

# Curriculum Reform and Practice Supporting the Cultivation of “Safety and Emergency Response” Specialized Management Talent: A Case Study of the Emergency Logistics Management Course

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## Abstract

In response to national needs for strengthening the emergency management system and in fulfillment of the responsibility of higher education institutions in Beijing to cultivate specialized management talent with expertise in “safety and emergency response”, the Emergency Logistics Management course at Beijing Institute of Petrochemical Technology has implemented systematic teaching reforms and practices guided by the OBE educational philosophy and “safety-oriented ideological and political education”. The reforms encompass four key dimensions: 1) Ideological and political education: constructing a ideological framework integrating teaching content, ideological and political elements, and emotional evolution; 2) Teaching mode: establishing an integrated teaching system that combines classroom instruction, academic competitions, scientific research, self-directed learning, and practical application; 3) Teaching content: restructuring modules according to the entire emergency management process and adopting a blended online-to-offline teaching approach; 4) Teaching evaluation: developing a multi-dimensional and multi-faceted assessment system that evaluates learning ability, learning mode, and learning outcomes. The reforms have yielded significant results, markedly enhancing students’ learning motivation and practical innovation capabilities. The course and teaching team have received multiple teaching awards and research projects. Future efforts will focus on further optimizing teaching resources and stakeholder involvement, building a diversified teaching community, and continuously supporting the cultivation of distinctive talent.

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## Keywords

OBE Educational Philosophy, “Safety and Emergency Response” Specialized Management Talent, Teaching Reform, Ideological and Political Education in the Curriculum, Evaluation System

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## 1. Introduction

The Outline of the 14th Five-Year Plan and the Long-Range Objectives Through the Year 2035 emphasize the enhancement of public emergency response capabilities and the improvement of the national emergency management system. However, the Opinions on Promoting Urban Safety Development reveal a misalignment between urban safety management and modernization, noting that higher levels of urban modernization are associated with increased vulnerability. Cultivating talent in safety and emergency management is essential for advancing emergency management modernization in Beijing and supporting high-quality development, representing a critical responsibility for higher education institutions in the capital (Zhang & Li, 2021).

The course “Emergency Logistics Management” is one of the core courses established under Beijing Institute of Petrochemical Technology’s “14th Five-Year Plan” initiative to develop interdisciplinary programs in “Safety and Emergency Management”. Designed for the urban safety logistics domain, it focuses on “Risk and Emergency Management” and supports the cultivation of specialized management talent in this field. As a required theoretical course for logistics management majors, it is offered to third-year students and serves as a pivotal link between foundational theoretical courses and subsequent practical training within the curriculum (Zheng & Dong, 2023).

The Outcomes-Based Education (OBE) is an educational philosophy that takes students’ expected learning outcomes as the core, designs teaching objectives, organizes teaching content, formulates teaching strategies and evaluates teaching effects around the achievement of these outcomes, with the key tenets including student-centeredness, outcome orientation and continuous improvement. It is selected as the guiding framework for this curriculum reform because emergency logistics management, as a discipline that emphasizes practical problem-solving and professional competency cultivation, highly aligns with OBE’s focus on bridging theoretical learning and real-world application. OBE can effectively guide the course in targeting the core competencies required for “safety and emergency response” specialized management talents and ensure that all teaching links serve the achievement of these competency outcomes. The course follows the complete emergency management lifecycle, emphasizing the teaching and discussion of emergency logistics management theories and modeling methods across three key phases: pre-incident preparedness and monitoring, and post-incident response. Guided by OBE educational principles and aligned with program objectives and graduation requirements, the course adopts “safety-oriented ideological and po-

litical education” as its foundation. Through critical emergency cases and corporate projects as practical scenarios, it cultivates students’ ability to integrate interdisciplinary knowledge from logistics management, emergency management, risk management, and digital-intelligent technologies (Liu & Zhang, 2020). This enables them to assess risks, design systems, and address complex challenges in emergency logistics management, thereby contributing to the development of specialized talent with a focus on “safety and emergency response”.

## **2. Teaching Reform and Practice of the Emergency Logistics Management Course**

### **2.1. Ideological and Political Education Reform**

A key developmental objective of the Emergency Logistics Management course is the subtle integration of ideological and political elements to enhance safety awareness, foster social responsibility, and deepen students’ patriotic sentiment. To achieve this, the course designs an educational framework that merges the main instructional content with an underlying ideological and political thread, based on the emotion-affection-behavior evolution pattern, thereby collectively advancing the course’s developmental goals (Wang & Liu, 2022).

The concept of “safety-oriented ideological and political education” takes “cultivating safety awareness as the foundation, shaping professional ethics as the core, and undertaking social responsibility as the goal” as its three key principles. Unlike the general curriculum ideological and political education, it focuses on the professional characteristics of safety and emergency fields, integrating ideological and political guidance with professional knowledge acquisition, and guiding students to establish a “safety first” value orientation while mastering emergency logistics management skills.

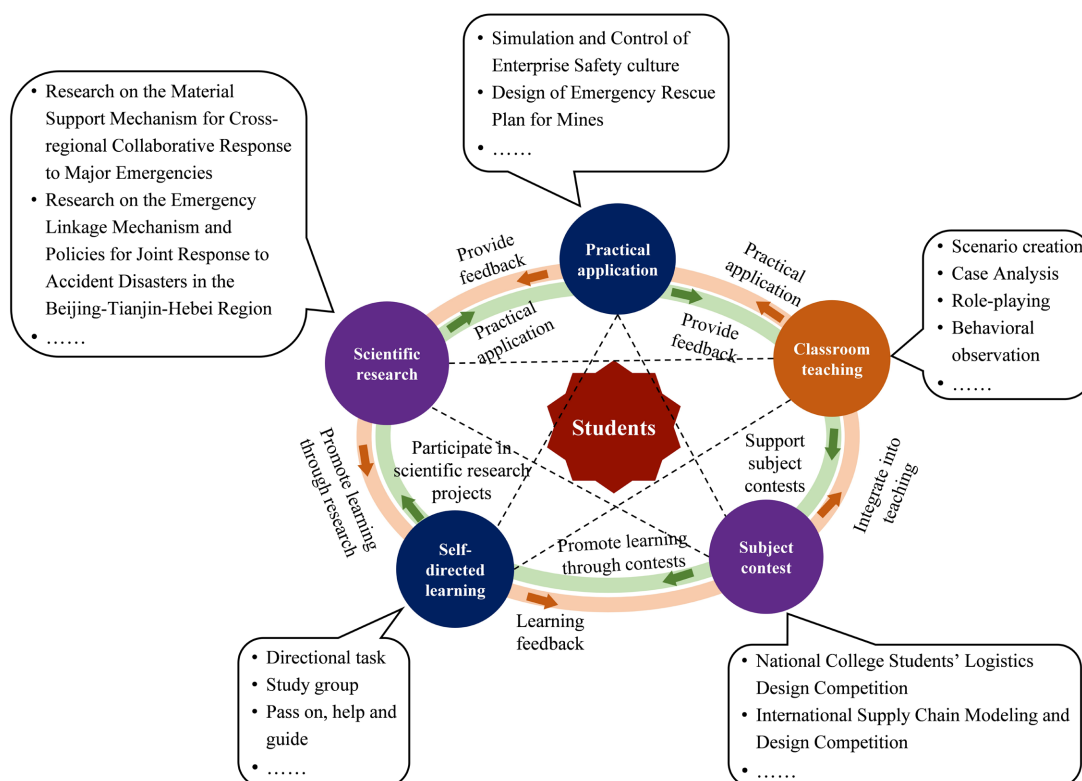
In practical integration into the course content, this concept is reflected in multiple modules: In the “Emergency Preparation” module, when explaining the design of emergency material reserve systems, cases of national key material reserve guarantees are introduced to emphasize the principle of “safety priority”. Students not only learn the technical standards for reserve quantity and storage conditions but also understand the political significance of ensuring national public health safety and social stability through material security. In the “Emergency Response” module, when discussing cross-regional logistics coordination mechanisms, the collaborative rescue practices of Beijing-Tianjin-Hebei emergency teams in major natural disasters are analyzed. While guiding students to design efficient transportation routes, they are also led to recognize the professional ethics of emergency management practitioners, such as “timeliness and responsibility” in disaster relief, and the sense of mission of “protecting people’s lives and property safety”, breaking away from the vague expression of “patriotic sentiment” and realizing the organic integration of safety professional literacy and ideological and political awareness.

On one hand, the course content progresses logically from simple to complex and from lower-order to higher-order cognitive levels, forming the main instruc-

tional thread. Ideological and political elements are subtly embedded into each phase of the content, enabling the two threads to intertwine and mutually reinforce each other. On the other hand, while integrating the main instructional and ideological-political threads, the course also incorporates an emotion-affection-behavior evolution line to achieve “three-line convergence”. By introducing compelling real-world cases, the course stimulates students’ emotional engagement and fosters a strong interest in emergency logistics management. Scenario-based exercises help students practice emotional management during emergencies, cultivating calmness and decisiveness. Gradually increasing the complexity of practical cases encourages students to develop behavioral patterns suited to efficiently managing urgent situations (Chen & Liu, 2023).

## 2.2. Teaching Model Reform

The “competition-teaching integration” and “learning-research combination” model—where competitions promote teaching and learning, and research enhances learning—proves effective in elevating course quality. Accordingly, the teaching team embraces a student-centered philosophy, extensively connecting five highly participatory elements: teaching, learning, competitions, research, and practice. As shown in Figure 1, this forms a “five-in-one” teaching model centered on classroom instruction, supported by academic competitions and scientific research, and guided by self-directed learning and practical application (Hu & Zhou, 2021).



**Figure 1.** Teaching model reform for the cultivation of “Safety and Emergency Response” specialized management talent.

First, basic knowledge and skills required for academic competitions are integrated into course objectives and content, creating mutual reinforcement between these components. For example, as logistics and supply chain competitions increasingly emphasize risk and resilience, the course team promptly updates content related to emergency logistics risk assessment and resilience evaluation. Second, students are encouraged to participate in the teaching team's research projects, conducting studies on topics such as "Cross-regional Collaborative Emergency Response Mechanisms" and "Emergency Material Supply Mechanisms for Major Emergencies". Faculty and students jointly apply for undergraduate research training programs, prepare research reports, and publish academic papers. Third, by leveraging faculty-led industry projects, students analyze real-world challenges and practical data from partner enterprises (Chen & Wang, 2021). They then apply emergency logistics management theories and methodologies to develop comprehensive solutions. Through these experiences, students acquire additional expertise and self-learning skills via "learning by doing", which in turn enhances their practical and innovative capabilities in academic competitions, scientific research, and real-world applications.

### 2.3. Curriculum Content Reform

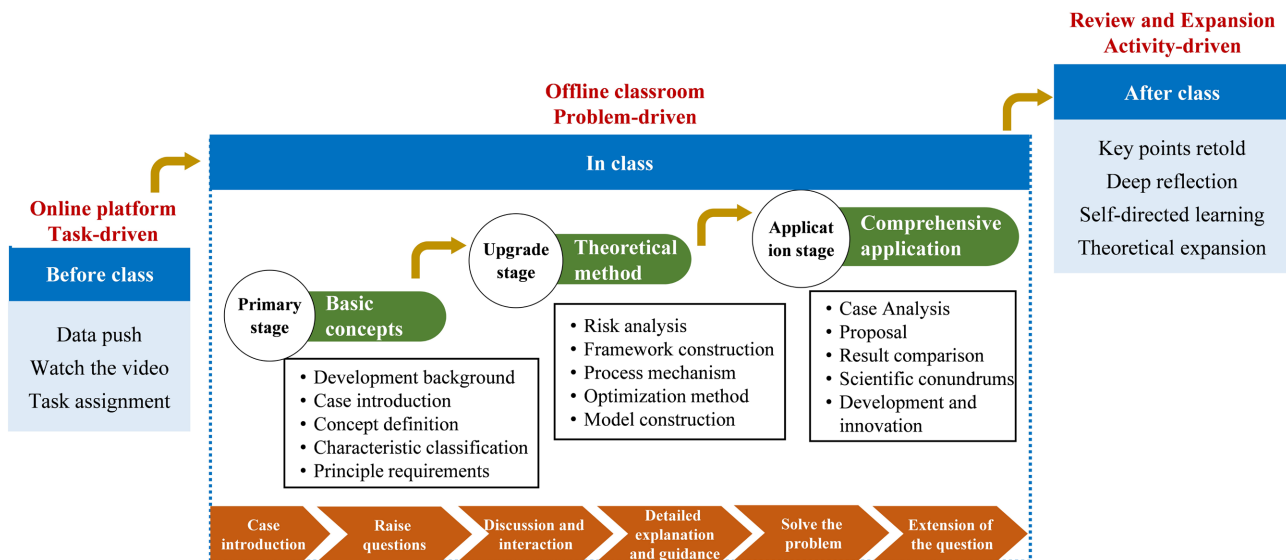
Existing textbooks on emergency logistics management often present theoretical concepts and model methodologies in separate sections, leading to a disconnect between theory and practice. Furthermore, extensive theoretical exposition in the early stages tends to disengage students and reduce teaching effectiveness. To address this, the course team reorganized the chapters into four modules based on the emergency logistics management process: Introduction, Preparation, Monitoring, and Response. This integration ensures that theoretical concepts and modeling methods are presented together within each management phase, not only resolving the disconnect but also promoting a holistic understanding of emergency logistics management (Yang & Zhao, 2022).

For each class session, the team employs social media and online platforms (Cloud Class) to implement blended learning. Pre-class, in-class, and post-class activities are coordinated through task-driven, problem-driven, and activity-driven approaches. In offline sessions, instructors begin with real-case studies to introduce practical problems and dilemmas. Guided by these issues, students engage in critical thinking and collaborative learning. Instructors address conceptual questions and explain fundamental and advanced theories step by step. Students then apply their knowledge to solve the initial problems and are encouraged to explore the applicability and potential improvements of these methods across various emergency scenarios. This instructional design ensures a seamless transition from basic to advanced concepts and practical application, progressively enhancing the course's depth, innovation, and challenge (Zhang & Sun, 2022) (Figure 2).

### 2.4. Reform of the Teaching Evaluation System

Centered on course objectives and the principle of continuous improvement, the

evaluation system emphasizes process-oriented assessment, multidimensional evaluation, diverse methods, and clear criteria. Modern teaching tools such as virtual simulation, social media, and online education platforms (Cloud Class) are comprehensively utilized to establish a “three-dimensional, two-faceted” assessment system (Yang & Li, 2021).



**Figure 2.** Curriculum content reform for the cultivation of “Safety and Emergency Response” specialized management talent.

This system moves beyond the traditional “teach-learn-test” model by incorporating self-directed learning evaluation, which encourages students’ initiative and creativity. Specific measures include: Pre-class preparation and post-class reflection tasks within assignments; case studies in course reports requiring proposed solutions; open-ended questions in presentations necessitating research, argumentation, and synthesis.

Since emergency logistics management relies on collaboration rather than division of labor, the course introduces team-based assessment to enhance students’ ability to “navigate uncertainty” in emergencies. This includes group discussions in class, group assignments, and team-based thematic reports.

Breaking away from theory-focused evaluation, the course also assesses practical problem-solving skills. Real-case-based problems are incorporated into all evaluation components: class participation, assignments, final exams, course reports, and project presentations (Li & Zhao, 2019).

### 3. Reform Outcomes of the Emergency Logistics Management Course

The teaching reforms have created a robust platform for student growth and faculty development, yielding significant benefits for both groups.

Students have demonstrated substantially increased learning motivation, deeper critical thinking, and enhanced practical innovation capabilities. Over the past

three years, average student satisfaction has exceeded 98%, with course evaluations consistently rated excellent. Students have published two academic papers in the journals of Sustainable Development and Management Science and Engineering, namely “Research on the Travel Behavior of Beijing Residents during the COVID-19 Epidemic” and “The Risk Assessment for High-Value Pharmaceutical Cold Chain Logistics Based on Bayesian Network”, and have won awards in multiple high-level academic competitions. Two graduation theses, such as “Research on Path Optimization for Electric Tricycle–Drone Collaborative Delivery During the Pandemic”, were awarded Beijing Municipal Outstanding Undergraduate Thesis, and two others received university-level honors (Xu & Sun, 2022).

The teaching team has achieved substantial outcomes in teaching reform, research projects, and academic publications, focusing on the “Risk and Emergency Management” niche. The course has been recognized as: “Beijing Higher Education Quality Undergraduate Course”, “2023-2024 National Higher Education Logistics Discipline Teaching Reform Excellence Case”, “Outstanding Teaching Achievement at the Academic Forum of the Higher Education Management Branch of the China Society of Law and Economics”, “University-Level Quality Undergraduate Course”.

The course syllabus was awarded “University-Level High-Quality Undergraduate Course Syllabus”. The lead instructor received second prize in the University-Level Young Faculty Teaching Fundamentals Competition (Sports and Arts Category) and second prize in the University-Level Faculty Teaching Innovation Competition. The teaching team was awarded first prize in the Teaching Achievement Awards by the China Petroleum Education Society (Petroleum Higher Education Category) and first prize in the University-Level Teaching Achievement Awards.

In teaching research, faculty members have secured one general project under the Beijing Municipal Education Science “14th Five-Year Plan”, one special project under the Beijing Digital Education Research Program, one Beijing Higher Education Undergraduate Teaching Reform and Innovation Project, one key project from the Beijing Higher Education Society, and two university-level key educational reform projects. Two projects, including “Research on Material Support Mechanisms for Cross-Regional Collaborative Response to Major Emergencies”, received support from the Ministry of Education’s Humanities and Social Sciences Research Program. The team also participated as key contributors in the university-level interdisciplinary research project “Research on Priority Active Control Methods for Urban Emergency Vehicles Based on IoT Technology”. Additionally, two teaching reform papers were published by the team as first or corresponding authors.

While the curriculum reform has achieved significant outcomes, several practical challenges emerged during implementation. First, faculty training requirements posed an initial barrier. The “five-in-one” teaching model and blended online-offline teaching approach demand interdisciplinary expertise and profi-

ciency in modern teaching tools. Teachers required systematic training to master these new skills, and the process of aligning academic competition content with course objectives also required continuous communication and adjustment among faculty, competition mentors, and industry experts. Second, student adaptation to new learning models was non-uniform. The reform emphasizes student-centered self-directed learning and team-based collaborative problem-solving, which differs from the traditional teacher-led lecture model. Some students, particularly those with weaker independent research abilities, initially struggled to complete open-ended tasks or contribute effectively to team projects, requiring additional guidance from instructors to build confidence and improve collaborative skills. Third, resource limitations affected the depth of practical application. While the course collaborated with enterprises to provide real-case scenarios, access to sensitive operational data was restricted due to privacy and security concerns, limiting students' ability to conduct in-depth data-driven analysis. They are important considerations for the continuous optimization of the curriculum.

#### 4. Conclusion

Through ongoing exploration and practice, this course adheres to the fundamental mission of fostering virtue and cultivating talent, guided by the OBE educational philosophy. It closely integrates the distinctive characteristics of applied engineering universities, professional training objectives, and unique course features. Reforms include the “three-line integration” ideology-political education logic, the “five-in-one” teaching model, modularized teaching content, and the “three-dimensional, two-faceted” assessment system. These initiatives have resulted in significant teaching innovations in course development, academic competitions, and practical projects.

Looking ahead, the course team will focus on three areas: enhancing course resources, upgrading teaching information technology, and expanding teaching stakeholders. Industry experts, alumni, and outstanding senior students will be invited to participate, and students will be encouraged to engage in external activities. These efforts aim to build a dynamic teaching community that extends beyond campus, continuously promoting students' comprehensive development and cultivating specialized management talent with expertise in “safety and emergency response”.

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### Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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