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Exploration of Curriculum Reform for Logistics Management based on Low-altitude Economy

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Abstract: With the rapid development of the low-altitude economy, low-altitude logistics has become an important driving force for the transformation and upgrading of China's logistics industry. However, the current talent cultivation model of logistics management major in Chinese universities still cannot meet the needs of the development of low-altitude economy. The relevant content of low-altitude economy has not been well integrated into the current curriculum system, and there is an urgent need for reform and innovation. This research aims to explore how to integrate the relevant content of low-altitude economy and apply the blended teaching mode to enhance the teaching quality of the logistics management major and the comprehensive quality of students, providing high-quality logistics management talents for the construction of low-altitude economy in China. Based on the analysis of the current situation of low-altitude economy and logistics management education in China, a teaching model framework of "three-stage five-dimensional integration" is proposed. Through online learning, interactive discussions, practical operations and diversified evaluations, a comprehensive curriculum reform is achieved. The research predicts that through the proposed online and offline blended teaching model, students' comprehensive quality and employability will be significantly enhanced, providing new ideas and practical basis for the reform of the logistics management education model in China.

Keywords: Low-altitude Economy, Logistics Management, Curriculum Innovation, Blended Teaching, Teaching Reform.

1. Introduction

Low-altitude economy refers to the business activities such as air transportation and unmanned aerial vehicle delivery carried out in low-altitude airspace, involving aircraft, airspace management and related service industries. The concept of "low-altitude economy" was first proposed in the "National Integrated Three-Dimensional Transport Network Planning Outline" in 2021 [1], providing positive guidance and support for it at the policy level. At the 2025 session of the National Two Sessions, it was repeatedly emphasized that efforts should be made to vigorously develop the low-altitude economy. The market size of China's low-altitude economy is expected to exceed 1.5 trillion yuan[2]. Local governments at all levels have also successively introduced relevant policies and implementation plans to support the development of the low-altitude economy, such as the "High-Quality Development Action Plan for the Low-altitude Economy" in Sichuan Province, Hunan Province, Guangdong Province and other places. According to statistics, by 2025, 30 provincial administrative regions have included low-altitude economy in their government work reports [3]. These measures indicate that the low-altitude economy is moving towards large-scale development. As a key link in this process, low-altitude logistics, with its efficient and flexible characteristics, has broken through the constraints of traditional ground logistics in terms of time and space, and has received widespread attention. However, it still has problems in terms of technology, safety, and regulations, and requires more professional logistics management talents to meet the demands of this emerging field.

The current logistics management talent training system in our country still cannot well meet the needs of the development of low-altitude logistics. The content of the current curriculum system mainly focuses on traditional logistics model teaching, lacking systematic theoretical explanations and practical application support. This gap has led to a shortage of low-altitude logistics talents in our country, seriously restricting the development of this industry. Therefore, how to cultivate logistics management talents that meet the development needs of low-altitude economy through innovative teaching mode reform has become an urgent problem to be solved.

This article addresses the problems existing in the development of low-altitude economy in our country. By optimizing and innovating the curriculum system of the logistics management major, it aims to cultivate professional talents with knowledge and skills in low-altitude logistics. The research objective is to establish a teaching model that meets the demands of low-altitude economic development and enhance the alignment between the educational quality of the logistics management major and the industry's demand for talents.

2. Literature Review

2.1. Current Research Status at Home and Abroad

2.1.1. Research Progress on Low-altitude Economy and Logistics Management

The development of low-altitude economy has become a firm will and long-term strategic direction at the national level. Major countries and regions around the world are also closely following the policy reforms and technological developments in the low-altitude field [4]. At present, most of the relevant research in China focuses on the impact on the development of the logistics industry. For instance, Zhao Guanghui and Li Chongrong (2025) hold that the development of low-altitude economy will have a significant impact on traditional logistics and transportation methods, especially in the fields of transportation and logistics, which have great potential for development [5]. In 2024, driven by national policies, low-

altitude logistics has become a key development area at the national level. Various regions have successively introduced relevant policies, such as the "Several Measures of Nanning City to Support the High-Quality Development of Low-altitude Economy". These policies have accelerated the infrastructure construction of low-altitude economy and promoted the formation of low-altitude logistics networks. Geng Yan et al. (2024) analyzed and studied the synergy between low-altitude economy and express logistics, arguing that the technical characteristics of low-altitude economy can effectively enhance logistics efficiency [6]. However, the research also points out that low-altitude logistics still has problems such as incomplete infrastructure and an imperfect management system, which require further in-depth research.

Research on low-altitude economy abroad focuses more on the combination of technology and policy. The United States, Europe and other countries have successively introduced a series of policies and measures to promote the development of the low-altitude economy. Among them, the United States issued the "Implementation Plan for the Innovative Application of General Aviation Equipment (2024-2030)", which promoted the commercial use of electric vertical take-off and landing aircraft (eVTOL) [7], while the European Union's "European Unmanned Aerial Vehicle Strategy 2.0" provided technical support and policy guarantees for low-altitude logistics [8]. In addition, Singapore has also utilized smart platforms, digital twins and other technologies to enhance the operational efficiency of low-altitude logistics [9]. These practices have accumulated valuable experience for China's development of the "low-altitude economy".

In terms of the integration of low-altitude economy and logistics management, relevant research achievements at home and abroad have provided important references for the policy-making and technological development of low-altitude logistics in China. However, at present, research on the cultivation of talents in low-altitude economy and logistics management is still insufficient.

2.1.2. Innovation in Logistics Management Education Research

With the rise of low-altitude economy, the educational reform of logistics management major has gradually attracted attention. In recent years, domestic universities have begun to explore how to introduce low-altitude economy into the teaching of logistics management majors to meet the demand for talents in emerging industries. The "hybrid education" model adopted by Northeast Finance University has shifted some courses to online teaching to meet the learning demands of emerging fields such as low-altitude logistics. University of Shanghai for Science and Technology has established a teaching framework centered on digital courses, while The Hong Kong Polytechnic University has enabled students to participate in actual projects of low-altitude logistics system design through case teaching and virtual simulation projects. Promote educational reform in the logistics management major.

Abroad, some countries have also begun to integrate low-altitude economy into the education and teaching of logistics management. For instance, the academies of applied sciences in Germany have already offered relevant courses such as "Low-altitude Logistics Network Design". These practices have certain reference significance for the cultivation of logistics management professionals in Chinese universities and also provide beneficial inspirations for the teaching reform and development of logistics management majors in Chinese universities.

However, although some achievements have been made in the field of low-altitude economy and logistics management education both at home and abroad, there is still a lack of systematic research on how to integrate the content of low-altitude economy into the teaching of logistics management courses in colleges and universities, especially the empirical research at the specific implementation level is not yet in-depth enough.

2.2. Analysis of Existing Teaching Models

2.2.1. Limitations of Traditional Teaching Models

At present, the logistics management major in our country still mainly adopts the traditional teaching mode of "lecture-based + case analysis", which has obvious limitations. The existing textbooks cover less about emerging fields such as intelligent warehousing and unmanned delivery, lacking practicality and forward-looking vision.

The current teaching model has obvious limitations in practical application. Many universities have not yet established a simulation experimental platform for low-altitude logistics, which leads to a lack of necessary practical experience accumulation for students when facing emerging positions. In addition, at present, the methods for assessing students' abilities in Chinese universities are relatively monotonous, which affects the development of college students' comprehensive qualities and makes their ability to solve complex problems relatively weak. Especially in the face of new professional fields such as low-altitude logistics planning and unmanned aerial vehicle dispatching, the existing teaching models are no longer able to meet the industry demands. According to the National Development and Reform Commission's Low-altitude economy Talent Development Plan, the talent gap in the low-altitude economy field is expected to reach 1.5 million by 2025 [10].

2.2.2. Innovative Practice of Blended Teaching

To address the shortcomings of traditional teaching models, domestic universities have successively carried out a series of teaching reforms, and some representative innovative models have emerged.

Some schools have adopted the approach of "flipped classrooms + virtual simulation". For instance, Wuhan University has introduced a low-altitude intelligent network simulation system in courses such as traffic management, which has significantly enhanced the interactivity and practicality of teaching. Some schools adopt a model of "research projects + interdisciplinary cooperation". For instance, Tongji University has established the "Low-altitude Logistics Innovation Research Center", and SF Express and South China University of Technology have jointly set up a "Low-altitude Logistics Experimental Base", which includes 35% enterprise instructors and conducts teaching based on actual enterprise cases.

However, these innovative models have exposed some problems in practical application, such as the low completion rate of online learning, the low utilization rate of offline training equipment, the underutilization of teaching resources, and the failure to fully achieve the expected goals of the reform.

The emergence of these problems indicates that although the blended teaching model has great potential, it still needs further optimization and improvement during the implementation process. In particular, it is necessary to overcome the shortage of technical and hardware resources

and further strengthen the cooperation between teachers and enterprises.

2.3. Theoretical Support and Improvement Directions

2.3.1. Theoretical Support

(1) Constructivist learning theory

The foundation of this teaching reform lies in the construction of the main theory of learning. It aims to encourage students to acquire knowledge through active construction with the help of others in specific situations. Constructivist learning theory focuses on the active construction of learners.

(2) The flipped classroom theory

The basic idea of the flipped classroom is to conduct autonomous learning before class, interactive discussions during class, and in-depth application after class. The courses of this reform utilize online platforms to incorporate industry trends, technical cases, preview tests and other methods, enabling students to complete their self-study work before class. Moreover, through classroom activities and project practices, students can deepen their understanding of the knowledge they have learned. This is consistent with the teaching ideology of the flipped classroom.

(3) Blended learning theory

Blended teaching encourages students to learn independently and emphasizes their subjectivity in learning, while teachers transform into the roles of learning designers and facilitators (Zhang Jinghua 2025) [11]. Digital technologies represented by artificial intelligence have driven the digital transformation of education. The shift of higher education from a single traditional offline classroom to a blended teaching model of online and offline is an inevitable trend of The Times (Wang Xiaohui 2025) [12]. The blended teaching model organically combines traditional face-to-face teaching with online learning and has significant advantages [13]. In the logistics management course of "low-altitude economy", online teaching can provide flexible teaching resources for students, while offline classrooms offer more opportunities for interaction and practice.

(4) Situational learning theory

Situational learning refers to placing learning in a real environment and, through specific scenarios and tasks, enabling students to deepen their understanding and application of the knowledge they have learned. Modern education increasingly emphasizes mobilizing the subjective initiative of learners. Unlike traditional educational cognition, it no longer regards learning as the transfer of knowledge from external to internal memory, but rather as a two-way process of the construction of learners' physical and mental health. Therefore, learning activities require a certain learning context that can subjectively stimulate learners' learning awareness and prompt them to try to the greatest extent possible to apply the knowledge they have learned to explain, analyze and solve the problems they face.

2.3.2. Directions for Improvement of the Existing Teaching Mode

In the process of popularization of higher education in our country, the traditional teaching methods of the logistics management major in colleges and universities can no longer meet the requirements for talents in the new era. To change the current situation, it is necessary to further improve the current teaching mode. Among them, the traditional education model has some drawbacks, such as over-reliance on theoretical instruction, relatively weak practical hands-on ability, and a low degree of integration with emerging technologies. For this reason, the focus of the improvement direction lies in the following aspects:

First of all, it is necessary to enhance the integration of teaching content with the actual needs of the logistics industry. Through cooperation with enterprises and the addition of enterprise guidance teachers, students can gain a deeper understanding of the current development trends and technological applications in the logistics industry.

Secondly, it is necessary to give full play to the advantages of blended education and improve educational methods. This course adopts an "online + offline" teaching mode, which not only enables students to have flexible study time but also enhances their practical abilities and problem-solving skills.

Finally, it is necessary to attach importance to the integration and cooperation across disciplines, especially focusing on the intersection of intelligent technology and logistics management. By offering a variety of course modules, we help students gain a complete understanding of the overall knowledge structure of logistics management, cultivate their interdisciplinary thinking, and equip them with the technical application ability to adapt to the future development of the industry.

This series of improvement measures has laid a solid foundation for the subsequent course design and the implementation of teaching methods, and provided theoretical support and practical paths for the innovation of logistics management courses in the context of low-altitude economy.

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3. Research Methods and Curriculum Design

3.1. Educational Reform Concepts and Goals

The core concept of this curriculum reform lies in making full use of the technological changes brought about by the low-altitude economy to promote the teaching reform of the logistics management major in our country and provide students with more practical and innovative opportunities. The rapid development of emerging technologies such as drone delivery and intelligent logistics is reshaping the operation mode of the logistics industry at present. Through curriculum reform and with the aid of advanced technological tools, we aim to help students gain a profound understanding of the operational methods of modern logistics, thereby enhancing their adaptability and innovative thinking in future industrial development, enabling them to better adapt to and respond to the dynamic changes in the logistics industry.

3.2. Design of the Three-Stage Five-Dimensional Integration Blended Teaching Model

The third-order five-dimensional fusion model summarizes the overall framework and specific implementation methods

of this mode. The construction of the three-level teaching model is divided into three stages: pre-class preparation, in-class teaching and post-class teaching. The "Five-dimensional Integration" approach supports the realization of teaching objectives from multiple dimensions through five stages: policy analysis, technical explanation, case analysis, practical operation exercises, and achievement display, comprehensively enhancing students' knowledge reserves and abilities.

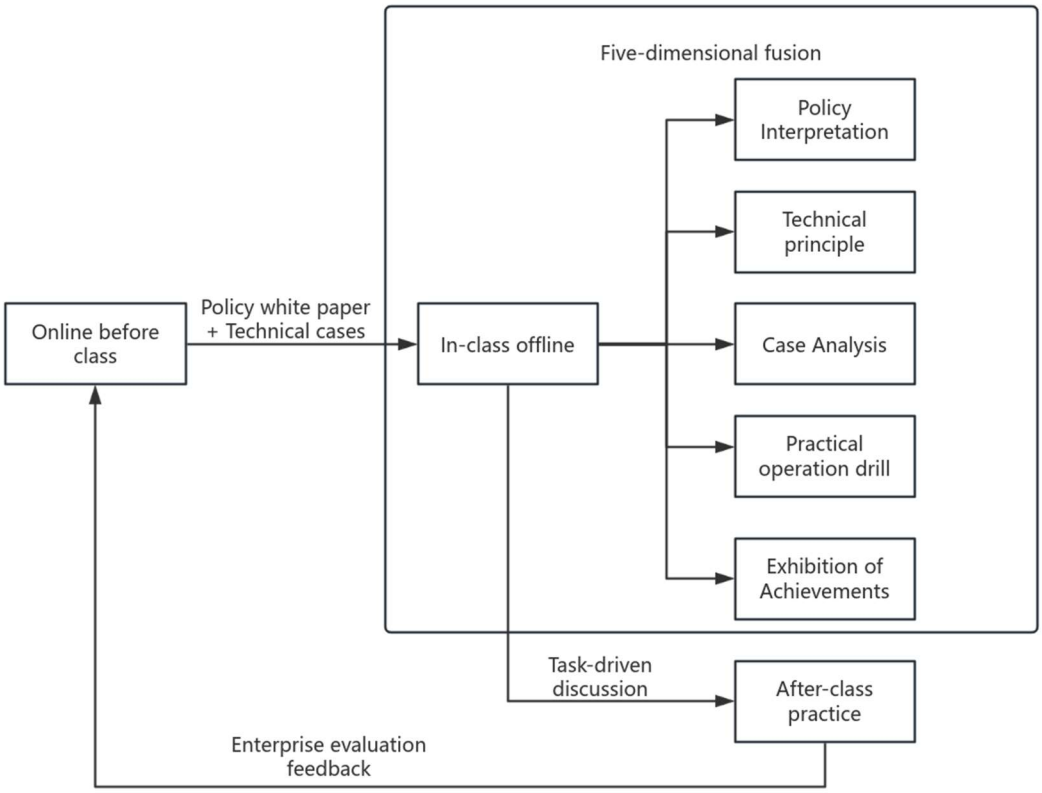

Fig. 1 Three-Stage Five-Dimensional Integration

3.2.1. Implementation Steps and Tools

Table 1. Implementation Steps and Tools

Stage	Specific activities	Tools and Resources
Before class	Push low-altitude economic policy documents (such as the "National Space Infrastructure Development Plan") and technical cases (such as Huawei 5G-A base stations)	Chaoxing Learning Pass, Tencent Classroom, Industry White Paper
In class	Situational task: Design the low-altitude logistics network plan for a certain city in 2025; Group discussions on the selection of unmanned aerial vehicles and policy compliance	Intelligent logistics sand table, drone simulator, and video connection with enterprise mentors
After class	Participate in the National Unmanned Aerial Vehicle Innovation Skills Competition; Write a report on the low-altitude logistics project	Dji UTC human-Machine Training System, Beidou Fuyi Low-altitude Intelligent Internet Platform, Enterprise internship base

In the "logistics Management" hybrid teaching system under low-altitude economy, according to the teaching process, the teaching flow is divided into three stages: before class, during class and after class. Each stage is equipped with appropriate tools and resources, thus ensuring the smooth progress of teaching activities and the effective improvement of learning outcomes.

The key points of the pre-class preparation stage are the laying of knowledge and the guidance of previewing. Through online platforms, policy documents in the field of low-altitude economy, such as the "National Space Infrastructure Development Plan", are pushed, providing macro policy guidance for the development of low-altitude economy and enabling students to better understand and grasp the future development trends of our country. And by pushing relevant content of technical examples such as Huawei's 5G-A base stations, students have gained a certain understanding of the latest technologies and applications in China's low-altitude economic development. At present, "Chaoxing Learning Pass" serves as a comprehensive learning platform. Its function is to store and distribute various teaching resources, enabling students to access the textbooks they need anytime and anywhere. Tencent Classroom has built an online communication platform for teachers and students, facilitating mutual communication and raising questions among them. The "Industry White Paper" is characterized by its authority and professionalism, providing in-depth analysis of the industry and helping students build a systematic knowledge framework.

In the process of course implementation, practical operation should be emphasized and teaching activities

should be carried out with practice as the orientation. Closely integrating the actual demands of China's low-altitude economic development, the scenario task of "2025 Low-altitude Logistics Network Planning for a Certain City" is set up. Centering on students, discussions are held around the types of unmanned aerial vehicles and the compliance issues of relevant laws and regulations. During the discussion, a virtual logistics sand table was used to simulate the real low-altitude logistics network environment, allowing students to have an intuitive understanding of the layout and operation of the logistics network. Unmanned driving simulators enable students to have hands-on experiences and practices of unmanned driving, and understand the performance parameters and usage methods of unmanned aircraft. A bridge can be established between the college and enterprises through video calls with enterprise mentors. These mentors share their work experiences and cases with students, providing them with some practical guidance and enabling them to transform their theoretical knowledge into practical abilities.

After the class, focus on practical expansion and the output of results. Organize college students to participate in the "National Unmanned Driving Technology Innovation Competition", and cultivate practical skills such as unmanned driving technology through the competition. And ask the students to write a special report on "low-altitude logistics", summarizing the results of their learning and practice. The DJI UTC drone training system is used for students' professional skills training. The Beidou Fuxi low-altitude intelligent network platform enables students to understand the latest low-altitude intelligent network technologies and application scenarios. Enterprise training bases can enable students to gain practical experience in actual work, thereby enhancing their professional competitiveness.

3.2.2. Course Module Design

The teaching content of the course modules of this course is centered on the in-depth integration of "low-altitude economy" and "logistics management". Through reasonable teaching mode reform, it aims to train students' comprehensive qualities.

Among them, "Low-altitude Economic Policies and Regulations" conducts a detailed analysis of the relevant provisions on the management of low-altitude airspace in China, the process of civil aviation airworthiness certification, and related international civil aviation laws and regulations from the perspective of macro policies. This project intends to take the "Low-altitude Economy Industry Fund" established in Henan Province and "Taizhou, Zhejiang Province" as the case study objects. Through case analysis, it aims to reveal the mechanism of policy effect on the formation of the logistics pattern of the "low-altitude economy". Through the study of this course, students will understand the significance of relevant policies and regulations in China's air transportation industry and be able to make logistics decisions based on these policies and regulations.

"Drone delivery technology" focuses on several key issues in drone delivery, including the selection of drone types, flight planning, obstacle avoidance algorithms, and battery endurance management. This project is based on the actual operation data of Meituan (Meituan) with a daily delivery volume of over 100,000 units, and combines the vertical take-off and landing aircraft (VTOL) charging technology of Fengfei Aviation to guide students in the optimization design of urban logistics networks. The aim of this course is to enable students to understand the operation theory and methods of unmanned aircraft, and to be able to design and optimize unmanned aircraft delivery systems in accordance with the requirements of the operation environment.

Table 2. Course Module Design

Module name	Core content	Low-altitude economic convergence point
Low-altitude economic policies and regulations	Analyze the national low-altitude airspace management regulations, civil aviation airworthiness certification procedures, and international aviation laws	Combining regional policies such as the Henan Low-altitude Economy Industry Fund and the full-chain layout in Taizhou, Zhejiang Province, analyze the impact of these policies on the logistics model
Unmanned aerial vehicle delivery technology	Drone type selection, flight planning, obstacle avoidance algorithm, battery life management	Taking Meituan's drones with an average daily order volume of over 100,000 and Fengfei Aviation's eVTOL fast charging technology as examples, an optimization plan for the urban delivery network is designed
Intelligent logistics system	Internet of Things architecture, big data analysis, automated warehouse management, AI path planning	Introduce the case of SF Express 'low-altitude logistics and analyze the effect of the layout of 5G-A base stations on improving logistics efficiency
Innovation in air cargo transportation models	Vertical take-off and landing aircraft (VTOL) operation, air traffic control (ATC) systems, cross-border low-altitude logistics	Explore the "trunk line - branch line - terminal * three-level network design" in the innovative plan for Shenzhen's low-altitude economy industry
Low-altitude intelligent Internet management	Low-altitude communication networks, airspace dynamic monitoring, and unmanned aerial vehicle (UAV) swarm collaboration	Based on the Beidou Fuxi information technology, simulate the construction and operation and maintenance of the low-altitude intelligent Internet of Things platform

The "Intelligent Logistics System" module focuses on technologies such as the Internet of Things architecture, big data analysis, automated warehouse management, and AI path planning. By introducing the successful case of SF Express 'low-altitude logistics, the role of 5G-A base station layout in improving logistics efficiency and achieving real-time transmission and precise scheduling of logistics information is analyzed. Cultivate students' application of intelligent technology to solve practical problems in logistics and

attempt to understand an efficient and intelligent low-altitude logistics system.

The "Innovation in Air Cargo Models" module explores the operational techniques of vertical take-off and landing aircraft, the operational mechanisms of air traffic control systems, and the special requirements of cross-border low-altitude logistics. Taking the three-level network design of "trunk line - branch line - terminal" in the innovation plan of Shenzhen's low-altitude economy industry as a reference, this paper analyzes the functions and collaborative methods of different levels of networks and explores the innovative path for the development of air cargo transportation models. Through the study of this module, students can cultivate innovative thinking and attempt to design a new type of air transport method that meets the needs of China's low-altitude economic development.

The "Low-altitude Intelligent Network Management" module is based on the Beidou Fuxi information technology and conducts simulation research on the construction and operation of low-altitude intelligent networks. It mainly includes key technologies such as the construction of low-altitude communication networks, the realization of airspace dynamic monitoring, and the collaborative control of unmanned aerial vehicle clusters. Through simulation practice, students master the management methods and technical applications of the low-altitude intelligent Internet of Things, providing technical support and talent guarantee for the intelligent development of low-altitude economic logistics management in the future.

These course modules support and work in synergy with each other, forming a relatively complete and systematic knowledge system for low-altitude economic logistics management. This will provide a reference for cultivating high-quality logistics management talents with innovative spirit and practical operation ability, to meet the needs of China's low-altitude economic development for professional talents.

3.2.3. Evaluation and Feedback Mechanism

This course adopts a combination of online and offline assessment methods to ensure a comprehensive evaluation of students' learning progress and practical abilities.

Evaluation method

Online assessment: It includes a 20% preview test and a 30% virtual simulation operation, which assesses students' mastery and application of knowledge through an online platform.

Offline assessment: It includes practical operation assessment accounting for 25% and project report accounting for 25%, mainly testing students' hands-on ability and scheme design ability.

Enterprise mentor evaluation: Invite enterprise mentors from Meituan, SF Express and other companies within the industry to participate in the evaluation work, focusing on assessing students' innovation level, practical value and feasibility in project plan design, and promoting the effective connection between course content and actual industry demands.

Construction of course feedback mechanism: Through conducting questionnaire surveys among trainees, collect and feedback the demands of enterprises, and fully understand whether the teaching content meets the needs of trainees. Based on the feedback, flexible adjustments and optimizations will be made to the course content and teaching methods to achieve the goal of improving teaching quality and realizing the training objectives.

4. Expected Outcomes and Implementation Challenges

4.1. Feasibility Analysis at the Theoretical Level

4.1.1. Educational Theory Support

According to constructivist learning theory, students view learning as an active process of constructing knowledge. Under the background of low-altitude economy, the innovative logistics management course adopts a hybrid teaching mode of online and offline. The online part can provide students with rich learning resources, such as reports on the low-altitude economy industry and cutting-edge cases in logistics management, creating an information-rich learning environment for students. Students can independently explore the knowledge they have learned in light of their own learning conditions and interests. Offline, through group discussions and practical solutions, communication and collaboration among students are strengthened, and they can better understand and construct the knowledge they have learned in the process of interaction.

The theory of blended teaching also provides a solid theoretical foundation for the implementation of this teaching reform. In this course, online teaching breaks the limitations of time and space, allowing participants to provide immediate learning feedback anytime and anywhere through online quizzes and discussion forums. Offline teaching can provide face-to-face guidance and communication, helping students solve difficult problems they encounter during the learning process, and cultivating students' practical operation ability and teamwork spirit. The organic combination of online and offline teaching can effectively improve the quality of classroom teaching and enhance students' learning experience.

Meituan's "Full Digitalization Solution for Low-altitude Economy" demonstrates that the development of the low-altitude economy requires the infiltration of the real industrial environment [14]. Under the background of low-altitude economy, by designing scenarios such as low-altitude logistics case analysis and drone operation, allowing students to learn in combination with actual cases, it is helpful to enhance their understanding of theoretical knowledge. This conclusion is highly consistent with the design concept of "task-driven low-altitude scenarios in the classroom" in this study, further verifying the effectiveness of blended learning in the context of the low-altitude economy.

4.1.2. The Demands of the Low-altitude Economy Industry are in Line

With the rapid development of the low-altitude economy, the demand for logistics management talents has also changed. Geng Yan and Zhao Chang (2024) believe that low-altitude logistics will drive the coordinated development of multiple industries such as unmanned aerial vehicle manufacturing, transportation, and logistics services. Compared with traditional logistics, this poses new demands on the professional knowledge and skill levels of logistics management talents. To achieve high-quality development, the express logistics industry must place talent building in a prominent position, clarify the goals and tasks, and cultivate a high-quality and highly skilled talent team to meet the development needs of the industry under the background of low-altitude economy. This teaching reform will integrate the relevant content of low-altitude economy into the teaching of logistics management, enabling students to understand the

characteristics, development trends and applications of low-altitude economy in the logistics industry, thereby enhancing students' interdisciplinary thinking and innovation ability. At the same time, a blended teaching model of online and offline can also be utilized to give trainees the opportunity to experience the actual situation of enterprises, communicate with some well-known enterprises, and enhance their practical skills and problem-solving abilities, so as to better adapt to the development of the country's low-altitude economy industry.

4.2. Expected Outcomes

4.2.1. Student Ability Enhancement.

Promote students' professional qualities and enhance their practical operation and problem-solving abilities. Introduce the concept of low-altitude economy into teaching and showcase the latest application cases of low-altitude transportation tools such as drones in the logistics industry. Through interactive classroom discussions and simulation experiments, students are guided to solve complex problems faced in low-altitude logistics operations with a "task-driven" way of thinking, such as the scheduling and route planning of low-altitude logistics. By adopting a multi-dimensional evaluation system and through methods such as group cooperation and case analysis, we cultivate students' habit of thinking from multiple perspectives and enhance their ability to handle complex situations. By integrating online theoretical teaching with offline practical operations, students can not only master the basic knowledge of logistics but also solve practical problems such as the allocation of low-altitude aircraft and the layout of logistics networks, comprehensively enhancing their creative thinking and hands-on abilities.

4.2.2. Improvement of Course Quality

It has enhanced the diversity and interactivity of teaching methods. The blended teaching model breaks the traditional framework, enabling students to study independently in the classroom and have in-depth communication with teachers. Before class, students can use online resources to learn about the trends in the logistics industry and the latest cutting-edge technologies. Deepen the understanding of the course through group discussions, case analyses and other methods in the classroom. Summarize and report after class to consolidate what has been learned. By integrating online and offline learning, students can enjoy a richer learning experience and more interaction.

The teaching content is closely integrated with industrial demands. The distinctive feature of this course is that it keeps pace with the development of China's low-altitude economy, integrating policy interpretation, technical analysis and practical application, thus ensuring a high degree of match between the teaching content and industrial demands. Through course study, students can better learn cutting-edge knowledge, keep up with the pace of industry development, and lay a solid foundation for future careers in high-tech fields such as low-altitude logistics and intelligent warehousing.

4.2.3. Effectiveness of Industrial alignment

This course integrates the latest development directions of China's low-altitude economy and logistics management, and has cultivated a group of high-quality talents that meet the development needs of the low-altitude logistics industry. The talent supply mechanism ensures a smooth transition from education to positions. Take SF Express as an example. In the past two years, it has directly recruited 37 graduates with practical experience from cooperative colleges and universities to serve as low-altitude logistics dispatchers. The cross-border logistics solution they designed for Shenzhen Airport has effectively reduced the transfer cost by 19%, and they have also provided new feedback and assistance to education by leveraging the company's resources. Form a virtuous cycle.

4.3. Data Verification System

To achieve the teaching reform results that are "quantifiable, traceable and sustainably optimized", a data verification system of "data collection - data analysis - dynamic feedback" is established, thereby forming a complete closed loop for improving teaching quality.

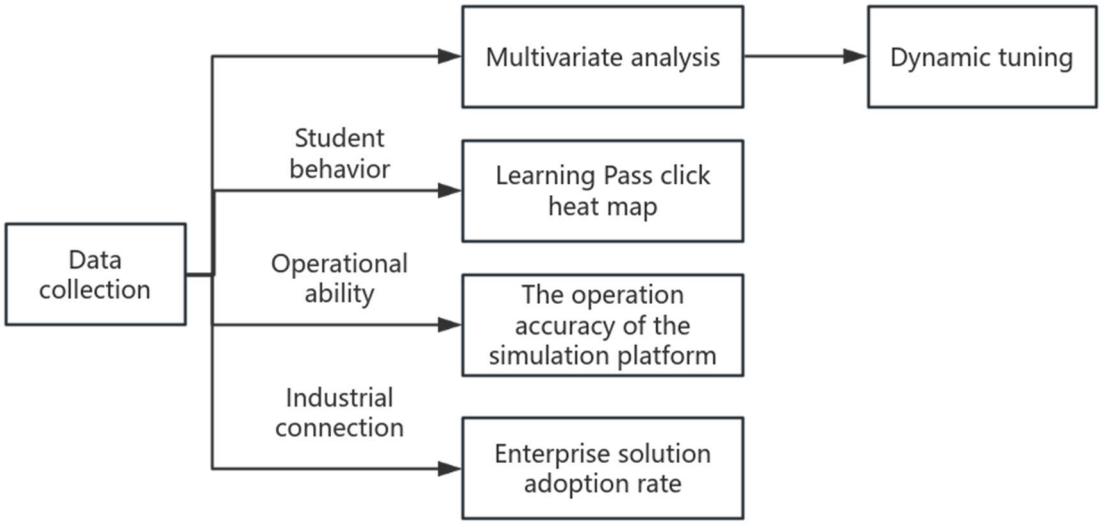

Fig. 2 Data verification system

4.3.1. Data Acquisition Channels

Students' learning progress and participation: Through online teaching platforms such as "Chaoxing Learning Pass" and "Tencent Classroom", comprehensive data collection has been conducted on all aspects of students' learning, including total learning duration, task completion status, and online test

scores, among other important data.

Virtual operation data of drones: Through the virtual simulation platform of DJI UTC drones, accurately obtain the operation data of trainees in the virtual scene, such as the precision of route planning, operation time consumption and other detailed parameters.

Project implementation result data: Through a comprehensive analysis of the low-altitude logistics special research report submitted by the trainees and the on-site operation assessment results, a comprehensive analysis of the actual effects achieved by the trainees during the project conception and implementation process is conducted.

Feedback on the assessment of enterprise instructors: By integrating the expert review results from leading enterprises in the industry such as SF Express and Meituan, and combining the working scenarios of the trainees in practice, the trainees are scored from multiple aspects including the feasibility of the plan, compliance with airspace management, and the degree of innovation, thereby establishing a virtuous cycle teaching improvement mechanism.

4.3.2. Data Analysis and Effect Evaluation

Through multi-dimensional data analysis and effect evaluation, the teaching process is continuously optimized to enhance students' comprehensive abilities.

Learning progress and effect analysis: By leveraging the data records on the virtual simulation platform, a comprehensive understanding of students' learning progress and knowledge mastery is achieved. By comparing and analyzing the data of each stage, the difficulties of the course and the knowledge blind spots of students can be precisely identified, laying a foundation for the next step of teaching adjustments.

Skill Enhancement assessment: By integrating the scores from enterprise mentors and the data recorded by the virtual simulation system, the students' abilities in key skills such as drone operation and logistics solution design are evaluated from multiple dimensions including the accuracy of path planning, the compliance and innovation of the plan. This enables a clear understanding of students' shortcomings in skills, providing a strong basis for subsequent optimization of teaching strategies and improvement of teaching quality.

4.3.3. Data-driven Teaching Optimization strategies

Update the teaching content dynamically. Based on the information feedback system, the course content is updated and iterated in accordance with the development trends of the industry and the actual needs of the trainees. In practical operation, by integrating the latest development trends of industry white papers and typical cases of enterprises, the course content is systematically adjusted to achieve an optimized design of the course structure.

Realize precise talent cultivation. By conducting a comprehensive analysis of students' learning behaviors and the characteristics of the industry's demand for talents, the setting of course modules and the allocation of teaching priorities can be adjusted in a targeted manner. Through the study of this course, a group of logistics management professionals with strong competitiveness will be cultivated, providing high-quality and suitable talents for enterprises.

Conduct quantitative assessment of teaching achievements. A data tracking mechanism for the entire teaching process was established, and regular quantitative evaluations were conducted on students' employment quality and industry adaptability. This system is based on data verification, ensuring that the direction of curriculum reform is consistent with the development laws of the regional economy, and closely integrating the supply of education with the needs of industries.

4.3.4. Iterative Upgrade of the Data Verification System

With the continuous development of low-altitude economy and logistics management, the data verification system will be dynamically optimized. Data collection and analysis tools will be upgraded towards automation and intelligence. On this basis, a closed-loop management system based on data has been established to continuously optimize the implementation process of teaching plans, thereby enhancing teaching quality and improving the efficiency of enterprise connection. This system emphasizes being based on empirical data, ensuring that the reform of the curriculum always revolves around the core needs of China's low-altitude economic development.

4.4. Real Challenges and Countermeasures

Many difficulties will be encountered during the implementation process. Among them, the most significant problem is the lack of internship resources. To address this issue, this paper proposes a collaboration mechanism with industrial enterprises, making use of the existing resources of enterprises to build internship platforms, and filling the gap in teaching resources through school-enterprise collaboration.

The rapid development of the low-altitude economy and the continuous upgrading of technology have put forward new requirements for the construction of the teaching system. Measures such as establishing a dynamic update mechanism, regularly inviting experts in the industry to give lectures, and conducting teaching in combination with the actual projects of enterprises can be adopted to ensure the advancement and practicality of the teaching content.

In addition, during the implementation of the curriculum, conflicts have emerged between students' extracurricular activities and cross-disciplinary courses, resulting in an imbalance in teaching hours. This requires the teaching team to optimize the course arrangement, design knowledge units in a modular way, and carry out hierarchical tasks based on students' cognitive laws. While ensuring the integrity of the core knowledge system, it is necessary to improve learning efficiency.

5. Conclusion

This paper conducts an in-depth exploration of the curriculum reform of the logistics management major under the background of low-altitude economy and proposes a teaching model framework of "three-stage five-dimensional integration". To enhance students' comprehensive qualities and meet the new requirements for logistics management education put forward by the development of low-altitude economy.

Although the current research has initially established the framework of a new teaching model and conducted discussions on the design of course content, there are still obvious limitations. Due to the lack of extensive classroom practice and data collection, there is not enough empirical data to support it, making it impossible to directly test the effectiveness and validity of this model, nor to conduct in-depth analysis of its teaching effect.

Based on the above situation, future research can take the experimental class as the object, comprehensively collect, sort out and analyze data on multiple aspects such as students' learning outcomes, satisfaction and employability, so as to

evaluate the practical effect of the blended education model. Furthermore, as the technology and policies of the low-altitude economy are constantly changing, the course content and teaching methods of logistics management must keep pace with the development of the industry and be updated continuously to ensure that the education system can keep up with the development of the industry.

References

[1] Central Committee of the Communist Party of China, State Council. Outline of the National Comprehensive Three-Dimensional Transportation Network[EB/OL]. (2021-02-25)[2025-08-05]. http://www.gov.cn/zhengce/2021-02/25/content_5589430.htm

[2] Civil Aviation Administration of China. 2025 China Low-Altitude Economic Development Forecast Report[R]. Beijing: Civil Aviation Administration of China, 2025.

[3] State Council. Government Work Report-Delivered at the Third Session of the 14th National People's Congress on March 5, 2025[EB/OL]. (2025-03-05)[2025-08-05]. http://www.gov.cn/premier/2025-03/15/content_5589430.htm

[4] Li Tang. Air-Ground Integrated Transportation: Research Opportunities for Low-Altitude Economy from the Perspective of Road Transportation[J]. Journal of Transportation Engineering and Information, 2025, 21(1): 1-14.

[5] Guanghui Zhao, Chongrong Li, Li You. Multimodal Transport Promotes High-Quality Development of Transportation: Practical Challenges and Governance Logic[J]. Logistics Technology, 2024, 43(12): 139-147.

[6] Yan Geng, Chang Zhao. Reflections and Countermeasures on High-Quality Development of China's Express Logistics Industry Under the Background of Low-Altitude Economy[J]. Transportation Research, 2024, 10(6): 95-103.

[7] Ministry of Industry and Information Technology, Ministry of Science and Technology, Ministry of Finance, Civil Aviation Administration of China. Implementation Plan for Innovative Application of General Aviation Equipment (2024-2030)[EB/OL]. (2024-04-07)[2025-08-05]. http://www.gov.cn/zhengce/zhengceku/2024-04/07/content_5589430.htm

[8] European Commission. European Drone Strategy 2.0[R/OL]. (2025-06-15)[2025-08-05]. https://ec.europa.eu/transport/modes/air/drones/strategy_en

[9] Maritime and Port Authority of Singapore. Maritime Digital Twin Port White Paper[R]. Singapore: Maritime and Port Authority of Singapore, 2025.

[10] Southern Xinhua Headhunting. Analysis of Talent Trends and Salary in China's Low-Altitude Economy Industry in the First Half of 2025[R]. Shenzhen: Southern Xinhua Headhunting, 2025-07-25.

[11] Jinghua Zhang. Research and Practice of Blended Teaching Mode for Programming and Software Development Courses Based on OBE Concept[J]. Computer Knowledge and Technology, 2025, 21(14): 167-170.

[12] Xiaohui Wang. Practical Approach of Digital Empowerment for Blended Teaching Reform in Ideological and Political Courses in Universities[J]. Journal of School Party Building and Ideological Education, 2025(12): 66-69.

[13] Shengfu Yang, Shougeng Hu, Zanqi Wang, et al. Exploration of Construction Path for Land Consolidation Engineering Specialty-Based on Comparison of 15 Universities[J]. Higher Agricultural Education, 2023(2): 63-68.

[14] Digital Economy Research Institute of Guangdong-Hong Kong-Macao Greater Bay Area. 2023 White Paper on Low-Altitude Economy Development (2.0)—Fully Digitalized Solution[R]. Shenzhen: Digital Economy Research Institute of Guangdong-Hong Kong-Macao Greater Bay Area, 2023-11-22.