

high interaction rates are more likely to feature bright colors and simple compositions, rather than profound artistic expressions [2]. This trend reflects a "de-depthification" of content enabled by social media, potentially eroding the nuanced appreciation of art.

This generalization affects both creators, who face pressures to conform to platform norms, and audiences, whose aesthetic preferences and habits may shift toward simpler content. Finding a balance between adhering to platform dynamics and preserving artistic depth is a critical issue for creators.

5. THEORETICAL FRAMEWORK FOR THE DISSEMINATION AND IMPACT MECHANISMS OF PHOTOGRAPHIC ART

5.1 The Dissemination Chain in the Social Media Ecosystem

The dissemination of photographic art in the social media era involves a multifaceted chain comprising content creation, platform distribution, and user engagement. Unlike traditional linear dissemination models, social media operates as a decentralized and dynamic network. Users assume overlapping roles as creators, disseminators, and audiences, seamlessly transitioning between these roles.

For example, a photographic work shared on social media may be expanded in reach as users interact via likes or shares, while feedback in the form of comments shapes the creator's future content. This iterative and multi-directional flow distinguishes social media dissemination, breaking traditional constraints of time and space.

5.2 Bidirectional Interaction Between Content and Audience Behavior

The success of photographic works on social media depends not only on their intrinsic quality but also on audience engagement. Metrics such as likes, comments, and shares directly determine the reach of a work and indirectly influence the creator's choices. Studies show that content aligning with mainstream aesthetic trends and algorithmic preferences tends to achieve higher interaction rates [3].

Audience feedback also influences creators' cultural expression. For instance, photographers may adapt themes or styles based on audience preferences to maximize engagement. While this bidirectional interaction enhances dissemination efficiency, it challenges the autonomy of artistic creation. Balancing creative independence with audience demands remains a critical area for future exploration.

5.3 Power Dynamics Between Platforms and Creators

Social media platforms play a pivotal intermediary role between creators and audiences, yet their control over content distribution imposes constraints on creators. To gain visibility, some photographers adjust their styles to align with algorithm-driven aesthetic and technical norms, potentially sacrificing creative authenticity.

Algorithms emerge as a focal point in the power dynamics between platforms and creators. While platforms rely on user data to optimize recommendations, creators must adapt to these mechanisms to maximize exposure. Exploring strategies to maintain creative independence and foster equitable dissemination environments is crucial for sustainable development in the field.

6. CONCLUSIONS

This study systematically analyzes the dissemination and impact mechanisms of photographic art in the social media era, highlighting the influences of technological advancements, platform algorithms, and user behavior. While social media offers unprecedented opportunities for dissemination, it also introduces challenges such as content generalization and diminished artistic depth. These findings enrich the intersection of communication and art studies, providing critical insights into the evolving dissemination dynamics of artistic content in digital environments.

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Human Resource Management Transformation in the Digital Economy Era: From Traditional Models to Innovative Thinking

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Abstract: With the rapid development of the digital economy, human resource management (HRM) is undergoing profound transformations as traditional models struggle to meet the new demands of organizational efficiency and talent optimization in a digitalized environment. This study explores pathways for HRM transformation in the digital economy, identifying limitations of traditional HRM models and proposing a new framework centered on innovative thinking. Using a combination of literature analysis and theoretical construction, this research synthesizes insights from global studies and examines the impact of digital technologies on organizational structures and individual behaviors. A comprehensive model is developed, incorporating digital tool application, data-driven decision-making, employee experience optimization, and organizational agility enhancement. the findings reveal that digital-driven HRM transformation significantly improves the scientific basis and efficiency of organizational decisions while enabling greater talent potential through personalized management and flexible incentives. This study underscores the need for HRM in the digital economy to embrace data and technology as foundational tools, with innovation as its core driver. It provides theoretical guidance and practical insights for organizations aiming to achieve sustainable competitive advantages in complex and dynamic environments.

Keywords: Digital Economy; Human Resource Management; Digital Transformation; Innovative Thinking; Data-Driven

1. INTRODUCTION

1.1 Research Background and Significance

As the global economy transitions toward digitalization, the digital economy has emerged as a critical driver of societal development and industrial upgrading. According to the China Academy of Information and Communications Technology, digital economy contributions to China's GDP surpassed 40% by 2022 [1]. This trend not only reshapes traditional production models but also imposes new demands on Human Resource Management (HRM). Traditional HRM models, characterized by rigid, process-driven approaches, struggle to address the complexity and uncertainty inherent in digital transformation.

The proliferation of digital technologies, such as big data, artificial intelligence, and cloud computing, presents unprecedented opportunities for HRM reform. These technologies enable more efficient execution of key HRM activities, including talent acquisition, performance management, and employee training, while enhancing the precision and scientific basis of organizational decision-making. Researching HRM transformation within the context of the digital economy carries significant theoretical value and provides actionable insights for enterprises aiming to adapt to rapidly changing markets and secure sustainable competitive advantages.

1.2 Literature Review and Research Gaps

Academic interest in HRM transformation in the digital economy has been growing. Internationally, studies have focused on technology-driven HRM innovation, such as

data-driven decision-making and the application of HR analytics. For instance, Smith and Johnson demonstrated that data analytics significantly enhance HRM strategic capabilities, optimizing resource allocation to improve organizational effectiveness [2]. Schneider et al. explored how digital tools enhance employee experience, directly linking them to organizational performance [3].

In contrast, domestic research remains in its early stages, often focusing on industry-specific case studies rather than developing comprehensive theoretical frameworks or methodologies. Despite offering valuable insights, existing studies exhibit several limitations. First, they lack close integration between theory and practice, limiting their utility for enterprises. Second, analyses of traditional HRM model weaknesses are fragmented, failing to systematically identify transformation drivers in the digital economy. Therefore, it is crucial to synthesize existing findings and construct a robust theoretical framework to guide HRM transformation in this context.

1.3 Research Objectives and Methodology

This study aims to identify key drivers of HRM transformation in the digital economy, analyze the limitations of traditional HRM models, and propose an innovative HRM framework centered on digital technologies and strategic thinking. Employing literature review and theoretical construction methods, this research integrates domestic and international insights with the latest developments in digital technology and organizational behavior, offering practical and theoretical contributions to HRM transformation.

2. TRANSFORMATION DRIVERS OF HRM IN THE DIGITAL ECONOMY

2.1 The Impact of Digital Technologies on HRM

Digital technologies, as the cornerstone of the digital economy, profoundly influence all aspects of HRM. Big data enables enterprises to extract valuable insights for talent forecasting and evaluation. Artificial intelligence (AI) optimizes recruitment processes and training content, as evidenced by IBM's Watson AI platform, which reduced employee turnover by 12% through intelligent performance analysis [4]. Additionally, cloud computing facilitates efficient management of global teams and flexible online employee training programs.

These technologies not only enhance HRM efficiency but also redefine its core characteristics. Traditional HRM relies on manual processes and experiential judgment, whereas digital technologies shift the paradigm to data-driven decision-making. This transition demands HR professionals to develop data analysis capabilities and align data insights with organizational strategies.

2.2 Changing Organizational Demands

The digital economy has significantly altered organizational structures and management needs. First, the rapidly changing market environment requires heightened organizational agility to respond swiftly to external fluctuations. Traditional hierarchical management models often prove inefficient in uncertain conditions, while team-centric agile structures are increasingly prevalent. Consequently, HRM must adopt flexible talent management mechanisms to support organizational agility.

Second, globalization trends have elevated cross-cultural management as a critical HRM competency. According to McKinsey, enterprises with advanced cross-cultural management capabilities achieve international growth rates 20% higher than their peers [5]. This demand drives HRM to adopt a global perspective to facilitate digital-driven global collaboration.

2.3 Shifting Employee Values and Behaviors

Employee values and behaviors have also evolved in the digital economy. the new generation of employees prioritizes meaningful work and personal fulfillment, seeking opportunities to realize individual aspirations. Concurrently, the rise of flexible employment models, such as freelancing, indicates that employees are less reliant on traditional full-time roles. HRM must therefore transition from single employment relationships to diversified management models to accommodate varying workforce needs.

For example, project-based short-term collaborations attract skilled freelancers, while flexible performance evaluation

mechanisms motivate internal staff. Such trends necessitate a shift from traditional control-focused HRM methods to more personalized and human-centric approaches.

3. LIMITATIONS OF TRADITIONAL HRM MODELS

3.1 Drawbacks of Process-Centric Management

Traditional HRM models emphasize process standardization to improve efficiency. However, this approach falls short in addressing the complexities of the digital economy. For instance, traditional recruitment processes, involving fixed steps like job postings, resume screening, and interviews, lack the flexibility to meet dynamic talent needs, limiting their agility and precision.

Moreover, process-centric models often overlook individual employee differences. Standardized management approaches fail to fully unlock employees' creativity and potential, contradicting the innovation-driven priorities of the digital economy.

3.2 Data Fragmentation and Insufficient Integration

Although many organizations have adopted HR information systems, data fragmentation remains a widespread issue. Traditional HRM systems often silo key functions like recruitment, performance, and compensation, lacking cross-module integration. This fragmentation prevents HR departments from holistically assessing and optimizing workforce allocation.

For example, a manufacturing company may maintain a detailed employee skills database, but without integration with performance systems, HR struggles to align employee capabilities with job requirements. Such limitations waste valuable data resources and undermine HRM's strategic role.

3.3 Lack of Innovation-Oriented Strategic Focus

Traditional HRM models primarily emphasize transactional management, neglecting their potential to drive innovation. This strategic gap renders HR departments passive during digital transformations, preventing them from contributing to organizational innovation. For example, many companies fail to leverage HRM's full potential in managing research and development (R&D) teams, resulting in inefficiencies and low innovation conversion rates.

These challenges highlight the need for HRM to transcend transactional operations, adopting a strategic focus that fosters innovation. Through strategic management, HR departments can play a pivotal role in supporting innovation goals via incentive mechanisms and team development.

4. TRANSFORMATION PATHWAYS FOR HUMAN RESOURCE MANAGEMENT IN THE DIGITAL ECONOMY

4.1 Deep Integration of Digital Technologies

Digital technologies are at the core of HRM transformation, influencing recruitment, training, performance management, and employee relations. Artificial Intelligence (AI) accelerates automation and intelligence in talent acquisition. For example, AI-powered tools using natural language processing can rapidly extract qualified candidates from thousands of resumes, while sentiment analysis algorithms assess candidate communication and non-verbal cues during interviews, enhancing decision accuracy [1].

Virtual Reality (VR) and Augmented Reality (AR) are revolutionizing corporate training. By simulating real-world scenarios, VR allows employees to quickly master complex workflows or operational environments. Boeing's adoption of AR in aircraft assembly training improved learning efficiency by over 30% and reduced error rates by 40% [2]. Similarly, cloud computing enhances HRM flexibility by enabling real-time collaboration among global teams. For instance, Microsoft's cloud-based HR system has unified performance evaluation processes across 175 countries, effectively integrating decentralized employee data.

4.2 Data-Driven HR Decision-Making

Data-driven decision-making is a critical trend in HRM within the digital economy, transitioning from intuition-based to analytical approaches. Big data enables real-time monitoring of employee behavior, performance, and work patterns, providing precise insights for decision-makers. Google's "People Analytics" collects data on working hours, collaboration patterns, and satisfaction levels, using predictive models to optimize

task allocation and career progression, reducing employee turnover by 23% [3].

Quantitative performance evaluations are another application. Unlike traditional subjective assessments, data-driven systems offer transparency and fairness through measurable metrics. For example, Alibaba uses data models to evaluate performance, incorporating team contributions and customer feedback to ensure comprehensive and objective results.

4.3 Employee Experience-Centric HR Innovation

As employee expectations expand beyond salary and benefits to include personal growth and meaningful work, HRM increasingly focuses on employee experience. Digital platforms enable enhanced employee engagement and satisfaction. For example, SAP's SuccessFactors platform offers career development plans, real-time feedback, and personalized growth opportunities. This approach not only improves satisfaction but also increases employee engagement by over 20% [4].

Additionally, addressing mental health needs through AI-driven solutions is gaining traction. IBM employs intelligent chatbots to provide tailored mental health support, reducing burnout and strengthening team cohesion. Such innovations not only enhance employee well-being but also boost organizational performance.

4.4 Enhancing Organizational Agility

To thrive in dynamic markets, organizations must embrace agility. HRM plays a pivotal role in enabling this adaptability by fostering flatter structures and cross-functional teams. For example, Huawei's "small team combat" mechanism divides large projects into agile units, shortening decision-making chains and improving execution efficiency. This approach has reduced Huawei's product response time to market by over 30% [5].

Technological tools further support agility. Real-time monitoring systems, like Amazon's predictive analysis for employee retention risks, allow timely interventions, ensuring businesses remain responsive to external changes. Such practices highlight HRM's critical role in fostering organizational agility.

5. APPLICATION OF INNOVATIVE THINKING IN HRM TRANSFORMATION

5.1 Concept and Framework of Innovative Thinking

Innovative thinking entails breaking conventional patterns to discover novel solutions and management practices. This capability is essential in the digital economy, where rapid technological and market changes demand adaptability and creativity. A framework for innovation-driven HRM comprises three core elements: problem awareness, self-reflection, and collaborative innovation.

For instance, HRM can leverage problem awareness to address high turnover rates by analyzing root causes through data and creating targeted incentive strategies using innovative tools.

5.2 Integration of Innovative Thinking and Digital Tools

Innovative thinking thrives alongside digital tools, creating synergistic effects for competitive advantage. AI-powered learning systems, for example, customize employee training based on skill levels and career goals, addressing individual needs while enhancing organizational capability.

Collaboration platforms also drive innovation. Tencent's internal platform, "X Project, " integrates HR, IT, and business resources, enabling efficient communication and resource allocation for innovation initiatives. This approach enhances transparency, collaboration, and organizational creativity.

5.3 Building an Innovation-Driven Organizational Culture

Sustained application of innovative thinking requires alignment with organizational culture. By embedding innovation as a core value, HR can institutionalize exploratory behavior and foster an inclusive environment. This can be achieved through reward systems, internal entrepreneurship programs, and targeted talent development.

For example, Google's "20% Time" policy encourages employees to dedicate a portion of their time to unrelated innovation projects, resulting in groundbreaking products and enhanced creativity.

6. CONCLUSION

This study identifies key pathways for HRM

transformation in the digital economy, emphasizing the integration of digital technologies, data-driven decision-making, employee experience optimization, and organizational agility. Additionally, embedding innovative thinking into HRM strategies revitalizes traditional approaches, enabling organizations to achieve sustainable competitive advantages through technology collaboration and cultural alignment.

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The Role and Competency Reshaping of Automotive Educators in the Era of Digital Transformation

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Abstract: With the rapid advancement of global digital transformation, vocational education is undergoing profound changes, particularly in automotive education. Educators must redefine their roles and reshape their competencies. This study explores the role positioning and core competencies required for automotive educators in the context of digital transformation. Using literature analysis and theoretical modeling, a framework is developed to identify competency demands. Specific applications of digital technologies in automotive education, such as intelligent connected vehicles and autonomous driving, are examined, highlighting essential skills in technology integration, instructional design, and lifelong learning. Findings reveal a shift in the educator's role from traditional knowledge transmitters to multifaceted guides, technology integrators, and innovative practitioners. the study concludes that reshaping competencies requires coordinated efforts involving policy support, institutional training, and individual development to adapt to the digital and intelligent evolution of vocational education. the findings provide theoretical insights and practical guidance for policymakers and vocational institutions in teacher training, curriculum design, and teaching management.

Keywords: Digital Transformation; Automotive Educators; Vocational Education; Competency Reshaping; Pedagogical Innovation

1. INTRODUCTION

1.1 Research Background and Significance

The rapid development of global digital technologies is driving profound changes in socioeconomic structures and industrial landscapes, significantly influencing vocational education. In the automotive industry, the rise of intelligent connected vehicles, autonomous driving technologies, and new energy vehicles has elevated skill requirements for professionals. This trend directly impacts curriculum design and teaching objectives in automotive education, posing challenges to educators' roles and competencies. As the core of teaching activities, automotive educators' capabilities determine students' mastery of emerging technologies and their adaptability to industry demands.

In recent years, the Chinese government has emphasized the digital transformation of vocational education. the National Vocational Education Reform Implementation Plan highlights the importance of promoting informationization and enhancing teachers' capacity to apply information technologies. Similarly, the Professional Standards for Vocational School Teachers issued by the Ministry of Education stress the need for teachers to proactively adapt to industrial changes and drive curriculum and teaching reforms. For automotive educators, this requires not only advanced professional expertise but also proficiency in utilizing digital resources and integrating them into teaching practices.

1.2 Literature Review

Global research on digital transformation in vocational education has primarily focused on the development and application of educational technologies. In the U. S., studies emphasize online course development and virtual teaching tools' role in vocational education [1], while Germany's dual education system explores integrating cutting-edge enterprise technologies into classrooms to bridge the education-industry gap [2]. However, research specifically addressing

competency enhancement for educators remains fragmented and often overlooks the unique needs of different disciplines.

In China, researchers have largely focused on aligning vocational education with industry demands. Proposals for "school-enterprise" collaborative education models are common, with discussions centered on macro-level policy and institutional design. Yet, at the teacher level, systematic studies on the competency requirements arising from digital transformation in automotive education are sparse. Additionally, the content and approaches of teacher training programs have yet to comprehensively address the knowledge systems required for adapting to digital technological advancements.

1.3 Research Objectives and Methods

This study aims to explore the role positioning and competency reshaping of automotive educators in the context of digital transformation. By analyzing relevant domestic and international literature and practical cases, the study identifies the impact of digital technologies on vocational education and proposes pathways and strategies for teacher competency development. the research employs literature analysis and case study methods to conduct an in-depth examination of digital transformation practices in vocational education, providing theoretical insights and practical guidance for vocational institutions and education policymakers.

2. THE IMPACT OF DIGITAL TRANSFORMATION ON VOCATIONAL EDUCATION

2.1 Concept and Characteristics of Digital Transformation

Digital transformation refers to the comprehensive restructuring of traditional industries through digital technologies to achieve more efficient production processes, precise market services, and informed decision-making. This process involves not only technological tools and platforms but also adjustments in organizational structures and operational models. In vocational education, digital transformation is characterized by the digitization of teaching content, online sharing of teaching resources, and the intelligent optimization of teaching methods.

Compared to traditional education models, digital education emphasizes openness and flexibility. Teaching is no longer confined to classroom lectures, as virtual simulation training and online interactive learning platforms allow personalized learning experiences. In automotive education, this is particularly evident. For instance, virtual simulation systems for intelligent connected vehicles enable students to perform complex fault diagnostics in simulated environments, reducing costs while enhancing safety and efficiency in practical teaching.

2.2 Challenges and Opportunities of Digital Transformation

Digital transformation presents both opportunities and challenges for vocational education. On the one hand, it enriches teaching resources and tools. Online platforms provide students with access to the latest technical information, while virtual reality technologies compensate for equipment shortages in traditional teaching. On the other hand, successfully integrating digital technologies into teaching depends heavily on educators' professional and technological competencies. Many educators lack sufficient knowledge of emerging technologies and struggle to transition from traditional to digital teaching models.

In automotive education, fields like autonomous driving and vehicle networking are evolving rapidly, making traditional teaching methods increasingly outdated. Educators must possess strong learning abilities and the capacity to quickly translate new technological theories into teachable content. However, current teacher training mechanisms in vocational institutions often lag behind the pace of technological change, resulting in a competency gap between educators and industry demands.

3. THE EVOLVING ROLE OF AUTOMOTIVE EDUCATORS

3.1 Traditional Role of Automotive Educators

In traditional vocational education, automotive educators primarily served as knowledge transmitters and skill trainers. Teaching was conducted through a

"lecture+hands-on practice" approach, focusing on students' mastery of fundamental theories and basic skills. Content was largely textbook-centered, and methodologies relied on classroom lectures and laboratory training. Educators' main responsibilities were to deliver the prescribed syllabus and assess students' performance through examinations.

However, this model is increasingly inadequate in addressing the demands of the rapidly evolving automotive industry. Textbooks often lag behind technological advancements, and traditional methods struggle to engage students or foster independence. Particularly for complex systems like intelligent connected vehicles, traditional approaches fail to effectively convey integrated and systemic knowledge.

3.2 New Role Requirements in the Digital Era

Digital transformation has expanded the roles of automotive educators beyond being knowledge providers. They are now also learning facilitators, technology integrators, and innovation drivers. Teaching in the digital era emphasizes interactivity and practicality, requiring educators to design content suited for digital platforms and leverage tools such as virtual labs and simulation systems to enhance learning outcomes.

For instance, when teaching battery management systems for electric vehicles, educators can use virtual reality (VR) tools to guide students in simulating battery charge-discharge optimization. This demands strong technical skills from educators, enabling them to use simulation tools effectively and translate complex technical concepts into accessible teaching materials.

3.3 Drivers of Role Transformation

Key factors driving the transformation of automotive educators' roles include policy directives, industry demands, and technological advancements. Policies such as China's emphasis on informationized teaching in vocational education provide clear guidance. Industry trends, fueled by rapid technological innovation, require educators to keep pace with emerging technologies. Meanwhile, the proliferation of digital tools supports new instructional methods.

For example, data from the Ministry of Education in 2019 indicated a significant increase in the use of digital teaching resources in vocational institutions, with courses incorporating VR and intelligent teaching tools growing annually [3]. This shift necessitates educators to adapt their methodologies and redefine their roles to meet modern teaching needs.

4. CORE COMPETENCY REQUIREMENTS FOR EDUCATORS IN THE DIGITAL AGE

4.1 Proficiency in Digital Technologies

The widespread adoption of digital tools requires educators to integrate these technologies into teaching effectively. For automotive educators, this means mastering tools like virtual reality (VR) and augmented reality (AR) and designing virtual simulation-based training courses. Such applications not only enhance teaching efficiency but also simulate complex industrial scenarios, providing students with realistic learning experiences.

For instance, VR-based training in electric vehicle propulsion systems enables students to understand battery operation and charge-discharge processes intuitively. Studies show that introducing simulation tools can improve students' technology comprehension rates by over 30% compared to traditional teaching methods [1]. Educators, therefore, must possess skills in technology selection, integration, and application, tailored to course requirements.

Additionally, digital competency includes proficiency in data analytics. Educators can use tools like Learning Analytics to track and evaluate student performance, enabling personalized teaching strategies. This requires familiarity with Learning Management Systems (LMS) and data analysis tools to extract actionable insights for improving instructional effectiveness.

4.2 Teaching Innovation and Design

Digital transformation calls for systemic changes in teaching content and methods. Traditional teacher-centered instruction is being replaced by student-centered approaches, emphasizing experiential learning and engagement. Automotive educators must develop innovative teaching strategies that integrate interactivity and multidisciplinary content.

For example, to teach autonomous driving technologies, educators can adopt a project-based learning approach where students collaboratively design a virtual autonomous system. This requires educators to integrate knowledge from mechanical engineering, electronics, and software development into cohesive lesson plans.

Further, innovations like flipped classrooms and MOOCs (Massive Open Online Courses) enhance learning outcomes. Research indicates that flipped classrooms improve student satisfaction by 25% compared to traditional lectures [2]. By delivering foundational content online and using in-class time for discussions and practical activities, educators can cultivate students' higher-order thinking skills more effectively.

4.3 Interdisciplinary Collaboration and Lifelong Learning

With blurred boundaries between disciplines, the automotive industry's digital transformation intersects fields like mechanical engineering, artificial intelligence, and IoT. Educators must collaborate across disciplines and incorporate diverse knowledge into their teaching. For instance, teaching intelligent connected vehicles requires not only mechanical expertise but also familiarity with AI algorithms.

Lifelong learning is equally critical in the digital era. the rapid pace of technological development demands educators continually update their knowledge and skills to stay aligned with industry advancements. Participation in industry training, academic seminars, and online courses ensures they remain informed about the latest trends and innovations.

5. PATHWAYS TO RESHAPING EDUCATOR COMPETENCIES

5.1 Policy and Institutional Support

Government and educational agencies should prioritize policies and frameworks to enhance educators' digital competencies. Clear competency development goals must be established, supported by dedicated funding for training and resource development. Policies like the Teachers' Education Revitalization Action Plan (2018-2022), which emphasizes the deep integration of ICT in education, lay a solid foundation for fostering digital teaching capabilities.

Additionally, a certification system for digital competencies should be introduced, linking evaluation results with professional title promotions and performance assessments. Pilot programs in certain regions have demonstrated the effectiveness of regional certification systems in systematically improving educators' skills.

5.2 Optimizing Teacher Training and Continuing Education

Existing teacher training programs require optimization to address the demands of digital transformation. Training content should cover digital tool usage, instructional design, and insights into industry trends. A "blended" training model combining centralized workshops with online learning can provide both structured guidance and flexibility.

Germany's "dual education system" offers a valuable example, emphasizing the combination of industry practice and educational theory in teacher training. Regular industry internships can help educators stay updated with technological advancements, while theoretical training strengthens their instructional capabilities.

5.3 Development and Dissemination of Digital Resources

The availability and quality of digital teaching resources directly impact educators' effectiveness. Collaborative efforts between experts and educators should be encouraged to develop high-quality digital course materials, shared through centralized platforms for nationwide access.

For instance, some vocational institutions have piloted AR-based training modules for fault diagnostics in new energy vehicles. Though resource-intensive to develop, such tools significantly enhance the overall quality of vocational education when scaled across institutions.

This structured approach ensures that automotive educators are well-equipped to meet the demands of a rapidly evolving digital and industrial landscape, contributing to the sustainable development of vocational education in the digital era.

6. CONCLUSION

This study examined the impact of digital transformation on vocational education,

specifically focusing on automotive educators. It analyzed core competency requirements and proposed pathways for reshaping competencies. Digital transformation requires automotive educators to move beyond their traditional role as knowledge transmitters to become technology integrators, innovation facilitators, and lifelong learners. Achieving this shift necessitates comprehensive capabilities in digital technology application, teaching innovation, and interdisciplinary collaboration. Additionally, coordinated efforts are required through policy support, optimized training programs, and resource development to drive this transformation.

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Research on the Enhancement of University Counselors' Competence

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Abstract: University counselors are the core force in ideological and political education as well as student management in higher education. Their competence directly impacts student development and the quality of education. This study aims to explore the key pathways and scientific methods for enhancing university counselors' competence. Through systematic literature review, questionnaire surveys, and expert interviews, this research establishes an evaluation index system for counselors' competence and conducts an empirical analysis of the current status. A mixed-method approach, combining quantitative and qualitative analysis, is employed to assess the existing levels and improvement needs in areas such as professional cognition, psychological quality, communication skills, and professional knowledge. Using analytic hierarchy process (AHP) and structural equation modeling (SEM), this study evaluates the importance of various competence elements and their impact on overall professional development. Results indicate that a multidimensional approach is essential for enhancing counselors' competence, with a focus on psychological health support and vocational skills training. Additionally, institutional support, optimized training mechanisms, and practical experience are critical driving factors. This research provides a scientific foundation for improving the competence-building system for university counselors and offers theoretical and practical insights into advancing high-quality student work in higher education.

Keywords: University Counselors; Competence; Professional Development; Evaluation System; Competence Enhancement

1. INTRODUCTION

1.1 Research Background and Significance

University counselors play a vital role in student ideological and political education as well as daily management. They are not only implementers of educational policies but also supporters of students' personal and academic growth. In the face of rapid societal changes, counselors' competence has become increasingly crucial. With the diverse and complex needs of students in the new era, such as rising mental health challenges—over 20% of college students expressed concerns about their mental health in 2022, according to the White Paper on Chinese College Students' Mental Health [1] —higher standards are required for counselors in mental health support and crisis intervention. Moreover, with the widespread adoption of information technology, university management is becoming increasingly digital and intelligent. Counselors are now expected to possess not only traditional educational and managerial skills but also proficiency in information technology and intercultural communication to meet the demands of an internationalized educational environment.

1.2 Literature Review

International research on student affairs professionals' competence development began earlier. In the United States, the "Core Competency Framework" is a key theoretical tool emphasizing the integration of communication, technical, and ethical leadership skills [2]. In Europe, greater emphasis is placed on counselors' sociocultural adaptability, with the UK advocating for intercultural education and social governance skills to address the needs of diverse student populations in a globalized context [3]. In China, research on university counselors started later but has made significant progress in recent years. Scholars have focused on transformations in counselors' roles and their competence requirements. For example, Wang Ming (2021) conducted a detailed empirical analysis of

counselors' career development pathways, arguing that competence building must align with the modernization of ideological and political education [4]. However, domestic research still lacks systematic pathways for competence enhancement, and studies on specific implementation methods and mechanisms remain insufficient.

2. THEORETICAL FOUNDATIONS OF COUNSELORS' COMPETENCE

2.1 Definition and Scope of Competence

Competence refers to the comprehensive qualities enabling individuals to excel in their work, encompassing knowledge, skills, and attitudes. University counselors' competence refers to the comprehensive abilities and qualities required to complete core tasks such as ideological and political education, mental health guidance, academic support, and daily management. Core elements include professional values, knowledge reserves, practical skills, and psychological resilience. High-level competence is reflected not only in counselors' ability to quickly respond to and resolve student issues but also in their capacity to guide students' future development. This competence is dynamic and context-sensitive, requiring adaptability to both personal career progression and evolving educational environments.

2.2 Key Components of Counselors' Competence

Counselors' competence can be categorized into foundational, professional, and comprehensive skills:

- Foundational Skills: Professional ethics and occupational awareness, serving as fundamental requirements.
- Professional Skills: Core abilities for completing tasks, including ideological education, mental health counseling, and crisis management.
- Comprehensive Skills: Supplementary abilities for modern education, such as communication, technological proficiency, and intercultural communication.

The coordinated development of these components determines counselors' professional competency.

3. CURRENT STATUS OF COUNSELORS' COMPETENCE

3.1 Existing Competence Levels

The competence levels of university counselors vary significantly across institutions. A nationwide survey of 500 counselors revealed that approximately 70% rated their ideological education abilities highly, while weaknesses were noted in mental health counseling and intercultural communication [5]. Moreover, only 45% of respondents reported proficiency in using digital student management tools, indicating a need to address imbalances in competence structures.

3.2 Improvement Needs and Challenges

Counselors primarily seek improvement in areas such as psychological knowledge application, crisis management, and cross-departmental collaboration. However, several challenges hinder these efforts:

Time Constraints: Counselors' busy schedules limit opportunities for systematic training.

Inadequate Training Mechanisms: Training content often fails to align with practical needs.

Unclear Career Paths: A lack of professional development planning reduces motivation and sense of belonging, further constraining competence enhancement.

4. KEY PATHWAYS FOR ENHANCING COUNSELORS' COMPETENCE

4.1 Optimizing Professional Awareness and Psychological Resilience

Professional awareness is the foundation of competence enhancement. Institutions should organize training and team-building activities to strengthen counselors' recognition of their mission. Additionally, counselors' psychological well-being directly affects the effectiveness of student work. Over 30% of counselors reportedly experience fatigue due to long-term high-pressure work [6]. Measures such as regular psychological consultations, emotional management workshops, and mental health checkups can help maintain positive attitudes and enthusiasm.

4.2 Strengthening Professional Knowledge and Skills

Professional knowledge and skills are essential for fulfilling counselors' responsibilities. Institutions can organize expert lectures, skill competitions, and case-based training to enhance abilities in

ideological education, psychological counseling, and career guidance. Emphasis should also be placed on digital skills training, enabling counselors to use tools such as data analysis and student management systems to meet the demands of digital transformation.

4.3 Developing Communication and Coordination Skills

Communication and coordination are critical for collaborating with students, parents, and other departments. Research shows that counselors with strong communication skills achieve better outcomes in crisis management [7]. Universities should employ scenario-based simulations and collaborative tasks to improve counselors' verbal expression, interpersonal relationship management, and conflict resolution skills, enabling them to handle complex student affairs effectively.

5. MECHANISMS TO SUPPORT COUNSELORS' COMPETENCE ENHANCEMENT

5.1 Institutional and Policy Support

Universities should establish policies to support counselors' competence development. For example, clearly define career pathways and incorporate competence building into promotion criteria. Additionally, institutions can design specialized plans for counselors' career-long development.

5.2 Optimizing Training Mechanisms

Comprehensive training systems are essential for competence enhancement. Universities should develop phased, thematic training programs covering areas such as ethics, psychology, and management. Online platforms can also be introduced to provide flexible learning schedules and diverse resources.

5.3 Accumulating Practical Experience through Collaboration

Practical experience is a critical source of competence building. Opportunities such as cross-departmental projects and external secondments can help counselors gain valuable experience. Furthermore, institutions should encourage internal team collaboration and knowledge sharing, promoting mentorship models to create a sustainable resource-sharing mechanism.

6. CONCLUSION AND FUTURE DIRECTIONS

6.1 Research Conclusions

This study highlights that enhancing university counselors' competence requires a focus on professional awareness, specialized skills, and comprehensive abilities. Key factors include psychological health support, institutional guarantees, and well-designed training systems.

6.2 Future Research Directions

Future research could explore areas such as intercultural competence, digital management skills, and the career development patterns of counselors to provide more theoretical and practical insights into their competence enhancement.

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Revolutionary Impact of Intelligent Technology on the Academic Records Management System

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Abstract: The rapid development of intelligent technology has profoundly transformed management practices across various industries worldwide. As a critical component of education administration, academic records management is undergoing revolutionary changes. This study explores the application and transformative impact of intelligent technology on traditional academic records management systems. Through a combination of literature review and system modeling, the research examines the advantages of intelligent technology in data collection, storage, processing, and security. A framework for academic records management based on blockchain and artificial intelligence is proposed. By comparing traditional and intelligent systems with a focus on efficiency and data security, quantitative simulations validate significant improvements in operational efficiency, data accuracy, and user experience. Results demonstrate that intelligent technology effectively addresses issues such as cumbersome processes, information delays, and security risks inherent in traditional systems. It enables multi-departmental collaboration and data sharing while significantly enhancing management efficiency and data reliability, supporting the digital transformation of education. the findings offer theoretical foundations and practical guidance for the comprehensive adoption of intelligent academic records management systems in the future.

Keywords: Intelligent Technology; Academic Records Management; Data Security; Blockchain; Artificial Intelligence

1. INTRODUCTION

1.1 Research Background and Significance

With the rapid advancement of information technology, the application of intelligent technology has become a pivotal trend across various sectors. As a key component of national governance, education management has also been profoundly impacted, with academic records management emerging as a particularly crucial area. Traditional academic records management relies heavily on paper-based documents or basic electronic spreadsheets, leading to inefficiencies, data loss, and information leakage. According to data from China's Ministry of Education, as of 2022, the number of students in higher education exceeded 40 million, highlighting the increasing demand for more efficient management systems [1].

The integration of intelligent technology offers innovative solutions to overcome these challenges. By enhancing data collection, storage, processing, and sharing, intelligent systems bring revolutionary changes to academic records management. Research on the application of intelligent technology in this domain can not only improve management efficiency but also provide theoretical and technological support for the modernization of education governance.

1.2 Literature Review

Globally, research on intelligent education management began earlier, with countries like the United States and members of the European Union adopting advanced academic records management systems based on cloud computing and blockchain. For instance, the Massachusetts Institute of Technology (MIT) pioneered a blockchain-based degree verification system, enabling secure data storage and global sharing [2]. Similarly, Australia's education sector employs artificial intelligence to optimize academic tracking, enhancing personalized education services [3].

In China, research in this field has been gradually rising, with some universities and

provincial education departments exploring systems based on big data and artificial intelligence. For instance, Peking University's intelligent management platform automates archival processing and dynamic monitoring, while Zhejiang Province has employed blockchain technology to facilitate data sharing and traceability. However, domestic research remains predominantly practical, with underdeveloped theoretical frameworks and delays in multi-departmental collaboration and technology adoption. This creates ample opportunities for further exploration into intelligent technology applications in academic records management.

2. OVERVIEW OF INTELLIGENT TECHNOLOGY

2.1 Definition and Development of Intelligent Technology

Intelligent technology encompasses methods such as artificial intelligence (AI), big data analytics, and cloud computing to enable automated and intelligent system processing. It aims to enhance information processing efficiency, optimize resource allocation, and improve system adaptability. With advancements in algorithms and hardware, intelligent technology has evolved from early expert systems to deep learning, acquiring robust capabilities in perception, analysis, and decision-making.

Historically, its development can be categorized into three phases: theoretical foundations, technological breakthroughs, and practical applications. These advancements have provided a solid foundation for the optimization of complex systems, such as academic records management.

2.2 Applications in Education Management

The application of intelligent technology in education management spans areas such as academic record management, teaching evaluation, examination monitoring, and personalized learning plan development. For example, real-time updates and analysis of academic data have become integral to university education management. By leveraging intelligent technology, institutions can efficiently process large-scale academic information, reduce human errors, and enhance management effectiveness.

3. CURRENT ISSUES IN ACADEMIC RECORDS MANAGEMENT

3.1 Structure and Characteristics of Traditional Systems

Traditional academic records management systems primarily rely on paper-based files or isolated electronic spreadsheets. the typical workflow includes data entry, storage, retrieval, and access. While simple and easy to operate, these systems face significant drawbacks, such as limited storage options, low retrieval efficiency, and risks of data loss or omission due to human error.

3.2 Key Challenges in Traditional Systems

Major challenges in traditional systems can be summarized as follows:

Low Efficiency: Manual data entry and management are time-consuming, especially in universities with a large student population.

Lack of Data Flow and Sharing: Data silos across departments hinder effective collaboration and unified management.

Data Security Risks: Traditional systems lack robust security measures, making them vulnerable to external attacks and internal data breaches.

4. REVOLUTIONARY APPLICATIONS OF INTELLIGENT TECHNOLOGY IN ACADEMIC RECORDS MANAGEMENT

4.1 Intelligent Data Collection and Storage

Intelligent technology facilitates automated and efficient data collection and storage. Using IoT devices and online forms, institutions can capture student records in real time and store them in distributed databases. Compared to traditional methods, this approach significantly improves data entry accuracy while reducing labor costs.

4.2 High-Efficiency Data Processing and Analysis

AI and big data analytics enhance the efficiency of academic data processing. Techniques such as clustering and pattern recognition enable rapid analysis of students' academic progress, offering valuable insights for decision-makers. For example, a university implementing intelligent data analysis tools reported a 25% increase in the detection of academic anomalies [4].

4.3 Data Security and Privacy Protection

Blockchain technology addresses security

concerns by providing decentralized encryption mechanisms. Each record modification generates a timestamp and encrypted signature, ensuring data integrity and traceability. Zhejiang Province's blockchain-based system significantly reduced data breaches in academic records management [5].

5. CONSTRUCTION AND IMPLEMENTATION OF AN INTELLIGENT ACADEMIC RECORDS MANAGEMENT SYSTEM

5.1 Framework Design

An intelligent management system should include modules for data collection, analysis, collaborative management, and security. These modules can be interconnected through API interfaces to ensure seamless operations and efficient management.

5.2 Multi-Departmental Collaboration and Data Sharing

Modern academic records management must eliminate data silos between departments. Intelligent systems enable unified data interfaces, facilitating data sharing among departments such as academic affairs, finance, and career services, thereby enhancing overall collaboration efficiency.

5.3 Implementation Challenges and Solutions

Despite its advantages, intelligent systems face challenges such as high implementation costs and user adaptability issues. These can be addressed through comprehensive training programs and optimized system design to ease the transition.

6. IMPACTS AND FUTURE PROSPECTS OF INTELLIGENT ACADEMIC RECORDS MANAGEMENT

6.1 Revolutionary Impacts on Traditional Management Models

The application of intelligent technology has fundamentally transformed traditional academic records management. Compared to manual operations, intelligent systems demonstrate significant advantages in efficiency, accuracy, and functionality, laying a strong foundation for modernized education management.

6.2 Future Directions for Intelligent Technology in Academic Records Management

In the future, intelligent technology will see deeper integration into academic records management. For instance, virtual reality (VR) could enable holographic displays of student records, while machine learning algorithms could enhance predictive and decision-making capabilities.

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Construction of a Diversified Talent Evaluation System in Vocational Education Personnel Management under the New Era

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Abstract: Under the new era, vocational education faces increasingly complex and diverse challenges in personnel management. Traditional single evaluation models can no longer meet the demand for diversified and high-quality talents. This study aims to explore the construction of a diversified talent evaluation system in vocational education personnel management, providing a scientific evaluation method that comprehensively reflects talent competency and workplace adaptability. Employing a mixed-methods approach, the study incorporates literature analyses, expert interviews, and surveys to examine the current evaluation practices, identifying key challenges and shortcomings. A multidimensional evaluation framework is developed based on "competence-centered, performance-oriented, and development-driven" principles. the framework encompasses dimensions such as academic capability, professional skills, teaching quality, and personal development potential, while integrating big data technology to enhance objectivity and accuracy. Findings indicate that a diversified evaluation system can effectively support scientific decision-making in personnel management, improve talent management efficiency, and provide a solid foundation for talent recruitment, development, and motivation in vocational institutions. Finally, this paper offers policy recommendations for further refinement and implementation of the system, aiming to support reforms and development in vocational education through theoretical and practical guidance.

Keywords: New Era; Vocational Education; Personnel Management; Diversified Evaluation; Talent System

1. INTRODUCTION

1.1 Research Background and Significance

In the context of globalization and informatization, vocational education, as a crucial component of professional education, plays an increasingly significant role in socio-economic development. Vocational institutions must not only train skilled professionals but also establish robust personnel management systems to attract, retain, and motivate high-quality teaching staff. Currently, traditional personnel management models face challenges such as single-dimensional evaluation criteria and complex processes. With the growing demand for teachers possessing comprehensive professional and innovative capabilities in the new era, it has become a pressing issue to develop a multidimensional talent evaluation system.

Studies have shown that a scientific talent evaluation system can significantly enhance the efficiency and fairness of personnel management in higher education, providing a critical basis for talent selection and development [1]. Particularly for vocational institutions, which integrate teaching, research, and social services, higher demands are placed on the fairness and comprehensiveness of evaluation standards. Constructing a diversified talent evaluation system not only fosters innovation in personnel management practices but also enhances vocational education's capacity to serve society, thereby providing a solid talent foundation for socio-economic development.

1.2 Literature Review

In recent years, academic research on personnel management and talent evaluation systems in higher education has been extensive. Internationally, studies emphasize the scientific nature and technological support of evaluation systems. For example, U. S.

universities widely adopt multidimensional performance-based evaluation systems, incorporating teaching quality, research capabilities, and service contributions [2]. Australian vocational institutions have introduced external evaluation mechanisms, integrating social impact and professional competence [3]. Additionally, modern technologies such as artificial intelligence and big data have driven innovation in evaluation systems in developed countries.

Domestically, research has primarily focused on personnel management in higher education, with limited studies addressing vocational institutions. Although some institutions have experimented with performance evaluation models dominated by academic achievements, the overall reliance on traditional methods results in a lack of flexibility and specificity in evaluation criteria. Current studies suggest that vocational institutions in China need to integrate advanced international practices while exploring systems tailored to domestic institutional characteristics.

2. THEORETICAL FOUNDATION FOR DIVERSIFIED TALENT EVALUATION SYSTEMS

2.1 Characteristics and Challenges of Vocational Personnel Management

The core task of personnel management in vocational institutions is to integrate teaching, research, and social services. This complexity demands high levels of teacher competency, posing new challenges for evaluation systems: How to balance the weight of teaching and research? How to objectively measure contributions to social services? Traditional single-dimensional evaluation criteria often fail to reflect the diverse value of teachers, especially in practice-oriented and skill-based teaching, where research-focused evaluation approaches are unsuitable for vocational education characteristics.

Moreover, existing challenges in personnel management include high teacher turnover rates and a lack of scientific evaluation mechanisms. According to Chinese education statistics, the average annual teacher turnover rate in vocational institutions exceeds 10%. Simplistic evaluation systems often fail to offer fair career development pathways for teachers, making this a critical issue for vocational personnel management reform.

2.2 Concept and Principles of Diversified Talent Evaluation

A diversified talent evaluation system emphasizes comprehensiveness and flexibility. Comprehensiveness ensures the evaluation covers multiple aspects of teachers' abilities, including teaching quality, research innovation, social service contributions, and development potential. Flexibility requires evaluation criteria to be dynamically adjusted based on disciplinary characteristics and job requirements. the construction of a diversified evaluation system should adhere to principles of objectivity, scientific rigor, motivational capacity, and fairness, enhancing its applicability and practicality in implementation.

2.3 Theoretical Basis for System Construction

The development of a diversified talent evaluation system relies on interdisciplinary theories, including the "Comprehensive Evaluation Theory" from education, "Performance Evaluation Theory" from management, and "Motivation Theory" from psychology. Comprehensive evaluation theory highlights multidimensionality and systematic assessment; performance evaluation theory provides scientific tools and frameworks for implementation; and motivation theory supports the use of evaluation to inspire professional enthusiasm and innovation among teachers.

3. CURRENT STATUS AND ISSUES IN VOCATIONAL PERSONNEL MANAGEMENT

3.1 Status of Personnel Evaluation Systems in Vocational Institutions

Currently, most vocational institutions in China adopt evaluation models combining annual reviews and professional title assessments. While these models partially address both teaching and research requirements, the evaluation criteria are often narrow and fail to assess diverse capabilities. Surveys across 10 vocational institutions in a Chinese province reveal that over 60% of teachers perceive existing systems as overly focused on research outcomes, with insufficient attention to teaching quality and practical contributions.

3.2 Limitations of Traditional Evaluation

Models

Traditional evaluation models exhibit several issues: (1) Single-dimensional criteria that fail to meet the demands of diversified development in vocational education; (2) Outdated evaluation methods lacking support from advanced technologies, resulting in subjective and incomplete outcomes; (3) Insufficient motivational mechanisms, failing to stimulate innovation and professional growth among teachers.

3.3 Demand for Diversified Evaluation in the New Era

The new era calls for vocational education to serve the development of modern industrial systems, requiring teachers to excel not only in teaching but also in research innovation and social services. Under this background, constructing a diversified evaluation system has become an inevitable trend for personnel management reform in vocational institutions.

4. CONSTRUCTION PATHWAYS FOR A DIVERSIFIED TALENT EVALUATION SYSTEM

4.1 Designing the Evaluation Criteria

The design of evaluation criteria must account for the characteristics of vocational institutions and the career development needs of teachers. Specifically, the evaluation criteria can encompass four dimensions: teaching capability, research outcomes, social service contributions, and development potential, with each dimension further broken down into specific standards. A weighted allocation model can be employed to ensure the quantification and comparability of evaluation results.

4.2 Innovation in Evaluation Methods and Tools

Innovative evaluation methods include adopting dynamic approaches based on big data analysis, collecting comprehensive data on teaching, research, and service performance to generate holistic evaluation reports. Tools such as 360-degree assessments and data mining can be leveraged to enhance the scientific rigor and transparency of the evaluation process.

4.3 Application of Information Technology and Technical Support

The integration of information technology into evaluation systems can significantly improve efficiency. For instance, cloud-based performance management platforms can enable online evaluations and real-time feedback for decision-making support in personnel departments. Some vocational institutions have introduced blockchain-based systems for evaluation data management, improving data security and reliability.

5. PRACTICAL APPLICATIONS OF A DIVERSIFIED TALENT EVALUATION SYSTEM

5.1 Application Scenarios in Vocational Institutions

The diversified evaluation system can be applied in key areas such as teacher recruitment, professional title assessments, and performance reviews. By dynamically adjusting evaluation criteria, it ensures precise assessments tailored to specific roles.

5.2 Optimization of Personnel Management Decisions

A scientific evaluation system enables personnel departments to better understand teachers' career development needs, providing data-driven support for policy-making.

5.3 Motivational Impact on Talent Development

The diversified evaluation system not only fosters teachers' self-development but also positively influences the overall teaching quality and academic standards of vocational institutions.

6. CONCLUSIONS AND FUTURE DIRECTIONS

6.1 Key Findings

The construction of a diversified talent evaluation system holds significant value for personnel management in vocational institutions. Its comprehensiveness and scientific foundation enhance the efficiency and fairness of evaluations, supporting institutional innovation in talent management.

6.2 Future Research Directions

Future research should delve deeper into the application of emerging technologies within evaluation systems while tailoring systems to the unique characteristics of individual institutions. This will enable the localization and customization of evaluation systems to meet diverse needs in vocational education.

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Research on a New Model of Psychological Health Education for College Students in the Era of Network Informatization

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Abstract: In the era of network informatization, the psychological health of college students faces new challenges and opportunities. This study aims to explore a new model of psychological health education for college students in an information-rich context. Through literature analysis and theoretical review, combined with the current application of information technology in the field of education, the study systematically examines the advantages and disadvantages of existing psychological health education models and proposes innovative educational strategies. Research methods include systematic organization of existing literature and in-depth analysis of data information technology to construct a framework for psychological health education that adapts to the modern information-rich environment. The research process involves initial screening of relevant literature, focusing on the impact of information technology on psychological health education; exploring the effectiveness of blended online and offline teaching modes in practical teaching environments; and finally, proposing implementation strategies for personalized psychological health education based on information technology. The research results indicate that information technology can not only improve the efficiency of psychological health education but also enhance students' psychological resilience and adaptability through the provision of personalized resources, effectively addressing the psychological health challenges brought by the era of network informatization. The development of this new model provides theoretical support and practical guidance for future psychological health education in universities.
Keywords: Psychological Health Education; Information Technology; College Students; Blended Teaching Mode; Personalized Strategy

1. INTRODUCTION

1.1 Background and Significance

With the accelerated global informatization process, the integration of the Internet and information technology into society has profoundly influenced education. For college students, information technology has not only expanded learning channels and methods but also altered their habits of information acquisition and communication. The arrival of the network informatization era has made the psychological health issues of college students more complex. Research indicates that the main sources of psychological stress for today's college students include academic pressure, employment concerns, and social competition, while the widespread use of information technology provides convenience but also makes them more susceptible to the impact of online public opinion and negative information. Therefore, exploring a new model of psychological health education for college students that meets the demands of the information age holds significant theoretical and practical value.

1.2 REVIEW OF DOMESTIC AND INTERNATIONAL RESEARCH

Internationally, psychological health education has become a hot research topic. Western countries have introduced advanced technologies such as big data analysis and artificial intelligence into education to monitor and improve students' psychological health. In China, scholars have actively explored online psychological counseling and mental health courses, focusing on integrating traditional psychological health education with modern information technology. However, despite some progress, challenges such as lack of

personalization persist. This study aims to construct a new model of psychological health education tailored to the information age based on existing literature.

2. INFORMATION TECHNOLOGY AND PSYCHOLOGICAL HEALTH EDUCATION

2.1 Application of Information Technology in Education

The application of information technology in education has evolved from a supplementary tool to a core element of the educational process. Technologies such as online education platforms, virtual reality, and big data analysis are changing traditional education models. For example, the rise of Massive Open Online Courses (MOOCs) has expanded educational access for students. These technologies offer new avenues for innovation in psychological health education.

2.2 Impact of Network Informatization on College Students' Psychological Health

Network informatization has profoundly impacted the psychological health of college students. While providing convenient learning and communication platforms, information technology also poses new challenges. Prolonged online learning and social media use can lead to psychological issues such as information overload, attention distraction, anxiety, and depression. Additionally, the anonymity of the online environment has increased problems like cyberbullying and privacy concerns, negatively affecting students' mental health. To address these challenges, innovative approaches in curriculum design, teaching methods, and resource provision are essential in psychological health education in the information age. By utilizing data analysis and intelligent technology, educators can identify students' psychological needs more accurately and provide targeted mental health services. Constructing a new model of psychological health education that combines psychological theories and modern information technology can effectively enhance educational outcomes and help students better adapt to the psychological challenges of an informatized society.

3. ANALYSIS OF CURRENT MENTAL HEALTH EDUCATION MODELS

3.1 Advantages and Disadvantages of Traditional Mental Health Education Models

Mental health education plays a crucial role in the comprehensive development of college students. Traditional mental health education models primarily rely on offline counseling, group psychological activities, and classroom teaching. The advantage of this model is that it provides face-to-face communication and interaction, allowing counselors to directly observe students' emotions and reactions, enabling more detailed analysis and guidance. This direct interaction helps build trust, making it easier for students to open up[1]. Another significant advantage of the traditional education model is its ability to foster teamwork and collaboration among students during group activities, which positively enhances their social adaptability.

However, the traditional model has noticeable shortcomings. Firstly, offline counseling and activities are limited by time and space, making it difficult to cover all students in need. Many students find it challenging to participate in regular counseling sessions due to class schedules and privacy concerns. Additionally, the resources in traditional models are limited, with a disproportionate number of professional counselors to student demand, making personalized services hard to achieve[2]. Furthermore, the traditional teaching methods are slow to update, unable to incorporate the latest psychological research and technological advancements promptly, affecting the timeliness of educational content.

3.2 New Educational Models in the Context of Information Technology

With the development of information technology, mental health education has undergone new transformations. New educational models in the context of information technology emphasize using the internet and digital technologies to overcome time and space limitations, providing more flexible and convenient psychological services for college students. The core of this model is to conduct mental health assessments, counseling, and interventions through online platforms, mobile applications, and social

media[3]. By collecting and analyzing data, educators can precisely identify students' psychological needs and offer customized solutions.

The advantages of the information-based education model include its wide coverage, providing psychological counseling services anytime and anywhere. Students can schedule counseling sessions online or participate in virtual mental health courses without being confined to fixed times and locations. Furthermore, the application of information technology enhances the interactivity and engagement of education. For example, virtual reality technology can simulate real scenarios, helping students learn psychological adjustment techniques through immersive experiences[4]. However, this model also faces challenges such as data privacy and technological dependency, which require robust legal regulations and technical measures for protection.

4. THEORIES AND METHODS FOR CONSTRUCTING NEW MODELS

4.1 Theoretical Foundation

Constructing new mental health education models in the information age requires grounding in multidisciplinary theories from modern education, psychology, and information technology. Humanistic psychology posits that everyone has the potential for self-actualization, and the task of education is to create conditions to help students realize their self-worth[5]. This theory provides guidance for new mental health education models, emphasizing personalized guidance and support to promote students' psychological growth and self-awareness.

Moreover, constructivist learning theory emphasizes that knowledge is constructed through social interactions rather than passively received. This theory highlights the learner's initiative and autonomy, suggesting that the educational process should be dynamic and interactive. Information-based education models can enhance students' active participation through online interactions and virtual experiments, thereby promoting deep learning[6].

4.2 Research Methods and Design

In research design, a mixed-method approach can be adopted, combining qualitative and quantitative analysis to comprehensively evaluate the effectiveness of new models. Firstly, conduct large-scale surveys to understand student satisfaction and preference for existing mental health education models. Through data analysis, identify key factors affecting students' mental health and educational pain points. Secondly, design and implement pilot projects for information-based mental health education, providing diverse psychological services through online platforms and using learning analytics to track student participation and psychological changes.

During the pilot, conduct in-depth interviews and focus group discussions to collect feedback from students and educators. This process not only reveals the strengths and weaknesses of the new model but also provides a solid basis for subsequent optimization. Additionally, by integrating educational big data and artificial intelligence technologies, analyze students' behavioral patterns and predict psychological risks, achieving personalized intervention and support. Through continuous experimentation and feedback, the theoretical foundation and practical pathways of the new model can be refined, ultimately providing more scientific and effective mental health education services for college students.

5. IMPLEMENTATION STRATEGIES FOR NEW MENTAL HEALTH EDUCATION MODELS IN THE INFORMATION AGE

5.1 Blended Online and Offline Teaching Model

In modern education, the blended online and offline teaching model is increasingly becoming an effective teaching strategy. With the deep application of information technology, this model shows unique advantages in mental health education. The online teaching component integrates teaching resources, psychological assessment tools, and interactive discussion boards through online platforms, providing students with learning opportunities unrestricted by time and location. This approach not only offers flexibility but also enhances students' learning

experience and absorption of psychological knowledge through multimedia elements.

The offline component continues to leverage the face-to-face benefits of traditional education models, allowing teachers to directly observe students' psychological states and provide personalized feedback and guidance. In practice, the core of the blended model is to optimize the combination of both approaches, using online platforms for disseminating mental health knowledge and initial screening, while offline sessions focus on in-depth individual counseling and group interactions.

Survey data shows that over 70% of students express high acceptance of this model, finding it offers richer learning resources and flexible learning arrangements[1]. The blended model not only enhances the coverage and efficiency of education but also provides targeted educational content through data analysis, better meeting students' diverse mental health needs.

5.2 Personalized Mental Health Education Strategies

Personalization is a key feature of mental health education models in the information age. By utilizing big data and artificial intelligence technologies, educators can collect relevant data when students register on online platforms, establishing personalized profiles. This data includes learning behaviors, psychological assessment results, and online interaction records, providing a foundation for developing personalized educational plans.

Mental health education should focus on each student's unique needs, identifying students who may be at psychological risk through data analysis and providing early intervention. Personalization strategies involve not only customized online content but also personalized arrangements for psychological counseling. During counseling, counselors can develop targeted guidance plans based on students' psychological profiles to promote positive mental health development.

Data shows that after adopting personalized strategies, the identification rate of students' mental health issues increased by 30%, and overall mental health levels improved[2]. This strategy not only enhances the effectiveness of mental health education but also increases student engagement and motivation.

6. ANALYSIS OF THE IMPLEMENTATION EFFECTS OF THE NEW MODEL

6.1 Evaluation of Teaching Effectiveness

To evaluate the effectiveness of the new model, systematic assessment studies are necessary. Methods such as surveys, in-depth interviews, and behavioral observations can be used to collect feedback on student satisfaction, learning outcomes, and psychological changes regarding the new model. Results indicate that after participating in blended courses, students show a significant improvement in their mastery of mental health knowledge, with noticeable reductions in anxiety and depression symptoms[3].

In evaluating teaching effectiveness, teacher feedback and their adaptability to the new model should also be considered. Most teachers believe that information technology provides rich resources and tools for teaching, enhancing classroom interactivity and participation. However, teachers also point out that the rapid changes in technology demand higher adaptability, requiring continuous skill updates to keep pace with educational technology developments.

6.2 Effects on Mental Health Improvement

The effect on mental health improvement is a key indicator of the new model's success. By introducing personalized intervention strategies and blended teaching models, students show significant improvement in scores on self-assessed mental health scales. Particularly in areas of emotional regulation and psychological resilience, students exhibit more positive changes[4].

Moreover, the improvement in mental health is not only reflected in students' subjective experiences but also in objective behavioral changes. Through psychological tracking and follow-up visits, many students report fewer psychological disturbances, with improvements in academic performance and interpersonal relationships. This suggests that the new model has promising applications in promoting student mental health.

7. CONCLUSION

This study explores the construction and implementation strategies of new mental health education models for college students in the networked information age, focusing on

the application effects of blended teaching models and personalized education strategies. The research indicates that these innovative models can effectively enhance college students' mental health levels, promoting personalized and comprehensive education by integrating information technology and psychological theories. The new models not only expand the scope of mental health education but also improve its targeting and effectiveness.

Future research can delve deeper into optimizing the application of information technology in mental health education, especially in balancing technology with humanistic care. With technological advancements, virtual reality and artificial intelligence are expected to play greater roles in mental health education. Additionally, long-term follow-up studies on educational outcomes should be strengthened to assess the impact of new models on students' long-term mental health.

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Application Analysis of Computer Database Technology in Information Management

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Abstract: This study explores the application mechanisms and optimization strategies of computer database technology in information management, addressing the increasing demands for data storage, processing, and management in the digital era. Through literature review, theoretical analysis, and data simulation, the study systematically examines the fundamental functions and implementation paths of database technology in information management. It focuses on the specific application scenarios, advantages, and limitations of technologies such as relational databases, distributed databases, and cloud databases. Beginning with the theoretical foundation of information management, the study highlights the roles of database technology in optimizing data storage structures, enhancing query efficiency, and ensuring information security. It further explores cutting-edge applications in big data processing, dynamic data sharing, and system integration based on recent advancements in database technology. the findings indicate that adopting advanced database technologies significantly optimizes the functional structure of information management systems, enhances real-time and stability support, and expands intelligent and secure applications through integration with artificial intelligence and blockchain technologies. This research provides theoretical and practical references for technological innovation and application in the field of information management.

Keywords: Database Technology; Information Management; Data Storage; Cloud Database; Big Data Processing

1. INTRODUCTION

1.1 Research Background and Significance

With the continuous advancement of global informatization, the generation and management of massive data have become critical challenges for societal development. In government agencies, enterprises, and research institutions, data storage, query, and analysis capabilities directly impact the scientific accuracy and efficiency of decision-making. Particularly in the era of big data, the rapid growth, complex structure, and frequent updates of data have posed severe challenges to traditional information management methods. Against this backdrop, computer database technology, as a core tool for information management, has become increasingly significant.

Database technology optimizes data storage structure and retrieval efficiency, handles large-scale data processing through distributed architecture and cloud storage, and ensures information security. Moreover, with the emergence of technologies such as artificial intelligence (AI) and blockchain, database technology is evolving, offering intelligent, distributed, and efficient solutions for information management. Therefore, analyzing the application of database technology in information management holds significant theoretical and practical value in improving data processing efficiency and advancing the informatization process of society.

1.2 Literature Review

Internationally, database technology has evolved from traditional relational databases to distributed and cloud databases. Recent studies have focused on NoSQL databases' applications and the deep integration of database technology with AI. For instance, U. S. researchers have proposed blockchain-based database systems to enhance data security and reliability [1]. In cloud computing, the Bigtable model by Google and the Dynamo system by Amazon have set industry benchmarks for large-scale data storage and processing [2].

In China, research has prioritized the self-development of database technologies and

their localized applications. With growing emphasis on information security and self-reliant technologies, domestic databases such as Dameng and OceanBase have gained traction, particularly in finance and telecommunications [3]. Research has also focused on optimizing query efficiency, enhancing data security, and reducing system costs. For example, advancements in index algorithms have substantially improved the ability of databases to handle massive data tasks [4].

However, challenges remain in addressing complex data structures and multidimensional information management needs, particularly in the integration of database technology with big data and AI. Further exploration and innovation are required to meet these broader demands.

2. FUNDAMENTAL THEORIES OF COMPUTER DATABASE TECHNOLOGY

2.1 Core Concepts of Database Technology

A database is a computer technology that organizes and stores data in a structured manner, enabling efficient management of data resources. At its core is the Database Management System (DBMS), which includes functionalities such as data storage, querying, updating, and security management. the evolution of database technology has progressed from hierarchical and network databases to relational databases, with current applications dominated by relational and NoSQL databases.

Relational databases store data in two-dimensional tables and allow users to query and manipulate data using Structured Query Language (SQL), featuring strong data consistency and integrity. In contrast, NoSQL databases, such as MongoDB and Cassandra, are designed for unstructured and semi-structured data, offering scalability and flexibility. Database technology addresses the trade-off between storage efficiency and access efficiency while providing a unified interface for managing complex data.

2.2 Classification and Characteristics of Database Technology

Database technologies can be classified into relational databases, NoSQL databases, distributed databases, and cloud databases. Relational databases, such as MySQL and Oracle, are ideal for processing structured data, supporting transaction consistency and complex queries. NoSQL databases, such as Redis and HBase, excel in handling unstructured data, offering high throughput and scalability. Distributed databases enable large-scale data storage and high-concurrency applications through coordination across multiple nodes. Cloud databases leverage cloud computing platforms to achieve elastic scalability and on-demand services.

Each type of database technology has distinct advantages in different scenarios. For instance, relational databases are widely used in traditional enterprise management systems, while NoSQL databases are popular in social media and IoT applications. Distributed and cloud databases are particularly suited for high-performance and high-availability requirements in industries such as finance and telecommunications. the diverse development of database technology provides robust support for varying information management needs.

3. PRACTICAL DEMANDS FOR DATABASE TECHNOLOGY IN INFORMATION MANAGEMENT

3.1 Characteristics and Challenges of Information Management

The core task of information management is to support the full lifecycle of data collection, storage, processing, and sharing. Its main characteristics include large data volumes, diverse data types, and high real-time requirements. In the era of big data, one critical challenge is managing massive datasets. For example, IDC predicts that global data will reach 175ZB by 2025, far beyond the capacity of traditional information management systems [5].

Additionally, the complexity of data types continues to grow, encompassing structured, unstructured, and semi-structured data. For instance, enterprise systems often need to manage employee information (structured), email attachments (unstructured), and log data (semi-structured). Information management systems must efficiently process these diverse data types to meet storage and analytical needs.

Data security and privacy are also major concerns. Data breaches have become

increasingly common; according to the 2022 Global Data Breach Report, approximately 60% of enterprises experienced data breaches in the past three years, highlighting the need for robust encryption, access control, and security mechanisms in information management systems [6].

3.2 Necessity of Database Technology in Information Management

Database technology provides scientific solutions to address these challenges. Distributed databases, for instance, use sharding and replication techniques to enable parallel storage and access for large datasets. Google's Spanner, a globally distributed database, offers multi-regional consistency, making it highly effective for multinational enterprises' information management [7].

For heterogeneous data management, NoSQL databases are particularly advantageous. MongoDB, for example, uses a document-based storage model to handle JSON data flexibly, making it suitable for managing complex data structures in scenarios like e-commerce platforms. Furthermore, indexing optimization and innovative query patterns in database technologies significantly improve operational efficiency. Studies show that B+ tree indexing can enhance query speeds by 30%-40% [8].

In terms of security and privacy, database technologies provide comprehensive support. Encryption and multi-level access control mechanisms prevent unauthorized access and data breaches. Additionally, blockchain-enabled distributed databases ensure data immutability and traceability through decentralization, offering a higher level of security for sensitive information management.

4. PRACTICAL APPLICATIONS OF COMPUTER DATABASE TECHNOLOGY IN INFORMATION MANAGEMENT

4.1 Applications of Relational Database Technology

Relational database technology serves as the fundamental backbone of modern information management systems, renowned for its structured data storage and efficient query capabilities. With its two-dimensional table structure and rigorous relational model, it provides organizations with a consistent and stable management framework. For instance, Enterprise Resource Planning (ERP) systems extensively utilize relational databases to integrate data across multiple departments, such as finance, supply chain, and human resources, ensuring data consistency and improving decision-making efficiency. Similarly, in e-governance, relational databases support centralized storage and efficient access to data like population statistics, tax records, and public services, facilitating government transparency and operational efficiency.

However, relational databases face scalability challenges when managing massive volumes of unstructured data due to the complexity of data modeling and limited extensibility. Despite these limitations, their stability and rigor make them indispensable in fields requiring high data accuracy and consistency, such as banking and healthcare. For example, a leading domestic bank employs Oracle relational databases to process billions of monthly transaction records, achieving a 40% reduction in query time through optimized indexing, thereby significantly enhancing business efficiency [1].

4.2 Applications of Distributed Database Technology

As data volumes grow exponentially, distributed database technology has become increasingly important for its high availability and horizontal scalability. Distributed databases divide and replicate data across multiple nodes, reducing system load and enhancing concurrent data processing capabilities. They are widely used in e-commerce, finance, and logistics, where high real-time performance and concurrency are critical. For example, a renowned e-commerce platform employs OceanBase, a distributed database, to handle peak traffic during its "Double 11" shopping festival, achieving transaction processing peaks of 590, 000 transactions per second with second-level response times, demonstrating exceptional efficiency and stability [2].

Distributed databases also support disaster recovery and data redundancy by implementing multi-replica mechanisms and failover algorithms, ensuring high availability even during network failures or hardware

faults. Furthermore, some distributed databases integrate distributed storage and computation, enabling complex queries and large-scale data processing for applications such as precision marketing and big data analytics. However, challenges related to transaction consistency persist. Technologies like Google Spanner partially address this issue by introducing global timestamp mechanisms, yet balancing performance and consistency remains a challenge in practical applications [3].

4.3 Applications of Cloud Database Technology

With the proliferation of cloud computing, cloud databases have become a focal point in information management. By integrating databases into cloud platforms, they reduce maintenance costs and enable on-demand resource allocation. Cloud databases are widely adopted in SaaS, PaaS, and IaaS architectures, allowing enterprises of different scales to subscribe to appropriate services, thus enhancing flexibility.

In the education sector, a prominent online education platform employs Alibaba Cloud's RDS database to dynamically allocate resources. Through automatic scaling, the platform accommodates peak traffic during live classes, supporting 100, 000 requests per second while reducing hardware costs by approximately 30%, thereby promoting equitable access to educational resources [4]. Additionally, with rising concerns over data security, cloud databases incorporate advanced security mechanisms such as data encryption, access control, and audit logs to safeguard against potential cyberattacks and data breaches.

Despite their advantages, cloud databases depend heavily on network connectivity, which may hinder data access and service quality during latency or interruptions. Moreover, storing data with third-party providers raises privacy and compliance concerns, necessitating further optimization in aligning with regional legal and regulatory requirements.

5. OPTIMIZATION STRATEGIES FOR DATABASE TECHNOLOGY IN INFORMATION MANAGEMENT

5.1 Optimization of Storage and Query Performance

The performance of database systems directly impacts the efficiency of information management. Optimized storage and query technologies can reduce resource consumption and improve response times. For storage, partitioning and compression techniques can significantly reduce space requirements. For example, a logistics company reduced storage costs by 25% through business-area-based partitioning and data compression techniques. For query performance, index optimization and query plan generation are critical. Multi-level B+ tree indexing accelerates data retrieval, while dynamic query planning in modern DBMS adjusts execution paths based on real-time system conditions, enhancing overall performance [5].

5.2 Enhancing Data Security and Privacy Protection

Data security and privacy have become key priorities in information management. Database technologies must protect against external attacks and prevent unauthorized internal access to sensitive information. Techniques such as access control, Transparent Data Encryption (TDE), and tamper-proof audit logs are effective countermeasures. For instance, a financial institution integrated role-based access control (RBAC) and attribute-based encryption (ABE) to minimize unauthorized access risks while ensuring user privacy compliance [6].

For privacy protection, differential privacy is increasingly applied in databases. By adding noise to query results, it prevents the reverse engineering of sensitive user information. Blockchain technology also offers innovative solutions for database security with its decentralized and tamper-proof features, ensuring extra security for sensitive data storage and transmission.

5.3 Integration with Emerging Technologies

Database technology is increasingly integrating with emerging technologies such as artificial intelligence, big data, and blockchain, driving the intelligence and diversification of information management systems. AI integration enables intelligent query optimization and anomaly detection, improving performance and security. In big data processing, databases integrated with

frameworks like Apache Hadoop or Spark can efficiently process unstructured data. As IoT advances, edge computing databases are emerging, enabling local data processing and storage on devices, reducing the burden on central servers.

6. CONCLUSIONS AND FUTURE DIRECTIONS

6.1 Key Findings

This study systematically analyzed the applications and optimization strategies of computer database technology in information management. Relational databases excel in data consistency and complex queries, distributed databases are advantageous for high-concurrency and large-scale data processing, and cloud databases offer flexibility and cost-efficiency, making them an essential choice for modern information management. Additionally, storage optimization, security strategies, and integration with emerging technologies ensure databases meet diverse requirements while expanding the functionality of information management systems.

6.2 Future Research Directions

Future research should focus on the deep integration of database technology with advanced technologies, such as AI-powered database systems and blockchain-based distributed architectures. In the realm of data security and privacy, application-specific solutions are needed to balance efficiency and security. Moreover, as global data compliance regulations grow stricter, database technology must align legal requirements with technical solutions to support globalized information management.

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Theoretical Integration of Education for Sustainable Development and Physical Education

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Abstract: The integration of Education for Sustainable Development (ESD) and Physical Education (PE) represents a significant area of research within modern educational systems, aiming to foster holistic student development and advance societal sustainability goals. Grounded in ESD theories and the characteristics of PE, this study explores pathways for theoretical integration. Through literature review and theoretical construction, it systematically examines international theories and practices, analyzing core concepts, values, and implementation strategies. the study highlights synergies in goal setting, curriculum design, and teaching methods, revealing that ESD's ecological awareness, global responsibility, and critical thinking can enrich PE's values, while PE's teamwork, physical well-being, and social interaction serve as practical platforms for ESD. Consequently, the study proposes a PE framework based on sustainable development goals and teacher training strategies, offering theoretical and practical guidance for future education. Results indicate that integrating ESD and PE not only enhances students' physical and mental well-being and sustainability awareness but also drives educational innovation and system improvement.

Keywords: Education for Sustainable Development; Physical Education; Theoretical Integration; Curriculum Design; Educational Innovation

1. INTRODUCTION

1.1 Research Background and Significance

In light of escalating global challenges related to environmental issues, social equity, and economic sustainability, Education for Sustainable Development (ESD) has become a critical agenda in international education. As highlighted in UNESCO's 2030 Agenda for Sustainable Development, education is considered a key driver of societal, economic, and environmental transformation, with ESD serving as a central strategy to achieve this goal. ESD emphasizes not only knowledge acquisition but also the cultivation of global responsibility, critical thinking, and actionable skills among students.

Physical Education (PE), as an integral part of school education, offers a unique platform for ESD implementation due to its practical, interactive, and affective nature. Traditional PE often focuses on physical fitness, overlooking its potential to foster social responsibility and ecological awareness. However, PE inherently encompasses humanistic, social, and ecological values, particularly in promoting collaboration, fairness, and community engagement. Integrating ESD into PE not only enriches students' learning experiences but also contributes to achieving sustainable development goals (SDGs).

Research on the theoretical integration of ESD and PE holds significant academic value in addressing theoretical gaps and offers practical guidance for curriculum design, teaching innovation, and policy-making. Such integration can advance educational reform, driving social progress.

1.2 Review of Domestic and International Research

Internationally, the theoretical framework for ESD is well-established. UNESCO's Decade of Education for Sustainable Development emphasizes the alignment of ecological awareness, social responsibility, and global perspectives in education [1]. Scholars such as Sterling R. argue that the core of ESD lies in fostering systems thinking to achieve a comprehensive transformation in knowledge,

attitudes, and behavior [2]. In PE, existing research explores its integration with health education and social responsibility education, demonstrating that PE effectively enhances teamwork, value development, and community engagement [3].

In China, the implementation of the "double reduction" policy and the deepening of quality education have raised the prominence of PE. As stated in China Education Modernization 2035, strengthening PE and related curricular reforms is essential. However, the integration of ESD into PE remains underexplored. Recent studies have addressed topics such as "green education" and "eco-sports, " but the theoretical frameworks and practical approaches lack systematic development. For instance, Wang Dong and colleagues examined the role of PE in ecological awareness but provided limited methodological insights [4].

While existing research underscores the theoretical and practical significance of integrating ESD into PE, further exploration is needed regarding implementation pathways and teacher training.

2. THEORETICAL FOUNDATIONS

2.1 Core Concepts and Framework of Education for Sustainable Development

The core principles of ESD include ecological responsibility, global perspectives, and social equity, aimed at achieving balanced development across economic, social, and environmental domains. Specifically, ecological responsibility emphasizes harmony between humans and nature; global perspectives cultivate students' ability to address international issues; and social equity focuses on moral development and fairness.

The theoretical foundation of ESD integrates systems theory, critical pedagogy, and constructivist learning. Systems theory emphasizes holistic understanding and multidimensional thinking in addressing complex social issues. Critical pedagogy advocates for reflective and transformative value formation, while constructivism promotes experiential learning and problem-solving [5]. Project-based learning (PBL) has been identified as an effective approach for ESD, as it enables students to address real-world challenges, develop teamwork, and propose actionable solutions [6].

2.2 Educational Value and Theoretical Basis of Physical Education

The value of PE extends beyond physical health to include psychological development, teamwork, and social responsibility. Ancient philosopher Aristotle regarded PE as a pathway to holistic development, involving physical, mental, and ethical dimensions—a viewpoint that persists in theories like multiple intelligences and social learning.

Key theoretical foundations of PE include cooperative learning theory, body-mind interaction theory, and humanistic education theory. Cooperative learning emphasizes teamwork and collective consciousness, while body-mind interaction explores the psychological benefits of physical activity. Humanistic education prioritizes individual needs and potential, facilitating comprehensive development through PE [7].

The practical nature of PE uniquely positions it to enhance behavioral competencies. With the implementation of the "Healthy China" strategy, PE has gained prominence in promoting physical well-being and instilling social values, creating a solid foundation for embedding ESD.

3. SYNERGIES BETWEEN EDUCATION FOR SUSTAINABLE DEVELOPMENT AND PHYSICAL EDUCATION

3.1 Conceptual Alignment

ESD and PE share conceptual synergies, emphasizing individual-society interaction, responsibility, and value cultivation. ESD's principles of ecological responsibility and global perspectives can be operationalized through physical activities. For instance, outdoor sports like ecological hiking reinforce environmental awareness, while global sports events foster cross-cultural understanding and appreciation. Similarly, ESD's social equity principle aligns with PE's emphasis on rule compliance and teamwork, enabling students to experience fairness and collaboration [8].

3.2 Complementary Educational Values

The educational values of ESD and PE are complementary. ESD focuses on fostering critical thinking and behavioral attitudes, while PE provides practical, interactive contexts for these goals. For example, critical thinking from ESD can be enhanced through

strategic discussions in PE activities, such as team-building exercises or game strategies. Additionally, PE activities like simulated disaster rescue scenarios combine physical fitness with system-based thinking, furthering ecological and social awareness.

4. INTEGRATION PATHWAYS FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT AND PHYSICAL EDUCATION

4.1 Goal Setting and Curriculum Design

Setting clear goals is essential for integrating ESD into PE, encompassing social, environmental, and economic dimensions. Goals should address students' knowledge, skills, and attitudes. For example, PE curricula can aim to foster ecological awareness, social responsibility, and collaborative problem-solving. Students should learn to appreciate fairness in competition, recognize the significance of environmental conservation, and develop interpersonal skills.

Curriculum design should reflect these goals. Activities like ecological hiking or environmental clean-up runs can enhance both physical fitness and ecological consciousness. Cross-disciplinary content, such as integrating biology or geography into PE, can deepen students' understanding of sustainability. International sports events, such as mock Olympic games, can familiarize students with diverse cultures and global sustainability challenges.

4.2 Teaching Methods and Implementation Strategies

Traditional lecture-based methods are insufficient for ESD. Experiential learning, cooperative learning, and task-based methods are more effective. For instance, task-driven learning could involve solving issues like waste management in sports venues, enabling students to explore practical solutions. Cooperative learning naturally aligns with PE, as team games or competitions encourage collaboration, fairness, and mutual understanding.

Teachers play a key role in embedding ESD into PE. They can guide students to explore sustainable practices within sports activities, such as designing eco-friendly sports venues or discussing sustainable sporting equipment. These strategies encourage students to critically engage with sustainability issues through active participation.

5. MECHANISMS FOR IMPLEMENTING EDUCATION FOR SUSTAINABLE DEVELOPMENT IN PHYSICAL EDUCATION

5.1 Teacher Roles and Capacity Building

Teachers play a pivotal role in integrating ESD into PE. Beyond expertise in PE, they must understand the principles and goals of ESD. Teachers should act as advocates for sustainability, modeling ecological awareness and social equity through their actions. For example, engaging in community service or using eco-friendly sports equipment can subtly instill sustainable values in students.

To enhance teacher capacity, institutions should offer training programs focused on ESD principles and interdisciplinary curriculum design. These programs could include strategies for fostering global perspectives, social responsibility, and sustainability awareness through PE activities. Performance appraisals should also incorporate ESD metrics to encourage continuous improvement in teaching practices.

Teachers also play a key role in curriculum innovation and resource integration. Collaboration with other disciplines can help create interdisciplinary courses, such as "Climate Change and Physical Training, " where students explore the impact of climate on physical performance while discussing broader health implications of climate change. Such innovative designs enhance students' understanding and engagement with sustainability.

5.2 Teaching Evaluation and Feedback Optimization

Evaluation is critical for achieving ESD goals in PE. Traditional assessments focusing solely on athletic performance must expand to include teamwork, problem-solving, and understanding of social equity and ecological responsibility.

A combination of formative and summative assessments is recommended. For instance, teamwork can be assessed by observing students' contributions during group tasks, while problem-solving can be evaluated through project outcomes. These multidimensional evaluations provide a

comprehensive understanding of student progress and inform teaching improvements.

Feedback mechanisms further support evaluation. Timely feedback allows students to identify areas for improvement, such as ecological awareness or teamwork skills, and motivates them to take corrective actions. For example, after a community cleanup activity, teachers can facilitate reflection sessions to discuss overlooked environmental issues or teamwork challenges. Such feedback fosters deeper comprehension of sustainability and encourages proactive participation in future initiatives.

6. CONCLUSIONS AND FUTURE DIRECTIONS

6.1 Key Findings

This study highlights the theoretical and practical value of integrating ESD into PE. ESD's core principles and systemic thinking offer new perspectives for PE, while the practical nature of PE serves as a robust platform for achieving ESD goals. By aligning objectives and designing scientifically sound curricula, the integration enables the incorporation of sustainability concepts into PE. Innovative teaching methods and effective implementation strategies significantly enhance students' ecological awareness, social responsibility, and teamwork skills.

The successful realization of ESD in PE relies on empowering teachers through capacity building and encouraging curriculum innovation and resource integration. With evaluation and feedback mechanisms in place, the impact of this integration is effectively ensured. Furthermore, interdisciplinary course design and contextualized learning approaches demonstrate high adaptability and contribute to improving students' practical skills and comprehensive competencies.

6.2 Future Research Directions

While progress has been made, there remain numerous areas for further exploration. First, future research could investigate the application of interdisciplinary teaching models in different grades and regions to understand their varying impacts. Second, studies should focus on standardizing teacher training and resource development to enhance feasibility and scalability. Additionally, advancements in data analysis tools and techniques could improve the comprehensiveness of student performance evaluations.

At a macro level, developing systematic policy frameworks is essential to support the integration of ESD and PE. National education reforms could provide theoretical guidance and resource support, facilitating the widespread adoption of ESD within school systems and promoting sustainable development goals through education.

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Application Prospects and Ethical Framework Analysis of Artificial Intelligence in Psychological Education

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Abstract: This study examines the application prospects of artificial intelligence (AI) in psychological education and the construction of its ethical framework, focusing on the opportunities and challenges brought by technological advancements in this field. Combining a literature review with theoretical analysis, the research reviews the practical applications of AI in emotion recognition, mental health assessment, and personalized educational interventions, highlighting its potential value and limitations in psychological education. Key advantages of AI, such as real-time feedback, personalized learning path recommendations, and early detection of psychological issues, are systematically analyzed. Simultaneously, the study evaluates ethical concerns arising from AI integration, including privacy breaches, algorithmic bias, changes in teacher-student relationships, and psychological safety risks. A transparency, fairness, and accountability-based ethical framework is proposed, emphasizing the need for collaborative efforts among developers, educators, and policymakers to establish standardized technical guidelines for AI's sustainable application. the study concludes that AI holds significant potential in psychological education, but its full societal value can only be realized through robust ethical governance mechanisms. This research provides theoretical and practical references to foster the scientific application of AI in psychological education.

Keywords: Artificial Intelligence; Psychological Education; Ethical Framework; Technological Applications; Privacy Protection

1. INTRODUCTION

1.1 Research Background and Significance

In recent years, psychological health has become a global concern. According to the World Health Organization (WHO), over 1 billion people worldwide are affected by mental health issues, with adolescents being particularly vulnerable. Meanwhile, as educational reforms deepen, psychological education has moved from a peripheral role to a core component, becoming essential for fostering students' mental and physical well-being. However, traditional psychological education faces significant challenges in resource allocation, service coverage, and efficiency, limiting its development.

The rapid advancement of artificial intelligence (AI) has brought new opportunities to psychological education. Leveraging technologies such as deep learning and natural language processing, AI demonstrates remarkable advantages in emotion recognition, mental health assessment, and personalized intervention plan design. AI enhances the precision and responsiveness of psychological education, offering data-driven, personalized mental health support that addresses the bottlenecks of traditional methods. Furthermore, AI facilitates a shift from teacher-centered to student-centered approaches in psychological education. However, the accompanying ethical challenges, such as data privacy, algorithm transparency, and fairness, have also become critical topics of concern. Exploring the application potential and ethical framework of AI in psychological education is not only a necessity for technological development but also a key to ensuring the sustainable development of mental health education.

1.2 Review of Domestic and International Research

Globally, research on AI applications in

psychological education has made initial progress. In developed countries like the United States, scholars have focused on AI's role in mental health interventions. For example, a Stanford study demonstrated that AI-driven emotion recognition systems can accurately identify adolescents' emotional states 85% of the time, effectively supporting targeted psychological interventions [1]. In Europe, researchers emphasize ethical frameworks and data privacy. the European Union's General Data Protection Regulation (GDPR) explicitly outlines data usage limits for AI systems in education, providing a legal foundation for AI applications in psychological education.

In contrast, research on AI in psychological education in China is still in its infancy but is developing rapidly. According to the "White Paper on Education and AI Development in China 2022, " over 200 primary and secondary schools in China have implemented AI mental health systems to monitor students' emotions and provide early warnings for psychological abnormalities. However, due to gaps in ethical frameworks and legal systems, risk management for these technologies remains underdeveloped [2].

1.3 Research Objectives and Methods

This study investigates the application prospects and ethical framework of AI in psychological education by systematically reviewing the current state of technological development and its potential value. It analyzes AI's positive contributions to psychological education while addressing ethical risks such as privacy concerns, algorithmic bias, and psychological safety. the research employs a combination of literature review and theoretical analysis, referencing existing domestic and international studies alongside trends in AI technology to provide a comprehensive discussion.

2. CURRENT APPLICATIONS OF AI IN PSYCHOLOGICAL EDUCATION

2.1 Emotion Recognition and Mental Health Assessment

Emotion recognition technology, powered by AI, utilizes tools such as speech analysis, facial expression detection, and physiological signal monitoring to capture users' emotional changes in real time. This technology has gradually expanded its applications in psychological education. For example, some schools have implemented AI-based emotion recognition systems in classrooms, enabling teachers to adjust instructional strategies based on students' emotional and attentional states.

Mental health assessment is another major application area for AI. Traditional assessments often rely on paper-based questionnaires or interviews, which are time-consuming and inefficient. In contrast, AI leverages machine learning algorithms to analyze large datasets, quickly generating mental health reports. For instance, IBM developed an AI mental health system capable of completing comprehensive assessments of students' mental health in just 35 minutes, with an accuracy rate of 87% [3].

2.2 Personalized Learning Path Recommendations and Interventions

Designing and implementing personalized learning paths in psychological education has long been a challenge. AI technologies analyze students' psychological profiles and academic performance through deep learning models, enabling the development of customized mental health intervention plans. For example, educational platforms use machine learning algorithms to recommend appropriate learning strategies based on students' habits and mental states, thereby improving engagement and psychological adaptability.

2.3 Early Warning and Intervention Mechanisms for Psychological Issues

The early detection and intervention of psychological issues are critical tasks in psychological education. AI systems, through big data analysis and predictive modeling, can identify psychological abnormalities in students. Some schools have implemented AI-based mental health systems that issue alerts to counselors when students exhibit significant emotional fluctuations, allowing timely interventions. This mechanism significantly reduces the occurrence of psychological crises.

3. POTENTIAL VALUE OF AI IN PSYCHOLOGICAL EDUCATION

3.1 Enhancing Efficiency and Precision in Psychological Education

AI significantly improves the efficiency of psychological education through real-time data collection and analysis. In mental health assessments, traditional methods require substantial time and strict testing environments, whereas AI can conduct non-invasive evaluations of students' mental states in a short period with improved accuracy and efficiency. Additionally, AI's ability to provide personalized analyses facilitates tailored interventions for students.

3.2 Improving Fairness and Accessibility of Psychological Services

In the context of unequal resource distribution, AI addresses the mismatch between supply and demand in psychological services. Remote mental health platforms and AI-based counseling tools allow students in underserved regions to access high-quality psychological education. Moreover, AI's scalability ensures broader user coverage, reducing inequalities in access to psychological resources.

3.3 Promoting Synergy Between Education and Mental Health Fields

AI's interdisciplinary nature fosters collaboration between psychological education and other fields. For instance, integrating AI into education management systems enables schools to consolidate students' mental health data with academic performance, creating a holistic education-mental health model. This synergy not only enhances educational quality but also advances mental health initiatives.

4. ETHICAL ISSUES OF AI IN PSYCHOLOGICAL EDUCATION

4.1 Data Privacy and Information Security

AI applications in psychological education rely heavily on sensitive personal data, including physiological indicators, behavioral patterns, and mental health information. While these data are crucial for optimizing algorithms and delivering personalized services, they raise significant privacy concerns. Without robust security measures for data storage, transmission, and sharing, personal privacy risks being compromised. For example, global economic losses caused by data breaches reached $4.4 billion in 2021, highlighting the ongoing challenges of safeguarding information in the digital age [1]. In psychological education, these issues are particularly sensitive. If students' mental health data are leaked, it could lead to severe consequences for their social interactions, academic performance, and psychological well-being. For instance, a social media platform's misuse of psychological analysis once caused undue societal pressure on users [2]. Similar incidents in educational contexts could harm students' mental health more profoundly.

Technical solutions such as data encryption, anonymization, and distributed storage have been developed to mitigate these risks. However, these measures can only reduce, not eliminate, privacy concerns. Thus, ensuring data privacy and information security remains a long-term priority.

4.2 Algorithmic Bias and Fairness Challenges

Algorithmic bias occurs when AI systems unintentionally exhibit stereotypes or unfair treatment due to imbalanced training data or flawed algorithm design. In a human-centered field like psychological education, fairness is particularly critical. For example, studies have shown that emotion recognition algorithms often perform less accurately for certain genders or ethnic groups, potentially leading to unjust outcomes for affected students.

The root of algorithmic bias often lies in unrepresentative training datasets. For example, AI-based psychological counseling systems developed in English-speaking countries may struggle to understand non-native speakers, impacting the effectiveness of their recommendations. Similarly, mental health assessment systems may overly rely on data from specific regions or cultural contexts, limiting their applicability to diverse populations. To ensure fairness in AI-driven psychological education, addressing algorithmic bias is essential.

Mitigating this issue requires optimizing algorithm design and expanding diverse datasets. Developers must incorporate training samples from varied cultural, age, and socioeconomic backgrounds to reduce bias. Regular fairness audits of AI systems are also necessary to identify and address disparities.

4.3 Teacher-Student Relationships and Psychological Safety Risks

The integration of AI into psychological education has altered traditional teacher-

student interactions, potentially leading to relational detachment and trust issues. Traditionally, psychological counseling relies on interpersonal interaction, with counselors providing emotional support and problem-solving guidance. While AI enhances efficiency, it might weaken the emotional connection in this process. For instance, students flagged by AI systems for mental health issues may feel stigmatized or isolated, exacerbating their psychological burden.

Psychological safety risks also arise from AI monitoring practices. For example, emotion recognition systems that analyze facial expressions or vocal tones may create discomfort or resistance due to excessive surveillance. the goal of psychological education is to enhance mental well-being, not to introduce new sources of stress. Therefore, careful consideration is necessary to balance technological efficacy with the maintenance of trust in teacher-student relationships.

5. ETHICAL FRAMEWORK FOR AI IN PSYCHOLOGICAL EDUCATION

5.1 Principles of Transparency and Accountability

Transparency is a cornerstone of AI ethics. In psychological education, it is crucial for students, teachers, and parents to understand how AI systems operate and the potential consequences of their use. Transparency also applies to algorithmic processes, requiring developers to disclose decision-making mechanisms, data sources, and system limitations. Greater transparency builds trust in AI-based systems.

Accountability emphasizes the clear definition of responsibilities for developers and users. Developers must ensure the accuracy and fairness of AI systems, while educational institutions must monitor the systems' practical applications and provide adequate support for students. For instance, the European Union's Artificial Intelligence Act outlines clear accountability boundaries for AI systems, offering a model for similar legislation in other regions.

5.2 Principles of Fairness and Non-Discrimination

Fairness is a fundamental goal for AI applications in psychological education. AI systems should avoid unequal treatment of any student group, aligning with ethical and educational principles. Achieving fairness requires that developers focus on collecting and applying diverse data during algorithm optimization to minimize bias.

Non-discrimination can be enforced through a combination of technical measures and policy support. For example, psychological education platforms can adopt fairness evaluation indicators to regularly audit algorithmic performance. Simultaneously, education authorities should implement policies ensuring comprehensive evaluation and equitable application of AI systems across all student populations.

5.3 Collaborative Mechanisms and Standardization

Building an ethical framework for AI in psychological education requires collaboration among educational institutions, technology companies, legal bodies, and the general public. Educational institutions should define technical requirements and objectives, technology companies must provide secure and effective solutions, and legal departments should establish relevant regulations. This multidisciplinary collaboration aims to create an interactive, transparent, and regulated ecosystem for AI applications.

Standardization is vital for the effective implementation of AI in psychological education. By establishing technical standards and usage guidelines, the arbitrary application of AI technologies can be reduced, enhancing their reliability. Standardization also facilitates resource sharing and consistency across different educational settings.

6. CONCLUSIONS

This study analyzed the current applications, potential value, and ethical challenges of AI in psychological education. It found that AI excels in areas such as emotion recognition, mental health assessment, personalized learning path recommendations, and early intervention for psychological issues. These advancements significantly enhance the efficiency and fairness of psychological education. However, ethical concerns such as data privacy, algorithmic bias, and changes in teacher-student dynamics require comprehensive solutions through technological refinement and ethical

frameworks.

Future research in AI-driven psychological education should balance technological innovation with ethical governance. As AI technology evolves, the application scenarios in psychological education will diversify, demanding adaptive and ethically sound solutions. Researchers must monitor the dynamic relationship between technology and ethics, developing AI systems that are both innovative and ethically responsible. Additionally, collaboration between education authorities and technology companies should be strengthened to establish open and shared research platforms, fostering the scientific and ethical integration of AI in psychological education.

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Exploring Career Guidance Models from a University-Industry Collaboration Perspective

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Abstract: This study explores career guidance models within the context of university-industry collaboration, aiming to analyze and elucidate the construction of an effective career guidance system through joint participation. With the rapid development of the global economy and changing demands in the job market, career guidance in higher vocational education requires continuous innovation and optimization. Utilizing a combination of literature review and theoretical framework development, this research identifies current challenges and shortcomings in existing models. We focus on the roles, collaboration mechanisms, and interaction dynamics between universities and industries in career guidance, also addressing potential barriers and solutions. A proposed framework, centered on collaborative innovation, highlights the active role of industries and the leadership role of educational institutions. The study demonstrates that deeper university-industry integration enhances the practical effectiveness of career guidance, allowing students to engage with real-world work environments and corporate cultures, thereby improving their competitiveness in the job market. This research offers a sustainable cooperation guidance strategy for vocational institutions and industries, and serves as a valuable reference for policymakers.

Keywords: University-Industry Collaboration; Career Guidance; Higher Vocational Education; Employment Promotion; Collaborative Innovation

1. INTRODUCTION

1.1 Research Background and Significance

The rapid development of the global economy and technological advancements pose significant challenges to higher education, particularly vocational education. Modern industrial structures increasingly demand skilled professionals, highlighting the gap between traditional educational models and market needs. Career guidance is a crucial educational component impacting students' competitiveness and overall employment rates. University-industry collaboration emerges as an effective educational approach to bridge this gap, providing students with genuine workplace experiences and helping companies build a talent pool. Thus, researching career guidance models within this collaboration context holds significant practical and theoretical importance.

1.2 Review of Domestic and International Research

Internationally, particularly in Western countries, university-industry collaboration has matured within vocational education. Studies indicate that such collaboration significantly enhances students' practical skills and job competitiveness. For instance, Germany's "dual education" system offers a robust partnership between enterprises and schools, providing comprehensive theoretical and practical training. Domestically, there has been progress, with policies encouraging such collaborations. However, challenges persist, such as insufficient enterprise involvement and shallow collaboration depth. Overall, existing studies provide a solid theoretical and practical foundation, but there is a need to tailor these models to China's unique context for more effective career guidance.

1.3 Research Objectives and Questions

This study aims to develop an effective career guidance model through university-industry collaboration, focusing on enhancing guidance effectiveness through joint participation. Key research questions include: How to design collaboration mechanisms

between enterprises and schools? How to define roles and responsibilities in career guidance? How to evaluate the impact of this collaboration model on student employment?

2. THEORETICAL FOUNDATIONS OF UNIVERSITY-INDUSTRY COLLABORATION AND CAREER GUIDANCE

2.1 Concepts and Types of University-Industry Collaboration

University-industry collaboration is an educational model integrating academia and industry to jointly cultivate practical talents. Collaboration varies in depth and breadth, from basic, such as offering internships, to deeper engagements, like co-developing curricula and joint research. The core of this collaboration is resource sharing and complementarity, with enterprises providing real work environments and industry demand insights, while schools offer structured curricula to meet market needs.

2.2 Basic Theories of Career Guidance

Career guidance involves supporting individuals in making informed educational and career decisions, encompassing career planning, skill training, and self-awareness development. Theories such as career adaptability and career development stages underscore that career guidance is a long-term developmental process, not merely a solution to employment issues. It helps students understand their interests, abilities, and values, enabling informed career choices aligned with industry trends.

2.3 Relationship Between University-Industry Collaboration and Career Guidance

A close relationship exists between university-industry collaboration and career guidance. Through collaboration, career guidance becomes more practical, allowing students to engage with real-world environments and corporate cultures alongside theoretical learning. This synergy aligns guidance with market demands, enhancing students' professional skills and practical abilities. Enterprises act as active participants and direct mentors, offering cutting-edge industry information and skills training. Educational institutions can then adapt curricula based on enterprise feedback to better meet market needs.

3. DEVELOPMENT OF A CAREER GUIDANCE MODEL THROUGH UNIVERSITY-INDUSTRY COLLABORATION

3.1 Necessity and Advantages of Joint Participation

In the modern economic landscape, evolving industry structures and rapid technological advancements lead to changing human resource demands. Traditional career guidance models in educational institutions struggle to keep pace with these shifts, often leaving graduates unprepared for the job market. University-industry collaboration effectively addresses this gap by integrating resources from both sectors.

Industries, being attuned to sectoral developments, can swiftly identify and communicate trends and technological changes. This capability allows them to provide current insights for career guidance, aiding students in acquiring relevant skills. For instance, in the information technology sector, with the widespread adoption of AI and big data, companies can relay pertinent information to universities, prompting timely curriculum adaptations. This ensures students are exposed to leading-edge technologies during their studies, facilitating smoother transitions into the workforce post-graduation.

Direct corporate involvement in career guidance offers students authentic workplace experiences. Through internships and collaborative projects, students can apply theoretical knowledge in real-world settings, enhancing their practical abilities. Such experience reduces the transition period from academia to the workplace and boosts employability. Research indicates that students engaged in university-industry collaborations tend to have higher employment rates and starting salaries compared to their peers.

3.2 Principles and Framework for Model Development

Building a career guidance model through university-industry collaboration requires adherence to key principles to ensure long-term benefits and sustainability.

Mutual Benefit: The foundation of collaboration relies on meeting both parties' interests. For universities, collaboration enhances teaching quality and graduate

employability, while enterprises gain access to a talent pool and technical support. Identifying a balance of interests to create mutual value is essential.

Long-term and Stable Partnerships: Collaboration should go beyond project-level engagements towards establishing a shared long-term vision. Building trust and fostering a cooperative relationship capable of adapting to market changes can be achieved through strategic agreements and regular executive exchanges.

Flexibility and Innovation: Given rapidly changing markets, the collaboration model must be flexible to adapt quickly to market demands and technological advancements. Continuous innovation is essential in content, teaching methods, evaluation criteria, and interaction mechanisms, such as project-based learning, enabling students to learn through problem-solving.

The collaboration framework can be structured at three levels:

Strategic Level: Define long-term objectives such as talent development and collaborative research goals, involving top management's strategic guidance.

Tactical Level: Design specific cooperative activities, including co-developing courses, providing internships, and organizing industry forums, driven by career guidance centers and corporate HR departments.

Operational Level: Establish detailed implementation plans, including project steps, timelines, resource allocation, and responsibilities, requiring close collaboration between execution teams to ensure effective implementation.

3.3 Roles and Responsibility Distribution

Clarifying roles and responsibilities is crucial for successful collaboration. Each party must understand its role to work synergistically towards project implementation.

Universities' Role and Responsibilities: As the education leader, universities are responsible for curriculum design, teaching, student management, and organizing career guidance activities. They must adjust coursework based on industry feedback to align with market needs and facilitate communication between students and companies.

Enterprises' Role and Responsibilities: Beyond resource provision, enterprises actively participate in education by offering internships, mentorship, and potentially teaching courses. They should provide updates on industry trends to help universities refine their programs and engage in project evaluations to offer constructive feedback.

Shared Responsibilities: Establishing a comprehensive evaluation mechanism is necessary to assess and adjust collaboration effectiveness. Both universities and enterprises must participate in the assessment process, using data analysis, surveys, and feedback to refine collaboration strategies.

4. IMPLEMENTATION PATHWAY OF UNIVERSITy-INDUSTRY CAREER GUIDANCE MODEL

4.1 Strategies for Corporate Participation in Career Guidance

Enterprises play a vital role in career guidance within collaborations, employing varied and innovative strategies tailored to their industry, resources, and talent requirements.

Offering Internship Opportunities: Internships allow students to experience a genuine work environment and enable companies to identify potential talent. These programs should be well-designed to offer diverse, challenging tasks that combine theory with practice.

Classroom Engagements: Companies can have professionals deliver industry lectures and technical training, exposing students to experts and updating them on current trends and career paths.

Career Planning Activities: Corporate career planners can provide personalized guidance, helping students understand the demands and trajectories of various careers, fostering alignment with company culture and values.

Mentorship Programs: Pairing students with seasoned employees for one-on-one mentorship offers practical advice and networking opportunities, significantly impacting students' career development.

4.2 Universities' Leadership Role in Career Guidance

Universities lead by integrating career guidance across educational programs. They must align curriculum design with market trends and enterprise feedback to maintain relevance.

Strengthening partnerships with enterprises to establish stable platforms for engagement,

involving them in curriculum development and academic activities through joint forums and workshops, ensures updated academic strategies.

Career guidance teachers play a crucial role in providing tailored counseling, helping students set realistic career paths and goals based on personal interests and market demand, while maintaining close industry ties.

Establishing a dedicated career center can organize career-related activities such as job fairs and industry competitions, facilitating students' understanding of workplace environments and requirements.

4.3 Building Interaction Mechanisms and Communication Platforms

Effective interaction mechanisms and communication platforms are vital for successful collaboration.

Regular Meetings: Scheduled discussions and joint meetings allow transparent sharing of experiences and addressing challenges collaboratively.

Technology Utilization: Online platforms enhance quick information sharing and engagement, providing access to industry updates, educational resources, and career guidance.

Feedback Systems: Implementing feedback mechanisms ensures timely problem resolution during collaborations via surveys and interviews, guiding project refinement for enhanced effectiveness.

An evaluation system helps measure collaboration outcomes, including student skill development, corporate satisfaction, and project efficacy, guiding continuous improvement and optimization of the collaboration model.

5. EFFECTIVENESS ANALYSIS OF UNIVERSITY-INDUSTRY COLLABORATIVE CAREER GUIDANCE MODEL

The success of the university-industry collaborative career guidance model is crucial for enhancing student employability and meeting corporate talent needs. Evaluating its effectiveness is vital for assessing the model and guiding future collaboration directions.

5.1 Evaluation Criteria for Model Implementation

A comprehensive and objective set of criteria is needed to assess the career guidance model's effectiveness, focusing on student employability, career development, and corporate satisfaction.

Employment Rate and Quality: The primary metric for assessing career guidance effectiveness is the student employment rate, particularly employment quality, including starting salaries, employer prestige, and job-role alignment, reflecting market competitiveness.

Job Adaptability and Career Progression: Students' adaptability and career advancement in the workplace are significant indicators, reflected in job stability, satisfaction, and promotion rates, as well as the ability to learn new skills and handle complex tasks quickly.

Student Satisfaction: Student satisfaction is a critical subjective measure, gathered through surveys and interviews to evaluate guidance content, methods, and outcomes, providing basis for improvements.

Corporate Feedback: As direct collaborators, corporate feedback is essential, including satisfaction with graduates, performance, and recognition of the collaboration, indicating success.

5.2 Measuring and Feedback on Implementation Outcomes

Assessing outcomes requires both quantitative and qualitative analyses for comprehensive and accurate evaluations.

Quantitative Analysis: Statistical data, such as employment rates, salary levels, and career trajectories, should be analyzed, using data from career centers and alumni networks to intuitively reflect strengths and deficiencies.

Qualitative Analysis: Collect detailed feedback from students, teachers, and companies through interviews and meetings, revealing underlying reasons behind data, such as challenges faced during internships and technical evaluations.

Feedback Mechanism: Establishing a feedback system, including regular reports, meetings, and improvement plans, helps monitor current cooperation, identify issues, and propose solutions promptly.

Focus should be on student performance during internships and corporate skill evaluations, analyzing feedback to identify shortcomings in career guidance, such as curriculum limitations and training gaps,

allowing for targeted adjustments.

5.3 Impact on Enhancing Student Employability

The collaboration model significantly boosts student employability.

Enhanced Practical Skills: Students apply acquired knowledge in real-world settings, improving practical and problem-solving abilities, thus increasing competitiveness. Internships provide authentic work experience, making students more attractive to employers.

Updated Industry Knowledge: Corporate participation exposes students to current industry trends and cutting-edge technologies, expanding their perspective and adaptability. Industries value not only existing skills but also the ability to learn new technologies.

Improved Career Awareness: Early career planning and understanding of industry trends and growth paths lead to clearer career direction and goals, aiding role identification and development targets in the workplace.

Increased Market Competitiveness: Students gain a comprehensive skill set, solid theoretical knowledge, practical experience, and professionalism. Empirical studies show an 11% increase in employment rates for students in collaborative guidance programs, underscoring its effectiveness.

6. CONCLUSION

The career guidance model from a university-industry collaboration perspective offers students a career path more aligned with market demands. By integrating corporate and educational resources, it addresses traditional educational shortcomings, enhancing practical skills and employability. Despite challenges in collaboration depth and coordination, this model provides valuable insights and new directions for vocational education. Future research should explore best practices across various institutions and companies to further optimize the guidance model.

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Analysis of Strengthening Government Non-Tax Revenue Management by Fiscal Departments under New Circumstances

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Abstract: Against the backdrop of rapid socioeconomic development and globalization, the significance of managing government non-tax revenue has become increasingly prominent. This study aims to explore how fiscal departments can effectively strengthen non-tax revenue management under new circumstances to enhance revenue quality, optimize resource allocation, and promote sustainable economic development. Adopting a combination of normative and systemic analysis methods, the research integrates relevant theories with international best practices in non-tax revenue management. It examines the current state, existing challenges, and optimization pathways in non-tax revenue management through theoretical analysis and policy comparisons. The study focuses on key areas such as classified management, digitalization, transparency enhancement, and regulatory improvements, systematically demonstrating the reform needs in institutional design and implementation. The findings indicate that under new circumstances, implementing precise classified management, advancing digital platforms, strengthening social oversight of non-tax revenue, and improving legal frameworks are critical measures for fiscal departments to optimize non-tax revenue management. This study provides theoretical foundations and policy recommendations for enhancing non-tax revenue management, contributing significantly to modernizing government governance and improving fiscal resource efficiency.

Keywords: Government Non-Tax Revenue; Fiscal Management; Digitalization; Transparency; Institutional Optimization

1. INTRODUCTION

1.1 Research Background and Significance

Amid global economic adjustments and domestic economic restructuring, the collection and allocation of fiscal resources face new challenges. As an essential component of fiscal revenue, government non-tax revenue serves as a crucial tool for mitigating tax revenue fluctuations, improving revenue quality, and optimizing public resource allocation [1]. With China's economic transition from rapid growth to high-quality development, alongside deeper government reform and market mechanisms, managing non-tax revenue has become increasingly complex. The COVID-19 pandemic has exacerbated economic pressures, increasing reliance on non-tax revenue while exposing issues such as insufficient transparency and institutional weaknesses. Strengthening scientific and refined management of non-tax revenue is not only a critical step toward modernizing China's fiscal system but also a key factor in enhancing national governance capacity.

1.2 Literature Review

In domestic research, scholars have explored the definition, institutional design, and role of non-tax revenue in optimizing fiscal structures. For instance, studies highlight issues like fragmented management and lack of transparency in budgetary control and suggest enhancing regulatory frameworks through legislation [2]. Other studies examine the relationship between non-tax revenue and macroeconomic policies, addressing its role in economic regulation.

Internationally, developed countries offer valuable insights into non-tax revenue management. For example, the United States establishes strict legal frameworks to regulate the sources and use of non-tax revenue, emphasizing transparency and public

participation [3]. EU countries integrate market mechanisms, employing specialized funds to ensure efficient utilization of non-tax revenue. In contrast, China's non-tax revenue management remains in an exploratory phase, requiring institutional and operational improvements by drawing on global best practices.

2. THEORETICAL FOUNDATIONS OF GOVERNMENT NON-TAX REVENUE

2.1 Concept and Definition of Government Non-Tax Revenue

Government non-tax revenue refers to fiscal income derived from non-tax activities as stipulated by laws and regulations, including administrative fees, fines, revenues from state-owned resources, and other non-tax categories. Unlike tax revenue, non-tax revenue is characterized by its diverse sources and flexibility, with a focus on targeted uses and resource compensation. It is not merely supplementary to tax revenue but a vital component of fiscal income, playing a key role in balancing fiscal budgets and mitigating tax revenue volatility.

2.2 Classification and Characteristics of Non-Tax Revenue

Non-tax revenue can be classified into the following categories:

Administrative Fees: Charges levied by government departments and public institutions for administrative and service activities.

Revenues from State-Owned Resources: Includes proceeds from land use rights transfers, concession fees, and other resource utilization incomes.

Fines and Forfeitures: Revenues from administrative penalties and confiscated assets.

Other Revenues: Includes miscellaneous sources such as public welfare lottery income [1].

Non-tax revenue is characterized by its legal basis, targeted use, and flexible management approach. However, it is prone to issues such as low transparency and decentralized management, necessitating standardization and precision in its administration.

2.3 Role of Non-Tax Revenue in the Fiscal System

Non-tax revenue holds a pivotal position in the fiscal system, accounting for approximately 20% of total fiscal revenue in China, with higher proportions in certain regions [3]. Its roles include:

Alleviating Fiscal Pressure: Supplementing fiscal resources amid slower economic growth and stagnant tax revenue.

Optimizing Resource Allocation: Enhancing resource utilization efficiency through market-based mechanisms.

Supporting Public Services: Funding critical sectors such as education, healthcare, and environmental protection through targeted allocations.

3. CHALLENGES IN MANAGING NON-TAX REVENUE UNDER NEW CIRCUMSTANCES

3.1 Economic Transformation and New Demands

Economic transformation poses new demands on non-tax revenue management. On one hand, slowing economic growth directly affects non-tax revenue. For example, land transfer fees, a significant source of non-tax revenue, are highly volatile, influenced by market demand and policy shifts. Data from 2022 shows a 22.7% year-on-year decline in national land transfer fees [3], creating fiscal pressure on local governments. On the other hand, the rise of digital and sharing economies calls for innovative management models, as traditional mechanisms are insufficient to address these emerging sectors.

3.2 Key Issues in Current Non-Tax Revenue Management

Several challenges persist in China's non-tax revenue management:

Institutional Weaknesses: The absence of a unified legal framework leads to inconsistent management. Lack of transparency in revenue sources and usage reduces efficiency and raises risks of corruption.

Fragmented Mechanisms: Departmentalized management results in dispersed revenue sources and weak budgetary control, with administrative fees still facing regulatory gaps.

Low Digitalization: Insufficient adoption of digital tools in collection, auditing, and oversight increases management costs and reduces efficiency.

3.3 Insights from International Practices

Best practices from developed countries provide valuable lessons for China. The

United States enforces clear legal provisions on non-tax revenue collection and usage, enhancing public oversight. Japan employs a "special account system" to ensure targeted use of non-tax revenues, improving resource efficiency. Additionally, the EU has made significant strides in digitalizing non-tax revenue management, offering guidance for China's digital transformation. These examples highlight the importance of legal frameworks, policy clarity, and technological innovation in modernizing non-tax revenue management.

4. OPTIMIZATION PATHWAYS FOR GOVERNMENT NON-TAX REVENUE MANAGEMENT

4.1 Scientific and Precise Classification Management

Given the diverse sources and functions of non-tax revenue, scientific classification is essential for improving management. Currently, some revenue is broadly categorized as "other income," lacking clear definitions and management standards, which undermines transparency and resource utilization efficiency. Classification should be refined based on legal basis, revenue source, and usage direction, with corresponding management mechanisms established. For example, administrative fees should balance service needs and costs, while state-owned asset revenues should focus on resource protection and long-term benefits. Key measures include refining fee directories, dynamically adjusting classification standards, and establishing interdepartmental coordination mechanisms to achieve precise revenue management.

For instance, administrative fees, which accounted for over 40% of non-tax revenue in 2021 with total revenue exceeding 800 billion yuan [1], should be carefully differentiated to identify essential fees, eliminating unnecessary charges to reduce administrative burdens on economic activities.

4.2 Digitalization and Information System Development

The management of non-tax revenue involves multiple departments and complex processes. Traditional methods suffer from inefficiencies in communication and data handling, affecting execution. Advancing digitalization can enhance collection efficiency, reduce costs, and minimize corruption risks. Measures include:

- Developing comprehensive non-tax revenue management systems to enable end-to-end tracking from revenue sources to fund utilization.
- Utilizing big data analytics to monitor revenue trends and provide a scientific basis for policy adjustments.
- Enhancing inter-system connectivity to improve data sharing and coordination.

For example, Zhejiang Province's "Integrated Non-Tax Revenue Management Platform" has significantly improved efficiency through real-time updates and monitoring. Such models should be promoted nationwide, with potential integration of blockchain technology to enhance data security and transparency.

4.3 Enhancing Transparency and Strengthening Social Oversight

Insufficient transparency in non-tax revenue—such as unclear sources and vague usage—has long been a public concern, potentially undermining government credibility. Fiscal departments should expand the breadth and depth of information disclosure, regularly publishing non-tax revenue standards, sources, and uses. Establishing public oversight platforms can provide convenient tools for inquiry and feedback, enabling active participation from citizens and media in supervision.

4.4 Improving Legal and Policy Frameworks

The legal framework for non-tax revenue management remains incomplete, with certain revenue items lacking clear legal bases, leading to regulation challenges. Enhancing the system requires efforts in both legislation and policy formulation.

- Legislation: Focus on standardizing revenue sources, collection standards, and usage, with clear accountability mechanisms for misuse.
- Policy: Develop targeted implementation guidelines and policies addressing key issues in non-tax revenue management.

For example, the United States mandates that fines and forfeitures must support public services, reducing arbitrary usage. Similarly, China could issue specific policies to regulate the use and allocation of significant non-tax revenue sources, such as land transfer fees, to

maximize benefits.

5. STRENGTHENING THE ROLE OF FISCAL DEPARTMENTS IN NON-TAX REVENUE MANAGEMENT

5.1 Standardizing Non-Tax Revenue Budget Management

Budgeting is central to non-tax revenue management. However, in practice, some local governments have failed to integrate non-tax revenue into their budgets, resulting in unscientific allocation. Fiscal departments should ensure full inclusion of non-tax revenue in the budgeting process, enabling unified allocation and rational utilization. Real-time monitoring mechanisms should also be established to ensure alignment between fund usage and budget objectives.

In 2022, the budget coverage rate for non-tax revenue exceeded 85% [3], indicating progress but leaving room for improvement. Enhancing budget standardization could further strengthen management efficiency.

5.2 Coordination in Execution and Oversight

Effective coordination between departments is key to improving management efficiency during execution. Fiscal departments should strengthen collaboration with tax, audit, and other related entities by sharing data and conducting joint enforcement. Simultaneously, oversight mechanisms must be bolstered to prevent fund misappropriation or waste.

For instance, a regular interdepartmental meeting mechanism could address management challenges and propose solutions. In the collection and allocation of state-owned resource revenues, collaboration between fiscal departments and the Ministry of Natural Resources is crucial to ensure efficient utilization and equitable distribution.

5.3 Enhancing Cross-Institutional Collaboration

Non-tax revenue management involves multiple government agencies and social stakeholders. Fiscal departments must play a central role in planning and coordination. Measures include:

- Establishing interdepartmental data-sharing platforms to improve information flow.
- Formalizing departmental responsibilities through cooperation agreements.
- Engaging industry experts and public stakeholders in evaluating and supervising major revenue projects to ensure scientific and fair decision-making.

6. CONCLUSION

This study highlights the critical role of non-tax revenue in fiscal systems and its impact on resource efficiency and public service quality. Amid economic transformation and modernized governance, non-tax revenue management faces challenges such as incomplete institutional frameworks, low digitalization, and insufficient social oversight. By promoting classification management, digital transformation, transparency, and legal improvements, fiscal departments can significantly enhance the scientific and standardized management of non-tax revenue. These efforts will contribute to the modernization of fiscal governance and the maximization of fiscal resource efficiency.

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Research on the Current Status and Influencing Factors of Elderly People's Sense of Meaning in Life—A Case Study of Zibo City

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Abstract: Conduct a survey on the current sense of meaning in life among 233 elderly residents in various communities in Zibo City, and analyze the factors that influence this sense. the results indicate that the sense of meaning in life among the elderly in Zibo City is at a relatively high level, with social support and interpersonal relationships being the primary influencing factors. Although the sense of meaning in life among the elderly in Zibo City is at a relatively high level, it is still necessary to consider the factors that affect this sense and implement multiple measures to continuously enhance it.

Keywords: Elderly people; Meaning in life; Influence factor

1. INTRODUCTION

The sense of meaning in life refers to an individual's perception and pursuit of their own purpose and value, and is the most important component of their spiritual level. the enhancement of the sense of meaning in life can provide spiritual satisfaction, enhance happiness, and maintain a good mental health state [1]. The results of the seventh national census in China show that about a quarter of the population in Zibo City are elderly people aged 60 and above, and about one sixth of the population are elderly people aged 65 and above. the aging level is higher than the national average, and the aging situation is severe. This study aims to explore the current status of the sense of meaning in life among elderly people in Zibo City and its influencing factors, providing a theoretical basis for formulating measures to enhance the well-being of elderly people in the community.

2. RESEARCH OBJECTS AND METHODS

2.1 Research object

From November 2023 to January 2024, a convenient sampling method was adopted to select 233 elderly residents from various communities in Zibo City as the research subjects. Inclusion criteria: ① Age ⩾ 60 years old; ② No mental abnormalities, capable of normal communication; ③ Proficient in using mobile phones to fill out questionnaires or willing to have the survey team assist in completing the questionnaire; ④ Voluntarily participate in this survey. Exclusion criteria: Elderly individuals with mental disorders, significant physical illnesses, or cognitive impairments.

2.2 Research tool

2.2.1 General Information Survey Questionnaire Designed by the researcher, the questionnaire items include: gender, age, occupation type, family residence, education level, marital status, family income level, physical health status, social support, and interpersonal relationships.

2.2.2 The Meaning of Life Scale was utilized in this study to assess the sense of meaning in life among elderly individuals. the MLQ scale, developed by Steger et al. in 2006, comprises 10 items [2]. It primarily aims to measure individuals' search for and experience of meaning in life. Specifically, questions 1, 4, 5, 6, and 9 focus on assessing an individual's search for meaning in life, whereas questions 2, 3, 7, 8, and 10 focus on measuring an individual's experience of meaning in life. the scale employs a Likert 7-point scoring system, with each question rated between "1=completely disagree" and "7=completely

agree". Notably, question 9 is a reverse scoring question. A higher score indicates a stronger sense of meaning in life among elderly individuals. In this study, the internal consistency coefficient of the scale was found to be 0.899.

3. RESULT

3.1 General Information of the Research Object

In this study, there were 93 males, accounting for 39.91%, and 140 females, accounting for 60.09%. the group of 60-69 years old has the largest number of elderly people, with 143 people. 77.25% of the elderly people live in urban areas, 67.81% of the elderly people have a college degree or above, 70.39% of the elderly people are working in state organs and institutions, 222 married elderly people, 65.24% of the elderly people have a monthly household income of more than 6, 000 yuan, 46.78% of the elderly people have good health status, 55.36% of the elderly people have good social support, and 56.65% of the elderly people have good interpersonal relationships.

3.2 The meaning of life for the elderly basic situation of sense

The scores of 233 elderly people on the sense of meaning in life were (52.59±11.09) points, the scores of seeking meaning in life were (26.35±5.59) points, and the scores of experiencing meaning in life were (26.24±6.69) points. See Table 1 for details.

Table 1 Basic Situation of Elderly People's Sense of Meaning in Life (n=233)

	Min	Max	M	SD
seeking meaning in life	6	35	26.35	5.59
experiencing meaning in life	5	35	26.24	6.69
meaning in life	11	70	52.59	11.09

3.3 Comparison of subjective well-being scores among elderly people with different characteristics

Using the general socio-demographic characteristics of elderly people in Zibo City as independent variables and their sense of meaning in life as the dependent variable, a one-way ANOVA or independent sample t-test was conducted. the research results indicated that there were differences in the impact of social support and interpersonal relationships on the sense of meaning in life among elderly people, and these differences were statistically significant ($P<0.05$). In terms of other factors, the differences were not statistically significant.

2.4 Analysis of factors influencing the sense of meaning in life of elderly people

Using the sense of meaning in life of elderly people as the dependent variable and statistically significant factors in univariate analysis (social support and interpersonal relationships) as independent variables, multiple linear regression analysis was conducted. the results showed that social support and interpersonal relationships entered the regression equation ($F=29.896$, $P<0.001$), explaining 20.6% of the total variation.

4. DISSCUSSION

The research results show that the sense of meaning in life of elderly people in communities in Zibo City scored (52.59 ± 11.09) points, the search for meaning in life scored (26.35 ± 5.59) points, and the experience of meaning in life scored (26.24 ± 6.69) points, indicating that the sense of meaning in life among elderly people is at a relatively high level. Zibo City is a city that focuses on people's livelihoods and elderly care services. It has been actively promoting the integration of family and community elderly care. Families are the main source of emotional support for the elderly, while communities enhance their social connections and sense of belonging by providing various elderly care services, activity venues, and social opportunities. This dual support system of family and community helps to enhance the sense of meaning in the lives of the elderly. In recent years, the Zibo Municipal Government has provided more convenient, efficient, and high-quality elderly care services to the elderly through the formulation and implementation of a series of elderly care policies, the planning of elderly care service systems, and the extension of elderly care service resources. the implementation of these policies not only improves the quality of life

of the elderly, but also makes them feel cared for and respected by society, thereby enhancing their sense of meaning in life.

The results of this study indicate that older adults with good social support and interpersonal relationships score higher in terms of their sense of meaning in life. Therefore, it is important to pay attention to the social support needs of older adults and help them establish harmonious interpersonal relationships. Encourage older adults to participate in social activities, and family, friends, and neighbors can provide more encouragement, care, and assistance to help them gain a greater sense of meaning in life.

5. CONCLUSION

This study investigated the factors that affect the sense of meaning in life among elderly people in Zibo City and their current situation. the results showed that the score of the sense of meaning in life among elderly people in Zibo City is at a high level, and social support and interpersonal relationships can have an impact on their sense of meaning in life. Governments at all levels and their relevant departments should formulate policies, take multiple measures, and continuously enhance the sense of meaning in the lives of the elderly.

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Research on the Analysis of Employment Dilemma and Optimization Path of Higher Vocational Students in the Age of Digital Economy

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Abstract: With the development of Internet technology and the wide application of digital technology, digital literacy has become an important factor affecting the quality of employment. the contradiction between the large employment gap in digital industry and the low employment willingness of students, the gradual increase in the quality requirements of digital skills and the insufficiency of students' ability to accept digitalisation, and the failure of the talent training system of vocational education to match with the digital economy have become more and more prominent, which have become the realistic problems affecting the high quality employment of higher vocational graduates. Therefore, relying on the social background of the development of digital economy, based on the new employment situation, we analyse the trend of high-quality employment of higher vocational graduates, and put forward corresponding optimization paths and solutions from the levels of government, enterprises, colleges and universities and students, in order to provide rationalized suggestions for the exploration of employment practice of higher vocational students and provide assistance for the cultivation of vocational education talents.
Keywords: Digital Economy; Higher Vocational Students; Employment Dilemma

1. INTRODUCTORY

Since the reform and opening up, China's economic growth has been rapid, productivity levels have improved and production relationships have been optimised, laying the foundation for the rapid development of the digital economy. At present, China's information technology and related industries are at a critical stage of development, and the scale of the digital economy has reached 56.1 trillion yuan, accounting for more than 44% of GDP [1], and the digital economy has become an important driving force for China's economic growth. the rapid development of digital technology has not only brought new impetus to economic growth, such as artificial intelligence, big data, etc., but also created many new jobs and new economic forms, such as the sharing economy, the e-commerce economy, the platform economy and the webcasting economy. the development of the digital economy has not only changed the structure of the economy, but also affected the structure of the labour market. However, in line with the development of the scale of the digital economy, the number of college graduates has increased year on year [2]. In this context, the employment situation of graduates has also undergone many changes.

2. DIFFICULTIES FACED BY HIGHER VOCATIONAL STUDENTS IN EMPLOYMENT

2.1 The imbalance between supply and demand between the large labour shortage in industries related to the digital economy and the low employment willingness of higher vocational graduates

First of all, since the new era, China's digital economy has been developing rapidly, and unlike the traditional manufacturing industry, the digital economy is a new economic form based on network technology and digital data elements [3], and the digitalisation of industries integrated with the real economy has become a major source of new

employment opportunities, creating new jobs and more diverse types of occupations. the data disclosed in the White Paper on the Development and Employment of China's Digital Economy (2019) show that: 191 million jobs were created in China's digital economy in 2018, accounting for 24.6% of the country's total employment in that year, with a year-on-year increase of 11.5%[4]. Secondly, the diffusion of technology has a compensatory mechanism, and the development of the digital economy has led to the phenomenon of 'machine substitution' while also bringing other new job demands. Some scholars have found that, along with the digital transformation of banks and other financial enterprises, the demand for traditional teller and management positions has dropped sharply, but also brought about an increase in computer programming and maintenance positions [5].

However, in contradiction with the urgent employment demand, in recent years, the employment tendency of higher vocational graduates is generally weakened, some students do not study seriously in school, internship paddling, lack of initiative in employment, negative attitude in the face of fierce competition, recruitment of several times to face the wall will be lack of confidence, resistance to participate in the subsequent recruitment activities; or blindly follow the crowd, in the absence of a clear plan for their own life course, they choose to participate in the Or they blindly follow the crowd and choose to participate in examinations such as 'self-study for bachelor's degree' and 'post-secondary education' without a clear plan for their own life paths, thus prolonging their time on campus, and in the process of preparing for the examinations, they are often ill-prepared for a variety of reasons, and ultimately fail to advance to higher education as they would like to do.

2.2 The new demand for industrial skills quality requirements gradually high and the lack of competence of higher vocational graduates facing the reality of skills dilemma between

With the continuous development of the digital economy, it makes up for the dilemma of industrial development under the traditional mode of production, provides a new impetus for economic growth, and a new type of production relationship gradually arises, and some platforms and e-commerce enterprises show the ability to lead the development and create employment, which generates a large number of jobs [6]. the digital economy has led to changes in the employment structure of the three major industries while continuously improving social productivity [7, 8]. the proportion of employment in the tertiary industry continues to rise, the primary industry is developing in the direction of scale and industrialisation, while the secondary industry (traditional manufacturing) not only requires more and more skills from the workforce, but also tends to adopt AI technology to replace human capital, which will continue to reduce the demand for personnel and lead to the rising risk of the replacement of traditional jobs.

However, as the type of education most closely related to regional industrial development, current vocational education graduates are not fully adapted to the trend of social development. On the one hand, for vocational colleges and universities, the current talent training mode, discipline construction and professional settings are not in combination with the market demand, and the knowledge taught in schools differs greatly from the needs of enterprises [9], which leads to the relative lack of quality of higher vocational students, it is difficult to be competent to meet the needs of positions created by the digital economy.

2.3 Higher vocational education training mode does not match well with the realistic requirements of the digital economy

With the transformation and upgrading of China's industries, clusters of advanced manufacturing industries have emerged in various regions, and the digital economy has unleashed its creative effect, creating a large number of high-end digitally skilled jobs. However, the new jobs created by the new industry are often structurally at odds with the labour supply of the past. For education management departments and higher vocational colleges and universities, their training models are formed according to the industrial demand that existed in the past, and there is a lag in the adjustment of policies, so it is difficult to deeply understand and

effectively grasp the trend of the development of the digital economy in a short period of time, and they cannot closely follow the development of the industry to meet the employment needs of industrial enterprises, which aggravates the structural imbalance of labour supply and demand.

From the students' point of view, compared with students in undergraduate colleges and universities, students in higher vocational colleges and universities have a relative lack of innovative concepts and innovation awareness, and most of the students' innovation ability needs to be improved. As the pace of digital technology updates accelerates day by day, professional skills are constantly updated, and lifelong learning and efficient learning have become the basic requirements for updating knowledge and skills.

3. OPTIMISATION MEASURES

In this paper, we will analyse specifically from four perspectives: government, universities, enterprises and students.

From the government's perspective, on the one hand, the government should improve the employment ecosystem and sound regulations and safeguards. the digital economy is a new industry, and the current relevant laws and policies are not perfect enough, so it should accelerate the construction of the policy system according to the economic situation and social development trend, focus on guaranteeing the sustainable development of the digital economy, and better stimulate the strengths and advantages of the digital economy to promote employment. On the other hand, legislation should be strengthened to protect the rights and interests of digital economy practitioners, and policies should be made to cover for the practitioners, so as to dispel the concerns of labourers about their employment in the digital industry, thus further improving the attractiveness of the digital industry to labourers.

From the perspective of colleges and universities, on the one hand, colleges and universities should pay more attention to employment training, follow the current economic development trend, actively study the policy reports on digital industry, and reform and innovate the talent training programmes and curriculum standards of related majors in an all-around way by combining the analysis of the reports. Vocational colleges should give full play to the advantages of higher vocational colleges and universities, and build a scientific and efficient collaborative parenting work pattern by linking all departments, enterprises, outstanding alumni and students' parents in the school. On the other hand, the school should act as a 'thought guide' for the students, helping them to set up a correct view of career choice and maintain a good mindset in order to find their ideal jobs.

From the perspective of the industrial sector, the industrial sector should take the initiative to seek co-operation with universities. This cooperation can be elaborated from two perspectives. On the one hand, industrial enterprises should carry out in-depth co-operation with higher education institutions in talent training, technology promotion and social services, collaborate in educating people and jointly cultivate high-quality talents for the society. On the other hand, digital enterprises can cooperate with inviting college teachers to practice and exercise in enterprises, develop school-enterprise co-construction courses with teachers, write teaching materials, design projects that meet both students and practical work, focus on the exercise of students, and promote the simultaneous enhancement of digital theoretical learning and skills exercise, so as to make students better adapt to the future employment environment.

From the students' point of view. In order to take the lead in the future fiercely competitive employment environment, firstly, higher vocational students should take the initiative to cultivate their basic working ability during the school period; secondly, students should make clear their employment direction during the school period, and carry out learning in a targeted manner to enhance their professionalism; lastly, they should maintain an optimistic mindset in the process of job hunting.

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A study on the Effects of High-Intensity Interval Training on Lower Limb Muscle Endurance and Muscle Strength of Male College Students

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Abstract: High Intensity Interval Training (HIIT) has been widely used in professional training and public fitness in recent years. As a popular exercise training method, HIIT is widely used in competitive sports and the general public due to its "short-term and efficient" characteristics.

Keywords: high-intensity interval exercise; HIIT; Muscle strength; Muscle endurance; Body composition; skeletal muscle

1. OVERVIEW OF HIGH-INTENSITY INTERVAL TRAINING

High Intensity Interval Training (HIIT) first appeared more than 100 years ago. In the 1950s, coaches and physiologists Gerschle and Reindell from the University of Freiburg in Germany began conducting extensive human studies on high-intensity interval training and applied it to sports training practice to observe its effects. In 1959, they first conducted empirical research and reported it in foreign academic journals. This training mode was initially used in the physical fitness and specialized training process of track and field athletes. Due to its obvious training effect and high efficiency, it has gradually been promoted and applied in the training of various track and field events. After a long period of development and promotion, it has been widely used in many other sports projects.

2. THE IMPACT OF HIGH-INTENSITY INTERVAL TRAINING ON BODY SHAPE

The Body Mass Index (BMI) is a commonly used indicator internationally to reflect body shape and evaluate obesity. the WHO normal standard for BMI level is 18.5-24.9, while the normal standard in China is 18.5-23.9. BMI index is also positively correlated with the incidence rate of various chronic diseases (such as diabetes and hypertension), suggesting that maintaining a normal BMI index level is an important guarantee for maintaining health. At the same time, there is a significant correlation between BMI index levels and mental health levels. Leibo [42] conducted a correlation analysis between BMI index levels and psychological self-esteem levels among college students in Lanzhou City, and found that college students with normal BMI levels also have relatively higher levels of psychological self-esteem, indicating that the more normal BMI levels are, the higher the psychological self-esteem level of college students; For overweight, obese, and underweight individuals, improving their BMI levels can regulate their psychological self-esteem levels. Therefore, in the process of implementing university physical education courses, actively maintaining the normal level of students' BMI and strengthening health education play an important role in promoting the physical and mental health of college students.

Research shows that for adolescents during their growth and development period, 8 weeks of high-intensity interval training can significantly reduce the weight, body fat, and BMI of both males and females; At the same time, the impact of short-term high-intensity interval training on body shape also has gender differences, manifested in the overall intervention effect on male body shape being better than that on female body shape. Research on college students also shows that

10 weeks of high-intensity interval training can significantly reduce the weight and BMI of female college students; A longer 12 week high-intensity interval training intervention can significantly reduce the weight and BMI of male and female college students. However, in the actual weight loss training process, combining multiple forms of exercise can achieve more significant practical effects in a short period of time. A study on the Shanghai Peak Weight Loss Summer Camp showed that a comprehensive training method combining aerobic endurance training and high-intensity interval training can significantly improve the body shape and body fat of adolescents with simple obesity with only 4 weeks of exercise intervention.

3. THE IMPACT OF HIGH-INTENSITY INTERVAL TRAINING ON MUSCLE STRENGTH

Muscle strength, also known as absolute muscle strength or maximum muscle strength, specifically refers to the maximum contraction force that a muscle can produce when contracting. In sports physiology, muscle contraction can be further divided into dynamic contraction and static contraction based on the type of muscle contraction. Among them, dynamic contraction can be further divided into centrifugal contraction, centripetal contraction, and super isometric contraction based on the specific form of muscle contraction. the rapid contraction ability exhibited by muscles during ultra long contractions also becomes muscle power, which is a manifestation of explosive force.

Liu Fuwei's study on the effects of high-intensity interval aerobic training on lower limb muscle fitness and balance showed that the high-intensity interval training group had a significant increase in relative work and power of the hip joint flexor muscle before and after training, while the power, relative work, and peak torque of the lower limb hip joint extensor muscle also increased significantly; In addition, the muscles around the lower limb knee joint show a significant increase in muscle strength, relative peak torque, power, and work of the knee flexion muscle group. At the same time, the muscle strength ratio of the flexor and extensor muscles at the knee joint also increases significantly. the 10 week high-intensity interval training has a significant improvement effect on the muscle strength, explosive power, and muscle endurance of the lower limb hip and knee joints, which is manifested in the muscles around the hip and knee joints. Li Zhaoquan conducted an 8-week high-intensity interval training intervention on a women's university in a certain university. After the training, various physical qualities, including 50 meters and standing long jump scores, showed significant improvement to a certain extent. This suggests that for people who are limited by concentrated exercise time, high-intensity interval training can be a good choice to achieve efficient exercise and improvement in physical fitness and health.

4. THE EFFECT OF HIGH-INTENSITY INTERVAL TRAINING ON MUSCLE ENDURANCE

Muscle endurance is an important component of healthy physical fitness, specifically referring to the ability of skeletal muscles to continue working and fighting fatigue during contraction and relaxation. In sports research, it is divided into static muscle endurance, dynamic muscle endurance, and isokinetic muscle endurance. Static muscle endurance is often evaluated by the duration of static load contraction, such as squatting against a wall, plank support, and arm suspension; Dynamic muscle endurance is often evaluated by the number of dynamic contractions, such as one minute sit ups, one minute push ups, one minute pull ups, one minute continuous squats, etc; Isokinetic muscle endurance requires specific isokinetic muscle strength testing instruments for measurement, commonly used to evaluate dynamic isokinetic contraction power, dynamic isokinetic peak torque reduction rate, etc.

5. THE IMPACT OF HIGH-INTENSITY INTERVAL TRAINING ON BODY COMPOSITION

Body composition refers to the amount of various components in the body, reflecting the proportional characteristics of the internal composition of the human body. the commonly used indicators for evaluating human body composition in sports research include skeletal muscle content, fat content,

bone content, water and mineral content, etc. These indicators are of great significance for evaluating the basic state of sports and the effectiveness of sports training, so traditional body composition testing is mainly used for monitoring athlete function. With the continuous development of mass sports and fitness, body composition is gradually being accepted and recognized by mass sports and fitness. Overweight and obese individuals have always been a research hotspot on the effects of exercise on body composition, and in recent years, with the promotion and application of high-intensity interval training in mass fitness, research reports on the effects of high-intensity interval training on body composition have gradually increased.

In the fitness of athletes and non obese individuals, paying attention to the skeletal muscle content in body composition is often more practical and valuable than fat content. In various competitive events, especially strength events, using traditional moderate intensity continuous training to develop aerobic endurance will reduce training benefits, while high-intensity interval training is a more compatible training form with the target event, because high-intensity interval training can not only improve cardiovascular endurance, but also maintain and develop the skeletal muscle mass, skeletal muscle strength, and skeletal muscle power of strength event athletes. the increase in the proportion of type IIa fibers in skeletal muscle may be an important factor leading to this result [58]. However, there are rare reports on the analysis of skeletal muscle content and characteristics of the general fitness population through high-intensity interval training. In this study, both 8-week regular exercise and high-intensity interval exercise significantly increased the overall skeletal muscle mass, right lower limb skeletal muscle mass, and left lower limb skeletal muscle mass of the subjects. Although different forms of exercise intervention did not show significant statistical differences in skeletal muscle content, the study found that compared to low-intensity continuous training, high-intensity interval training can better improve the activity of glucose oxidase and glycolytic enzymes in the general population, make more use of lipid energy supply, and reduce the utilization of liver glycogen, which helps to improve exercise ability and prolong the onset of exercise-induced fatigue.

The physiological contradiction that high-intensity interval training and regular exercise have a significant impact on exercise performance but no significant effect on skeletal muscle content can be found in animal experiments. In depth research through animal experiments shows that one-time acute high-intensity interval training can simultaneously recruit fast and slow muscle fibers and activate multiple signal transduction pathways, while inducing significant increases in protein expression levels such as p-AMPK/AMPK, CaN, and PGC-1 α; Regular long-term high-intensity interval training can upregulate the proportion of type I and IIa muscle fibers in fast muscle, increase muscle glycogen content and aerobic metabolic enzyme activity in skeletal muscle, as well as anaerobic metabolic enzyme activity in fast muscle, ultimately achieving the effect of improving skeletal muscle fitness.

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Analysis of Accurate Financial Aid For Poor Students In Jiangsu Maritime Higher Vocational Colleges

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Abstract: The characteristics of Jiangsu maritime higher vocational colleges are school-enterprise cooperation in running schools. A large proportion of the students come from difficult industries every year. Students work in the hard industry, learn the knowledge and skills of the hard industry, work in the hard industry, receive the ideological education of the hard industry, is an important link of their own growth and success. In order to make the difficult students in difficult industries better receive education and grow up, Jiangsu navigation higher vocational colleges have taken various measures to help them solve their difficulties in study and life. When Jiangsu navigation vocational colleges provide precise funding to students, they combine the learning characteristics and working characteristics of navigation professional students, and help the students to grow up and become talents from the aspects of accurate identification, precise funding and precise education.

Keywords: Navigation Major, Difficult Students, Financial Aid Analysis

1. ACCURATE IDENTIFICATION, GRASP THE REAL SITUATION OF STUDENTS

In the identification of students, we should separate the students from other students, and not confuse them to avoid causing psychological pressure to the students in difficult industries. In the identification of family economic difficulties, we should achieve "four precision": first, accurate identification. According to the jobs and characteristics of students in difficult industries, make full use of information means to accurately identify students from poor families; second, accurate identification. Accurately identify the poor students in difficult industries, and minimize the expenses on the study and living of students from poor families with guaranteed authenticity and accuracy; third, precise funding. Students in the national grants, scholarship and other categories; fourth, precise education. Students in difficult industries may have some difficulties in learning, so we should strengthen targeted educational guidance and funding, so that they can grow up better.

2. PRECISE FUNDING, TO SOLVE THE URGENT NEED OF STUDENTS

According to the relevant regulations of the state and the characteristics of the school, Jiangsu maritime vocational colleges provide financial aid to poor students in difficult industries in various ways. For students from poor families and difficulties in study, the school will take targeted measures according to their actual situation to help them solve their practical difficulties in study and life, so that they can feel at ease in study and grow up healthily. for example:

First, according to the relevant regulations and policies of the school, the tuition problem will be solved through the "green channel" and the postponement of tuition fees.

The second is to set up work-study positions in the campus to help poor students to solve the difficulties in life.

Third, actively organize and carry out social practice, volunteer service, innovation and entrepreneurship activities, to build a platform for students in dire need to grow up in difficult industries.

Fourth, students from poor families should be given priority in the national grants, national encouragement scholarship, school scholarship and work-study positions provided by the school. At the same time, students from poor families will be given

appropriate preference in the evaluation of national grants and national encouragement scholarships.

3. PRECISE EDUCATION, TO PROMOTE THE ALL-ROUND DEVELOPMENT OF STUDENTS

For students in the hard industry, Jiangsu navigation vocational colleges implement precise education to help them establish the correct world outlook, outlook on life and values, so that they fully realize the importance of working in the hard industry, so that students can better adapt to the working environment of the hard industry. At the same time, for students in difficult industries, Jiangsu maritime vocational colleges should guide them to establish a correct view of success and employment, help them realize the limitations of difficult industries, so that they can face up to the shortcomings of their own environment, and help them overcome the difficulties encountered in the process of employment and job selection. Schools can hold employment entrepreneurship lectures, career planning, let the student understand the hard industry working environment on the adverse effects of personal growth and development, and to teach them how to overcome these adverse effects, achieve personal development goals, enable it to become to meet the needs of society.

4. PRECISE MANAGEMENT, IMPROVE THE STUDENT FINANCIAL AID SYSTEM

We will establish a sound student financial assistance system to achieve comprehensive coverage and targeted financial assistance. According to the characteristics of the poor students in maritime higher vocational colleges, the student financial aid system should be further improved, and the funding objects, identification methods and working procedures should be defined, so as to form a comprehensive and multi-level student financial aid system. On the basis of national scholarships, national encouragement scholarships and school grants, living allowances for students from poor families will be given to ensure their study and living expenses at school. At the same time, the university has also established a "green channel" system, providing tuition fees and subsidies to students from special difficulties. In addition, the school has also set up various forms of funding projects, such as "scholarships", "work-study" and "social aid", to provide various forms of help to students from poor families. In addition, the school also relieves the pressure on students from poor families by setting up grants and credit loans from local students.

5. PRECISE ASSISTANCE TO PROMOTE THE HEALTHY GROWTH OF STUDENTS

When the school provides precise financial aid to students in difficult industries, it also pays attention to strengthening the care for students in difficult industries from the aspects of thought, life and study. the school pays attention to educating and guiding students with Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, nourishing students with the excellent traditional culture of the Chinese nation, and guiding students with the core socialist values, so that students can strengthen their ideals and beliefs, and enhance their love for the Party and patriotism. the school also attaches importance to the mental health education for students in difficult industries, and pays attention to their psychological counseling. Every year, the school organizes the themed activities of "funding education" and "inspirational education". the school also organizes lectures on mental health counseling for students in hard industries and difficulties, and invites professionals to give lectures.

The school also pays attention to career planning and employment guidance for students in difficulties and industries. the school focuses on providing them with employment information services, guiding them to understand the market demand and determine the employment direction. the school also pays attention to the entrepreneurship education for students in difficult industries, guiding them to use their professional knowledge and skills to find jobs and start businesses in difficult industries, and providing them with necessary policy and financial support.

6. CONCLUSION

Students work in hard industries and learn the knowledge and skills of hard industries, which is an important link of their own growth and success. According to the actual situation of the difficult industries, Jiangsu nautical higher vocational colleges constantly explore and provide precise financial aid to students to help them successfully complete their studies and solve their difficulties in life. However, there are still some problems in the actual work, such as some students have "wait, rely, want" thought, some students family economic difficulties, but can not face correctly; students do not understand the financial aid policy, there are certain misunderstanding and deviation. Therefore, in the future work, we should combine the actual situation to further improve the precise identification, precise funding, precise education work system. Strengthen the ideological and political education for students in difficult industries from many angles, help them to establish a correct outlook on life, values and world outlook; strengthen the education for students career planning, professional ethics and gratitude; help students to solve practical difficulties and make them feel the care of the Party, the government and all sectors of society. Let them more love their major, actively into the hard industry.

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Progress, Problems and Countermeasures of the Personal Bankruptcy System

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Abstract: With the continuous development of China's economy, the real demand for personal bankruptcy system is increasing. the establishment of the personal bankruptcy system is of great significance in balancing the creditor-debt relationship and perfecting China's market exit system. the system of personal bankruptcy should be built on the basis of the current enterprise bankruptcy system, and the overall scope of application of the bankruptcy system should be expanded through the opportunity of the revision of the enterprise bankruptcy law. Specifically, the personal bankruptcy system should be designed in conjunction with the system of disclosing personal bankruptcy information in accordance with the law and the digitalized personal bankruptcy credit evaluation mechanism. At the same time, from the perspective of practical needs, the relevant system of out-of-court procedures for personal bankruptcy should be established, so as to realize the benign interaction between the personal bankruptcy system and the supporting mechanisms, and give full play to the social value of the personal bankruptcy system.

Keywords: Personal insolvency; legislative models; institutional structure

1. INTRODUCTION

In order to standardize personal bankruptcy procedures, rationally adjust the rights and obligations of debtors, creditors and other interested parties, so that the economy of honest debtors can be revitalized, and to improve the socialist market economic system, in August 2020 Shenzhen formulated the Regulations on Personal Bankruptcy of the Shenzhen Special Economic Zone in the light of its actual situation. the pilot of Shenzhen's personal bankruptcy system has accumulated relevant experience for the full implementation of the personal bankruptcy system, and in this way started to further explore the personal bankruptcy system suitable for the socialist market economy with Chinese characteristics. the construction of the personal bankruptcy system is an important measure to protect the rights and interests of “honest but unfortunate” debtors, while also safeguarding the realization of creditors' claims.

2. THE NECESSITY FOR ESTABLISHING A PERSONAL BANKRUPTCY SYSTEM

The construction of the personal bankruptcy system plays an irreplaceable and important role in perfecting the socialist market economic system, promoting economic development and facilitating the optimal allocation of resources. 2024 The Decision of the Central Committee of the (C_P) of China on Further Deepening Reforms in a Comprehensive Way and Promoting Modernization of the Chinese Style (hereinafter referred to as the “Decision”) points out that it is necessary to “optimize the policy environment for entrepreneurship and employment promotion and support and regulate the development of new forms of employment”. standardize the development of new employment forms. ” the construction of a personal bankruptcy system can incentivize individuals in debt distress to return to society and create wealth, objectively reduce the losses of creditors and other stakeholders, and maintain social stability. the main purpose of the personal bankruptcy system is to provide creditors and debtors with a new method of resolving debt dilemmas, the essence of which lies in balancing the rights and interests of both parties through the resolution of debt problems, thereby preventing the creation of serious social problems. At the same time, the establishment of a personal bankruptcy system will provide debtors with insolvency

protection and prohibit creditors from pursuing destructive individual recoveries against debtors, which protects the interests of creditors to a certain extent. [1]

In current judicial practice, there is a situation in which all the assets of the debtor are insufficient to satisfy the debts owed, thus accumulating many cases that are difficult to execute, and the current blacklisting mechanism for executors is unable to solve this problem. the establishment of the personal bankruptcy system can, to a certain extent, solve the cases of difficult-to-execute judgments and ease the tension between debtors and creditors. the establishment of personal bankruptcy law can balance the interests between debtors and creditors as a value pursuit, and stimulate the vitality of market economic development by coordinating the relationship between creditors and debtors. the establishment of the personal bankruptcy system is an important way of allocating factors of production, and to a certain extent can further release the vitality of individual innovation and creativity, providing important support for the realization of the efficient development of economic activities, thus better assisting the country in developing the new quality of productive forces.

3. LEGISLATIVE STYLE OF PERSONAL BANKRUPTCY

The Decision states that it is necessary to improve the mechanism for enterprise bankruptcy, explore the establishment of a personal bankruptcy system, push forward the reform of supporting enterprise write-offs, and improve the system for exiting enterprises. the premise of exploring the establishment of a personal bankruptcy system is how to deal with the relationship between the personal bankruptcy system and the enterprise bankruptcy system. Especially at the present time is in the “Enterprise Bankruptcy Law” revision of the opportunity. the demand for personal bankruptcy legislation in China's economic development is getting stronger and stronger, the pilot work of personal bankruptcy is dependent on the expected prospects of personal bankruptcy legislation, if the legislative work of personal bankruptcy law cannot be started in time, the difficulties encountered in the pilot work may not be solved smoothly, the work of personal bankruptcy legislation is closely related to the development of key areas and emerging areas in China, and the relationship with China's innovation policy, credit system and so on. the development of these fields and the implementation of the system need better protection by the personal bankruptcy system. Therefore, personal bankruptcy should be incorporated into the scope of legal adjustment in a timely manner, so as to improve and perfect the legal system of China's market economy.

With regard to the choice of personal insolvency legislation, there are considerations of consolidated legislation and discrete legislation. Considering the urgent need for personal bankruptcy system in judicial practice, many scholars believe that China should adopt the combined legislation. At present, the revision of China's Enterprise Bankruptcy Law has been included in the legislative planning of the Standing Committee of the Fourteenth National People's Congress, and the revision of the Enterprise Bankruptcy Law has been initiated. Taking the opportunity of this revision of the Enterprise Bankruptcy Law, expanding the scope of application of the main body of the Bankruptcy Law, and incorporating the personal bankruptcy system into the revision of the Bankruptcy Law can accelerate the progress of the legislation of the personal bankruptcy system, so as to make it able to serve China's economy and society as soon as possible in order to adapt to the urgent need of the society for the adjustment of personal bankruptcy legal relations. If the personal insolvency law is legislated separately, there may be various procedural obstacles, which is not conducive to the improvement of legislative efficiency. [2]The consolidated legislation is conducive to the efficient completion of the personal bankruptcy law, the revision of which could have included the expansion of the scope of application of its subject matter. Incorporating the personal bankruptcy system into the procedure for amending the enterprise bankruptcy law can reduce the repetitive work of legislating on

enterprise bankruptcy and personal bankruptcy separately, thus improving legislative efficiency and reducing legislative costs.

4. CONSTRUCTION OF A SUPPORTING SYSTEM FOR PERSONAL BANKRUPTCY

In view of the problems that may be caused by the personal bankruptcy system, a scientific and rigorous system design is needed to solve the potential problems, so as to realize the benign interaction between the personal bankruptcy system and the supporting mechanisms, and to promote the establishment and perfection of the personal bankruptcy system, so as to better safeguard the sustained and healthy development of China's market economy.

4.1 Construction of a system for disclosure of personal bankruptcy information in accordance with the law

Personal bankruptcy cases involve the interests of creditors, debtors and other interested parties, and the disclosure of information relating to personal bankruptcy in accordance with the law is, on the one hand, conducive to the strengthening of the supervision of debtors, and is necessary to safeguard the right to know of all parties. on the other hand, it can prevent and combat the debtor's behavior of using personal bankruptcy procedures to evade debts, which is the proper meaning of building a social credit system. Personal bankruptcy information involves personal privacy and is sensitive. Therefore, it is necessary to clearly define the scope of disclosure of personal bankruptcy information and the boundary of personal information protection. It is necessary to distinguish between information that is publicized to the society, information that can be known to creditors and information that can be queried by the public, and to clarify the rights enjoyed by subjects related to personal bankruptcy, such as the right to know, the right to object, the right to correction, the right to repair, the right to query and other related rights and interests. [3]In addition, the subject and period of time for disclosure of personal bankruptcy information should be clarified, and the debtor may apply for termination of the disclosure of information when the time limit expires or when the prescribed conditions are met. At the same time, the relevant departments shall utilize relevant technical measures to control the risk of information disclosure within reasonable limits and to safeguard the right to remedy the abuse of personal information.

4.2 Establishment of a digital personal bankruptcy credit evaluation mechanism

Data, algorithm and platform together form a three-dimensional social structure in the digital era, and the framework and logic of "data-algorithm-platform" is also the basis for the realization of the digital personal bankruptcy credit evaluation mechanism. the establishment of the digital personal bankruptcy credit evaluation mechanism is the result of the coupling of the digital construction of the credit system and the digital processing of personal bankruptcy in the context of the overall digital transformation of the society in the digital era, and the establishment of this mechanism has an important impact on the implementation of the personal bankruptcy system. [4]The establishment of a digital personal bankruptcy credit evaluation mechanism can make comprehensive judgments on the property information filled out by the debtor, the property information actually identified in the bankruptcy proceedings, and the personal consumption situation after the debt is cleared, so as to efficiently and accurately judge the personal bankruptcy credit situation. In real life, there is a difference between individual consumption behavior and business behavior, and it is difficult to trace and sort out consumption and business behavior, and it is particularly important to consider personal credit in personal bankruptcy proceedings, and without a comprehensive and effective credit evaluation system for personal bankruptcy, the exemption of personal bankruptcy debts will become a piece of empty talk. the integration of personal application for bankruptcy with the construction of a credit evaluation system through institutional safeguards can ensure that personal data are complete, accurate and traceable.

4.3 Establishment of out-of-court procedures for personal bankruptcy

Personal bankruptcy involves not only legal issues, but also social issues, and the establishment of out-of-court procedures for personal bankruptcy is not only an inherent requirement for the simplification and streamlining of bankruptcy cases, but also an effective way to reduce the social costs of clearing personal debts. [5]Therefore, it is necessary to set up out-of-court procedures in China's personal insolvency legal system, and if an agreement on debt settlement is reached in out-of-court procedures and unanimously agreed upon by all creditors, the people's court may be requested to give the debt settlement agreement the power of compulsory enforcement. In the event that the debt settlement agreement cannot be reached or enforced, the case shall be transferred to in-court proceedings in a timely manner, and a system shall be established for the smooth connection between out-of-court and in-court proceedings. the establishment of out-of-court procedures for personal insolvency is for the purpose of smoother handling of personal insolvency cases, and it is necessary to clarify the purpose of the out-of-court procedures so as not to make the establishment of out-of-court procedures become an invisible obstacle to the acceptance of personal insolvency cases, thus affecting the actual social effect of the personal insolvency system.

5. CONCLUSION

The full implementation of the personal bankruptcy system requires not only top-level design but also specific design of the entire system. the personal bankruptcy system should be promoted as soon as possible to provide legal support for the rebirth of debtors, the protection of creditors' interests and the healthy development of the market economy.

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Analysis on the Innovation Path of Financial Vocational Education in the Digital Financial Era

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Abstract: The vigorous development of digital economy has pushed the traditional financial industry to the tide of digital transformation. the rapid progress of financial technology has not only changed the way of providing financial products and services, but also reshaped the talent demand of the financial industry. As an important base for training financial talents, vocational education is facing unprecedented opportunities and challenges. This paper will explore the development status of financial vocational education under the background of digital finance, analyze the challenges it faces, and put forward the corresponding reform path from the aspects of talent training mode, curriculum system, teaching resources, teaching staff and the integration of production and education, in order to provide reference for the cultivation of financial technology talents to meet the needs of the new era.

Key words: Digital Finance; Fintech; Vocational Education; Talent Training Mode; Integration of Production and Education

1. INTRODUCTION

With the rapid development of information technology, the financial industry is undergoing a profound digital transformation, and digital finance and financial technology have become important forces to promote industry reform. Emerging technologies such as big data, artificial intelligence and blockchain continue to emerge, bringing new development opportunities and challenges to the financial industry. the mode of financial products and services has been continuously innovated, and intelligent, personalized and scene oriented have become the trend. At the same time, the demand for talents in the financial industry has also changed dramatically. Traditional financial skills can no longer meet the needs of the industry development. Talents with complex financial technology skills such as data analysis, artificial intelligence and blockchain have become the key to the development of the industry. As an important base for cultivating high-quality technical and skilled talents, vocational education needs to adapt to the development requirements of the digital financial era, carry out reform and innovation, and provide more high-quality financial technology talents for the financial industry.

2. THE IMPACT OF DIGITAL FINANCE AND FINANCIAL TECHNOLOGY ON VOCATIONAL EDUCATION

2.1 Changes in talent demand

The rise of financial technology has spawned a large number of emerging financial positions, such as data analysts, AI engineers, blockchain engineers, etc. the demand for talents in these positions has shifted from traditional financial skills to complex financial technology skills, requiring practitioners to have knowledge and skills in data analysis, artificial intelligence, blockchain and other fields.

2.2 Update of teaching content

In order to adapt to the development trend of the industry, the traditional financial courses need to integrate financial technology related content, such as big data analysis, quantitative investment, intelligent investment adviser, etc. At the same time, new courses need to be developed, such as blockchain technology and applications, the application of artificial intelligence in the financial field, etc., to meet the needs of students' learning and employment.

2.3 Innovation of teaching methods

New technical means such as virtual reality,

online learning and hybrid teaching can be applied to teaching, creating diversified forms of education to meet the learning needs of different students and improve teaching efficiency. At the same time, more effective teaching methods need to be explored, such as project-based learning, case teaching, flipped classroom, etc., in order to cultivate students' practical ability and innovation ability.

3. CHALLENGES FACED BY FINANCIAL VOCATIONAL EDUCATION

3.1 Talent training objective positioning deviation

Some colleges and universities fail to accurately grasp the development trend of financial technology, and the training objectives are out of line with the needs of the industry. This leads to the mismatch between the students' knowledge and the actual work needs, and affects the students' employment competitiveness. the existing curriculum system often focuses on traditional financial knowledge and lacks the integration of emerging financial technology knowledge such as big data, artificial intelligence and blockchain, resulting in the students' inability to meet the needs of financial technology enterprises for interdisciplinary talents. the traditional practice teaching method pays too much attention to the explanation of theoretical knowledge and lacks the cultivation of students' practical ability, which makes it difficult for students to apply their knowledge to practical work. the demand for talents in the financial industry is characterized by an obvious distribution of education levels. High end R&D positions have a high demand for talents with master's degree or above, while junior college students have more advantages in application development positions. However, at present, the financial talents cultivated by vocational education are mainly concentrated at the junior college level, which is difficult to meet the industry's demand for high-end talents. Some higher vocational colleges pay insufficient attention to the development trend of emerging fields such as green finance and carbon finance, which leads to the lack of foresight in the orientation of talent training objectives, and it is difficult to cultivate financial talents to adapt to the future development trend.

3.2 Insufficient cross integration of curriculum system

The curriculum is lack of interdisciplinary integration. Most of the existing curriculum systems are mainly "finance based" or "technology-based", tending to focus on traditional financial knowledge or information technology knowledge. the lack of deep integration of financial and information technology knowledge makes it difficult for students to form interdisciplinary knowledge structure and ability. the existing practical teaching content often lags behind the development trend of the financial technology industry, and can not meet the needs of students to master the latest skills. Also, the lack of effective connection between the existing curriculum system and the vocational qualification certificate makes it difficult for students to master the knowledge and skills required by the vocational qualification certificate through curriculum learning.

3.3 Lack of teaching resources for professional courses

The construction of teaching materials lags behind, and there is a lack of teaching cases and training projects with real business scenes. This leads to the lack of opportunities for students to practice, and it is difficult to apply the knowledge they have learned to practical work. Besides, the existing digital teaching resources are mainly offline teaching resources, lacking the development and utilization of online teaching resources, which is difficult to meet the needs of students' personalized learning. the existing digital teaching resources are not updated in time, which can not reflect the new development trends of the financial technology industry in time, and can not meet the needs of students to master the latest knowledge and skills.

3.4 Lack of teaching staff of financial technology specialty:

The structure of the teaching staff is unreasonable. Some teaching staff are mainly teachers with the background of traditional financial disciplines such as economics and finance, lack of teachers with the background of big data, artificial intelligence, blockchain and other engineering disciplines, and the existing teaching staff are short of the

knowledge of new financial technology and relevant practical experience, which is difficult to meet the needs of students to master the latest knowledge and skills.

4. REFORM PATH OF FINANCIAL VOCATIONAL EDUCATION UNDER THE BACKGROUND OF DIGITAL FINANCE

4.1 Innovation of talent training mode

The exploration of talent training modes, such as the "two-way integration, three-dimensional integration, and four-level progression" model, is crucial. This approach incorporates the concepts of production and education integration, curriculum ideological and political education, and labor education throughout the talent cultivation process. By merging theoretical learning with practical application, students are better able to apply their knowledge to real-world work scenarios.

4.2 Curriculum system construction

The curriculum system requires the development of an interdisciplinary framework focusing on "big data, blockchain, and finance. " This entails offering application-oriented courses in areas like big data analysis, artificial intelligence, and blockchain technology, while also incorporating these concepts into practical digital finance scenarios. Such a curriculum aims to equip students with a comprehensive understanding of financial technology's core concepts and practical applications, thereby establishing a solid foundation for their future careers in the financial sector.

4.3 Construction of teaching resources

Teaching resources must be expanded to include digital textbooks, online open courses, and virtual simulation training projects. Additionally, a "post course competition certificate" integration platform should be established. These resources are designed to cater to students' diverse learning and employment needs, ultimately enhancing their practical skills and fostering innovation.

4.4 Construction of teaching staff

To enhance the teaching staff, it is essential to recruit and develop professionals who possess a dual understanding of finance and technology. Additionally, encouraging educators to engage in practical training and continuous professional development is crucial. Furthermore, establishing a team of dual qualified teachers, comprising experts from both academia and industry, can contribute to a comprehensive and practical learning experience for students.

4.5 Deepening the integration of production and education

To deepen the integration of production and education, collaboration with enterprises to establish industrial colleges and practice bases is crucial. Initiatives such as order classes and modern apprenticeships should be undertaken to foster talent development. This collaborative approach promotes resource sharing, mutual benefit, and a win-win partnership, ultimately providing students with abundant opportunities to enhance their practical skills and cultivate innovation capabilities.

5. CONCLUSION

In the contemporary digital financial landscape, vocational education in finance encounters both novel prospects and formidable challenges. Through the innovation of talent cultivation paradigms, the restructuring of curricular frameworks, the augmentation of pedagogical resources, the fortification of the faculty, and the intensification of industry-education collaboration, it becomes feasible to nurture a greater cadre of financial technology professionals who are well-equipped to meet the exigencies of the evolving era. Concurrently, it is imperative to augment the harmonization between vocational, general, and continuing education sectors. This entails the establishment of a more robust financial vocational education infrastructure and the exploration of more adaptable and multifaceted models of talent development. Such endeavors are pivotal for cultivating a larger pool of financially adept individuals with a global perspective and innovative prowess, thereby substantively contributing to the progressive transformation of China's financial sector and its broader economic and societal advancement.

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Research on the Issues and Countermeasures of Integrating Data Assets into Financial Statements: A Case Study of Company A

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Abstract: With the rapid development of information technology, data assets have gradually become an important asset for enterprises. Incorporating data assets into financial statements, that is, standardizing and transparently managing and presenting these data assets, helps enterprises better understand their asset status, improve decision-making efficiency, and enhance investor confidence in the capital market. Taking Company A as an example, this paper discusses the issues faced and countermeasures for incorporating data assets into financial statements, aiming to provide reference and guidance for other enterprises.

Keywords: Data Assets; Financial Statements; Data Asset Valuation

1. INTRODUCTION

Data assets play an irreplaceable role in modern enterprise business decision-making, risk management, and business innovation. Incorporating data assets into financial statements has become an important part of enterprise financial management [1]. However, it also faces many challenges, such as data quality, security, and accurate measurement. Taking Company A as an example, this paper conducts in-depth research on the issues and countermeasures for incorporating data assets into financial statements [2].

2. CURRENT STATUS OF INCORPORATING DATA ASSETS INTO FINANCIAL STATEMENTS AT COMPANY A

As a large retailer, Company A possesses a large amount of structured, semi-structured, and unstructured data information, such as social media data and IoT data. These data assets are crucial for the company's business decision-making and business innovation. However, in terms of incorporating data assets into financial statements, Company A faces the following major issues:

2.1 Difficulty in identifying and assessing data assets

Due to the diversity of data sources, complex formats, and varying value densities, it is difficult to accurately identify data assets with commercial value, as shown in Table 1.

Table 1. Complexity of Data Sources and Formats

Data Source	*Data Format*	*Data Volume (GB)*	*Remarks*	*Value Density Assessment (High/Medium/Low)*	*Assessment Reason*
Internal Systems	*Structured (SQL)*	*1000*	*Including ERP, CRM, etc.*	*High*	*Contains core business processes and customer information, crucial for decision support*
External Purchases	*Semi-structured (CSV, JSON)*	*500*	*Including market research reports, industry data, etc.*	*Medium*	*Provides industry trends and competitive analysis, but may contain redundant information*
Social Media	*Unstructured (Text, Images, Videos)*	*2000*	*Including user-generated content from platforms*	*Low-Medium*	*Contains user preferences and market trends, but with high*

			like Weibo, WeChat, Douyin, etc.		*noise levels, requiring deep mining*
IoT Devices	*Time Series Data (TSDB)*	*300*	*Including sensor data, device logs, etc.*	*High*	*Reflects real-time device status and operational conditions, crucial for predictive maintenance*
Partner Sharing	*Mixed Formats*	*400*	*Including Excel, PDF, custom formats, etc.*	*Medium-Low*	*Data quality and value depend on the willingness of partners to share and their data processing capabilities*

2.2 Unclear measurement methods for data assets

Due to the high malleability and time-sensitive value of data resources, selecting a measurement method is difficult, and there is a lack of unified standards.

2.3 Data security and privacy protection issues

In the process of incorporating data assets into financial statements, a large amount of sensitive information such as personal privacy and business secrets may be leaked, posing legal risks and economic losses.

2.4 Insufficient supporting environment

The lack of mature data asset assessment institutions, professional data management personnel, and a comprehensive data service system hinders the smooth progress of incorporating data assets into financial statements.

3. ANALYSIS OF ISSUES IN INCORPORATING DATA ASSETS INTO FINANCIAL STATEMENTS

3.1 Data Asset Identification Issues

The identification and evaluation of data assets form the foundation for their inclusion on the balance sheet.

Firstly, the diversity and complexity of data sources lead to varying levels of data quality. For instance, Company A, a large retailer, possesses vast amounts of sales data, customer behavior data, inventory data, and so forth. These data originate from multiple systems, including POS systems, CRM systems, ERP systems, among others. During the process of data asset identification, Company A discovered that there were duplicates and inconsistencies among data from different systems.

Furthermore, Company A found significant differences in the value judgments of data assets among different departments. For example, the sales department may pay more attention to sales data and customer purchasing behavior data, while the supply chain department focuses more on inventory data and supply chain efficiency data. It is challenging for Company A to accurately identify data assets with commercial value and to determine which data are redundant or ineffective.

3.2 Data Asset Valuation Issues

The inclusion of data assets in financial statements is a complex and crucial process, with the measurement and assessment of data assets serving as pivotal steps. Prior to incorporating data assets into financial statements, enterprises must evaluate their value to determine the carrying value of these assets and complete their initial measurement. On the premise of providing assessment safeguards and ensuring evaluation security, enterprises should analyze the basic attributes and characteristics of data assets, conduct data evaluations, and obtain parameters such as quality factors, cost factors, and application factors for use in value assessment. Subsequently, they can adopt the income approach, cost approach, or market approach to complete the value assessment. However, currently, each method has its drawbacks. Selecting the most suitable assessment method based on the actual situation of the industry and the enterprise is a significant challenge faced by Company A [3].

For instance, when using the income approach, overly optimistic or conservative revenue forecasts may lead to overvaluation or undervaluation of data assets. Similarly, when employing the cost approach, factors such as

data depreciation and reduced replacement costs due to technological advancements may be overlooked, resulting in overvaluation, while inadequate consideration of the long-term value and appreciation potential of data may lead to undervaluation. When using the market approach, selecting unrepresentative comparable cases or neglecting market fluctuations or overheating may also result in high or low valuations. This makes it difficult to establish uniform assessment standards, and enterprises face challenges in including data assets in their financial statements.

3.3 Data Asset Rights and Security Issues

In the process of data asset inclusion, the confirmation of the right to data assets is a key link. Confirmation of rights means confirming that the enterprise has legal ownership or control of data resources, which is the prerequisite for data assets accounting in corporate financial statements. Company A found that due to the complexity and diversity of data resources, the process of confirming rights needs to consider the source, processing, and use of data and involves a variety of rights, such as the right to hold data, the right to process and use data and the right to operate products. At present, Chinese legal framework for data rights is not yet perfect, and enterprises need to explore a suitable path for their rights based on existing laws, regulations and policy documents, such as the Twenty Articles on Data, to ensure the safe and compliant circulation of data assets. At the same time, in the process of data assets in the table, a large amount of sensitive information such as personal privacy, business secrets, etc. may be leaked, which will bring legal risks and economic losses to the enterprise [4]. Company A needs to establish a sound data security protection mechanism to ensure the security and privacy of data assets.

3.4 Insufficient Supporting Environment Issues

Incorporating data assets into financial statements requires the support of a mature data asset assessment institution, professional data management personnel, and a comprehensive data service system. However, these supporting environments are currently not yet perfect, hindering the smooth progress of incorporating data assets into financial statements. Company A needs to strengthen top-level design, improve relevant regulations and standards, and enhance data management capabilities.

4. COUNTERMEASURES FOR INCORPORATING DATA ASSETS INTO FINANCIAL STATEMENTS

4.1 Establish and Improve Data Management System

Firstly, Company A should integrate data from different systems and improve data quality through data cleaning, deduplication, and standardization. the platform should have a data lineage tracking function to clarify the source and flow of data and reduce data duplication and inconsistency. Secondly, organize a cross-departmental data asset identification and evaluation team to hold regular meetings to discuss the value, usage, and potential business value of data assets. By sharing information and knowledge, we can enhance understanding and consensus among departments. In addition, refer to industry best practices and successful cases, and develop a set of data asset evaluation standards that are suitable for their own company, taking into account the actual situation of company A. the standard should cover multiple dimensions such as accuracy, completeness, timeliness, accessibility, and interpretability of data.

4.2 Establish a Dynamic Evaluation Mechanism

The value of data assets will change with time, market demand, technological progress and other factors. Therefore, Company A should establish a dynamic evaluation mechanism to re-evaluate data assets regularly and adjust the book value in a timely manner. During the evaluation process, the income method, cost method, and market method are comprehensively applied based on the characteristics and uses of data assets, while fully considering factors such as the uniqueness, scarcity, and market demand of data, as well as the impact of technological advancement on data value. You can also choose a third-party data asset evaluation agency with credibility and professional competence to conduct the evaluation, in order to improve the objectivity and accuracy of the evaluation results [5].

4.3 Clarify Data Ownership and Strengthen Data Security Protection

On the basis of complying with existing laws, regulations, and policy documents, explore a path for data ownership confirmation that is suitable for company A, and clarify the ownership and usage rights of data. Establish and improve data security protection mechanisms, including data encryption, access control, data backup and other measures [6]. At the same time, strengthen the training of employees' data security awareness and improve their ability to prevent data leakage. For sensitive information, such as personal privacy and trade secrets, stricter protection measures should be taken.

4.4 Improve the Supporting Environment

Company A should strengthen top-level design, improve relevant regulations and standards, and enhance data management capabilities. At the same time, we should actively embrace new technologies, promote the construction and development of supporting environments such as data asset evaluation institutions, professional data management personnel, and a comprehensive data service system. By establishing a comprehensive data service system, including data consulting, data evaluation, data security and other services. By providing comprehensive data service support, it meets various needs during the process of incorporating data assets into financial statements for company A.

5. CONCLUSION

The inclusion of data assets in financial statements is of great significance in improving the quality of corporate financial statements, demonstrating the digital competitive advantage of enterprises, and providing a basis for enterprises to carry out investment and financing business. However, incorporating data assets into financial statements also faces many challenges. This article takes company A as an example to conduct in-depth research on the problems and countermeasures of data asset entry into the table. By establishing and improving data management systems, establishing a dynamic evaluation mechanism, clarifying data ownership, strengthening data security protection, and improving supporting environments, company A can effectively promote the development of data asset reporting and improve the management and application level of data assets.

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Research on the Path of Deep Integration of Excellent Traditional Chinese Culture and Ideological and Political Education for College Students

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Abstract: In the context of globalization and informatization, the deep integration of excellent traditional Chinese culture and ideological and political education for college students is particularly important. This article aims to explore how to integrate excellent traditional Chinese culture into the ideological and political education of college students, in order to enhance the penetrability and extensibility of education. the article first analyzes the connotation and characteristics of excellent traditional Chinese culture, and then elaborates on its importance in ideological and political education for college students. Next, the article explores the difficulties and challenges encountered in the integration process, and proposes corresponding countermeasures, including theoretical integration, system innovation, teacher training, and atmosphere creation. the ultimate goal is to lay a solid foundation for cultivating qualified socialist builders and successors.

Keywords: Excellent Traditional Chinese Culture; College students' ideological and political education; Integration

1. INTRODUCTIONS

In the wave of globalization and informatization in the 21st century, the inheritance and development of culture are facing unprecedented challenges and opportunities. Chinese excellent traditional culture, as the spiritual lifeline and cultural gene of the Chinese nation, carries rich historical wisdom and national spirit, and plays an irreplaceable role in shaping the values, worldview, and outlook on life of college students. Therefore, integrating excellent traditional Chinese culture into the ideological and political education of college students is not only the inheritance and promotion of traditional culture, but also the innovation and development of modern education. Faced with the impact of Western culture and the challenges of information technology, how to effectively integrate excellent traditional Chinese culture into ideological and political education, enhance the attractiveness and effectiveness of education, has become an urgent problem to be solved. This article will delve into this topic, analyze the necessity, current situation, difficulties, and challenges of integration, and propose corresponding countermeasures, in order to provide useful reference and inspiration for ideological and political education in universities.

In this process, we not only need to pay attention to the connotation and value of traditional culture, but also explore how to combine it with modern educational concepts to meet the requirements of the new era. This is not only an educational issue, but also a cultural strategic issue. On the international stage, the competition for cultural soft power is becoming increasingly fierce. How to inherit and promote excellent traditional Chinese culture through education, enhance national cultural soft power, and strengthen international discourse power is of great significance for maintaining national cultural security and promoting Chinese culture to the world. [1]

2. THE CONNOTATION AND CHARACTERISTICS OF EXCELLENT TRADITIONAL CHINESE CULTURE

The excellent traditional Chinese culture is the

essence of the culture created, accumulated and continued by the Chinese nation in the long history, which contains unique meaning and characteristics. This culture not only includes multiple aspects such as moral ethics, ideological concepts, and humanistic spirit, but also presents the spiritual demands of the Chinese nation to strive for excellence and uphold virtues. It emphasizes spiritual comfort and spiritual sublimation, emphasizes collective role, and highlights peaceful development. the concepts of "benevolence" and "ritual" in Confucian culture, as well as "nature" and "non action" in Taoist culture, are important components of China's excellent traditional culture. They still have a profound impact on people's moral behavior and values to this day. These cultural characteristics not only reflect the wisdom and spiritual pursuit of the Chinese nation, but also provide valuable spiritual resources for contemporary college students.

In contemporary society, the connotation and characteristics of excellent traditional Chinese culture still have important practical significance. They are not only a manifestation of the spirit of the Chinese nation, but also an important cornerstone of social harmony and progress. Through a deep understanding and practice of these traditional cultures, we can better grasp the direction of social development and promote the construction of socialist core values. At the same time, these cultural characteristics also provide rich spiritual nourishment for college students, helping them maintain a clear mind and firm beliefs when facing the complex and ever-changing modern society.

3. THE SIGNIFICANCE OF EXCELLENT TRADITIONAL CHINESE CULTURE IN THE IDEOLOGICAL AND POLITICAL EDUCATION OF COLLEGE STUDENTS

The excellent traditional Chinese culture has profound significance for the ideological and political education of college students. Firstly, it inherits the national spirit and values, such as ethical principles and ideological concepts of benevolence, loyalty, filial piety, etiquette, etc., which are the cornerstone of building a harmonious society. Secondly, traditional culture, with its unique aesthetic charm and cultural expression, can cultivate noble sentiments and aesthetic literacy among college students, and enhance their cultural confidence. Finally, the inheritance and promotion of traditional culture contribute to enhancing the country's cultural soft power and international competitiveness. By studying traditional culture, college students can not only gain a deeper understanding of China's history and culture, but also contribute to the promotion of Chinese culture and enhance the country's influence on the international stage.

In the context of globalization, the education of excellent traditional Chinese culture also plays an important role in cultivating college students' international vision and cross-cultural communication skills. By studying traditional culture, college students can better understand and respect the differences between different cultures, and promote cultural exchange and integration. At the same time, traditional cultural education also helps college students form a correct view of history and ethnicity, enhancing their sense of identity and belonging to Chinese culture. This is of great significance for cultivating talents with international competitiveness and promoting Chinese culture to the world. [2]

4. DIFFICULTIES AND CHALLENGES IN INTEGRATING EXCELLENT TRADITIONAL CHINESE CULTURE INTO IDEOLOGICAL AND POLITICAL EDUCATION FOR COLLEGE STUDENTS

Although the integration of excellent traditional Chinese culture and ideological and political education for college students is of great significance, it still faces many difficulties and challenges in practical operation. Firstly, the theoretical construction is not perfect, and the ideological and political courses offered by universities have not been well integrated with the excellent traditional Chinese culture, lacking systematic theoretical guidance. Secondly, the system construction is not deep enough, and most of the content related to excellent traditional Chinese culture has not formed a mature system for organic integration with ideological and political education for college students. Teaching departments, student work

departments, and even logistics departments are mostly independent and lack unified system construction support. In addition, the forms of integration and integration are not rich enough, and some universities have shown a formalistic phenomenon guided by exam oriented education. the teaching and practical aspects lack interest and attractiveness, and are not very attractive to students' learning. It is even more difficult to cultivate "ideological and political golden courses".

In current educational practice, how to combine the essence of excellent traditional Chinese culture with modern educational concepts, how to innovate teaching methods and means, and how to enhance the effectiveness and attractiveness of education are all urgent problems that need to be solved. In addition, how to overcome the problems of insufficient resource allocation and weak teaching staff is also the key to promoting the integration of excellent traditional Chinese culture and ideological and political education for college students. Only through continuous exploration and practice can effective integration paths be found to achieve the effective inheritance and innovative development of excellent traditional Chinese culture in ideological and political education for college students.

5. COUNTERMEASURES FOR THE INTEGRATION AND COMMUNICATION BETWEEN EXCELLENT TRADITIONAL CHINESE CULTURE AND IDEOLOGICAL AND POLITICAL EDUCATION FOR COLLEGE STUDENTS

To effectively integrate excellent traditional Chinese culture with ideological and political education for college students, universities need to adopt a series of comprehensive measures, from theory to practice, from faculty to teaching system, to comprehensively promote.

5.1 Theoretical Integration: Building a Theoretical System of Education with Chinese Characteristics

The primary task is to achieve theoretical integration. Universities should combine the spiritual connotation of excellent traditional Chinese culture with Marxist theory to construct a theoretical system of ideological and political education with Chinese characteristics. This not only involves the reform of course content, but also the innovation of teaching methods and evaluation systems. By aligning traditional culture with modern educational concepts, such as Confucianism's "benevolence" and socialist core values of "friendliness, " students can better understand and accept the modern values of traditional culture.

5.2 System Innovation: Building a New Teaching System

Universities need to establish a new teaching system that organically combines excellent traditional Chinese culture with ideological and political education. This requires universities to offer ideological and political courses with Chinese excellent traditional culture as the theme, and adopt interactive teaching methods such as case teaching and discussion teaching to enhance students' interest and participation in learning. At the same time, through self written textbooks, collective lesson preparation and other teaching activities, we will discuss and open up chapters and content related to excellent traditional Chinese culture, expanding the depth of integration between both parties. [3]

5.3 Cultivating Teachers: Enhancing Teachers' Professional Literacy

The teaching staff is the key to achieving educational goals. Colleges and universities should attach great importance to cultivating a teaching team that understands both ideological and political education and is proficient in excellent traditional Chinese culture. Through regular training, seminars, and academic exchanges, enhance teachers' professional competence and teaching ability. At the same time, teachers are encouraged to conduct research in relevant fields, transform research results into teaching content, and make teaching content more rich and in-depth.

5.4 Creating an atmosphere and innovating carriers: expanding educational channels

Universities should also create a strong atmosphere of excellent traditional Chinese culture on campus, by organizing various cultural activities such as lectures on traditional Chinese studies, celebrations of traditional festivals, calligraphy and painting exhibitions, etc., so that students can

experience the charm of traditional culture in practice. At the same time, by utilizing modern information technology such as online courses, multimedia teaching, etc., innovative carriers of traditional culture dissemination can be used to make traditional culture education more vivid and effective.

5.5 Practical Teaching: Strengthening Students' Practical Experience

In addition to classroom teaching, universities should also strengthen practical teaching, allowing students to experience and learn excellent traditional Chinese culture through practice. Organize students to visit historical and cultural relics, participate in the protection and inheritance activities of intangible cultural heritage, and enhance their understanding and comprehension of traditional culture through personal experience.

5.6 Interdisciplinary Integration: Expanding Educational Perspectives

Encourage the intersection and integration of different disciplines, and incorporate elements of excellent traditional Chinese culture into the teaching of different subjects, such as adding content on traditional culture in courses such as literature, history, philosophy, and art, so that students can not only learn professionally but also be exposed to rich knowledge of traditional culture.

5.7 International Perspective: Enhancing the International Influence of Chinese Culture

In the context of globalization, universities should also cultivate students' international perspective, by comparing the similarities and differences between different cultures, so that students can recognize the unique value and global significance of Chinese culture. At the same time, encourage students to participate in international exchanges, spread Chinese culture, and enhance the international influence of Chinese culture. [4]

6. CONCLUSIONS

The excellent traditional Chinese culture has provided cultural accumulation for the great rejuvenation of the Chinese nation and is also the cultural source for the innovative development of ideological and political education for college students. Universities should better integrate ideological and political education with excellent traditional Chinese culture, actively research and explore innovative implementation paths that combine school-based characteristics and practical significance, continuously stimulate students' cultural awareness and national identity, strengthen students' national and cultural confidence, and lay a solid foundation for cultivating qualified socialist builders and successors

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An Analysis of the Importance of Aesthetic Education in Student Management

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Abstract: In the contemporary educational landscape, aesthetic education plays a pivotal role in student management. It is not merely an academic subject but a transformative tool that shapes the holistic development of students. This paper delves into the significance of aesthetic education in nurturing well-rounded individuals capable of contributing positively to society. By examining the role of aesthetics in fostering creativity, emotional intelligence, and cultural appreciation, this study underscores the importance of integrating aesthetic education into student management strategies.

Keywords: Aesthetic Education; Student Management; Creativity, Emotional Intelligence; Cultural Appreciation

1. INTRODUCTION

In the realm of education, aesthetic education is often overshadowed by more traditional academic subjects. However, the importance of engaging students with the arts cannot be understated. Aesthetic education plays a pivotal role in shaping the character and cognitive abilities of students, making it an essential component in effective student management. This paper explores the impact of aesthetic education on student behavior, academic performance, and social development, and discusses how it can be integrated into student management practices to enhance the overall educational experience. Aesthetic education is not merely about creating or appreciating art; it is a transformative process that fosters creativity, critical thinking, and emotional intelligence. It is through the lens of aesthetics that students can develop a deeper understanding of themselves and the world around them. This paper argues for the necessity of aesthetic education in nurturing well-rounded individuals who are prepared to contribute positively to society.

2. THE ROLE OF AESTHETICS IN STUDENT DEVELOPMENT

Aesthetic education is instrumental in the comprehensive development of students. It extends beyond the mere appreciation of beauty; it is a medium through which students can express themselves, understand diverse cultures, and develop critical thinking skills.

2.1 Cultivating Creativity

Creativity is indeed the cornerstone of aesthetic education, serving as a catalyst for innovation and originality. It pushes the boundaries of conventional thinking, encouraging students to explore uncharted territories of thought and challenge traditional perspectives. In the realm of student management, creativity is not just a bonus; it's a critical asset for problem-solving and adaptability, equipping students with the tools to tackle the ever-changing landscape of future challenges. Engaging in creative processes, students learn to dissect problems from various angles, developing a versatile skill set that is invaluable across all facets of life, from academic pursuits to professional endeavors and personal growth. This multifaceted approach to thinking is the hallmark of a creative mind, one that is ready to embrace complexity and find innovative solutions in a world that increasingly demands such agility. [1]

2.2 Enhancing Emotional Intelligence

Aesthetic education serves as a vital platform that enables students to delve into their emotional landscape and articulate their feelings. This exploration is not only essential for cultivating emotional intelligence but also for enhancing the ability to communicate effectively and empathize with others in their interpersonal interactions. By engaging with various art forms, students have the opportunity to navigate and process a spectrum of complex emotions. This process

not only fosters self-awareness but also deepens their comprehension of the emotional experiences of those around them, laying the groundwork for more compassionate and insightful social interactions.

2.3 Fostering Cultural Appreciation

Cultural appreciation, a pivotal outcome of aesthetic education, cultivates a profound understanding and respect for the myriad of cultural expressions. It nurtures a spirit of global citizenship and fosters inclusivity, as students are immersed in the diverse tapestry of global art and traditions. This exposure significantly expands their worldview, compelling them to not only acknowledge but also cherish the intricate richness of human creativity and expression that spans the globe.

3. AESTHETIC EDUCATION IN STUDENT MANAGEMENT

Incorporating aesthetic education into student management strategies can yield significant benefits. It not only enriches the educational experience but also equips students with essential life skills.

3.1 Promoting Student Engagement

Aesthetic education has the power to captivate students on a profound level, transforming the learning experience into one that is not only enjoyable but also deeply significant. This form of education resonates with students, igniting a passion that makes them more than mere recipients of knowledge; they become active, eager participants in their own learning journey. Such engagement is the catalyst for superior academic performance, as students who are invested in their learning are driven to dedicate the necessary time and energy to excel. This passion translates into a commitment to understanding, which in turn leads to a more profound mastery of the subject matter and a greater sense of accomplishment. the impact of aesthetic education is thus not just academic; it shapes the way students approach learning for the rest of their lives, fostering a love for knowledge that extends beyond the classroom walls.

3.2 Enhancing Social Skills

Aesthetic education, with its focus on group projects and collaborative artistic activities, significantly bolsters students' social skills. In these settings, students learn the nuances of teamwork, negotiation, and leadership—skills that are not only crucial for academic success but also indispensable in the professional realm. the collaborative essence of artistic pursuits simulates real-world scenarios, offering students a platform to hone their ability to work harmoniously with diverse peers. This practice is particularly beneficial in our globalized society, where the ability to collaborate effectively is a hallmark of success and a key to unlocking opportunities in an increasingly interconnected world. [2]

3.3 Supporting Mental Health

Aesthetic education serves as a vital creative outlet, allowing students to articulate their innermost thoughts and emotions through various art forms. This expressive freedom is not only therapeutic but also a powerful tool for mental health, offering students a sanctuary to navigate the tumultuous waters of stress and emotional turmoil. In a world where educational pressures can mount, the chance to engage with their creativity provides students with a lifeline, enhancing their overall well-being and resilience. It fosters a space for self-exploration and emotional release, which is essential for maintaining a balanced and healthy mindset amidst the demands of academic life.

4. THE IMPACT OF AESTHETIC EDUCATION ON STUDENT IDENTITY DEVELOPMENT

Aesthetic education plays a crucial role in the development of student identity, as it allows students to explore and express their individuality.

4.1 Encouraging Self-Expression

Aesthetic education unlocks a multitude of avenues for self-expression, including painting, music, and drama, which serve as potent alternative languages for students. These creative mediums offer a sanctuary for those who struggle with verbal communication, providing a rich tapestry of non-verbal tools to convey complex thoughts and emotions. the process of crafting art becomes an intimate journey of self-discovery, empowering students to delve into their inner selves and articulate dimensions of their identity that elude verbal description. This exploration is not just an exercise in creativity; it's a transformative experience that can shape students' understanding of their own

multifaceted nature.

4.2 Shaping Personal Values

Engagement in aesthetic activities not only fosters self-esteem but also amplifies it significantly. When students witness the tangible results of their creativity and receive affirmation from their peers and educators, their self-assurance in their own capabilities is bolstered. This recognition is a cornerstone in building confidence and a sense of self-worth. For students who might not find the same level of success in conventional academics, the affirmation derived from artistic accomplishments can be particularly influential, offering a renewed sense of pride and validation that strengthens their overall self-image.

5. AESTHETIC EDUCATION AND THE DEVELOPMENT OF CRITICAL THINKING AND EMOTIONAL WELL-BEING

Aesthetic education is not just about creating art; it also involves critical analysis and reflection, which are essential components of critical thinking.

5.1 Analyzing Art and Culture

Studying art and culture is a multifaceted endeavor that compels students to delve into the intricate layers of human expression. It sharpens their critical thinking skills as they dissect the nuances of various art forms, considering not just the artwork itself but also its broader context and societal implications. This analytical journey fosters a discerning mind that can synthesize information and form well-reasoned judgments. Students learn to approach every facet of life with a critical eye, questioning assumptions, dissecting complexities, and evaluating outcomes, thereby developing a versatile skill set that extends beyond the classroom and into their personal and professional lives.

5.2 Encouraging Open-Mindedness

Aesthetic education serves as a gateway to a myriad of perspectives and ideas, cultivating in students a disposition of open-mindedness that is essential for critical thinking. By immersing themselves in diverse artistic expressions, students are prompted to weigh various viewpoints, thus enriching their thought processes and delaying the formation of rigid opinions. This exposure to a spectrum of interpretations and understandings of the world nurtures an inclusive and tolerant mindset, preparing students to navigate the complexities of a pluralistic society with empathy and respect for differing viewpoints. [3]

5.3 Developing Problem-Solving Skills

Creating art is inherently a problem-solving endeavor that sharpens students' ability to articulate their visions. They learn to navigate the complexities of bringing an idea to life, often through trial and error, which refines their problem-solving acumen. This iterative process, characterized by cycles of attempting, encountering failure, and retrying, ingrains the virtues of resilience and flexibility. Students come to appreciate that overcoming obstacles is not just about immediate success but also about the iterative learning that occurs with each attempt, thus equipping them with a robust toolkit for tackling challenges across various facets of life.

5.4 Providing Emotional Outlets

Art serves as a profoundly effective therapeutic tool, enabling students to articulate and process a spectrum of emotions that might otherwise remain inexpressible. This form of emotional release is instrumental in enhancing mental health and mitigating stress. In a world increasingly gripped by mental health challenges, particularly among the youth, the avenue for emotional expression through art emerges as a critical support system. the act of creating art allows for a non-verbal yet profound communication of inner experiences, which can be particularly beneficial for individuals who struggle with verbal expression. Moreover, the process of artistic creation can lead to a decrease in stress hormones and an increase in positive emotions, thereby contributing to overall well-being. Art therapy, encompassing various forms such as visual art, music, dance, and drama, has been recognized for its ability to address psychological and emotional difficulties, providing a safe and expressive space for students to explore and heal.

5.5 Building Resilience

Participating in aesthetic activities is not just a creative pursuit but also a crucible for building resilience in students. As they engage in the art-making process, they inevitably encounter obstacles and setbacks, which serve as

opportunities to practice overcoming challenges and learning from missteps. This journey of trial and error is fundamental in instilling perseverance and teaching the invaluable lesson that failure is a stepping stone to success. Such experiences are instrumental in developing resilience, equipping students with the mental fortitude to confront and surmount hardships in all domains of their lives, from personal growth to academic and professional challenges.

5.6 Promoting Mindfulness

Aesthetic education can encourage mindfulness through activities like drawing, painting, or music composition. These activities require focus and presence, which can help students develop mindfulness skills that contribute to their emotional well-being. In an age of constant distraction, the ability to focus and be present in the moment is a valuable skill that can lead to reduced anxiety and increased enjoyment of life.

6. CONCLUSION

In conclusion, aesthetic education is a multifaceted component of student management that contributes significantly to the development of well-rounded individuals. It fosters creativity, emotional intelligence, cultural appreciation, critical thinking, emotional well-being, social cohesion, and lifelong learning. By addressing challenges and implementing effective strategies, educational institutions can harness the power of aesthetic education to shape the future generation. Aesthetic education is not a luxury but a necessity in preparing students for the complexities of the modern world, and its integration into student management practices is a step towards fostering a more compassionate, innovative, and intellectually curious society.

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Research on College Student Management under the Guidance of Employment and Entrepreneurship

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Abstract: Facing the increasingly severe employment situation where the supply exceeds demand in the talent market, college student management should fully prioritize students' employment and entrepreneurship issues. Through scientific and reasonable employment and entrepreneurship guidance, students' employment competitiveness can be enhanced, making their employment smoother. This article analyzes the practical value and main content of college student management under the guidance of employment and entrepreneurship, summarizes the existing problems in current college student management, and proposes specific optimization strategies.

Keywords: Employment and Entrepreneurship Guidance; Optimization Strategies for College Student Management

1. THE VALUE OF COLLEGE STUDENT MANAGEMENT UNDER THE GUIDANCE OF EMPLOYMENT AND ENTREPRENEURSHIP

Student management is an important part of colleges' daily work. Under the guidance of employment and entrepreneurship, further strengthening the practical value of student management is mainly reflected in the following aspects.

Firstly, it helps cultivate compound talents. Currently, enterprises and the talent market have increasingly higher standards for talent. Talents must not only possess rich professional theoretical knowledge but also strong practical abilities. Carrying out student management work guided by employment and entrepreneurship allows for the adjustment and updating of talent training objectives according to the requirements of enterprises and the talent market. By improving the level of student management, it accurately grasps the demand for talent in various positions in the future talent market, adjusts management thinking, and improves the matching degree between talent and positions. Secondly, it increases students' employment rates. In the general environment of economic downturn and increasingly severe employment situations, all sectors of society have paid increasingly higher attention to college students' employment. the main purpose of student management is to regulate students' behavior. Implementing employment and entrepreneurship guidance in student management can achieve the transformation and upgrading of the student management system and realize the training objectives of professional talents. Student management guided by employment and entrepreneurship includes content related to career planning, which can improve students' job adaptability and thus their employment rates. Finally, it achieves effective connections between schools and enterprises. College students' employment rate is not only an important indicator for students' parents to evaluate a college's educational quality during the enrollment process but also an important reflection of society's requirements for college students. Therefore, colleges need to pay attention to college students' employment issues after graduation, the application of theoretical knowledge and professional skills, etc. Under the guidance of employment and entrepreneurship, college student management adjusts management plans according to the demands of the talent market, combines the actual situation of colleges, focuses on employment to improve students' practical abilities and professional qualities, strengthens the effective link between schools and enterprises, and enables students to better adapt to the working environment.

2. THE MAIN CONTENT OF COLLEGE STUDENT MANAGEMENT UNDER THE GUIDANCE OF EMPLOYMENT AND ENTREPRENEURSHIP

Compared to pure student management, student management under the guidance of employment and entrepreneurship is richer in content. Besides conventional management content, it also includes the following special content.

Firstly, career planning guidance. Effective career planning guidance can help students more clearly understand their abilities, interests, and career preferences, guiding them to make more correct career choices. During the process of student management, career planning guidance enables students to clarify their strengths. Through career counseling, career lectures, industry tours, etc., students can gain a more intuitive and three-dimensional understanding of various career fields and specific job positions, strengthening their career cognition. Based on in-depth communication with students, guide them to set long-term career goals and phased career goals and provide them with related resource support, such as vocational skills training, recommending internship opportunities, participating in volunteer activities, etc., to help students achieve their career goals.

Secondly, strengthen employment skills training. Employment skills include job search techniques, interview skills, resume writing, communication abilities, etc. Employment skills mainly guide students on how to fully showcase their abilities and improve their employability competitiveness. Colleges should provide students with more opportunities to participate in internships. Internship forms can be full-time long-term internships or short-term summer internships, mainly determined by students' majors. Internships can help students establish connections with enterprises, become more familiar with work processes, understand the actual operational models of enterprises, and learn how to find their own positioning in team collaboration, strengthening their sense of teamwork. Thirdly, provide entrepreneurial support and conduct entrepreneurial education. A considerable number of college students have a strong entrepreneurial willingness. For these students, colleges should provide certain entrepreneurial education and support, offering entrepreneurial courses including market analysis, business model design, risk management, as well as how to find entrepreneurial opportunities, formulate business plans, conduct market research, etc., to help students comprehensively understand the process of entrepreneurship and related elements and solve problems encountered during the entrepreneurial process.

3. PROBLEMS IN COLLEGE STUDENT MANAGEMENT UNDER THE GUIDANCE OF EMPLOYMENT AND ENTREPRENEURSHIP

Firstly, there is a deviation between educational ideas and employment needs. Colleges and universities generally prioritize student management and employment and entrepreneurship guidance as work focuses. However, in practical work, a considerable number of colleges have overly conservative management ideas and prefer to maintain the status quo, leading to employment and entrepreneurship guidance becoming a mere formality and unable to ensure effectiveness. For example, student management work under the guidance of employment and entrepreneurship should help students adjust their employment concepts to better adapt to the employment environment. However, in practical work, there is a mismatch between students' employability and enterprises' hiring needs, with the fundamental reason being a deviation between colleges' employment and entrepreneurship education concepts and actual talent demands.

Secondly, student management does not match employment and entrepreneurship courses. Student management under the guidance of employment and entrepreneurship requires setting up employment and entrepreneurship courses and assessing the effectiveness of course teaching. In actual employment and entrepreneurship guidance, specific courses are mainly taught by counselors, who not only lack understanding of the talent market but are also not professional instructors. In employment and entrepreneurship guidance, course content is not set according to students' actual situations, ultimately leading to a mismatch between student management and employment and

entrepreneurship courses, directly affecting the effectiveness of course teaching.

Finally, the effectiveness of student management and employment and entrepreneurship is not obvious. Student management runs throughout the entire schooling process of students. the content of management not only involves the improvement of students' ideology, morality, and psychological quality but also the cultivation of professional knowledge and the investigation of social practice, covering both depth and breadth. However, student management under the guidance of employment and entrepreneurship neglects the assessment of students' practical abilities and overly focuses on the evaluation of students' theoretical knowledge, resulting in insufficient effectiveness of student management and employment and entrepreneurship.

4. STRATEGIES TO IMPROVE THE EFFECTIVENESS OF COLLEGE STUDENT MANAGEMENT UNDER THE GUIDANCE OF EMPLOYMENT AND ENTREPRENEURSHIP

4.1 Establish a Complete Employment and Entrepreneurship Guidance System

Firstly, promote the organic integration of professional teaching and employment and entrepreneurship education. Employment and entrepreneurship guidance is based on professional teaching. Professional courses are the prerequisite for students' employment and entrepreneurship. In student management work, teachers should organically integrate professional teaching with employment and entrepreneurship guidance. When teaching professional courses, they should incorporate related guidance on employment and entrepreneurship. Colleges should also conduct professional construction oriented towards employment and entrepreneurship to ensure that the direction of talent training meets the demands of the talent market, achieving a benign interaction between professional teaching and employment and entrepreneurship guidance.

Secondly, implement hierarchical guidance. Student management runs through the entire period of students' school life, and the content of employment and entrepreneurship management similarly runs through the entire process of student management. Improve the effectiveness of employment and entrepreneurship management through hierarchical guidance.

4.3 Strengthen Students' Mental Health Guidance and Guide Them to Establish Correct Career Views

Mental health guidance for students is an important part of college student management under the guidance of employment and entrepreneurship. Therefore, teachers and counselors should pay special attention to students' mental health and mental state, actively communicate with students in daily work, deeply understand their psychological state, and jointly conduct regular mental health education needs surveys and mental health status surveys with the school's psychological counseling teachers to improve the pertinence of mental health guidance. Teachers and counselors should actively understand students' mental health needs, proactively provide psychological counseling services, guide students to actively confide their difficulties in the process of employment and entrepreneurship, and help them alleviate their distressed moods. In addition, strengthen the education and guidance of students' worldviews, outlooks on life, and values, emphasize the traditional concept of "one should obtain wealth through rightful means" to students, strengthen the education of equal employment views, make them understand the principle that "there is no nobility or ignobility in occupations, " and guide them to establish correct career views.

In summary, the continuous development of higher education has also put forward new requirements for college student management. Colleges should not only create a good learning and living environment for students but also pay attention to students' employment and entrepreneurship issues. Through scientific and efficient employment and entrepreneurship guidance, students' employment and entrepreneurship abilities can be enhanced, and they can obtain good career development.

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Political Education Reform Exploration and Practice in Music Courses for Preschool Education Majors

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Abstract: Music course is a compulsory course for preschool education majors, and it is very helpful for cultivating the comprehensive music literacy of preschool teachers and improving their ability to organize music activities. Preschool music education has important value in optimizing and shaping children's personality, developing their intellectual potential, and promoting their comprehensive development. Music teachers majoring in preschool education in universities can combine their professional characteristics to sing red songs, organize students to perform classic red works, stimulate students' patriotism, promote the integration of music education and ideological and political education, and achieve the resonance of knowledge imparting and value guidance, thus achieving the goal of collaborative education.

Key words: Preschool Education; Music courses; Ideological and political education; Political Education

1. INTRODUCTION

General Secretary Xi Jinping pointed out at the symposium of ideological and political theory teachers that "we should explore the ideological and political education resources contained in other courses and teaching methods, and achieve all-round education for all staff throughout the process". This has pointed out the direction for the development of curriculum reform in universities. On May 28, 2020, the Ministry of Education issued the "Guidelines for the Construction of Ideological and Political Education in Higher Education Curriculum", which pointed out that comprehensively promoting the construction of ideological and political education in higher education curriculum is an essential part of talent cultivation.

Preschool education is an important component of the national education system, which is related to the future of the country, society, and families. Preschool music education is a microcosm of quality education, which can stimulate preschool children's interest in natural cognition and experiential learning. Therefore, promoting the teaching reform of ideological and political education in music courses for preschool education majors in universities has important theoretical and practical significance for improving the quality of talent cultivation for preschool teachers.

2. CURRENT SITUATION OF IDEOLOGICAL AND POLITICAL EDUCATION IN MUSIC COURSES FOR PRESCHOOL EDUCATION.

Curriculum ideological and political education is a new educational concept that belongs to implicit education. It requires the permeation of ideological and political education into various aspects of teaching and teaching reform in universities. Strengthening daily moral education for students, and it is an unconscious, unplanned, and unexpected values and knowledge abilities that students learn in the school environment. In recent years, many music teachers in universities have conducted research on the ideological and political reform of music courses in preschool education majors from the aspects of teaching methods, curriculum systems, evaluation methods, curriculum design, textbook compilation and selection. In terms of music curriculum design, some teachers adopt the Orff music teaching model, which integrates gamification into classroom teaching, stimulates students' innovative consciousness, cultivates their comprehensive music literacy, and promotes the improvement

of the quality of ideological and political education in the curriculum. Some teachers integrate ethnic music into music curriculum teaching and educational practice activities to enhance the effectiveness of ideological and political education for college students. College teachers are implementing the concept of ideological and political courses into higher education, comprehensively promoting quality education.

3. PRACTICAL EXPLORATION OF IDEOLOGICAL AND POLITICAL TEACHING REFORM IN MUSIC CURRICULUM OF PRESCHOOL EDUCATION

With the advancement of basic education reform, higher requirements have been put forward for the comprehensive music literacy and music activity organization ability of preschool teachers. Many music teachers in universities have proposed teaching strategies for ideological and political education in music courses to enhance the music skills and literacy of students majoring in preschool education. For example, adopting the flipped classroom teaching model to innovate the teaching methods of preschool music classes, achieving the unity of music education and ideological and political education. From the perspectives of employment, faculty, and student foundation for students majoring in preschool education, analyzed the issues and carried out reforms and innovations in the curriculum, teaching content, teaching methods, and textbook selection for each music course. the curriculum was deeply integrated, and representative music works with socialist advanced cultural orientation were excavated to enhance the affinity of ideological and political education.

4. SPECIFIC IMPLEMENTATION STRATEGIES FOR IDEOLOGICAL AND POLITICAL EDUCATION IN MUSIC CURRICULUM FOR PRESCHOOL EDUCATION

4.1 Innovative application of integrating ideological and political education into preschool music curriculum design.

4.1.1 Optimize curriculum design and improve skills and literacy.

The music curriculum for preschool education majors must be guided by the job requirements of kindergartens, integrating, optimizing, and reorganizing the existing music courses. the curriculum highlights the professional characteristics of preschool education, forming a comprehensive curriculum based on basic music theory and sight singing, and relying on dance, vocal music, and piano techniques. Teachers can use ideological and political education in the curriculum as a starting point to implement the fundamental task of cultivating students' moral character, and conduct practical teaching of music curriculum ideological and political education in the three comprehensive modules of dance, vocal music, and piano techniques. Dance comprehensive course aims to cultivate students' dance character and artistic sentiment, and assist in character development. the comprehensive vocal course enables students to appreciate the national spirit and the spirit of the times through singing, cultivating a sense of patriotism and social responsibility. Comprehensive piano lessons can infuse patriotic emotions into children's song playing training, guiding students to establish correct values.

4.1.2 Strengthen curriculum construction and enhance innovation capability

The music curriculum for preschool education majors tends to focus on developing skills such as playing, singing, and dancing. However, college students majoring in preschool education lack the ability to design innovative music activities such as improvisational notation, accompaniment, and choreography in practical applications. There are generally problems with weak theoretical foundations in music and insufficient interest, gameplay, foundation, and demonstration in music curriculum teaching. Therefore, teachers can strengthen curriculum construction by adopting a synchronous teaching mode of "learning" and "application", optimizing teaching content and time, attaching importance to music basic courses, and adding practical music courses in kindergartens on the basis of cultivating college students' singing, playing, and dancing skills. The teaching content should focus on children's song playing and singing, children's music appreciation, children's music rhythm, etc., to promote the improvement of college

students' kindergarten operation skills.

The music curriculum for preschool education should match the requirements of the times, focus on practical operation, innovate practical teaching models, and cultivate rich stage practice abilities for college students. Universities can establish off campus practice bases for kindergartens, allowing college students to understand the teaching needs of kindergartens, experience the teaching process of young children, and actively respond to the skill improvement of professional learning on campus. Universities can also design and organize various music stage performance practical activities, integrating ideological and political elements such as ideals, beliefs, social responsibility, and mindset into practical teaching. In addition, college students can be organized to participate in rehearsals and performances of music activities, enhancing their comprehensive music and music education abilities, and allowing them to accumulate stage performance experience.

4.2 Practical Analysis of Integrating Red Culture into the Preschool Education Teaching System

4.2.1 Sing red songs and lead spiritual growth

The music course adopts task-based teaching, situation teaching, interactive teaching and other teaching methods for ideological and political education to explain the touching stories behind the patriotic songs, enlivens the classroom atmosphere through music, and enhances students' artistic taste. For example, *'We are the successors of socialism'* expresses the spirit of the successors to move forward courageously, work hard, and not be afraid of sacrifice for the revolution. *Defending the Yellow River* can help students understand the spirit of countless revolutionary predecessors who selflessly devoted themselves in the face of national and ethnic interests, without considering personal gains and losses. Explaining the stories behind music can cultivate students' aesthetic ability and personal cultivation, and promote their comprehensive development.

In the context of ideological and political education in the curriculum, music courses should focus on students' personalized development, advocate singing red songs, and performing classic red works. For example, college students play songs such as "Guerrilla Song" and "Our Motherland is a Garden", sing songs such as "Selling Newspaper Song" and "Wang Erxiao Releasing Cowherd", practice sight singing such as "Red Star Sparkling" and "Ava People Singing New Songs", and teach dance courses such as "Deep Affection" and "Golden Peacock".

4.2.2 Explore red resources and create a nurturing atmosphere

Teachers should organically integrate the function of cultivating talents with the red spirit in various aspects of preschool education, actively explore music education resources, and achieve a dialectical unity of scientific and value, knowledge and ideology. We should integrate patriotism education, tell Chinese stories, tell the story of the CPC, tell the story of socialism with Chinese characteristics in the new era, integrate excellent traditional culture and red classic resources into preschool education comprehensive practice courses and quality development courses, and present a new pattern of building morality and fostering people's thinking and politics.

5. CONCLUSION

The practical teaching of music courses in preschool education is a curriculum based ideological and political education that focuses on current hot topics. The requirement of integrating ideological and political education into the subject teaching of various majors in universities is to incorporate ideological and political education into the curriculum. In terms of music courses, we need to clarify the educational objectives of music courses, integrate ideological and political elements into the entire teaching process, construct a "whole process education, all-round education" education pattern, and further play the evaluation and incentive function of curriculum ideological and political education to cultivate applied early childhood education talents.

The new trend and direction of college curriculum reform is to break the boundaries of disciplines and achieve the integration of curriculum resources. This requires teachers to establish ideological and political awareness of the curriculum, fully prepare for classes, use diverse music teaching methods,

deeply explore the ideological and political elements contained in the curriculum, promote the construction of ideological and political education in the curriculum, and thus promote the development of music education in preschool education majors in colleges and universities.

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Study on the Influence of Side Circumference Parts on Side Impact Performance

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Abstract: The side of the car is a relatively weak part in the body. It is particularly important to optimize the stiffness and strength of the side parts to enhance the collision resistance of the car side. Establish a side impact finite element model for a domestic SUV, and conduct a side impact simulation according to the regulations, and analyze the energy in the system to verify the effectiveness of the model. By comparing the values of the speed, intrusion amount and acceleration of the key points before and after, based on the basis of the test design and the response surface method, the scheme for the improvement of the side impact resistance is proposed and the effectiveness of the response surface method in improving the impact resistance of the structure is verified.

Key words: Side Impact Resistance; Optimized Design; Rigid Strength Matching; Test Design; Response Surface Method

1. INTRODUCTION

At present, the response surface method is widely used in the structural optimization research of nonlinear problems (such as collision resistance). As a statistical and mathematical method, the response surface method is mainly used for "development, improvement and optimization". Nowadays, the response surface method is used in optimization design, that is, by constructing reasonable test design to construct the approximate function between target and design variables [2]. By constructing the response surface model, the computation of solving optimization problems can be reduced and the optimization efficiency can be improved.

In terms of improving the collision resistance of automobiles, the often used methods and measures are: the application of high strength steel plate, modifying the section shape of the parts, increasing the thickness of the plate, and the use of structural reinforcement parts.

In this paper, the rigid strength of the side circumference is optimized by using the high strength steel plate and increasing the plate thickness. During the study, use orthogonal test design and comprehensive balance method; use uniform test design to optimize the thickness of side parts and response surface method.

2. TEST DESIGN AND RESPONSE SURFACE METHOD

2.1 Test design

Trial design (Design of Experiments, DOE) belongs to the category of mathematical statistics and is an important tool for scientific research. the task of trial design is to combine theoretical expertise and practical experience, scientifically arrange the experiment, effectively control the interference, obtain reliable information to the greatest extent, find out the way to solve the problem and obtain the optimal solution.

Orthogonal test design is one of the most commonly used test design methods, and "balanced distribution, comprehensive comparable" is its most remarkable feature. the basic tool of orthogonal trial design is orthogonal table, and equilibrium distribution is the core of orthogonal table.

As a test design method, uniform design only considers the "uniform distribution" of the test site within the test range, but not the "neat contrast", so the test number of times is greatly reduced. When the change range of test factors is large and the number of selected levels is large, the use of uniform design can greatly reduce the number of tests. Uniform design also uses a set of tables to arrange the experiment, and the table used is called the

uniform design table [3], Each design table is accompanied with a use table.

2.2 Response surface method

Response surface method (Response Surface Method, RSM), as an approximate model technology, is a mathematical regression method that predicts the response value of the unknown point according to the response information of known points. It fits a polynomial regression function that can approximate the relationship between the output and design variables by a certain amount of test value. the most commonly used response surface model is the first-order and second-order power polynomial. the structure function is simulated by the second-order model, which can accurately approximate the actual engineering and has high use value.

3. OPTIMIZE THE MATERIALS OF THE SIDE CIRCUMFERENCE COMPONENTS

3.1 Orthogonal test design

The orthogonal test design was used to optimize the materials of the B-column reinforcing plate, the threshold inner plate, the middle floor beam and the front door collision bar in the side enclosure structural parts, and the materials of the four components are recorded as factors A, B, C and D respectively. For the four factors, DP600, DP800 and DP1000 were selected as different material levels, which were recorded as level 1, 2 and 3 respectively. the test was arranged using an orthogonal test table, and the maximum acceleration of the body and the maximum intrusion in the middle of the B-pillar inner plate were calculated by LS-DYNA. the influence of four factors on the side collision resistance of the car is discussed, and the optimal combination of components is selected. $L_9(3^4)$

The average conversion rate K was calculated separately for each factor for two target valuesAnd i and its extreme range values R. among, Ki= ki/3, kThe i represents the sum of the corresponding test results when the factor (any column in the test schedule) takes the level of i; extreme R average conversion rate KThe difference between the maximum and the minimum value of i. In general, the larger the extreme difference value indicates that the level of modifying this factor has a greater impact on the test results.

3.2 Selection and verification of the optimization scheme

The comprehensive balance method was used to select the optimization scheme. In this paper, the maximum intrusion in the middle of the inner plate was selected as the main evaluation index, and the body acceleration was selected as the secondary evaluation index. According to Figures 1 and 2, the order and preference of the factors affecting the acceleration are D> B> C> A and A1B2C1D3, and the order and preference of the factors affecting the intrusion are A> D> B> C and A3B2C3D3. Comprehensive analysis, the final selected optimization scheme is A3B2C3D3. the finite element model was modified according to the optimization scheme, and the comparison between the acceleration of the body and the intrusion of the middle part of the B-pillar inner plate was arranged before and after the improvement after calculation, as shown in Figure 7 and Figure 8.

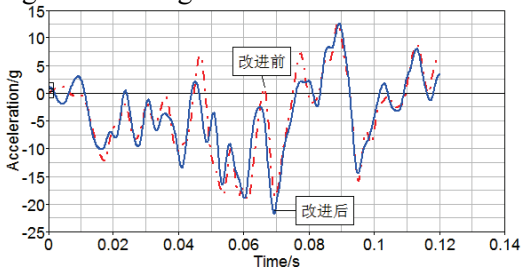

Figure 1 Comparison of acceleration before and after improvement

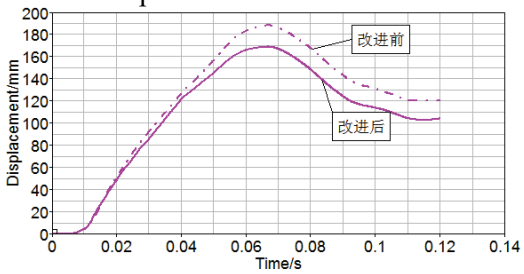

Figure2 Comparison of intrusion before and after improvement

According to the comprehensive analysis, as the main target value for the optimization improvement, the maximum value of the middle volume of the inner plate decreased from 187.7 mm before the improvement to 168.4 mm, which decreased by 10.3%. Although the acceleration of the body increased from the original 19g to 21.7g, the increase is not very large. Therefore, it can be considered that the modification of the

material can improve the body collision resistance to some extent.

4. OPTIMIZE THE THICKNESS OF THE SIDE ENCLOSURE PARTS

The main side circumference structure components in the body include internal and outer plate of B-column, B-pillar reinforcement plate, internal and outer plate of the door, threshold beam, roof side beam, anti-collision rod, floor beam, etc. Through research and analysis, the thickness of the door interior plate, B-column outer plate, B-column reinforcing plate and the middle floor beam are selected t (t1, t2, t3, t4) Design variables for the optimization problem.

When establishing the optimized model, the maximum intrusion amount L in the middle of the inner plate of the B column was selectedThe max and the maximum invasion speed, VAs a constraint to evaluate crashability, considering the requirement of lightweight body, the total mass m of the four parts is selected as the optimization goal to minimize it.

On the basis of ensuring the reliability and lightweight requirements of the structure, the maximum intrusion amount and maximum intrusion speed are equal to or less than the initial value, that is, the constraint condition is set as: the intrusion amount is less than or equal to 168.4 mm and the intrusion speed is less than or equal to 5638 mm · s-1. Literature indicates that when the invasion speed of the lateral structures is controlled at 8000mm · sCan can meet the requirements of side impact occupant protection when within the range. In this optimization problem, the constraint value range setting is more reasonable.

4.1 Response surface construction based on the uniform test design

To obtain sufficient design samples, the uniform test design method was used in this study. Reference [6] construct Uniform Table U25(254), each factor in the table has 25 levels, a total of 25 trials, and in this study, a quadratic polynomial model was used to simulate the maximum intrusion L in the middle plate of the B columnAnd max, maximum invasion speed VMax these target quantities and the design variable thickness t (t1, t2, t3, t4) Nonlinear relationship between the nlinfit function in MATLAB software, and the final mathematical model is as follows:

$$\begin{aligned} L_{\max} &= 484.48 - 24.649t_1 - 221.948t_2 - 145.83t_3 \\ &\quad + 35.38765t_4 - 6.7503t_1^2 + 34.1788t_2^2 \\ &\quad + 17.60234t_3^2 - 6.9984t_4^2 + 17.3187t_1t_2 \\ &\quad + 7.7831t_1t_3 - 9.2986t_1t_4 + 35.19t_2t_3 \\ &\quad - 2.24705t_2t_4 - 4.09903t_3t_4 \end{aligned} \quad (5)$$

$$\begin{aligned} V_{\max} &= 10856.431 + 106.7018t_1 - 1176.493t_2 \\ &\quad - 4456.286t_3 - 907.771t_4 - 405.697t_1^2 \\ &\quad - 147.919t_2^2 + 777.117t_3^2 + 284.381t_4^2 \\ &\quad + 46.6278t_1t_2 - 60.5122t_1t_3 - 222.03t_1t_4 \\ &\quad + 586.235t_2t_3 - 58.072t_2t_4 + 231.316t_3t_4 \end{aligned} \quad (6)$$

$$m = -1.296 + 9.998t_1 + 17.8949t_2 + 4.41t_3 + 1.62t_4 \quad (7)$$

Lmax、VComplex correlation coefficient R for max and m2 and the value of the modified complex correlation coefficient, R R_{adj}^2 The values of 2 and are all close to 1, indicating that the fit accuracy of the three functions is high and can be used for subsequent optimization calculations. R_{adj}^2

4.2 Multi-objective optimization and result verification

The optimal value of the objective function was solved using the fmincon function in the MATLAB software, and the resulting optimization result was t1=0.89 mm, t2=0.65 mm, t3=2.4 mm, t4=0.8 mm.

According to the optimal solution obtained above, the parameters of the corresponding structure are adjusted in the vehicle model and calculated by LS-DYNA software simulation. By comparing the result value of the response surface function and the finite element simulation result, the target prediction value obtained by the response surface function and the target value calculated by the model simulation are similar, and the error of both is controlled within ± 5%. It can be obtained that the result of optimizing the function constructed by the response surface method has some confidence.

5. CONCLUSION

The vehicle and trolley model for side impact analysis is established, and the validity of the model building is verified. Orthogonal test design is used to analyze the materials of the

side circumference parts and select the better scheme. Based on the uniform test design and response surface method, and the principle of reducing the intrusion amount and the intrusion speed, the thickness of the main components was optimized, the optimal solution was obtained by MATLAB software, and the effectiveness of the response surface method was verified by finite element simulation calculation. Using the response surface method, and it has some applicability in the engineering field.

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Development Of Thermal Insulation Coatings

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Abstract: With the increasing global focus on energy efficiency and sustainable development, the application of thermal insulation coatings in construction, chemical industry, transportation and other fields is increasing. This paper reviews the types, principles, advantages and disadvantages of thermal insulation coatings. the development trend of thermal insulation coatings will move towards intelligence, multi-function and green environmental protection, so as to promote the sustainable development and application of thermal insulation technology.

Key words: Research progress on thermal insulation coatings, energy saving and emission reduction, safety protection

1. INTRODUCTION

With the increasing global focus on sustainable development, the chemical industry plays a crucial role in driving the "dual-carbon" goal [1]. According to statistics, the energy consumption of the chemical industry accounts for a large proportion of the total energy consumption in China, and in many chemical production processes, the heat energy loss is significant, leading to low energy efficiency and environmental pollution. Therefore, how to reduce the energy consumption of chemical industry and improve the energy efficiency has become an urgent issue to be solved. In this context, thermal insulation coating, as a new energy-saving material, is increasingly concerned.

Thermal insulation coating is mainly used in the outer surface of chemical equipment to reduce the loss of heat and heat loss. This kind of coating can not only effectively reduce the energy consumption of equipment, but also improve the production environment, improve safety. the study shows that the heat loss of chemical equipment and pipelines is mainly concentrated outside, especially in high temperature and low temperature conditions, the proportion of heat loss is particularly obvious. By coating the thermal insulation coating on the surface of the equipment, it can effectively reduce the heat conduction, improve the operation efficiency of the equipment, and then achieve the purpose of energy saving and consumption reduction. the performance of thermal insulation coating mainly depends on its composition and structural design. the coating achieves good heat preservation effect by slowing down the heat transfer and improving the heat radiation reflection ability. According to different heat insulation mechanisms, thermal insulation coatings can be divided into three categories: barrier coatings, reflective coatings and radiation coatings. According to the special needs of the equipment in the chemical industry, choosing the appropriate thermal insulation coating type can significantly improve the energy utilization rate of the equipment and reduce the operating cost.

2. BARRIER COATING

The principle of barrier coating is to introduce air into the coating or add a filler with low thermal conductivity to reduce the thermal conductivity of the coating [$\lambda \leqslant 0.25W/(m\cdot K)$] [3]. the packing to prevent heat conduction, through the heat conduction between the environment and the substrate surface, so as to achieve excellent heat insulation effect.

According to the Kunson effect, when the pore size of the packing with high stomatal rate is less than 50nm, within the average free range of the air molecules, the gas in the pore cannot flow freely, and the collision between the gas molecules will be greatly weakened, effectively reducing the convective heat

transfer between the gases. At the same time, because the air molecules in the pores cannot heat flow as general static air, the pores inside the coating is in an approximate vacuum state, so as to further prevent the heat conduction heat transfer, the final thermal conductivity of the filler can be lower than the thermal conductivity of conventional air 0.0267W/(m·K) inside the coating introduced air as heat insulation component, increase the coating porosity, the water absorption increases, will lead to the mechanical properties and heat insulation performance of the coating. At present, the most widely used coating is the composite carbonate [2] thermal insulation coating developed in the 20th century 80, which is made of inorganic and organic binder, heat insulation aggregate (expanded perlite, vermiculite, etc.) and gas leading agent. Although it can meet the high temperature demand, but the corrosion resistance and adhesion are poor.

Barrier coating is usually thick coating, a wide range of application fields, mostly used in industrial energy storage equipment, chemical equipment equipment surface, its preparation cost is low, the preparation process and equipment is simple, is a widely used thermal insulation coating, excellent heat insulation performance. However, due to its thick coating, it brings more gaps, so when the surface is wet, a large amount of water will be inhaled. Because the thermal conductivity of the liquid is much higher than the thermal conductivity of the gas, the heat insulation performance of the coating is reduced, affecting its actual application effect.

3. REFLECTIVE COATING

The action principle of reflective coating is to add the thermal radiation (solar radiation, infrared radiation, etc.) (such as TiO_2, ZnO, Cu_2O, Fe_2O_3, etc.) and base material. Yan packing has high reflectivity to infrared light and visible light. the energy of sunlight mainly has three radiation spectrum regions, of which 95% are concentrated in the visible light area with wavelength of 0.4~0.72 μ m and the infrared light region [4] with wavelength of 0.72~2.5 μ m. Therefore, the higher the reflectivity of the modified interval wavelength is, the better the thermal insulation effect is. Because its main function is "heat insulation" rather than "heat preservation".

Reflecting coating has good adhesion, strong weather resistance, and is mainly used in building surface, road surface and chemical storage tank. Reflective heat insulation coating packing mostly for inorganic materials, led to the slurry dispersion and stability is bad, and reflective heat insulation coating because the coating is thin, so it must be used with external insulation system can improve its thermal insulation effect, exposed to outdoor reflective coating will appear aging phenomenon, and sand and rain and snow weather will stain the coating surface, affect the coating of sunlight reflectivity, reduce its insulation performance. This greatly increases the cost of construction, resulting to its application being greatly limited.

4. RADIATION COATING

The principle of action of radiation coating is to add in the coating with strong infrared radiation ability (such as SiC, NiO, Cr_2O_3, etc.) to spread the absorbed energy through the form of thermal radiation again, reduce heat transfer. the atmospheric window is 2.5~5 μ m and the infrared radiation [3] of 8~13.5 μ m can penetrate 80% energy. Therefore, the absorbed energy needs to be converted into these two kinds of infrared radiation as much as possible to reduce the temperature of the object.

Radiant thermal insulation coating is active cooling, has strong adaptability to temperature. In low temperature or normal temperature environment, the radiation power of filler is low, in high temperature environment, the radiation power of filler will be significantly increased. At present, the radiation thermal insulation coatings on the market are mainly ceramic coatings, which are limited by the complicated preparation process and the expensive price of raw materials, leading to the unstable emission rate of coatings, which limits their widely application.

5. DEVELOPMENT TREND

With the rapid development of chemical coating industry, global heat insulation materials will develop in the direction of water-based heat insulation coating, multi-functional thin heat insulation coating, nanopore super heat insulation coating, transparent heat insulation and heat insulation.

Sometimes the use of a single coating can not play an obvious role in heat insulation, therefore, the research and development of 2~3 kinds of heat insulation heat insulation mechanism synergistic effect of high performance composite heat insulation coating is of great significance. Therefore, the mixed action mechanism of different functional fillers towards environmental protection, heat insulation, thin layer and the preparation method of compound fillers with various heat insulation mechanisms are the future research directions.

6. CONCLUSION

The application of thermal insulation coating in the chemical industry is very important. This kind of coating has good thermal isolation performance, which can effectively reduce the heat loss of equipment and pipelines, improve energy efficiency, and reduce energy consumption. By optimizing the formulation and application process of coatings, chemical enterprises can achieve higher production efficiency and environmentally friendly operations, thus promoting the realization of sustainable development goals.

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The Impact of Organizational Fit and Job Fit on Employee Job Satisfaction and Employee Performance in State-Owned Enterprises In Guiyang City

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Abstract: This study aims to explore the impact of organizational fit and job fit among state-owned enterprise employees in Guiyang on their job satisfaction and job performance. Given the unique organizational characteristics of state-owned enterprises, understanding the relationship between these factors is critical to improving employee productivity and organizational effectiveness. This article adopts quantitative research methods, taking 333 employees of state-owned enterprises in five major industries in Guiyang City as the research objects, and conducts a questionnaire survey through stratified random sampling. Use SPSS statistical software to conduct descriptive analysis, correlation analysis and multiple regression analysis on the collected data. the research results show that organizational fit and job fit are significantly positively related to employee job satisfaction, and job satisfaction plays an important mediating role between organizational fit, job fit and job performance. This finding reveals the complexity of employees' attitudes and behaviors in state-owned enterprises and provides empirical basis for managers of state-owned enterprises to optimize human resource strategies. This study suggests that leaders of state-owned enterprises should improve employees' organizational fit and job fit by creating a corporate culture with a strong sense of organizational identity and providing adequate on-the-job training and career development paths, thereby leading to higher job satisfaction and performance. At the same time, managers of state-owned enterprises should also actively listen to their employees, improve performance appraisal and incentive mechanisms, and let employees feel recognized and cared for by the organization. This study not only provides useful inspiration for the practice of human resource management in state-owned enterprises, but also contributes to the theoretical development in the field of organizational behavior.

Keywords: Organizational Fit, Job Fit, Employee Job Satisfaction, Employee Performance, State-owned Enterprises

1. INTRODUCTION

In today's competitive business environment, employee job satisfaction is critical to the success of an organization. Satisfied employees are more likely to exhibit positive work attitudes, improve job performance, and show long-term commitment to organizational development (Lin et al., 2020). Organizational fit refers to the alignment of employees' values, goals, and behaviors with the organizational culture and values, and is important to ensure that employees feel connected and engaged with the organization. Job fit involves the alignment between employees' skills and abilities and the requirements of their specific job roles. When employees feel that their jobs utilize their abilities effectively, they are more likely to experience job satisfaction and perform well in their roles. Employee job satisfaction is the degree to which employees are satisfied with their job roles, including aspects such as the work environment, responsibilities, compensation, and recognition. Employee performance measures

how well employees perform their job responsibilities and contribute to organizational goals. High performance is often influenced by appropriate organizational fit, job fit, and the level of job satisfaction experienced by employees, leading to better overall organizational success.

Guiyang's state-owned enterprises play a key role in the city's economic landscape. However, these state-owned enterprises face unique challenges due to their ownership structure and operating mechanisms. A recent survey among employees of state-owned enterprises in Guiyang City showed that only 30% of employees reported high job satisfaction, while more than 50% expressed concerns about limited career development opportunities and skill-job mismatch (Guiyang Statistical Yearbook, 2022). Therefore, the purpose of this study is to investigate the impact of organizational fit and job fit on job satisfaction among employees of state-owned enterprises in Guiyang. By focusing on this specific context, this study aims to provide targeted insights and recommendations to improve employee satisfaction and performance in these organizations.

2. RESEARCH METHODOLOGY

2.1 Research Design

This study adopts a quantitative research design to examine the hypothesized relationships between the key variables. the choice of a quantitative approach is guided by the nature of the research questions, which seek to measure and analyze the impact of organizational fit and job fit on employee job satisfaction and, subsequently, on employee performance. the cross-sectional survey method is employed to collect data from a representative sample of employees working in various SOEs across Guiyang City at a single point in time.

Based on the context of state-owned enterprises in Guiyang City, this study proposes the following hypotheses.

H1: Organizational fit has a significant impact on employee job satisfaction.

H2: Job fit has a significant impact on employee job satisfaction.

H3: Employee job satisfaction has a significant impact on employee performance.

2.2 Population and Sample

The target population for this study consists of employees working in state-owned enterprises across Guiyang City. These organizations were chosen due to their significant influence on the regional economy and their distinctive organizational structures, which are pivotal in examining the impacts of organizational and job fit on job satisfaction.

To ensure a diverse representation, a stratified random sampling method is employed. the population is divided into different strata based on industries and job levels, and then samples are randomly selected from each stratum. This approach ensures that the sample is representative of the overall population and allows for comparisons across different demographic and occupational segments within the organization.

To calculate the required sample size, we use the Yamane formula as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n represents the required sample size.

N denotes the total population size.

e represents the desired level of precision, typically set at 0.05(5%).

Given that we have a total population size (N) of 2, 000 employees in the state-owned enterprises in Guiyang, and we are assuming a desired level of precision (e) of 0.05, the calculation is as follows:

$$n = \frac{2000}{1+2000\times(0.05)^2}$$

= 2, 000/(1+2, 000 * 0.0025)

= 2, 000/(1+5)

= 2, 000/6

= 333.33

Using the Yamane formula, with a desired precision level of 0.05, the required sample size from a population of 2, 000 employees would be approximately 333 employees. Therefore, we plan to select a sample of about 333 employees for our study.

2.3 Data Collection Methods

The primary data collection instrument for this study is a structured questionnaire. the questionnaire is designed to capture information on the key variables of interest: organizational fit, job fit, employee job satisfaction, and employee performance. the

questionnaire items are adapted from well-established and validated scales in the literature, ensuring their reliability and validity.

The questionnaire employs a 5-point Likert scale, where respondents are asked to indicate their level of agreement or disagreement with various statements. the Likert scale is a widely used method for measuring attitudes, opinions, and perceptions in social science research. the 5-point scale provides a balanced set of response options, allowing respondents to express their level of agreement or disagreement with a particular statement. the scale anchors are as follows:

1 - Strongly Disagree
2 - Disagree
3 - Neither Agree nor Disagree
4 - Agree
5 - Strongly Agree

The questionnaire is administered through an online survey platform, ensuring ease of distribution and data collection. To maximize the response rate, the questionnaire is designed to be concise, clear, and user-friendly. Participants are assured of the confidentiality and anonymity of their responses to encourage honest and candid feedback.

3. RESEARCH FINDING

3.1 Demographic Information of the Respondents

This chapter analyzed the result finding of the questionnaires collected from the 350 respondents, which were distributed to employees from 5 industries and several position. the researcher received questionnaires back 333, so response rate was 95.14%, with an effective response rate.

Table 3.1: Amount and percentage of general information of respondents

Demographic Factors	Group	Amount (N)	Percentage
Gender	Male	173	52
	Female	160	48
Age	21-40	160	> 48
	41-60	123	> 37
	61 and above	> 50	> 15
Position	High-Level Management	> 56	> 17
	Technical Staff	> 67	> 20
	Production Staff	> 67	> 20
	Administrative Staff	> 67	> 20
	Frontline Workers	> 76	> 23
Industry	Manufacturing	> 100	> 30
	Financial	> 70	> 21
	Transportation	> 60	> 18
	Retail	> 70	> 21
	Healthcare	> 33	> 10
Years with current company	< 1 year	> 50	> 15
	1-3 years	> 77	> 23
	4-6 years	> 87	> 26
	7-10 years	> 63	> 19
	> 10 years	> 57	> 17
	Total	> 333	> 100

3.2The Level of Employee Job Satisfaction

Table 3.2 represented the descriptive statistics analysis of employee job satisfaction, which separated into 3 aspects, including Organizational Fit, Job Satisfaction & Recognition and Personal Growth & Team Support.

Table 3.2 Descriptive statistics analysis of Employee Job Satisfaction

Employee Satisfaction	*JobMean*	*S. D.*	*Interpretation*
Organizational Fit	*4.09*	*0.40*	*High*
Job Satisfaction &	*4.08*	*0.37*	*High*

Employee Satisfaction	JobMean	S. D.	Interpretation
Recognition			
Personal Growth	&4.26	0.44	High
Team Support			
	4.15	0.28	High

According to Table 3.12, the overall level of employee job satisfaction is high, with an average score of 4.15 (SD = 0.28). Among the three dimensions, Personal Growth & Team Support had the highest mean at 4.26 (SD = 0.44), followed by Organizational Fit at 4.09 (SD = 0.40), and Job Satisfaction & Recognition at 4.08 (SD = 0.37).

These results indicate that employees in Guiyang's state-owned enterprises experience a high level of job satisfaction overall. the strong showing of the Personal Growth & Team Support dimension suggests that employees feel well-supported in their professional development and have positive relationships with their colleagues.

The high score for Organizational Fit implies that employees perceive a good alignment between their personal values and those of their organizations. This congruence is crucial for fostering a sense of belonging and commitment.

While still high, the slightly lower mean for Job Satisfaction & Recognition (4.08) may point to some room for improvement in terms of employees feeling fully satisfied with their specific job roles and the recognition they receive for their contributions.

3.3 The Level of Employee Performance

Table 3.3 represented the descriptive statistics analysis of employee performance, which separated into 3 aspects, including Work Efficiency & Quality, Team Collaboration & Communication and Proactivity & Adaptability.

Table 3.3 Descriptive statistics analysis of Employee Performance

Employee Performance	Mean	S. D.	Interpretation
Work Efficiency	&4.19	0.40	High
Quality			
Team Collaboration	&4.19	0.44	High
Communication			
Proactivity	&4.07	0.37	High
Adaptability			
Overall	4.15	0.36	High

According to Table3.3, the overall level of employee performance in Guiyang's state-owned enterprises is high, with a mean score of 4.15 (SD = 0.36). Both Work Efficiency & Quality and Team Collaboration & Communication dimensions show equally high means of 4.19, with standard deviations of 0.40 and 0.44 respectively. the Proactivity & Adaptability dimension, while still high, has a slightly lower mean of 4.07 (SD = 0.37).

These results suggest that employees are demonstrating strong performance across key aspects of their work. They are efficiently completing high-quality work, collaborating effectively with their teams, and showing good levels of proactivity and adaptability.

The high scores for Work Efficiency & Quality indicate that employees are productive and focused on delivering excellent results. the equally high scores for Team Collaboration & Communication highlight the strength of teamwork and information sharing within these organizations.

While still in the high range, the slightly lower mean for Proactivity & Adaptability suggests that there may be some room for further encouraging employee initiative and enhancing their ability to navigate change.

3.4 Regression Analysis

Based on the research hypotheses proposed in this study, the regression models are constructed as follows:

H1: Organizational fit has a significant impact on employee job satisfaction.

Employee job satisfaction = $\beta 0$ (Intercept)+$\beta 1$ (Organizational Fit)+ε.

H2: Job fit has a significant impact on employee job satisfaction.

Employee job satisfaction = $\beta 0$ (Intercept)+$\beta 2$ (Job Fit)+ε.

H3: Employee job satisfaction has a significant impact on employee performance.

Employee performance = $\beta 0$ (Intercept)+$\beta 3$ (Job Satisfaction)+ε

Where:

$\beta 0$ represents the baseline level or constant term in the regression equation.

$\beta 1$, $\beta 2$, $\beta 3$ represent the regression coefficients that indicate the impact of the corresponding independent variable on the dependent variable.

ε is the error term representing the variance not explained by the model.

The regression results for each hypothesis are presented and interpreted below.

3.4.1 Hypotheses Test Results of H1

H1: Organizational fit has a significant impact on employee job satisfaction.

Table 3.4 presents the linear regression results testing the impact of organizational fit on employee job satisfaction. the model included various dimensions of organizational fit as independent variables.

Table 3.4 Linear Regression Analysis of the impact of the Organizational Fit on Employee job satisfaction

Dependent Variable:	Unstandardized Coefficients		Standardized Coefficients		
Job satisfaction	B	Std. Error	Beta	t	p-value
(Constant)	4.464	0.123		36.433	0.000**
Job Satisfaction	0.008	0.066	0.014	0.116	0.908
Work Environment & Support	0.034	0.074	0.073	0.459	0.647
Career Development & Opportunities	0.349	0.077	0.751	4.526	0.000*
Compensation & Security	-0.269	0.059	-0.665	-4.534	0.000*
Company Culture & Management	-0.197	0.067	-0.450	-2.964	0.003*

Independent Variable: Organizational Fit

R2 =. 130, Adjusted R2 =. 117, F = 9.811, Sig. =. 000

* p<0.05 ** p<0.01

Organizational Fit = 4.464+0.349 Career Development & Opportunities
+ (-0.269) Compensation & Security
+ (-0.197) Company Culture & Management

The results reveal that career development & opportunities ($\beta = 0.349$, $p < 0.01$) has a significant positive impact on job satisfaction, indicating that employees who perceive good growth prospects in the organization tend to be more satisfied. In contrast, compensation & security ($\beta = -0.269$, $p < 0.01$) and company culture & management ($\beta = -0.197$, $p < 0.01$) show significant negative effects, suggesting that these aspects of organizational fit, if not well-managed, can undermine job satisfaction. The model has an adjusted R-squared value of 0.117, meaning that 11.7% of the variance in job satisfaction is explained by the organizational fit variables included. the F-statistic of 9.811 ($p < 0.01$) indicates that the model as a whole is statistically significant, confirming the collective impact of organizational fit dimensions on job satisfaction.

However, it's important to note that job satisfaction ($\beta = 0.008$, $p > 0.05$) and work environment & support ($\beta = 0.034$, $p > 0.05$) did not show significant effects in this model. This suggests that these aspects of organizational fit may have a more indirect or complex relationship with job satisfaction in the context of Guiyang's state-owned enterprises.

Overall, the regression results partially support H1, highlighting the significant impact of certain organizational fit dimensions (career development & opportunities, compensation & security, company culture & management) on employee job satisfaction. However, the non-significant effects of job satisfaction and work environment & support dimensions indicate that the relationship between organizational fit and job satisfaction is nuanced and multifaceted.

3.4.2 Hypotheses Test Results of H2

H2: Job fit has a significant impact on employee job satisfaction.

Table 3.5 presents the linear regression results examining the impact of job fit dimensions on employee job satisfaction.

Table 3.5 Linear Regression Analysis of on the Job Fit on Employee Job Satisfaction

Dependent Variable:	Unstandardized Coefficients		Standardized Coefficients		
job satisfaction	B	Std. Error	Beta	t	p-value
(Constant)	-0.961	0.429		-2.242	0.026*
Skills and Job Fit	0.146	0.048	0.136	3.048	0.002**
Job Challenge and Development	0.437	0.066	0.292	6.652	0.000**
Job Values and Team Collaboration	0.604	0.043	0.639	13.938	0.000**

Dependent Variable:	Unstandardized Coefficients		Standardized Coefficients		
job satisfaction	B	Std. Error	Beta	t	p-value

Independent Variable: Job Fit
R2 =. 439, Adjusted R2 =. 433, F =85.680, Sig. =. 000
* p<0.05 ** p<0.01
Employee Job Satisfaction = -0.961+ (0.146) Skills and Job Fit
+(0.437) Job Challenge and development
+(0.604) Job Values and Team Collaboration

The model reveals that all three dimensions of job fit have significant positive effects on job satisfaction. Skills and job fit ($\beta = 0.146$, $p < 0.01$), job challenge and development ($\beta = 0.437$, $p < 0.01$), and job values and team collaboration ($\beta = 0.604$, $p < 0.01$) all contribute to higher levels of job satisfaction among employees.

The standardized coefficients indicate that job values and team collaboration has the strongest impact ($\beta = 0.639$), followed by job challenge and development ($\beta = 0.292$) and skills and job fit ($\beta = 0.136$). This suggests that alignment of personal values with the job and strong teamwork are particularly crucial for fostering job satisfaction, even more so than the match between skills and job requirements.

The model has an impressive adjusted R-squared value of 0.433, indicating that 43.3% of the variance in job satisfaction is explained by the job fit variables. the F-statistic of 85.680 ($p < 0.01$) confirms the overall statistical significance of the model, underscoring the strong collective impact of job fit on job satisfaction.

The intercept term ($\beta = -0.961$, $p < 0.05$) is also statistically significant, suggesting that there are other factors beyond job fit that influence baseline levels of job satisfaction.

3.4.3Hypotheses Test Results of H3

H3: Employee job satisfaction has a significant impact on employee performance.

Table 3.6 presents the linear regression results testing the impact of employee job satisfaction dimensions on employee performance.

Table 3.6 Linear Regression Analysis of on the Employee job satisfaction on Employee Performance

Dependent Variable:	Unstandardized Coefficients		Standardized Coefficients		
Employee Performance	B	Std. Error	Beta	t	p-value
(Constant)	3.859	0.304		12.696	0.000**
Organizational Fit	0.072	0.055	0.081	1.310	0.191
Job Satisfaction & Recognition	0.077	0.057	0.079	1.346	0.179
Personal Growth &Team Support	-0.074	0.047	-0.091	-1.563	0.119

Independent Variable: Employee Job Satisfaction
R2 =0.022, Adjusted R2 =0.013, F = 2.432, Sig. =0.065
* p<0.05 ** p<0.01

Surprisingly, none of the job satisfaction dimensions showed significant effects on employee performance in this model. Organizational fit ($\beta = 0.072$, $p > 0.05$), job satisfaction & recognition ($\beta = 0.077$, $p > 0.05$), and personal growth & team support ($\beta = -0.074$, $p > 0.05$) all had non-significant coefficients.

The adjusted R-squared value of 0.013 indicates that only 1.3% of the variance in employee performance is explained by the job satisfaction variables included in the model. the F-statistic of 2.432 ($p > 0.05$) further confirms that the model as a whole is not statistically significant.

These results do not support H3, suggesting that, in the context of Guiyang's state-owned enterprises, employee job satisfaction does not have a direct, significant impact on employee performance as measured in this study.

However, it's important to interpret these findings with caution. the non-significant results could be due to several factors, such as the specific measures used for job satisfaction and performance, the unique organizational context of state-owned enterprises, or potential mediating or moderating variables not accounted for in the model.

Moreover, the low R-squared value suggests that there are many other factors beyond job

satisfaction that influence employee performance. These could include individual characteristics, leadership styles, organizational resources, or external market conditions.

While the regression results do not support a direct link between job satisfaction and performance, it's crucial not to dismiss the importance of job satisfaction altogether. Previous research has consistently shown the benefits of job satisfaction for other important outcomes such as employee retention, organizational commitment, and well-being.

4. CONCLUSION

Based on all the above statistical analysis tests and results, Table 4.1 summarized the results of the research hypothesis test, which are based on the context of state-owned enterprises in Guiyang City, this study proposes the following hypotheses.

Table 4.1 Summary of Test Results of Research Hypotheses

Hypothesis Research Hypothesis Result

H1a-H1e Organizational fit, including job satisfaction, work environment and support, career development and opportunity, compensation and security and company culture and management has a significant impact on employee job satisfaction. H1c-H1e Accepted

H1a-H1b

Not accepted

H2a-H2c Job fit, including skills and job fit, job challenge and development and job values and team collaboration has a significant impact on employee job satisfaction. H1a-H1c Accepted

H3a-H3c Employee job satisfaction, including organization fit, job satisfaction and recognition and personal growth &team support has a significant impact on employee performance. H3a-H3c

Not Accepted

The results provide mixed support for the hypothesized relationships between organizational fit, job fit, employee job satisfaction, and employee performance in the context of state-owned enterprises in Guiyang City.

H1 proposed that various dimensions of organizational fit would significantly impact employee job satisfaction. the results partially support this hypothesis. While career development & opportunities (H1c), compensation & security (H1d), and company culture & management (H1e) showed significant effects, job satisfaction (H1a) and work environment & support (H1b) did not have significant impacts on job satisfaction in the regression model. This suggests that certain aspects of organizational fit are more crucial than others in shaping employee job satisfaction in this context.

H2, which posited that job fit dimensions would significantly influence employee job satisfaction, was fully supported. Skills and job fit (H2a), job challenge and development (H2b), and job values and team collaboration (H2c) all had significant positive impacts on job satisfaction. This highlights the importance of ensuring a comprehensive fit between employees and their job roles, considering skills, growth opportunities, values alignment, and team dynamics.

However, H3, which proposed a significant impact of employee job satisfaction dimensions on employee performance, was not supported. None of the job satisfaction aspects - organization fit (H3a), job satisfaction and recognition (H3b), or personal growth & team support (H3c) - showed significant effects on performance in the regression analysis. This unexpected finding suggests that the link between job satisfaction and performance may be more complex and indirect than hypothesized, at least within the studied context.

From a practical standpoint, the results suggest that state-owned enterprises in Guiyang should prioritize fostering a strong sense of organizational fit and job fit to enhance employee job satisfaction. This could involve initiatives to promote career development, ensure competitive compensation, cultivate a positive company culture, and optimize job designs to align with employee skills and values.

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The Training of TCM Professional Masters and The Construction of Famous Old TCM Expert Inheritance Studio Under the Perspective of Medical and Education Cooperation

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Abstract: Traditional Chinese medicine has a long history, is the wisdom crystallization of the Chinese nations struggle against disease, and is a unique medical science in China. the 1 old Chinese medicine experts are outstanding representatives of Chinese medicine in China, and their precious academic wealth should be better inherited. With the deepening of the reform of Chinas medical and health education system, since 2015, the education mode of standardized training for resident doctors (hereinafter referred to as regular training) and graduate students of TCM masters degree (hereinafter referred to as professional master of TCM) has been implemented. Through his own clinical practice and learning experience, the author actively proposed a new traditional Chinese medicine inheritance mode combining the training of professional master of TCM and the construction of famous expert inheritance studio. In the article, please correct the same way.

Keywords: Combination Of Medicine And Teaching; Professional Masters Of Tcm; the Inheritance Workroom Of national prestigious physicians; TCM inheritance

1. CURRENT SITUATION AND PROBLEMS

old experts of traditional Chinese medicine inheritance studio establishment and the problems in order to do a good job of the old Chinese medicine academic inheritance, Shanghai longhua hospital first established in 2001, and old TCM name studio [1], the state administration of traditional Chinese medicine since 2010 set up the national old inheritance of traditional Chinese medicine expert studio construction project, to 2015 nationwide has established 5 batches, a total of 958 old Chinese medicine experts inheritance studio [2]. the inheritance studio integrates medical treatment, teaching and scientific research, which effectively promotes the inheritance and development of the academic ideas of the famous old traditional Chinese medicine. However, there is no denying that the current famous and old traditional Chinese medicine expert inheritance studio is still facing some problems. First, due to the limited scope and method of heir selection, most of them choose from those who have taken on or part-time administrative work. In the process of learning from teachers, these heirs can rarely follow the old Chinese medicine to learn and explore experience [3]. Second, some successors have become experts in a certain field, academic ideas have been formed, it is inevitable that the experience of famous old Chinese medicine is biased [4]. Third, the lack of graduate students and young doctors among the successors of the studio results in a gap in the inheritance of the experience of the old Chinese medicine, and also reduces the number of young graduate students and doctorsMachine to improve their own traditional Chinese medicine literacySince 1981, China has launched the education of TCM graduate students for more than 30 years. During this period, the scale of enrollment and school running gradually expanded, which enriched the Chinese TCM medical team, and made great contributions to the national health cause

and peoples physical and mental health. Since 2015, China has implemented the model of combining standard training and professional master education of TCM [5-6]. Through his own experience, the author expounds the deficiencies and possible problems in the cultivation of professional master of Traditional Chinese medicine. (1) the training of professional master of TCM is carried out in TCM hospitals, However, the diagnosis and treatment methods of TCM hospitals are heavy in modern medicine, and the characteristics of TCM diagnosis and treatment are not distinct enough, and there is no strong academic atmosphere of TCM. (2) the enrollment scale of professional masters of traditional Chinese medicine is to expand, and the number of graduate tutors has not increase accordingly, leading to a large number of students, which may reduce the quality of graduate training. Moreover, the clinical teaching level of the training teachers is uneven, and it is difficult to ensure the quality of the training. (3) the professional training of resident doctors and the professional master of TCM education have just begun to be integrated. Although specific implementation rules have been formulated, in the process of specific training, both clinical teachers and professional master students of TCM participating in the training lack supervision and guidance, and the quality of the training is difficult to guarantee. Fourth, residentsAfter the integration of regular training and professional master of TCM, professional master of TCM has 33 months in clinical departments, with no specific time to engage in scientific research, which is not only contrary to the training goals of graduate students, but also may affect the writing and publication of graduate papers [7

2. THINKING AND STRATEGIES

In view of this, the author suggests that the cultivation of professional master of TCM should be combined with the construction of the inheritance studio of famous old TCM experts, which can not only expand the scope of academic inheritance of famous old TCM experts, but also improve the clinical diagnosis and treatment level of professional master of TCM. How to combine the above two people together, the author thinks that mainly from the following aspects to try.

Do a good job in top-level design and strengthen policy support To combine the training of professional master of TCM with the construction project of famous old TCM inheritance studio, the relevant administrative departments need to build a policy bridge. Since the Ministry of the Ministry of Education, the National Health and Family Planning Commission and other six departments issued the Opinions on Deepening the Reform of Medical Personnel Training through Medical and Education, TCM colleges and universities in all provinces and cities have actively cooperated and issued corresponding policies. Taking Shandong Province as an example, the new professional master of TCM enrolled in 2015 is required to rotate in clinical related departments for 33 months. In order to ensure the characteristics of TCM, each graduate student is required to follow the tutors TCM outpatient clinic once a week. In addition, the author believes that master of Chinese medicine can go to the old TCM expert studio in the hospital according to their personal wishes. In view of the large number of graduate students, a two-way selection mechanism can be adopted to select qualified talents to carry on the experience inheritance of famous old TCM experts.

Construction of transparent mechanism and two-way disclosure of information TCM professional masters are eager to get direct instruction and guidance from famous TCM experts, and the inheritance studio of famous TCM experts also lacks young students to learn and inherit. In the authors opinion, the old TCM expert studio can publish the short-term or long-term plans through the website of the hospital or university, and publicize the latest expert visit plan and visit places through the website, so that graduate students with learning enthusiasm can visit and study.

Relying on the network platform, promoting the mass communication of famous old TCM experts have rich experience in clinical treatment, but there are some difficulties in modern computer technology and emerging multimedia technology, especially in the application of modern social platform technology such as Weibo and wechat. the professional master of traditional Chinese medicine is young, can skillfully use various

computer software and various intelligent equipment, can better handle and save the visual, frequency and audio data of the famous old Chinese medicine, can also help in the establishment of the famous old Chinese medicine experts inheritance studio weibo, wechat public account and other new media to publicize.

Innovate teaching methods and integrate new knowledge Professional masters of TCM mostly receive classroom cramming education in college. Due to the limitations of undergraduate practice, most of them are not taught by famous old Chinese medicine, which is the weakness of TCM education in China. In the authors opinion, the inheritance studio of famous TCM experts should focus on the inheritance of famous old TCM experience, carry out clinical case teaching, regular lectures by famous teachers, academic salons and other teaching forms, so as to promote the communication and interaction between graduate students of TCM masters and famous TCM experts, and inspire the TCM thinking of graduate students.

Actively summarize experience and improve academic literacy. the Professional Master of TCM does not have enough time to carry out scientific research work independently to write his graduation thesis during the regular training period. the author thinks that the professional degree of traditional Chinese medicine graduate student on the basis of certain scientific research knowledge, can start from the name of old TCM clinical experience, experience summary or case report or, is the theory, as graduation subject design, this can inherit the old academic views of traditional Chinese medicine, and can improve their quality of traditional Chinese medicine.

3. CONCLUSION

Medical and health undertakings are related to the health of the people, and there is a long way to go to train qualified successors of traditional Chinese medicine. the relevant departments of the state have realized the problem of unclear training objectives of clinical talents and scientific research talents in the process of medical personnel training in China, and have made the decision of jointly training clinical talents with medical education. the cultivation of traditional Chinese medicine talents has its characteristics, the cultivation of professional master of Chinese medicine and the construction of the old Chinese medicine expert studio, combined, can improve the clinical level of professional master of traditional Chinese medicine, and can promote, old experts of traditional Chinese medicine inheritance work further, the inheritance of traditional Chinese medicine successor, it is indeed a mutually beneficial and win-win measures.

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Optimization of the Wartsila RTA-flex W5X35 Fuel System of a Ship Main Engine

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Abstract: The main engine of a ship Wa rtsilaRTA-flexW5X35 adopts a single two-stroke low-speed diesel engine, the main engine operates under normal working conditions, the fuel system pressure is normal, but when the fuel pressure is greater than 0.3 MPa, the main engine has power decline, fuel consumption increase, increased vibration and other faults. By analyzing the cause of the fault, it is determined that the main factors leading to the fault are the fault of the oil supply pipeline, fuel filter and other components. the three-dimensional simulation software is used to simulate the system, and optimize and improve the oil circuit, filter element, fuel injector and other aspects. Through comparative analysis, it is found that the pressure and oil temperature of the optimized fuel system can meet the requirements, and the fuel system runs smoothly. the optimized fuel system has been verified on site, and the oil supply pressure and oil temperature meet the requirements, effectively avoiding the host failure caused by the failure of the oil supply line, filter element and other components.
Keywords: Main Engine, Fuel Oil System, Optimization

1. PREFACE

The ship main engine fuel system is a complex hydraulic and electrical system, the fuel system failure, may cause the main engine failure. In the operation process of the ship main engine, the fuel oil system mainly undertakes the functions of conveying fuel to the cylinder, supplying the oil pump power, and driving the operation of the main engine. If the fuel system fails, it will affect the normal operation of the main engine, and even cause the ship to sail normally.

In recent years, due to the sizing of ships, high speed and high load weight, the case of ship fuel system failure is increasing. Usually, the main engine fault mainly has the following types: (1) engine power decline, fuel consumption increase; (2) temperature increase in the cylinder; (3) vibration aggravation; (4) vibration abnormal noise; (5) noise increase. In the process of ship operation, the failure caused by the fuel system failure accounts for a large proportion. Therefore, how to avoid the host failure caused by the fuel system failure has become an important topic in the safe operation of ships. This paper analyzes and optimizes the primary fuel system failure of Wa rtsilaRTA-flexW5X35 main engine.

2. SYSTEMATIC ANALYSIS

According to the manual of the main engine, under normal working conditions, the fuel pump is directly supplied to the main engine tank by the main engine through the fuel pipeline. the oil supply amount of each fuel pump is 6L, the fuel pressure is 0.45 MPa, and the oil supply pressure of each cylinder is equal. the fuel system diagram is shown in Figure 1.

Under normal working conditions, the main engine of the ship is in normal use, but when the fuel pressure exceeds 0.3 MPa, there are faults such as power decline, increased fuel consumption, and increased vibration increase. Through the inspection of the fuel pump, oil supply line, fuel filter and other components, it is found to work well. Therefore, the fault caused by the fault of the oil supply pipeline is eliminated. In order to further determine the cause of the failure, the 3 D simulation software is used to simulate the structure of the ships fuel pump and oil supply pipeline. Through comparative analysis, it is found that the system pressure and oil temperature fluctuated greatly due to the unreasonable

pipeline design. Therefore, the scheme to optimize the fuel system is proposed.

Use three-dimensional simulation software to model the optimized fuel system, analyze the flow and pressure changes of the fuel supply pipeline, filter element, injector and other components under different working conditions, and simulate and calculate the flow rate of the fuel supply pipeline under different working conditions. Changes in pressure and pressure. After the fuel system has been optimized, the pressure and flow rate have not changed much, both at around 0.03 MPa, which meets the requirements of the main engine operating conditions. After comparative analysis with before optimization, the power curve of the main engine when running under rated working conditions is basically the same as before optimization, but the speed and load fluctuate greatly under rated working conditions, and the fuel consumption curve increases much more than before optimization. After analysis, it was concluded that the main reason is that the pressure of the fuel system is low under rated operating conditions, which results in the flow and pressure of the fuel supply pipeline becoming smaller. the reduced flow of the fuel system results in the pressure of the fuel supply pipeline becoming smaller. After adjustment under rated operating conditions, the oil supply pipeline pressure returned to normal.

3. OPTIMIZE THE SCHEME

After analyzing the cause of the fault, it is confirmed that the fuel injector fault is the main cause of the high fuel pressure. According to the actual operating conditions of the main engine, the optimization scheme of the fuel system is determined:

3.1 Pipeline optimization: increase the inner diameter of the oil pipe, reduce the diameter of the oil pipe, increase the diameter of the pipeline by increasing the number of oil pipe, to avoid the instability of oil pressure due to the small oil pipe diameter;

3.2 Filter optimization: due to the blockage of some filters in the fuel system pipeline, resulting in a large number of impurities into the oil supply system, blocking the oil circuit, so it is necessary to add a filter in the oil tank;

3.3 Fuel injector optimization: improve the performance and efficiency of the engine by changing the injection pressure, injection advance angle and injection amount of the injector;

3.4 Fuel filter optimization: due to the blockage of the fuel filter, the filter core is blocked, resulting in the decrease of the filter filter capacity, and the filter capacity is improved by replacing the new filter element.

4. SIMULATION VERIFICATION

According to the analysis of the cause of the fault and the working principle of the system, the three-dimensional simulation model of the fuel system is established. Combined with the actual situation of the field, the influence of fuel pressure and oil temperature on the fuel system is mainly considered in the simulation process. the verification results show that when the fuel pressure is too high, the oil supply pressure will decrease, which will decrease the power of the host; the oil temperature will increase the oil level of the oil tank, which will deteriorate the oil quality and ultimately affect the performance of the host.

According to the above analysis results, the filter element, fuel injector and other components are added to the system. Through simulation, it is found that by improving the oil supply line, filter element, fuel injector and other components, the host fault caused by the failure of the oil supply line and filter element can be effectively avoided. Through the comprehensive inspection and maintenance of the host, as well as the transformation of the fuel system, the host returned to normal operation. According to the relevant conventions and regulations, the host engine needs to conduct a comprehensive inspection of the fuel system every three years. Since the fuel system has been used for 3 years before the transformation, it was found that the oil supply pressure and oil temperature have met the requirements through the optimization and improvement of the oil circuit, filter element and fuel injectors. Through the comprehensive inspection and maintenance of the main engine, the safe operation of the fuel system is ensured.

Hrough the above verification, it can be seen that the two-stroke low-speed diesel engine of

the ship owner can meet the operation requirements of the diesel engine, and avoid the failure of the main engine caused by the failure of the oil supply line, fuel injectors and other components.

5. CONCLUSION

According to the actual operating conditions of the host, the 3 D simulation software is used to simulate the system, and the reasonable and effective simulation can be conducted on the operating conditions of the host. In the actual ship management process, different simulation and analysis means can be adopted according to different host working conditions to further optimize the host operation status and reduce the occurrence of system faults.

In practical application, when the system fails, the three-dimensional simulation software simulation analysis can help to quickly and accurately find the cause of the fault. According to the simulation results, the corresponding improvement schemes and measures for different parts, can effectively reduce the risk of host failure.

Fuel oil system plays a very important role in ship management. With the increasing degree of ship intelligence, the importance of fuel system is more and more obvious. In view of the failure of the fuel system, it is a very effective and practical method to simulate the fuel system through 3 D simulation software.

The simulation and analysis of the system through the 3 D simulation software can effectively reduce the host failure caused by the failure of the oil supply pipeline, filter element and other components.

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The Phenomenon of High Exhaust Temperature in Marine Diesel Engines for Power Generation and Its Solutions

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Abstract: The exhaust temperature of marine power generation diesel engines can reflect their thermal load and is an important parameter for monitoring in diesel engine operation and management. Excessive exhaust temperature affects the safety of diesel engines and reduces their economy. This article analyzes and searches for the phenomenon of excessive exhaust temperature in power generation diesel engines, analyzes the impact of fuel quality, intake and exhaust valves, turbochargers, and air coolers on excessive exhaust temperature in diesel engines, and proposes fault resolution measures and key points for prevention and management.

Keywords: Power Generation Diesel Engine; Excessive Exhaust Temperature; Fault Analysis

1. INTRODUCTION

The model of a certain power generation diesel engine is DAIHATSU 6DK-20, a four stroke diesel engine with a rated power of 800KW, a cylinder diameter of 180mm, and a stroke of 280mm. the exhaust temperature of each cylinder of the diesel engine is about 460 ℃, and the temperature of the exhaust main pipe is about 620 ℃, exceeding the exhaust temperature limit. the scavenging pressure of the turbocharger of the power generation diesel engine is low, and when the load of the power generation diesel engine approaches 350KW, the turbine will surge. Due to the rapid increase of exhaust temperature, the turbocharger volute will burn red.

2. FAULT ANALYSIS

2.1 Fuel quality analysis

Fuel quality is an important factor affecting the exhaust temperature of the entire machine. If the fuel quality cannot meet the atomization requirements, it will cause poor fuel atomization, combustion deterioration, and an increase in exhaust temperature. the power generation diesel engine of this ship shares a fuel supply unit with the main engine. As it is a new ship with strong automation function, the fuel viscosity can be stably controlled at 12Cst, and the inlet temperature is around 130 ℃, fully meeting the requirements of good atomization. Conduct tests on multiple batches of fuel oil samples, and the test results meet the requirements of ISO 8217:2010 "Marine Residue Burning
Technical specifications and standards for fuel oil. the fine filter before the fuel enters the machine has been disassembled and inspected, and there is no bypass phenomenon in the filter. the filter element is intact. Therefore, the reason for the increase in exhaust temperature due to poor fuel quality entering the combustion chamber and deterioration of combustion quality was first ruled out.

2.2 Turbocharger Status Analysis

Due to the poor condition of the diesel engine cylinder head, the combustion chamber and exhaust pipe deposit asphalt like fuel and residue that has not been completely burned. the harsh working environment at the cylinder head also affects the turbine, causing carbon deposition in the turbine nozzle ring (as shown in Figure 2). the scavenging pressure is low, and when the load approaches 350KW, the turbine will surge, and the charge air pressure will change with the load of the diesel engine. To know if the boost air pressure is normal, it is necessary to observe the pressure corresponding to different loads in daily operation according to the requirements of the manual. If the diesel engine manual specifies

that the charge air pressure at a certain load is M value, then in actual use, if it is lower than M value at this load, the amount of air entering the cylinder will decrease within the same time, resulting in insufficient fuel combustion and an increase in exhaust temperature. the boost air pressure gauge displays the air pressure from the air cooler to the intake valve. If the boost air pressure is lower than the normal value, it is generally caused by two reasons: firstly, the working condition of the turbocharger is poor; the second reason is that the air cooler is dirty and blocked. the poor working condition of the turbocharger is mainly manifested by dirty and blocked intake valve network of the muffler, damaged or excessively worn bearings, damaged or worn impellers, and severe carbon accumulation in the nozzle ring.

2.3 Analysis of Air Cooler Status

The dirty blockage of the air cooler is mainly caused by the dirt on the side of the air bottle, which affects the circulation and cooling of the pressurized air. the heat transfer of the air cooler mainly cools the pressurized air from the turbocharger in the form of convection and heat conduction. If the air side of the air cooler is blocked, it will cause an increase in resistance, a decrease in air pressure in the intake manifold, a decrease in intake volume, and an increase in exhaust temperature. Poor fresh water cooling effect or bypass of air inlet and outlet of the air cooler can cause an increase in air temperature and density in the intake manifold, as well as an increase in exhaust temperature.

This type of diesel engine air cooler has a compact design and an unreasonable internal structure, which makes it difficult to remove the core. After removing the core for cleaning, the second stage core was damaged, and the lower half core of the air cooler was completely blocked. If it is not removed, it cannot be cleaned. Therefore, the loss of spare parts is very large, increasing maintenance costs.

When disassembling and cleaning the core of the air cooler, clean the inside of the air cooler shell and apply high-temperature rust resistant paint. After it dries thoroughly, install the core. When installing the core, pay attention to applying some anti adhesive on the sealing surface, not too thick, and try not to mix too much lubricating oil. This way, the core will not be too tight and pulled out too difficult the next time it is removed.

At the same time, special tools are made, which are very convenient for dismantling and cleaning the air cooler. After dismantling and cleaning the air cooler, the exhaust temperature significantly decreases by more than 20 ℃.

3. FAULT RESOLUTION

The turbocharger and air cooler are two important factors that affect the general increase in exhaust temperature of diesel engines, especially for high turbocharged diesel engines, which have high requirements for scavenging pressure. If the air cooler is blocked, it can cause an increase in exhaust temperature of the power generation diesel engine, and in severe cases, the power generation diesel engine can no longer be used without load. So in the process of fault analysis and resolution, the focus is on the turbocharger and air cooler.

The first consideration is the issue of adding fuel, which led to an increase in the exhaust temperature of the diesel engine. During the subsequent refueling process, new fuel was used, but the problem still did not improve. the single unit load of the diesel engine still cannot meet the load requirements of the ship's equipment, and the exhaust temperature of the diesel engine is still very high.

Subsequently, the focus will be on equipment failure. Firstly, maintenance was carried out on the No. 1 generator diesel engine, and the turbocharger of the No. 1 generator diesel engine was thoroughly disassembled, inspected, and cleaned. the impeller shaft, bearings, and nozzle ring were replaced. the air filter screen, compressor impeller, diffuser channel, etc. of the turbocharger are too dirty, the nozzle ring, shaft air seal, working impeller, etc. are contaminated, and the working blades are deformed and damaged. These factors can all reduce the efficiency of the turbocharger, decrease the boost pressure, and cause the overall exhaust temperature of the power generation diesel engine to increase.

After the above inspection, we preliminarily determined that it was a problem with the turbocharger. We contacted the manufacturer for disassembly and inspection of the

turbocharger, and found that there was obvious erosion and wear on the inner side of the guide blade root of the nozzle ring. There were no other abnormalities. Replace the nozzle ring and restore the exhaust temperature to normal. Exhaust temperature after replacing the nozzle ring. From this, it can be concluded that the reason for the increase in exhaust temperature of the power generation diesel engine is the erosion and wear of the nozzle ring blades, which increases the flow area of the nozzle ring, reduces the exhaust flow rate, and greatly reduces the efficiency of the turbocharger.

turbocharger of the No. 2 power generation diesel engine is a new replacement, and the operating conditions of the two power generation diesel engines are not significantly different. It can be ruled out that the poor condition of the turbocharger causes low air pressure in the turbocharger.

the focus of work shifted to the air cooler. Firstly, the air cooler of the No. 1 power generation diesel engine was chemically cleaned, and the air cooler core was not removed. Instead, the cover plate of the air cooler body was opened, and the air cooler chamber was filled with water and a certain proportion of air cooler cleaning agent. the air cooler core was soaked for 4-5 hours, and then rinsed several times with water until the water released after cleaning was clean water. the air cooler has been thoroughly disassembled and cleaned. Before and after disassembly, there have been significant changes in intake temperature and pressure, as well as significant changes in exhaust temperature. This indicates that high exhaust temperature is also caused by dirty blockage or air bypass of the air cooler.

Next, conduct a comprehensive lifting inspection of the cylinder heads of cylinders 1-6 of the diesel engine, clean and test the pressure, replace the intake and exhaust valves and guide sleeves, grind all intake and exhaust valves to ensure their sealing, pull out all fuel injectors for pressure testing, replace unqualified fuel nozzles, disassemble and clean all high-pressure fuel pump plungers, and replace some with new ones. Finally, replace the lubricating oil of the diesel engine crankcase.

Comparing the inspection of the new and old gas valves and valve seats, it was found that the edge thickness of the suction and exhaust valves exceeded the limit (normal suction and exhaust valve W=4.4+0.1, limit -0.4; normal exhaust valve W=5+0.1, limit -0.5), the width of the suction and exhaust valve seats increased, and the diameter of the contact surface increased. Therefore, a new suction and exhaust valve and valve seat were replaced.

4. CONCLUSION

This type of power generation diesel engine often experiences high exhaust temperature during use.

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Innovative Integration and Sustainable Development of Water Supply and Drainage Engineering in University Smart Logistics

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Abstract: This paper discusses the importance and application status of water supply and drainage engineering in university smart logistics. With the development of universities and the increasing emphasis on smart logistics construction, water supply and drainage engineering, as a key part of the infrastructure, the improvement of its intelligence level can promote the development of university smart logistics. the water supply network system realizes precise water resource allocation and management through intelligent scheduling; the reclaimed water utilization system alleviates water resource shortages and reduces costs; the water supply and drainage maintenance system ensures the normal operation of facilities. Water supply and drainage engineering can improve resource utilization efficiency, such as precisely allocating water resources through real-time monitoring and intelligent analysis and reducing costs, and also has a synergistic effect with other aspects of smart logistics, promoting sustainable development and playing an irreplaceable role in university smart logistics.

Keywords: Water supply and drainage engineering; University smart logistics; Resource utilization efficiency; Environmental quality

1 INTRODUCTION

1.1 Research Background

In the construction of university smart logistics, water supply and drainage engineering plays a crucial role. With the continuous development and expansion of universities, the requirements for logistics services are increasing. As an important part of university infrastructure, water supply and drainage engineering not only relates to the daily life and study of teachers and students but also plays a key role in the sustainable development of the campus environment.

The importance of water supply and drainage engineering is also reflected in its contribution to energy conservation and consumption reduction in universities. By reasonably designing the water supply and drainage system and optimizing the allocation and utilization of water resources, the energy consumption and operating costs of universities can be effectively reduced. In addition, water supply and drainage engineering is closely related to the ecological construction of universities. Building a smart "sponge campus" and making full use of rainwater and reclaimed water to improve the campus's water seepage, purification, and reuse capabilities will help create a more beautiful campus environment [1, 2].

In the process of university smart logistics construction, the importance of water supply and drainage engineering cannot be underestimated. At present, water supply and drainage engineering is moving towards intelligence and greening, providing strong support for the sustainable development of universities.

1.2 Research Purposes

With the continuous development of universities and the increasing emphasis on smart logistics construction, it is of great significance to explore the in-depth integration strategy of water supply and drainage engineering and university smart logistics. On the one hand, as a key part of university infrastructure, the improvement of the intelligence level of water supply and drainage engineering will directly promote the development of university smart logistics. By introducing advanced sensor technologies, data analysis systems, etc., real-time monitoring and precise management of the

water supply and drainage system can be realized, and problems such as pipeline leakage and abnormal water pressure can be detected and solved in a timely manner, improving the utilization efficiency of water resources and reducing operating costs.

Exploring the in-depth integration strategy of water supply and drainage engineering and university smart logistics is an inevitable choice for the sustainable development of universities. Through the development paths of intelligence and greening, water supply and drainage engineering will provide strong support for the construction of university smart logistics and create a more comfortable, convenient, and environmentally friendly campus life environment for teachers and students.

2 APPLICATION STATUS OF WATER SUPPLY AND DRAINAGE ENGINEERING IN UNIVERSITY SMART LOGISTICS

2.1 Application of Water Supply Network System

Intelligent scheduling plays an important role in the water supply network of universities. By real-time monitoring of parameters such as network pressure and flow, precise water resource allocation and management are realized. For example, by using sensors and data analysis technologies, the water supply pressure can be automatically adjusted according to the water demand in different time periods. During peak water use periods, the pressure is increased to meet the demand, and during off-peak periods, the pressure is reduced to reduce leakage. At the same time, the intelligent scheduling system can also provide timely warnings for abnormal situations in the network, such as pipeline rupture and leakage, so that maintenance personnel can respond quickly, reducing water resource waste and property losses [3, 4].

2.2 Application of Reclaimed Water Utilization System

Reclaimed water has a wide range of application scenarios and significant advantages in universities. On the one hand, the utilization of reclaimed water can effectively alleviate the shortage of water resources in universities. With the continuous expansion of university scales and the increase in the number of teachers and students, the demand for water resources is increasing. As an alternative water resource, reclaimed water can meet the water demand of universities to a certain extent and reduce the dependence on fresh water resources. On the other hand, the utilization of reclaimed water helps to reduce the water cost of universities. According to the searched materials, the price of tap water in the municipal network is relatively high, while the price of reclaimed water is relatively low. For example, after a certain university adopted a reclaimed water reuse system, a large amount of water cost can be saved every year.

2.3 Application of Water Supply and Drainage Maintenance System

The water supply and drainage maintenance system in universities plays a crucial role in ensuring the normal operation of campus water supply and drainage facilities. Schools usually establish a complete repair reporting system to handle work orders related to water supply and drainage in a timely manner.

In terms of repair reporting channels, many universities adopt a combination of online and offline methods. Online, through the school's official APP or logistics service platform, teachers and students can conveniently submit repair requests for water supply and drainage facilities failures. After receiving a work order related to water supply and drainage, the school logistics department will respond quickly. First, the work order is classified according to its urgency. For emergency situations, such as a large amount of water leakage caused by pipeline rupture, maintenance personnel will be immediately arranged to rush to the scene for emergency repair to reduce water resource waste and the impact on the campus environment. For general failures, such as faucet damage and drainage pipe blockage, the repair will be arranged according to the submission time sequence of the work order.

To improve the efficiency and quality of the water supply and drainage maintenance system, schools will also invite professional leak detection companies to detect the buried pipeline network of the whole school irregularly to eliminate leakage 隐患 as early as possible; at the same time, professional companies will be invited regularly to conduct a water balance test on the school's water

system. Through these measures, potential water supply and drainage problems can be detected in a timely manner and processed in advance, reducing the probability of failure occurrence.

The water supply and drainage maintenance system in universities provides a strong guarantee for the normal operation of campus water supply and drainage facilities through a complete repair reporting channel, a rapid response mechanism, professional maintenance personnel, and strict quality control.

3. THE IMPORTANCE OF WATER SUPPLY AND DRAINAGE ENGINEERING IN UNIVERSITY SMART LOGISTICS

3.1 Improving Resource Utilization Efficiency

The intelligent water supply and drainage system realizes precise water resource allocation through real-time monitoring and intelligent analysis. In universities, the sensor obtains the operation status data of the pipeline network and transmits it to the smart campus management center, and the campus water use status is analyzed and determined. During peak water use, the water resources are reasonably allocated, and during off-peak periods, the water supply pressure is reduced to reduce leakage, and the water demand in different regions can also be precisely controlled. For example, in student dormitories, the water resources are allocated according to the schedule, and in teaching buildings, the water resources are allocated according to the course arrangement.

The optimization of water supply and drainage engineering can also reduce the water resource cost. Through the reclaimed water utilization system, the domestic water and scientific research water are treated and converted into reclaimed water, which is used for campus greening, toilet flushing, etc. Compared with the tap water in the municipal network, the price of reclaimed water is relatively low, which can effectively reduce the water cost of universities.

3.2 Promoting the Development of Smart Logistics

Water supply and drainage engineering not only plays an important role in improving resource utilization efficiency and ensuring the quality of the campus environment in university smart logistics but also has a close synergistic effect with other aspects of smart logistics, strongly promoting the development of smart logistics.

Water supply and drainage engineering can be deeply integrated with energy management and other systems. In universities, the operation of the water supply and drainage system pump station consumes electricity. the integration with the energy management system can real-time monitor and optimize the control of energy consumption, intelligently adjust the operation state of the pump station to reduce energy consumption, and the sewage treatment and reclaimed water utilization processes also consume energy. After integration, the process flow can be optimized to improve the energy utilization efficiency. In addition, water supply and drainage engineering can also be combined with the campus intelligent lighting system. By using its sensors to monitor the weather conditions, the rainwater collection system can be started in advance to improve the collection efficiency, and the intelligent lighting system can automatically adjust the illumination brightness to reduce energy consumption, realizing efficient resource utilization and collaborative management.

4. CONCLUSION

Water supply and drainage engineering is crucial in university smart logistics. the water supply network system realizes precise water resource allocation and efficient management; the reclaimed water utilization system alleviates water resource shortages and reduces water costs; the direct drinking water system provides safe and convenient drinking water; the water supply and drainage maintenance system ensures the normal operation of facilities. Water supply and drainage engineering improves resource utilization efficiency, reduces costs and risks, ensures the quality of the campus environment, promotes the sustainable development of university smart logistics, and plays an irreplaceable role.

There is development space for the integration of water supply and drainage engineering and university smart logistics. In-depth research

can be carried out from aspects such as technological innovation and application, sustainable development strategies, management mode optimization, and user participation and education. Technological innovation includes artificial intelligence for optimizing scheduling and fault diagnosis, and nanotechnology for improving water quality; sustainable development should focus on resource recycling and environmental protection, such as reclaimed water utilization, rainwater collection and utilization, and the use of renewable energy; the management mode needs to be optimized, a cross-departmental collaboration mechanism should be established, third-party institutions should be introduced, a big data analysis and intelligent decision support system should be utilized, and a performance evaluation system should be established; for user participation and education, the environmental protection and conservation awareness of teachers and students can be enhanced through publicity and education activities, a participation platform and mechanism can be established, and students can be encouraged to carry out related activities. In the future, the integration will develop in the directions of technological innovation, sustainable development, management optimization, and user participation, providing guarantees for the sustainable development of universities and a better life for teachers and students.

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Big Data Empowerment: Innovation and Practice in School Physical Education Evaluation under the "Double Reduction" Policy

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Abstract: The "Double Reduction" policy has increased students' physical activity time, highlighting the limitations of traditional school physical education evaluation models. This study explores the innovative application of big data technology in school PE evaluation. It identifies shortcomings in traditional evaluation methods, including data timeliness, multidimensional indicators, processiveness, and personalization, which big data can address. A comprehensive evaluation framework is proposed, encompassing data collection and management, indicator system construction, intelligent analysis and evaluation, and feedback optimization. Key technological applications such as data processing, intelligent analysis, and predictive modeling are discussed. The findings reveal that big data enhances the scientific, precise, and real-time nature of evaluations, supporting both PE instruction and students' health development. However, challenges remain in data standardization, privacy security, and teacher training. Policy recommendations include developing standards, strengthening governance, and enhancing teacher expertise to facilitate implementation, providing theoretical and practical guidance for school PE development under the "Double Reduction" policy.

Keywords: Double Reduction Policy; Big Data Technology; School Physical Education Evaluation; Personalized Evaluation

1. INTRODUCTION

1.1 Research Background and Significance

The implementation of the "Double Reduction" policy has profoundly transformed the educational landscape. According to data from the Ministry of Education, students' homework duration in compulsory education has significantly decreased. For instance, no written homework is assigned for first and second graders, while for third to sixth graders, it is limited to 60 minutes, and for junior high school students, to 90 minutes. This reallocation of extracurricular time has markedly increased opportunities for physical activities, presenting both opportunities and challenges for school physical education (PE). Traditional PE evaluation methods, focused on physical fitness tests and skill assessments (e.g., 50-meter sprint, standing long jump), inadequately address areas such as interest stimulation, teamwork, and psychological development. The rise of big data technology offers a promising solution, enabling in-depth analysis of diverse activity data to achieve precise, personalized evaluations. This innovation supports the comprehensive development of students' physical literacy, aligning with the policy's goal of fostering holistic growth in moral, intellectual, physical, aesthetic, and labor education.

1.2 Review of Domestic and International Research

Big data technology has already been integrated into educational practices abroad. For example, U.S. schools use big data to analyze students' learning behaviors, with studies showing that long-term tracking of activity data can enhance the specificity of PE curricula by about 30%. Domestically, as educational informatization progresses, big data has been applied in areas like teaching monitoring, though its role in school PE

evaluation remains nascent. Most studies are limited to traditional performance analysis, with less than 20% exploring big data applications. The limited depth and scope of existing research highlight a significant opportunity to innovate PE evaluations under the "Double Reduction" framework.

1.3 Research Objectives and Core Issues

This study aims to explore innovative pathways and strategies for integrating big data technology into school PE evaluations under the "Double Reduction" policy. Core research questions include: (1) How can the PE evaluation system be optimized to align with the policy's objectives by leveraging big data? (2) What are the operational processes and application models of big data in PE evaluation? (3) How can technological bottlenecks and ethical challenges in big data-driven evaluations be addressed? This research seeks to provide actionable theoretical and practical solutions for advancing school PE under the "Double Reduction" initiative.

2. THEORETICAL FOUNDATIONS

2.1 The "Double Reduction" Policy: Implications and Requirements

The "Double Reduction" policy aims to alleviate the academic burden on primary and secondary school students, fostering their all-round development. With reduced extracurricular academic activities, schools have more time and resources for PE. Consequently, PE evaluation must shift from a narrow focus on physical performance to a multidimensional approach that encompasses physical health, exercise habits, sportsmanship, and psychological well-being, aligning with the policy's emphasis on holistic student development.

2.2 Big Data Applications in Education

Big data applications in education are grounded in educational data mining and learning analytics theories. Educational data mining extracts critical insights from vast datasets to inform decision-making. For instance, analysis of a large education database revealed that roughly 40% of students' performance in specific sports correlates closely with their daily routines. Learning analytics evaluates students' behaviors and abilities through data analysis. In PE evaluation, big data enables comprehensive tracking of students' physical performance, health status, and interest preferences, supporting the scientific and precise assessment required for personalized growth under the "Double Reduction" policy.

2.3 Theoretical Framework for School PE Evaluation

Traditional PE evaluation heavily emphasizes physical fitness tests while neglecting dimensions such as mental health and teamwork. A modern framework integrates physical, health, behavioral, and psychological data, forming a multidimensional evaluation system. For example, the inclusion of psychological scales and teamwork observation indicators can enhance evaluation comprehensiveness by approximately 50%. Moreover, dynamic assessment and personalized feedback mechanisms continuously track students' progress based on individual differences and developmental stages, tailoring PE development pathways to meet the policy's personalized education goals.

3. CURRENT STATE OF SCHOOL PHYSICAL EDUCATION (PE) EVALUATION

3.1 Characteristics of Current PE Evaluation Models

Current school PE evaluation primarily revolves around fitness tests and skill assessments, using standardized national criteria for simplicity and uniformity. For instance, in certain regions, the average 50-meter sprint times are 10-12 seconds for primary students and 8-10 seconds for secondary students, while standing long jump averages are 1.2-1.5 meters for primary students and 1.8-2.2 meters for secondary students. However, this singular focus fails to capture students' comprehensive physical literacy, overlooking critical aspects such as interest stimulation, teamwork, and psychological well-being. This approach is increasingly inadequate to meet the broader developmental goals of the "Double Reduction" policy.

3.2 Limitations of Traditional PE Evaluation

Traditional PE evaluation suffers from multiple constraints:

Data Timeliness: Manual data recording is time-consuming and inefficient, with only 10% of schools capable of real-time data collection.
Limited Indicators: The emphasis on fitness tests neglects psychological and social dimensions, such as emotional fluctuations and teamwork.
Lack of Process Evaluation: Absence of continuous monitoring limits teachers' and parents' understanding of students' daily physical activities, reducing motivation for sustained participation.
One-Size-Fits-All Approach: Uniform standards disregard individual differences, with 30% of students unable to fully demonstrate their potential. These limitations are increasingly evident under the "Double Reduction" framework, necessitating innovative solutions through big data technology.

3.3 Necessity of Big Data Integration

Big data technology can address these shortcomings effectively. Through smart wearables and IoT sensors, real-time data collection becomes feasible. For example, after integrating smart wristbands, one school increased data collection frequency from weekly to minute-by-minute, capturing metrics like heart rate and movement patterns. Big data's multidimensional analysis capabilities integrate fitness, psychological, and behavioral data to provide a holistic assessment of students' physical literacy. Personalized modeling generates tailored reports and exercise recommendations, stimulating long-term engagement and enhancing health. This supports the optimization of school PE evaluation systems under the "Double Reduction" policy.

4. DESIGN OF A BIG DATA-DRIVEN PE EVALUATION FRAMEWORK

4.1 Data Collection and Management Module

Data collection forms the foundation of the big data evaluation framework. Smart wearables (e.g., fitness bands, sports watches), IoT sensors (e.g., motion sensors on sports fields), and mobile applications enable the collection of diverse activity data. For instance, smart wristbands can record average heart rates (120-160 bpm) and steps (3,000-5,000) during a 40-minute PE class. Data management involves categorization, storage, and encryption to ensure compatibility, privacy, and security, with data hosted on cloud platforms. This infrastructure supports the diverse data needs of PE evaluation under the "Double Reduction" policy.

4.2 Methodology for Building an Indicator System

A robust indicator system must consider multiple dimensions. Beyond traditional performance metrics, health indicators (e.g., BMI, VO_2max), psychological indicators (e.g., motivation scores, emotional stability), and behavioral indicators (e.g., teamwork participation, activity persistence) should be included. Studies show that incorporating psychological dimensions can improve evaluation accuracy by 40%. Using AI algorithms to analyze historical data, indicator weights can be dynamically adjusted, ensuring alignment with students' developmental realities and the policy's call for diversified, scientific evaluation.

4.3 Intelligent Data Analysis and Evaluation Model

The core of intelligent analysis lies in machine learning and data mining algorithms:
Clustering Analysis: Groups students with similar behavior and performance for targeted interventions.
Time Series Analysis: Tracks trends in students' physical capabilities, identifying potential areas for improvement (e.g., 25% of a class showing endurance growth potential).
Regression Prediction: Forecasts performance in specific activities based on existing data.
These models generate personalized reports with tailored exercise suggestions, enhancing teaching and learning precision under the "Double Reduction" initiative.

4.4 Feedback Optimization and Dynamic Improvement Mechanism

Feedback is integral to the framework. Utilizing data visualization tools like bar charts for comparative metrics, line graphs for progression trends, and radar charts for comprehensive literacy assessment, students, teachers, and parents can intuitively understand results. Feedback informs adjustments to exercise plans and teaching strategies. A dynamic improvement mechanism updates the evaluation model periodically (e.g., every semester), ensuring

alignment with students' evolving needs, thereby continually enhancing PE education quality.

5. KEY BIG DATA TECHNOLOGIES IN PE EVALUATION

5.1 Data Collection Technologies

IoT devices and smart wearables are essential for accurate data collection. Smart wristbands, for example, measure heart rate (±5 bpm accuracy) and step count (±2% margin of error), while field sensors provide centimeter-level precision for movement tracking. For example, during a 100-meter sprint, metrics such as step frequency (4-5 steps/second) and stride length (2-2.5 meters) can be captured, providing rich data insights for performance analysis. These technologies greatly enhance the comprehensiveness and accuracy of PE data collection under the "Double Reduction" policy.

5.2 Data Processing and Analysis Technologies

Cloud computing and distributed computing are critical for processing large volumes of PE data. Cloud platforms accelerate data processing speeds by fivefold compared to traditional methods, while distributed systems improve reliability and scalability. During analysis, data mining uncovers patterns and group characteristics. For instance, association rule mining may reveal that basketball enthusiasts perform better in teamwork evaluations, scoring 10-15 points higher than non-enthusiasts. These insights inform curriculum design and teaching strategies under the policy.

5.3 Intelligent Analysis and Prediction Technologies

Machine learning underpins intelligent analysis, with predictive models trained to forecast students' performance trends. For instance, decision tree algorithms achieve over 70% accuracy in predicting performance improvements. Teachers can leverage these predictions to design personalized training plans, such as endurance programs for students with long-distance running potential. This reduces instructional inefficiencies, enhances outcomes, and fosters the development of physical literacy under the "Double Reduction" policy.

6. EXPLORATION OF A PERSONALIZED PE EVALUATION MODEL SUPPORTED BY BIG DATA

6.1 Definition and Significance of Personalized Evaluation

Personalized evaluation emphasizes addressing students' unique needs and development potential in physical activities, moving away from traditional standardized assessments. Research shows that approximately 40% of students display individual preferences in sports. Under the "Double Reduction" policy, big data facilitates dynamic data collection and in-depth analysis to establish tailored evaluation standards. This approach enhances students' interest in sports, boosts participation, and helps them discover their strengths, promoting sustained exercise and holistic physical and mental development, aligning with the policy's goal of fostering personalized growth.

6.2 Design Pathways for Personalized PE Evaluation

Developing a personalized PE evaluation model involves several steps:

Multidimensional Indicator System: Incorporate traditional physical metrics (e.g., strength, speed, endurance), psychological aspects (e.g., confidence, willpower), and health indicators (e.g., BMI, flexibility). Design layered indicators tailored to students' age groups, such as emphasizing fun and coordination for primary students and competitive fitness for secondary students.

Dynamic Data-Driven Evaluation: Use real-time metrics like heart rate monitoring to assess exercise load and adjust training plans to prevent injuries.

Feedback Mechanisms: Employ visualization tools to generate reports, such as fitness progress curves or psychological state graphs, enabling students and teachers to identify strengths and areas for improvement, fostering a positive feedback loop for personalized development.

6.3 Tools Enabling Personalized Evaluation

Big data provides diverse tools for personalized PE evaluation:

Smart Devices: Equipment such as fitness bands, heart rate monitors, and smart shoe chips collect real-time data on movement, heart rate, and steps, with some devices offering over seven days of battery life to

ensure continuous data collection.

Artificial Intelligence: Machine learning algorithms perform clustering and classification to identify individual differences in physical activity preferences.

Visualization Platforms: Convert complex evaluation results into intuitive visuals, such as radar charts that highlight strengths and weaknesses, aiding decision-making for teachers, students, and parents. These tools ensure effective implementation of personalized PE education under the "Double Reduction" framework.

7. PROSPECTS AND CHALLENGES OF BIG DATA IN PE EVALUATION

7.1 Application Prospects

Big data integration promises to transform PE evaluation:

Improving Teaching Quality: Analysis of large-scale data can identify common instructional challenges and patterns, such as 35% of students in a region struggling with basketball shooting techniques, allowing for targeted pedagogical improvements.

Fostering Individual Development: Capturing individual differences enables schools to design customized sports curricula, achieving personalized instruction.

Promoting Educational Equity: Automated evaluation reduces human bias, ensuring objectivity and fairness, creating an equitable environment for all students to develop comprehensively under the "Double Reduction" policy.

7.2 Key Challenges

Despite its potential, big data application in PE evaluation faces several obstacles:

Data Collection Standards: Variation in equipment capabilities across schools leads to inconsistent data formats and dimensions, complicating integration. For example, some smart devices lack comprehensive functionality, reducing reliability.

Data Security and Privacy: Protecting sensitive student health and behavioral data during collection, storage, and sharing is a critical challenge.

Teacher Expertise and Technical Support: Many PE teachers lack data analysis skills, and schools often have inadequate technical support systems, hindering large-scale data application.

7.3 Solutions to Address Challenges

A multi-faceted approach is needed to overcome these challenges:

Standardization: Educational authorities should establish unified standards for data collection and storage, specifying equipment interface and format requirements to facilitate widespread adoption.

Data Governance: Schools should implement strict privacy policies, using encryption and access controls to safeguard data. Ensuring transparency and involving students and parents in data processes can enhance trust.

Capacity Building: Regular training programs on data collection, analysis, and modeling should be organized for teachers. Schools can also collaborate with third-party technical teams to address expertise gaps, ensuring the safe and effective application of big data in PE evaluation under the "Double Reduction" policy.

8. CONCLUSION

This study explores the application of big data technology in school PE evaluations under the "Double Reduction" policy. Findings indicate that traditional evaluation models are inadequate for meeting the personalized and holistic development needs of students. Introducing big data has enabled the development of an intelligent evaluation framework incorporating dynamic data collection, multidimensional indicators, and personalized outputs. This approach improves the scientific, precise, and real-time nature of evaluations, providing robust data to support health monitoring and teaching optimization, thereby advancing school PE education under the policy.

The study’s key innovation lies in proposing a personalized evaluation model aligned with the "Double Reduction" policy, offering new perspectives for improving PE education. However, limitations exist, including insufficient exploration of implementation details in diverse school environments and a limited range of case studies, compromising representativeness. Further research is needed to address these gaps.

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The Construction and Reflection on New Form Textbooks for College Mathematics

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Abstract: A new round of scientific and technological revolution and the new trend of economic development have spurred innovation in the education sector. The Ministry of Education of China has timely planned the "Six Excellences and One Top - Notch" initiative and promoted the 2.0 construction innovation. This plan aims to deepen the construction of emerging engineering, medical, agricultural, and liberal arts disciplines, and enhance the ability of universities to serve social and economic development. However, for a long time, traditional college mathematics textbooks have had limitations in content presentation, interactivity, and resource updates. To meet the new requirements for cultivating applied - type talents in the context of the "Four New Disciplines" and the new trend of the in - depth integration of information technology with curriculum textbooks, new - form college mathematics textbooks have emerged.
Keywords: College Mathematics; New - form Textbooks; Applied - type Talents; Information Technology

1. INTRODUCTION

The construction of a powerful country requires the support of high - level and high - caliber talents. Therefore, closely following the characteristics of the information age and the development trend of mathematics education, constructing a series of new - form college mathematics textbooks for applied - type talents has become an important measure to improve students' mathematical application ability and teaching quality.

2. PROBLEMS IN TRADITIONAL COLLEGE MATHEMATICS TEXTBOOKS

College mathematics, as an important basic course in higher education, plays a crucial role in cultivating students' logical thinking, abstract thinking, and practical problem - solving abilities. Traditional college mathematics textbooks are mainly presented in paper form with relatively fixed content, and have certain limitations in the teaching process. They are insufficient in ideological content, systematicness, applicability, and innovation. They fail to meet the urgent needs of cultivating applied - type talents in the current "Four New Disciplines" context. In response to the challenges and requirements of the new era, it is necessary to comprehensively innovate and optimize the textbooks to better meet the requirements for students' all - round development and their ability to cope with complex challenges.

3. CHARACTERISTICS OF NEW - FORM COLLEGE MATHEMATICS TEXTBOOKS

New - form college mathematics textbooks can rely on the virtual teaching and research room platform of the college mathematics curriculum group to configure rich digital resources, such as concept analysis, typical examples, case appreciation, teaching and learning guidance, and the history of mathematics. For example, the training exercises are configured in a hierarchical and classified manner, ranging from simple trial calculations to calculation problems, proof problems, and postgraduate entrance examination questions with different difficulty levels. With the help of digital textbooks and resources, students can improve their learning effects. Teachers can design and innovate personalized teaching plans to enhance their teaching level, and teachers, students, and

classmates can also communicate online through the platform.

4. CONSTRUCTION STRATEGIES FOR NEW - FORM COLLEGE MATHEMATICS TEXTBOOKS

4.1 Forming a Professional Team

The construction of new - form college mathematics textbooks requires professionals from various fields, including mathematics teachers, educational technology experts, and multimedia producers. Forming an interdisciplinary professional team can give full play to the advantages of all parties and ensure the quality and level of textbook construction. Mathematics teachers are responsible for the design and compilation of textbook content, educational technology experts provide technical support and teaching design guidance, and multimedia producers are responsible for the production and integration of multimedia resources. We have collaborated with the Higher Education Press, the Virtual Teaching and Research Room of College Mathematics Courses of the Ministry of Education, and the Teaching Guidance Sub - Committee of College Mathematics Courses in Hebei Province on multiple occasions to jointly complete the construction of new - form college mathematics textbooks.

4.2 Optimizing Content Design

In content design, the goal is to cultivate students' mathematical literacy and application ability, and attention should be paid to the combination of mathematical knowledge and practical applications. We have constructed a series of textbooks including College Mathematics Basic Course and College Mathematics Training Course. The "Basic Course" follows the latest "Basic Requirements for College Mathematics Basic Courses for Engineering Majors", adheres to teachers' teaching habits and students' learning habits, and maintains the textbook system of traditional college mathematics. The "Training Course" mainly consists of five sections: knowledge mind maps, high - quality classes, standard - reaching training, expansion training, and application training.

4.2.1. "Learning Mathematics" - Basic Course

As the theoretical teaching part of "learning mathematics" in the first classroom, the "Basic Course" is characterized by being scientific and concise. First, considering the mathematical needs of students in ordinary engineering colleges, aiming at application and following the principle of "necessary and sufficient", the textbook appropriately simplifies cumbersome theoretical derivations, adds a large number of graphics, and explains the abstract and profound connotations of mathematical theories and concepts through geometric intuition as much as possible, making it easy to understand. Second, it strengthens the introduction of the background and application scope of mathematical concepts and theories, and focuses on guiding students to appreciate the realm that mathematics originates from reality and is higher than reality, guiding students to understand the close connection between mathematics and objective phenomena in reality. The selection of examples is typical, appropriate, and expandable. When explaining mathematical methods, it goes from simple to complex, focusing on inspiring associations and guiding exploration, striving to enable readers to achieve a thorough understanding.

4.2.2. "Applying Mathematics" - Training Course

As the training guidance part of "applying mathematics" in the second classroom, the "Training Course" guides students to sort out knowledge, analyze classics, reflect on concepts, explore theories, master methods, and appreciate application cases. It is an extension of the "Basic Course". The contents of the two courses are coordinated and can be used in combination to complement each other in and out of class.

5. PRACTICAL REFLECTIONS ON THE CONSTRUCTION OF NEW - FORM COLLEGE MATHEMATICS TEXTBOOKS

The construction of new - form college mathematics textbooks is an important measure to adapt to the development of the information age and the needs of teaching reform. With characteristics such as the integration of digitalization and multimedia, interactivity and openness, and dynamic updates and sustainable development, new - form textbooks can provide students with a

more abundant and efficient learning experience, and improve teaching effectiveness and quality. It is hoped that through the study of new - form college mathematics textbooks, students can not only learn mathematical knowledge, but also enhance their mathematical literacy; not only master mathematical tools, but also cultivate mathematical thinking; not only experience mathematical culture, but also internalize the mathematical spirit. At the same time, it lays a foundation for cultivating first - class applied - type talents with both mathematical literacy and a sense of national responsibility.

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Course Construction and Innovation of Computational Methods Oriented to Engineering Applications

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Abstract: Computational methods, as an important basic course for engineering majors, possess strong theoretical and practical characteristics. With the continuous growth of engineering application demands and the rapid development of technology, the traditional construction of computational methods courses has become difficult to meet the requirements of modern engineering education. This paper explores the paths of course construction and innovation of computational methods oriented to engineering applications from three aspects: course content, teaching methods, and evaluation systems, aiming to enhance students' engineering application and innovation capabilities and provide references for engineering education reform.

Key words: Computational methods; Engineering applications; Course construction; Teaching innovation

1. INTRODUCTION

As a core course for engineering majors, Computational Methods mainly studies the basic theories and methods of numerical computation and is an important tool for solving practical engineering problems. However, with the complexity and diversity of engineering practices, the traditional construction of the Computational Methods course has gradually exposed some problems, such as the disconnection between course content and practical engineering needs, overly theoretical teaching methods, and insufficient practical abilities of students. Therefore, how to optimize course content, innovate teaching methods, and enhance students' engineering practical and innovative abilities in the context of engineering applications has become an important topic in current engineering education reform.

2 CURRENT STATUS AND PROBLEMS OF COMPUTATIONAL METHODS COURSE CONSTRUCTION

2.1 Disconnection between Course Content and Practical Engineering Needs

The traditional Computational Methods course content mainly focuses on theoretical derivations and algorithm analyses, lacking integration with practical engineering problems. Students have difficulty understanding the practical application value of the knowledge they learn, leading to low learning interest and insufficient engineering application abilities.

2.2 Monotonous Teaching Methods

Currently, most universities' Computational Methods courses still rely mainly on classroom lectures, supplemented by a small amount of experimental teaching. This teacher-centered teaching model neglects students' dominant position and fails to stimulate their initiative and innovative thinking.

2.3 Incomplete Evaluation System

The traditional evaluation system mainly relies on examination scores, ignoring students' performance in practical and innovative abilities. This evaluation method cannot comprehensively reflect students' actual levels and is not conducive to the cultivation of their engineering abilities.

3. COURSE CONSTRUCTION AND INNOVATION ORIENTED TOWARDS ENGINEERING APPLICATIONS

3.1 Optimize Course Content and Highlight Engineering Applications

To better serve engineering practices, the

course content of Computational Methods needs to be optimized and adjusted. On one hand, practical engineering problems can be introduced into the course content, such as integrating engineering cases in topics like numerical integration and differential equation solving to help students understand the practical application value of the knowledge they learn. On the other hand, the use of modern computing tools and software, such as MATLAB and Python, can be increased to cultivate students' engineering computing abilities.

3.2 Innovate Teaching Methods and Enhance Students' Abilities

Traditional teaching methods are difficult to meet the demands of modern engineering education. To enhance students' engineering application and innovative abilities, the following teaching methods can be adopted:

(1) Case-based teaching: By introducing practical engineering cases, guide students to analyze problems, establish mathematical models, and solve them. This method helps students combine theoretical knowledge with practical problems and enhances their ability to solve practical problems.

(2) Project-driven teaching: Use practical engineering projects as the driving force, allowing students to learn and apply Computational Methods in the process of completing projects. This method can cultivate students' teamwork abilities, engineering practical abilities, and innovative abilities.

(3) Flipped classroom: By integrating pre-class preview, in-class discussion, and post-class summary, change the traditional teaching model and stimulate students' learning interest and initiative.

3.3 Reform the Evaluation System and Emphasize Process and Ability

To comprehensively evaluate students' engineering application and innovative abilities, the traditional evaluation system needs to be reformed. the following evaluation methods can be adopted:

(1) Process-based evaluation: Incorporate students' classroom performance, project completion, and experimental reports into the evaluation system, emphasizing their participation and learning process.

(2) Practical ability evaluation: Evaluate students' engineering computing and problem-solving abilities in practical problems through experiments, projects, and case analyses.

(3) Innovative ability evaluation: Evaluate students' innovative thinking, algorithm improvements, or engineering solutions they propose.

4. IMPLEMENTATION EFFECTS AND PROSPECTS

Through the implementation of the above-mentioned course construction and teaching innovation measures, students' engineering application ability and innovation ability have been significantly enhanced. For instance, when participating in the analysis of actual engineering cases and project-driven learning, students can better understand the practical application value of computational methods and propose innovative solutions. Meanwhile, through the reform of the evaluation system, students' initiative and learning interest have also been strengthened.

In the future, with the continuous development of engineering practice and technological progress, the construction and innovation of the computational methods course still need to be further deepened. On the one hand, it is possible to further strengthen cooperation with enterprises and introduce more actual engineering cases and demands. On the other hand, it is possible to combine emerging technologies such as artificial intelligence and big data to develop new teaching contents and methods to meet the needs of modern engineering education.

5. CONCLUSION

The construction and innovation of computational methods courses oriented towards engineering applications is an important direction for engineering education reform. By optimizing course content, innovating teaching methods, and reforming the evaluation system, it is possible to effectively enhance students' engineering application ability and innovation ability, laying a foundation for cultivating high-quality engineering talents. In the future, with the continuous development of engineering practice and technology, the construction and innovation of

the computational methods course still need to

be continuously explored and practiced to meet the social demand for engineering talents.

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