Study on Systematic Reform of Teaching Mode of Logistics Management under the Field of Industry-Teaching Integration

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Abstract: In the new stage of synergistic evolution of industrial upgrading and educational change, logistics management professional education is facing a paradigm shift from knowledge transfer to competence construction. This paper analyzes the characteristics of the typology of vocational education, constructs a "four-dimensional one" reform model, and examines the status quo of teaching logistics majors from a multi-dimensional perspective, exploring the ideas of teaching reform in the field of industry-teaching integration. Based on the development theory of vocational education typology, this paper proposes to construct a "four-dimensional one" teaching reform framework, and form a new mode of talent cultivation adapted to the needs of the development of intelligent logistics through the reconstruction of the curriculum system, upgrading of the training platform, innovation of the evaluation mechanism and optimization of the faculty through the concerted efforts of four dimensions. The study emphasizes the in-depth coupling of teaching elements and industrial elements, and explores the implementation path of "curriculum content aligned with occupational standards, teaching process docked with workflow, and learning outcomes corresponding to job competencies", providing theoretical reference and practical paradigm for the cultivation of applied logistics talents.

Keywords: Integration of Industry and Education; Capacity Building; Coupling of Teaching Elements; Logistics Education; Model Innovation

1. Introduction

Driven by the dual drive of global supply chain reconstruction and digital technology penetration, the logistics industry is experiencing a profound change from traditional operations to intelligent operations. This change puts forward brand-new requirements on the knowledge structure, technical ability and professionalism of practitioners, exposing structural contradictions such as lagging curriculum content, virtualization of practical teaching and rigid evaluation mechanism in the current education system. The essence of the problem lies in the elemental isolation between the teaching system and the industrial system, which is manifested in the disconnection between the curriculum standard and the vocational standard, the asynchrony between the teaching resources and the technological evolution, and the misalignment between the cultivation specification and the job demand. Cracking these contradictions requires the establishment of an industrial demand-oriented teaching reform framework from the perspective.

2. The Theoretical Framework of Teaching Mode Reform

2.1 Analysis of the Typological Characteristics of Vocational Education

As an independent education type parallel to general education, its essential characteristics are reflected in the systematic innovation of value orientation, content structure and methodological system. This type of typification feature presents a three-dimensional dialectical unity in the reform of logistics professional education. First of all, at the level of education goals, vocational education breaks through the traditional "knowledge storage" orientation and emphasizes the symbiosis of professional competence and lifelong development. Specifically, it is manifested as: based on the "National Vocational Skills Standards for Logistics Teachers (2023)", focusing on the cultivation of explicit professional abilities such as intelligent warehousing equipment operation (such as AGV scheduling system operation and maintenance), supply chain optimization algorithm design (such as Dijkstra path planning)[1]; at the same time, based on the OECD key capability framework, we focus on the cultivation of sustainable development potential such as digital literacy (visual analysis of logistics big data), innovative thinking (green packaging cycle solution design), and form a dual-target structure of "that is, combat power + growth power". Secondly, at the teaching content level, vocational education takes the systematic work process as the logical starting point and reconstructs the subject knowledge system.[2] The BAG analysis method (typical work task analysis method) is used to decompose the logistics position into 12 typical work links, including warehouse management, order processing, and abnormal parts disposal, and the organic integration of the work process and knowledge structure is achieved through the transformation mechanism of "job task-ability unit-learning field". Taking the cross-border logistics practice course as an example, we integrate international trade theory (INCOTERMS2020 rules), information technology (blockchain traceability system operation) and risk management knowledge (customs compliance review) to build a modular course cluster. Finally, at the implementation path level, vocational education establishes a "three-level progressive" industry-education integration mechanism: the basic level achieves the docking of the teaching process and the production process through "school-in-school" (such as SF Campus Distribution Center); the advanced level relies on "factory lieutenant college" (such as JD Asia No. 1 Intelligent Warehouse Training Base) to carry out technical research; the innovation level builds an industrial college that is collaborative with "government-school-enterprise" (such as Cainiao Network Digital Supply Chain College), and jointly formulates industry technical standards such as unmanned distribution equipment operation. This type of feature requires that the teaching of logistics majors must break the path dependence of subject logic, and build a "five-level spiral" curriculum system with typical work tasks as the carrier and professional ability development as the main line - from career cognition (enterprise observation) to basic skills (RFID equipment operation), through comprehensive application (618 major promotion order processing simulation), innovative practice (distribution path algorithm optimization), and finally achieve career expansion (full-process rotation of supply chain), through the three-in-one teaching space reconstruction of "classroom-training room-enterprise", promote learners' ecological transformation from "school people" to "professional people".

2.2 Construction of "Four-Dimensional Integration" Reform Model

Based on the theoretical framework of Complex Adaptive System Theory, the teaching reform of logistics management majors requires the construction of an ecosystem with self-organized and nonlinear feedback characteristics. The "four-dimensional integrated" model proposed in this study follows the research approach of "element deconstruction - mechanism explanation - system reconstruction", and forms a collaborative evolution model with four dimensions of curriculum system, practical teaching, evaluation mechanism and teacher construction. Its theoretical core and practical direction reflect the triple construction logic:

First, the knowledge transformation logic of the curriculum system dimension. By building a dynamic mapping mechanism of "industrial demand-education response", we will realize structural reform on the supply side of education. Specifically, the DACUM (Developing A Curriculum) occupational analysis method is adopted to transform the 72 capability elements in the "Logistics Practitioner Capacity Standard" into a modular course system of "basic general modules (logistics economic geography, industry regulations and ethics) - professional core modules (intelligent warehousing operation, cross-border supply chain management) - expansion innovation modules (logistics big data analysis, carbon neutral logistics design)[3].Among them, the basic module focuses on professional identity and general ability cultivation, the core module is connected to key technical fields such as intelligent picking robot operation and transportation path optimization algorithms, and the innovative module introduces cutting-edge technology units such as digital twins and blockchain traceability to form a "capacity tree" course architecture that supports lifelong learning capabilities.

Second, the context reconstruction logic of practical teaching dimensions. Relying on the practical training ecosystem of "physics-virtual-enhanced" three-space integration, a gradual cultivation path of "cognitive concreteization-skill structure-ability transfer" is built. Physical space configures automated three-dimensional warehouses, AGV scheduling systems and other physical equipment in accordance with the "Logistics Training Base Construction Specifications"[4]; virtual space uses Flexsim simulation software to build regional logistics hub digital twins, supporting decision-making and deductions such as inventory strategy optimization and network resilience testing; enhancement space uses mixed reality technology (Mixed Reality) to superimpose fault codes, heat maps and other digital information layers on physical equipment to achieve a "learning by doing". This multimodal practice environment allows students to advance the role of "equipment operator-process administrator-system planner" and promotes the transformation of declarative knowledge to procedural knowledge.

Third, the value symbiosis logic of the evaluation mechanism dimension. Break through the limitations of Taylor's target evaluation model and build an evaluation system of "subject diversity-process continuity-standard dual source". A CIPP (Context-Input-Process-Product) evaluation model is used to form a four-dimensional diagnostic system that includes background evaluation (conformity of teaching objectives and industrial needs), input evaluation (synchronization rate of practical training equipment and technology), process evaluation (match degree of teaching implementation and work flow), and achievement evaluation (compliance between ability achievement and job requirements).Introduce the capability indicators in the "Logistics Professional Skill Level Standard", focusing on the professional capability elements such as equipment operation standardization (such as stacker safety operation SOP execution degree), abnormal handling efficiency (such as timeliness for generating emergency plan for bankruptcy), process optimization innovation (such as unit energy consumption reduction rate), and achieve the value unity of education evaluation and industry certification.

Fourth, the logic of ability transition in the dimension of faculty construction. In response to the problems of technical lag and practical de-embedding in the teaching team, implement the three-dimensional spiral improvement plan: establish a banking system for practical credits for teachers in the technical dimension, and requires no less than 1 enterprise technical transformation project per year; develop a TPACK (Technological Pedagogical Content Knowledge) training system in the teaching dimension to improve the compound capabilities of VR teaching resource development, project-based teaching design, etc.; form a logistics technology teaching innovation team in the research dimension, and carry out application research on the transformation of intelligent equipment operating procedures and the development of virtual and real training standards. Simultaneously implement the "dual-job mutual recruitment" mechanism, and the technical backbone of enterprises undertakes practical teaching tasks of no less than 30% of the total class hours, and teachers of colleges and universities participate in enterprise R&D projects to form a symbiotic pattern of "technical iteration driving teaching reform, teaching feedback feeding back technology innovation"[5].

3. The Multi-Dimensional Examination of the Current Situation of Logistics Teaching

3.1 Structural Imbalance of the Course System

The current logistics education system faces significant intergenerational fault problems, and traditional theoretical courses still dominate, while curriculum development in emerging fields such as intelligent warehousing, cross-border supply chain, and green logistics is lagging behind, making it difficult to match the industry's technological iteration needs. The update speed of textbook content is disconnected from the development of key technologies such as logistics automation equipment operation and big data analysis, which leads to a significant gap between teaching content and practical application scenarios. This structural imbalance has caused the student's knowledge system to have "excessive tradition and insufficient innovation". It not only lacks systematic understanding of cutting-edge fields such as Internet of Things architecture and digital twin technology, but also makes it difficult to adapt to practical requirements such as intelligent scheduling and cross-border data compliance. At its root cause, discipline barriers hinder the integration of cross-domain knowledge, the lack of industry-education coordination mechanism has exacerbated the dislocation of educational supply and industrial demand, and the lag in technical iteration of the teacher team further restricts curriculum innovation. To solve this dilemma, it is urgent to build a dynamic course update mechanism, open up technology transformation channels through in-depth collaboration between schools and enterprises, strengthen the cross-penetration of disciplines such as artificial intelligence and environmental science, and establish a continuous update system for teachers' technical capabilities, so as to achieve accurate docking between the education chain and the industrial chain.

3.2 The Practical Dilemma of Practical Teaching

The current logistics professional practical teaching system faces multi-dimensional structural contradictions, which seriously restricts the effectiveness of cultivating applied talents. At the hardware facilities level, the intergenerational difference in the training platform is becoming increasingly prominent: the logistics laboratories in most colleges and universities are still mainly mechanized equipment such as traditional forklifts and basic sorting lines, and it is difficult to build intelligent operation scenarios that include AGV cluster scheduling, intelligent warehousing digital twins, cross-border logistics customs system and other elements, resulting in students' technical cognition staying in the Industry 2.0 stage[6].There are significant systemic flaws in the design of practical content. The existing teaching projects focus on single skill training in isolated links such as warehousing and storage, transportation and loading, and lack comprehensive business drills throughout the entire supply chain. In particular, the simulation of complex scenarios such as multimodal coordination, emergency logistics scheduling, and green packaging cycles in cross-border e-commerce logistics is seriously insufficient. This fragmented cultivation model is difficult to cultivate systematic thinking and collaborative decision-making capabilities. The school-enterprise collaboration mechanism is in a formal dilemma. Surface on-the-job internships often become repetitive labor in simple positions. It has neither established a dual-tutor guidance system for schools and enterprises, nor has it transformed real projects such as intelligent logistics system operation and maintenance, supply chain risk simulation, and logistics big data governance into teaching cases. It also lacks in-depth cooperation carriers such as co-construction of R&D centers and technical research groups, resulting in the formation of a "parallel space" between practical teaching and industrial frontiers. This three-fold contradiction has given rise to structural defects in human talent. Graduates generally show typical characteristics of skilled mechanical operations but weak control of intelligent equipment but poor system optimization capabilities and insufficient innovation and problem-solving capabilities[7].To solve the difficulties, we need to build a new paradigm of practical teaching: to build a smart logistics innovation factory jointly built by schools and enterprises in the facility dimension, integrate new generation technology platforms such as 5G Internet of Things, digital twins, and blockchain; to design a multi-level project system in the content dimension, embed a composite task such as cross-border supply chain stress testing and low-carbon logistics solution design; to innovate the industry-education integration system in the mechanism dimension, and by establishing a joint teaching and research department of schools and enterprises, implementing dynamic project library management, and implementing dual-job mutual recruitment of teachers and engineers, forming a spiral coordinated development ecosystem between the education chain and the industrial chain.

3.3 Directional Deviation of the Evaluation System

The logistics education quality evaluation system has deep structural defects, and its core contradiction lies in the misalignment of value between the static and academic evaluation paradigm and the dynamic and capability-based industrial needs. The current evaluation mechanism relies too much on standardized testing frameworks, and focuses on shallow cognitive dimensions such as concept memory and theoretical reproduction, and fails to establish a monitoring system covering the entire cycle of capacity development. The composition of the evaluation subject is characterized by one-dimensionality. Teachers are the absolute authority leading the evaluation process. The participation of multiple stakeholders such as industry enterprises, practice tutors, and student subjects is absent, resulting in the evaluation perspective being limited to the campus wall. The design of evaluation standards is in an academic stalemate, and one-sidedly emphasizes the assessment of the integrity of the discipline knowledge system, but ignores practical ability dimensions such as problem modeling, technical adaptation, and solution iteration in logistics scenarios. In particular, new capability elements such as intelligent equipment fault diagnosis, supply chain elasticity assessment, and cross-border compliance risk disposal have been away from the evaluation framework for a long time. The evaluation method tools have significant technical lag, and they still use final written tests and practical reports as the mainstream forms. They lack modern evaluation methods such as process tracking based on digital twins, performance evaluation based on project-based learning, and decision-making simulation testing for complex situations, resulting in key qualities such as students' systematic thinking, innovation ability and professional qualities becoming evaluation blind spots. This evaluation orientation deviation triggers a dual development dilemma: at the teaching level, it forms a path dependence that emphasizes knowledge transmission and neglects capability construction, and it is difficult for teachers to obtain dynamic data on the growth of students' technical application capabilities, resulting in a lack of precise coordinates for teaching improvement; at the industrial level, it causes structural mismatch between the portrait of human talent and the job demand map. Although graduates master traditional logistics theory, they find it difficult to cope with practical challenges such as algorithm tuning, digital customs processing, and low-carbon solution design in smart logistics scenarios[8].To solve this dilemma, we need to reconstruct the new evaluation paradigm of "three-dimensional collaboration": establish a diversified evaluation community of school-enterprise and CPPCC in the main dimension, introduce industry certification standards and job ability models; build a "knowledge-skill-literacy" three-dimensional indicator system in the standard dimension, focusing on incorporating new capability observation points such as intelligent technology application, cross-cultural collaboration, and sustainable development; innovate intelligent evaluation tool chain in the method dimension, develop a digital twin evaluation system that runs through the entire process of course learning, project practice, and on-the-job internships, and use learning analysis technology to achieve visual presentation of the ability development trajectory. It is also necessary to establish a closed-loop feedback mechanism of "evaluation-teaching-industry" to feed the evaluation data back to curriculum iteration and teaching reform in real time, and ultimately form a modern logistics education evaluation ecosystem guided by ability development, supported by industry-education integration, and driven by digital technology.

4. Systematic Implementation Path of Teaching Reform

4.1 Reconstruction Strategy of Course System

The restructuring of logistics education course system requires the implementation of a three-in-one systematic reform strategy: in the demand docking dimension, build an industry-education integration community composed of education institutions, industry associations and leading enterprises, use DACUM task analysis method to deconstruct the typical working scenarios of intelligent logistics post groups through the normalised professional capability analysis workshop, transform emerging capability elements such as intelligent equipment fault diagnosis, cross-border supply chain digital affairs, low-carbon logistics system design, etc. into modular course objectives, and form a layered and progressive course cluster of "technical base - business platform - strategic decision-making". At the content update mechanism level, establish the technology evolution monitoring and course standard warning dual wheel drive model, rely on the logistics technology maturity curve (Hype Cycle) to track the technology diffusion trajectory of block chain traceability, digital twin storage, unmanned distribution system, etc., implement the quarterly course map update through the University and Enterprise Joint Course Committee, develop the scenario loose page teaching materials embedded with AR technology, and build a dynamically replaceable micro-certification unit system. The capacity training path design shall follow the cognitive development law to create a "four-dimensional spiral" advanced training framework - the basic cognitive layer constructs the digital twin model of intelligent logistics equipment through the virtual simulation platform to realize the specific recognition of abstract concepts such as AGV path planning algorithm and WMS system architecture; Skill migration layer carries out multi-mode learning in the training environment combining virtual and real, and simulates complex scenes such as cross-border supply chain interruption recovery and emergency logistics network reconstruction with the help of intelligent logistics sand table; The practical application layer promotes project system learning (PBL), converts the real cases of enterprises into teaching projects, and guides students to complete the whole process practice from scheme design to implementation verification in intelligent warehouse layout optimization[9], logistics carbon footprint accounting and other topics; At the innovation breakthrough level, the school enterprise joint innovation workshop carries out inquiry learning around such frontier fields as unmanned distribution ethics governance and supply chain digital twin modeling to train students' technical adaptability and paradigms innovation ability. The course implementation guarantee system needs to be synchronously innovated, and a teacher technical capability certification and iteration mechanism shall be established to promote the digital capability transformation of the teaching team through enterprise technology suspense duty, micro certification course development and other ways, and a credit bank system based on blockchain technology shall be constructed to achieve the traceability, accumulation and transformation of the learning results of the course module, and finally form the intelligent logistics course ecosystem with accurate demand docking, dynamic content evolution and capacity ladder growth.

4.2 Ecological Construction of Practical Teaching

The ecological construction of logistics education practice teaching needs to build a panoramic training matrix of "3D space - dual driving - 4D collaboration", and create a virtual and real intelligent training field at the physical space level: the physical operation area is configured with AGV cluster, automatic stereoscopic warehouse, intelligent sorting line and other industrial equipment, and a complete operation chain from receiving and inspection to delivery distribution is built; Relying on the simulation platform of the logistics system, the digital twin layer maps the warehouse operation data flow and equipment operation status in real time, and supports the decision-making deduction of supply chain network elasticity optimization, multi-modal transport path planning, etc; The augmented reality layer realizes the deep interaction between the intelligent wearable device and the logistics control system through the mixed reality (MR) technology and equipment operation guidance and fault warning information, forming a closed-loop training mode of "real operation - virtual verification - digital feedback"[10]. At the teaching implementation level, the "dual project driving" mechanism of deep integration of production and education is promoted: vertically implement the real project of the enterprise into the classroom, transform the intelligent warehouse layout optimization, cross-border logistics customs clearance scheme design and other engineering problems into teaching cases, and reconstruct the teaching contents according to the complete engineering process of "demand disassembly - scheme iteration - prototype development - effect evaluation"; Horizontally carry out teaching and scientific research projects into enterprises, establish teachers and students tackling teams around unmanned distribution path optimization algorithm, supply chain carbon footprint tracking model and other topics, and verify theoretical assumptions and technical schemes in real business scenes. The innovation of education mechanism focuses on the ecological construction of "four-dimensional coordination": in terms of main body coordination, establish the dualistic governance structure of schools and enterprises, and realize the resource exchange and standard mutual recognition through co-construction of modern industrial colleges; Teachers cooperate to implement the "dual mentor+engineer" configuration mode. The technical director of the enterprise is responsible for teaching the intelligent equipment operation and maintenance specifications and industry technical standards. The college teachers focus on the methodology guidance and the construction of the knowledge system, and the industry certification experts provide the professional quality evaluation; Training path of "three-stage advanced" process collaborative innovation - in the recognition stage[11], the virtual workshop is used to master the equipment principle, the application stage completes the system joint debugging in the mixed environment, and the innovation stage participates in the technical breakthrough to solve the engineering problems; Evaluation and collaboration build a competency based certification system, organically integrate industry technology certification standards, enterprise post competency models and academic assessment indicators, and develop a micro-certification unit covering core capabilities such as intelligent device operation, logistics algorithm optimization, and cross-border compliance management. In order to ensure sustainable ecological evolution, it is necessary to establish a school enterprise technology collaborative innovation center as the nerve center to capture the diffusion trajectory of new technologies such as blockchain traceability and digital twin scheduling in real time, dynamically adjust the training items and teaching standards, and build a learning outcome distribution ledger through blockchain technology, so as to realize the visual presentation and cross-institution recognition of the growth trajectory of practical ability, and finally form a practical teaching ecological system of deep coupling between education elements and industry elements, ability training and technical evolution in the same frequency resonance.

4.3 The Paradigm Transformation of Evaluation System

The transformation of logistics education evaluation system paradigm requires the construction of a new evaluation ecosystem integrating "multiple subjects - process intelligence - capability certification", breaking through the traditional single authority mode in the evaluation subject dimension, and forming a five-element evaluation community composed of college teachers, enterprise engineers, industry certification officers, student bodies and third party evaluation institutions: teachers track theoretical internalization through knowledge map analysis tools, enterprise instructors use project evaluation scales to test the application efficiency of technology, certification institutions review professional quality with reference to ISO/TS international standards, students use reflective logs to carry out meta-cognitive evaluation, and third party institutions implement course quality fusion evaluation, forming a three-dimensional evaluation network of multi-source data. The process evaluation system needs to rely on digital twin technology to build all-factor monitoring matrix, design dynamic evaluation indicators covering the whole cycle of "pre-school learning - classroom interaction - project practice - innovation and expansion", use intelligent sensing equipment to collect equipment operation normative data in real time, analyze innovative thinking characteristics in scheme design through NLP technology, and use blockchain technology to build an immutable ability growth file, so as to realize hologram from knowledge mastery to technology migration. The reconstruction of competency based evaluation standard shall focus on the three-layer competency model of "technical adaptability - process optimization - value creation": the basic layer connects with the certification standard of logistics equipment operators, and focuses on the assessment of AGV path planning, WMS system configuration and other technical specifications; To assess the ability to solve complex problems such as multimodal transport scheme optimization and cross-border compliance risk treatment by referring to the professional standards of supply chain managers; The innovation level is connected with the certification system of logistics engineer, and the potential of technical innovation such as digital twin system modeling and carbon footprint tracking algorithm design is investigated[12]. In order to realize the ecological transformation of evaluation results, it is necessary to build an intelligent closed-loop system of "evaluation - certification - feedback": develop the capability radar map to dynamically present the individual growth trajectory, connect with the national credit bank to realize the cross-domain accumulation of micro certificates, use the generative AI technology to generate a personalized capability improvement scheme, and feed the evaluation insight into the course iteration and teaching improvement in real time through the school enterprise data center. The deeper transformation lies in the establishment of a dynamic evolution mechanism of evaluation standards, the prediction of future capability demands based on the industrial technology roadmap, the incorporation of forward-looking indicators such as UAV distribution ethics evaluation and supply chain digital resilience testing into the evaluation framework, the innovation of the evaluation technology carrier, the use of meta-space to carry out immersive situation evaluation, and the automatic triggering of the certification task of specific capability nodes through intelligent contracts, and the formation of a new quantitative evaluation model that resonates with the development of intelligent logistics, fits in the depth of individual professional growth, and co-evolves with the innovation of education forms.

4.4 Level Improvement of Teaching Staff

The construction of logistics education teachers team needs to build a co-evolution mechanism of "two-way enabling - technology backnursing - ecological activation", establish a dynamic balance system of the interaction of school and enterprise talents in the dimension of human capital flow: implement the technical enabling plan of teachers and the teaching transformation plan of enterprise engineers through the "dual track system" career development channel design, embed professional teachers into the enterprise R&D center every school year to participate in technical iteration projects such as intelligent equipment upgrading and cross-border customs system optimization, synchronously establish the enterprise technical backbone teaching ability certification system, undertake the modular teaching tasks after OBE teaching design, curriculum ideological and political integration and other special training, and form the rotary gate mechanism of "technical experts teaching in school+professional teachers in enterprise R&D.". In the aspect of technology transformation, create the technical innovation source of production and education integration. Relying on the smart logistics research institute jointly built by schools and enterprises, focus on the unmanned digital twin, low-carbon supply chain modeling and other frontier fields to establish a cross-discipline research team, develop a "technology package - course package - training package" three-in-one teaching resource transformation system integrated with the latest technical achievements, transform the technical patents into virtual simulation projects through intelligent matching algorithms, deconstruct the project cases into teaching micromodules, and build a two-way transmission channel for technology R&D and teaching application[13]. The teaching innovation incentive mechanism needs to build a closed-loop driving model of "value creation - achievement identification - ecological nurturing": set up a layered and classified teaching reform fund pool, focusing on supporting intelligent teaching scene construction, loose-leaf textbook development[14], virtual-reality fusion teaching method innovation and other projects; Create an intelligent incubation platform for teaching results, carry out multi-dimensional verification and iterative optimization for innovative results with digital twin technology, and establish a full-life cycle management system from teaching prototype development to popularization and application; The deeper reform lies in restructuring the evaluation system of teacher development, designing a three-dimensional evaluation model including technology transformation efficiency, teaching innovation index, industry-teaching integration contribution degree and other new indicators, and strongly correlating the evaluation results with title promotion and resource allocation. In order to ensure the continuous evolution of the system, it is necessary to establish an intelligent monitoring system for teachers' ability. Through big data analysis of teachers' technical ability gap and teaching innovation potential, the enterprise practice projects and teaching and research resources are targeted, and the "technical ability digital passport" coordinated by schools and enterprises is synchronously developed to realize the visual presentation and cross-organization authentication of teachers' engineering experience. Finally, it forms a new type of teacher ecology with spiral rising teaching ability and technical ability, two-way transformation of scientific research results and teaching resources, and co-existence of personal development and organizational evolution, providing continuous momentum for the cultivation of intelligent logistics talents.

5.Value and Effectiveness of Reform Practice

5.1 Significant Improvement of Talent Training Quality

Through systematic reform, students' technical application ability has been substantially enhanced, which is reflected in significant improvement of equipment operation norms, continuous optimization of complex problem solving ability, and effective activation of innovative thinking awareness. Graduates show good job adaptability and career development potential and are highly recognized by employing units.

5.2 Deep Reconstruction of Teaching Elements

The course system realizes the transformation from discipline orientation to work process orientation, the practice teaching completes the upgrading from simulation training to real project driving, the evaluation mechanism forms the transformation from result assessment to ability diagnosis, the teaching team realizes the transformation from theory teaching to technology, and builds a new teaching system that adapts to the needs of industrial transformation.

5.3 Ecological Construction of Industry-Education Integration

Both schools and enterprises form a stable cooperation mechanism in the course development, platform construction, project operation and other links, and the education supply and industrial demand are dynamically matched. This deep integration not only improves the quality of talent training, but also promotes the collaborative development of enterprise technical progress and school teaching reform.

6.Conclusions and Prospects

The "four-dimensional integration" teaching reform framework constructed in this study effectively solves the core contradiction in logistics professional education through factor restructuring and mechanism innovation. Reform practice shows that only by adhering to the value orientation of production and education integration, the core objective of capacity building and the implementation path of system reform can high-quality technical and technical talents adapt to the development of intelligent logistics be cultivated. The follow-up research will focus on the adaptive improvement of teaching mode under the background of digital transformation, explore the realization path of AI enabled teaching innovation, and continuously improve the logistics professional education system with Chinese characteristics.

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