

An Innovative Training Path for Applied Logistics Professionals from the Perspective of Industry-Education Collaboration: "Two Approaches + Three Collaborations + Four Integrations"

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Abstract: As an innovative talent cultivation mechanism, the industry-education integration model effectively combines educational resources, corporate resources, and societal demands, fostering a sustainable ecosystem for developing applied professionals. Currently, as China steadily advances toward its strategic goal of becoming a logistics powerhouse, higher education institutions must further deepen reforms to their market-oriented talent development systems. This involves establishing a collaborative industry-education curriculum framework guided by dual approaches and characterized by interdisciplinary integration; exploring a new paradigm for cultivating applied logistics professionals featuring dual-track motivation (academic innovation and professional competence), tripartite synergy (cooperation among the education chain, industrial chain, and innovation chain), and four-dimensional integration (interdisciplinary convergence, deep industry-education collaboration, theoretical-practical alignment, and university-enterprise resource synergy), thereby providing precise and specialized talent support for advancing the high-quality development of China's logistics sector.

Keywords: Industry-Education Integration; Collaborative Education; Applied Talents

1. Introduction

The "14th Five-Year Plan for Modern Logistics Development" issued in December 2022 marked the beginning of a new phase in China's transformation from a major logistics country to a leading logistics power. The plan explicitly emphasizes leveraging industrial and supply chains to enhance the resilience and security of the logistics system [1]. Technologies such as artificial intelligence and big data are also accelerating the digital and intelligent development of the logistics sector. In response to these industry transformations, logistics programs in universities must prioritize both theoretical knowledge and practical application: on one hand, refining theoretical frameworks and integrating interdisciplinary elements; on the other hand, aligning with smart logistics demands to strengthen hands-on training [2]. Furthermore, by leveraging industry-education integration mechanisms, they should explore innovative talent cultivation models, establishing a comprehensive system that combines interdisciplinary approaches, industry-academia collaboration, and real-world training to lay a solid foundation of skilled professionals for building a strong logistics nation [3].

2. Analysis of Issues in the Training Model for Applied Talents under the Background of Industry-Education Integration

2.1 The talent training program urgently requires structural adjustment and precise refinement based on dynamic demands

As the core component of higher education, the talent training program should rely on relevant policies and standards to establish a three-dimensional educational system[4], aiming to cultivate logistics professionals suited to the new quality of productive forces. Currently, logistics programs in universities face challenges such as overlapping training objectives, unreasonable curriculum design, insufficient interdisciplinary content, poor integration between classroom instruction and practical applications, and a lack of courses tailored to emerging job roles, leading to mismatches between talent supply and demand as well as dual difficulties in employment and workforce needs[5].

2.2 The shortcomings in the "dual-qualified" teaching workforce have become increasingly prominent

In the new era, logistics educators must possess both solid theoretical knowledge and practical industry expertise to effectively implement integrated theory-practice teaching. Current faculty members face significant deficiencies[6]: young teachers lack practical experience in enterprises, while senior teachers struggle to keep pace with the rapid digital and

intelligent transformation of the industry. Only by deepening industry-education integration, encouraging teachers to engage in corporate learning, and facilitating the application of research findings can we achieve coordinated development among education, talent cultivation, industry, and innovation [7].

2.3 There remains significant room for expanding and deepening the scope and depth of university-industry collaboration

Research indicates that while industry-education integration in university logistics programs is relatively widespread, overall outcomes remain inadequate. Collaboration models tend to be simplistic and superficial, lacking systematic, real-world practical experiences; internship management at universities often remains formalistic, limiting students' exposure to core technologies; enterprises show low willingness to participate due to concerns regarding costs, confidentiality, and talent attrition, making it difficult to establish sustained, in-depth partnerships that would enhance the quality of industry-education integration [8].

3. Exploration of Training Pathways for Applied Talents under Industry-Education Integration

In the context of deepening industry-education integration, it is essential to establish an innovative training pathway for logistics professionals characterized by "dual-driven approaches, tripartite collaborative mechanisms, and comprehensive integration."

3.1 Dual-track Approach – Integrated Development of Academic Innovation and Professional Competence

3.1.1 Academic Innovation Track

The academic innovation track focuses on cultivating high-caliber logistics science and technology innovators, implementing a four-stage training model. The curriculum incorporates specialized content such as intelligent algorithms and logistics big data, supplemented by research writing to enhance professional competence; university-enterprise collaborative laboratories are established to conduct research and participate in academic competitions using real-world business scenarios; a dual-supervisor system is implemented to facilitate joint research efforts between academia and industry, balancing academic value with practical industrial application.

3.1.2 Professional Competency Path

This pathway develops a four-stage educational model tailored to job requirements. Leveraging real-world corporate environments, the 1+X certification system, and dual-supervisor mentoring, it offers practical courses with credit conversion for certifications; implements rotational internships for hands-on training, bridges academic qualifications with professional certifications, delivers customized instruction through order-based programs, and dynamically refines curricula based on employment feedback.

3.2 Three Collaborative Linkages – Deep Integration of the Education Chain, Industrial Chain, and Innovation Chain

Education Chain: Dynamically adjusting academic disciplines to align with industry needs, establishing a "demand-oriented" talent cultivation system. The education chain is rooted in discipline development and employs a three-step approach—optimizing program orientations, upgrading curriculum systems, and integrating industrial resources—to meet industry demands: keeping pace with trends such as green and intelligent logistics by updating course content, building a tiered curriculum system incorporating practical enterprise cases, collaborating with enterprises to develop simulation-based teaching platforms and co-create teaching materials, thereby forming a complete closed-loop system driven by demand and dynamically optimized.

3.3 Industrial Chain: Deepen industry-education integration by leveraging the leading role of enterprises, creating practical scenarios for technology transfer

The industrial chain is enterprise-driven and relies on three mechanisms—joint base development, scenario-based transformation, and standard integration—to align with educational needs: schools and enterprises collaborate to establish smart logistics industry-education integration bases, transforming real-world operational scenarios into practical training sessions; incorporate corporate standard workflows into training assessments, and address technical challenges through targeted problem-solving initiatives; invite industry experts to participate in all teaching phases, fostering an industry-education ecosystem that bridges training with employment opportunities.

3.4 Innovation Chain: Supported by research institutions, it promotes joint R&D efforts and establishes an accelerated pathway for technology commercialization

The innovation chain leverages research institutions to drive development through three key dimensions: collaborative research, technology transfer, and case-based feedback. This includes establishing university-enterprise joint innovation centers focused on addressing challenges in the logistics industry through technological R&D; creating efficient channels for technology commercialization to facilitate its implementation in enterprises while enriching teaching cases; and forming a closed loop through demand alignment, project collaboration, and outcome sharing, thereby achieving mutual reinforcement among talent cultivation, technological advancement, and educational enhancement.

4. Four Integrations and Penetrations – Systematic Integration of Multi-dimensional Resources and Elements

4.1 Interdisciplinary Integration: Empowering curriculum restructuring through technology to cultivate interdisciplinary composite talents.

Interdisciplinary integration represents the core approach for innovating traditional logistics talent cultivation. By leveraging technological drivers and disciplinary integration to reshape the curriculum system, we aim to develop composite talents proficient in both logistics and cutting-edge technologies. Universities have established multi-domain "Logistics+" micro-specializations incorporating technologies such as algorithms, blockchain, and artificial intelligence; formed interdisciplinary faculty teams to develop cross-disciplinary courses; conducted practical training using enterprise data and tools; enhanced students' ability to address complex problems; and established an educational model that mutually strengthens technology and academic disciplines.

4.2 Deep Integration of Industry and Education: Leveraging the "Dual-Mentor System" as a bridge, a new paradigm for collaborative talent cultivation between universities and enterprises has been established

This deep integration relies on corporate participation and scenario-based extensions to align talent development with industry needs, with the dual-mentor system being its core mechanism. Universities collaborate with leading enterprises such as JD Logistics and SF Express Technology, where corporate technical experts work alongside university mentors to jointly develop training programs, design courses, and guide practical training; enterprise mentors transform frontline industry experience into teaching content, while university mentors contribute research to support technological innovation within enterprises, thereby establishing a virtuous cycle of collaborative education and joint innovation.

4.3 Integration of Theory and Practice: Validating solutions through dual scenarios to enhance problem-oriented practical capabilities

By leveraging the synergy between virtual simulation experiments and real-world enterprise projects, a comprehensive training system covering theoretical modeling, simulation validation, and practical optimization is established. The digital twin platform replicates various high-pressure logistics scenarios, enabling students to apply their professional knowledge in simulated tasks; simultaneously, students are deployed to frontline industrial sites for long-term practical projects where they implement simulation algorithms and use measured data to refine theoretical models, thereby creating a closed-loop practice training system that integrates virtual and real-world experiences with continuous iteration.

4.4 Integration of University-Enterprise Resources: Leveraging jointly established platforms as a vehicle, this approach achieves resource complementarity and value co-creation.

Universities and enterprises promote resource integration through collaborative development and long-term cooperation, deepening collaboration via platforms such as the Smart Logistics Research Institute. Both parties contribute equipment data, facilities, and teams to jointly develop modular teaching materials; operational sustainability is ensured through intellectual property rights and revenue-sharing mechanisms, with revenues reinvested into facility upgrades, thereby establishing an integrated model characterized by complementary resources, shared outcomes, and joint ecosystem development.

3. Conclusion

The cultivation of applied talents in logistics requires establishing an educational system characterized by dual-track drive, tripartite synergy, and quadruple integration. The dual tracks focus on academic innovation and professional

competence respectively, each featuring a four-stage development framework; the education-industry-innovation chains are interconnected to form a closed loop; and four-dimensional integration of disciplinary expertise, industry-education collaboration, theoretical-practical alignment, and university-enterprise partnerships is promoted, leveraging diverse measures to create an ecosystem-based educational model.

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