Construction and Practice of First-class Undergraduate Course "Organizing Train Operations at Railway Stations in the Context of Integration of Production and Education"

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Abstract: This article examines higher education teaching reform focused on integrating production and education. Using the exemplary first-class undergraduate course "Organizing Train Operations at Railway Stations," it highlights the "numerical-intelligence-creativity" aspects and the "production-education-research" concept. The course consists of seven modules, emphasizing integrated theoretical knowledge and practical abilities, creating a personalized digital teaching environment. It introduces teacher research projects and enterprise practice projects to enhance students' innovation abilities and teamwork. The course has achieved significant results in cultivating comprehensive qualities, enhancing enthusiasm for learning and innovation consciousness. This article offers references and insights for other professional courses' construction and practice.

Keywords: Integration Of Production and Education; Organizing Train Operations At Railway Stations; Course Construction

1. Introduction

With China's economy and society experiencing rapid development, higher education is poised to enter a new era of high-quality growth. Undergraduate education, as a key component of higher education, plays a vital role in nurturing exceptional talents required by society and industries. The construction of first-class undergraduate courses has become a central concern in ongoing higher education reform. Papers like "Construction of First-class Blended Course in Applied Theoretical Mechanics for Applied Undergraduate Education" offer valuable insights into course construction and teaching practices. In the context of production and education integration, this article uses "Organizing Train Operations at Railway Stations" as a case study to explore the creation of a top-notch undergraduate course. By drawing on previous research achievements and practical situations, the aim is to promote innovative teaching models, including production and education integration, practice-oriented teaching, and interdisciplinary collaboration. This provides guidance for the development of high-quality undergraduate education and the cultivation of adaptable, high-quality talents for future societal and industrial needs.

"Organizing Train Operations at Railway Stations" is a core course in transportation engineering, focused on cultivating talents with the competencies of a "Rail Transit Operation Manager" and enhancing students' professional ethics and organizational skills in train operations. This article will discuss the establishment of students' core values in course construction, the cultivation of professional ethics and dedication, continuous improvement of students' technical proficiency through skill competitions, and the development of their ability to independently complete station train tasks and handle emergencies. This research delves into the methods of constructing first-class undergraduate courses in the context of production and education integration, providing practical guidance for cultivating high-quality talents in the field of railway station train organization.

2. The Problems in the Teaching of the "Organization of Railway Station Operations" Course are as follows

Firstly, the course encompasses challenging knowledge areas, such as railway transport organization, operational management, and technical operations, leading to difficulties for students in developing a systematic understanding. The complexity and specialization of the content make it challenging for students to grasp, necessitating further integration of teaching content.

Secondly, practical teaching presents issues, with emphasis on singular project operations rather than comprehensive teamwork and ability training. Additionally, the practical content lacks integration of professional ethics, social responsibility, and political awareness cultivation. There is a need to optimize practical teaching design and enhance cultivation of practical abilities, political awareness, and profes-

sional skills.

Lastly, there is a deficiency in teaching resources. The current resources focus mainly on theoretical teaching and practical operations, lacking alignment with industry trends and technology. To improve teaching effectiveness, there is a need to continually expand and update teaching resources, incorporating industry practice cases, scientific research projects, and collaboration with enterprises to cultivate innovation awareness and application ability in students.

3. The teaching design and development of the "Rail Transit Station Operation Organization" course

The teaching content of the "Rail Transit Station Operation Organization" course includes seven parts: station work, trains, train reception and dispatch, shunting operations, transportation flow, freight statistics, and operation plans. With an integrated approach of "production-education-research" and a parallel concept of "data-intelligence-innovation," the teaching process is designed, teaching resources are organized, and teaching methods are optimized. The focus is on cultivating students' use of digital, intelligent, and innovative platforms for learning before, during, and after class. The goal is to guide students in completing the "four-level six-tier" learning model, creating a complete teaching loop for student growth. Ideological and political education is also emphasized, with teaching activities organized based on the "six-tier" principle.

Firstly, the teaching content design emphasizes train reception and dispatch operations, shunting operations, and station operations. Through in-depth explanations of theoretical knowledge, case analysis, and practical exercises, students will develop an understanding of the basic principles and practical skills of railway station operation organization.

Secondly, digital and intelligent platforms will be utilized for teaching organization. The "four-level six-tier" learning model will be introduced to facilitate comprehensive student growth. This model consists of four stages: passive learning, active learning, constructive learning, and interactive learning. It aims to foster students' interest in learning and develop their autonomy in studying.

Before class, students can engage in passive learning through online platforms or educational applications, receiving relevant information and knowledge. In class, active learning will be promoted, encouraging students to participate in classroom activities, reflect, discuss, and contribute their own viewpoints. Constructive learning elements will be introduced, allowing students to personalize their understanding and interpretation of the content.

Additionally, we will utilize interactive learning methods, fostering interaction among students as well as between students and technology, allowing for mutual supplementation and inspiration, promoting deep-level learning, and encouraging students' active involvement.

Lastly, we emphasize the importance of ideological and political education. Based on the "six-tier" principle, we guide students to recognize the significant value of railway traffic organization and apply the knowledge learned into practical scenarios. Through the value tier, students can grasp the important value of railway traffic organization and learn how to apply their knowledge. Through the goal tier, we guide students to achieve learning objectives using a project-based approach. Through the improvement tier, we elevate students' learning levels and capabilities. Through the practice tier, students engage in practical exercises, enhancing their skills and application of knowledge. Through the integration tier, students can comprehend the knowledge and skills of various aspects. Lastly, through the reflection tier, we encourage students to summarize and reflect, consolidate their knowledge, and improve learning outcomes. We integrate professional ethics and social responsibility into learning and practice to cultivate students' sense of social responsibility and a strong sense of professional ethics.

(1) Building a modular teaching system

Based on the "Railway Station Operation Organization" course, seven important modules have been identified: station work, trains, train reception and dispatch, shunting operations, transportation flow, freight statistics, and operation plans. Among them, train reception and dispatch, shunting operations, and operation plans are key and challenging topics. Teachers use various teaching methods, including lectures, discussions, presentations, mind maps, and practical training. This modular design helps students build a comprehensive knowledge system and solves the problem of complex content. Passive, active, constructive, and interactive learning methods are encouraged, with digital platforms used to collect progress. Knowledge points are assessed based on value, goal, improvement, practice, integration, and reflection levels.

Different strategies are used for each module to cultivate professional skills, bility, and innovation.

(2) Building an Industry-Education Integrated Practical Teaching Platform

To implement practical teaching of the "Railway Station Operation Organization" course, we need to consider station operations' complexity and collaboration. Practical training projects should emphasize school-enterprise cooperation and step-by-step progression. Clear goals should be set, specifying objectives and expected outcomes for each stage of training, providing students with a clear learning path. Phased guidance should divide the project into stages, challenging students progressively. Basic training is crucial before advancing to complex operations. Multi-position linkage exercises should be designed, requiring students to complete complex tasks. Continuous feedback and evaluation according to enterprise standards to help students understand progress. Combining course content with actual station operation cases aims to enhance teaching quality.

(3) Construction of "Data-Intelligence-Innovation" Teaching Resources

Constructing "Data-Intelligence-Innovation" teaching resources expands students' innovation capabilities. Digital platforms can be used to construct classrooms and improve teaching efficiency. Analyzing and processing data from these platforms provides a better understanding of students' learning situations, enabling personalized tutoring and guidance for innovation. Introduce teacher research projects and enterprise projects to enrich theoretical knowledge content. These projects cover professional knowledge related to "Railway Station Operation Organization" course, fostering individuality and innovation capabilities in students. Encourage participation in innovative practical projects related to course knowledge and explore competition cases, strengthening theoretical knowledge. Combining theoretical teaching with innovation practice sparks enthusiasm for learning and innovation awareness.

4. The Construction Effect of the "Railway Station Operation Organization" Course

(1) Significant Achievements in Course Construction

In constructing the "Railway Station Operation Organization" course, the station operation organization content was systematically categorized into 7 modules, integrating enterprise work into practical teaching. Innovative projects were incorporated, forming an integrated "Production-Education-Research" curriculum and "Data-Intelligence-Innovation" tracks. The course was recognized as a demonstration course in applied undergraduate education, a school-level ideological and political course, and a first-class course project. Continuous updates and industry alignment made it a practical transportation and logistics major course.

(2) Significant Improvement in Student Training Quality

Over four years, the course improved talent cultivation by integrating industry and education, using modular teaching and practical projects. This increased student interest and cultivated problem-solving abilities, knowledge transfer, innovation, and responsibility. Student performance improved, with average grades rising from 72.6 to 83.2, the proportion of excellent students increasing from 5% to 11%, and the passing rate rising from 60% to 84%. These changes reflect enhanced student understanding, effective course implementation, and teaching methods.

(3) Abundant Achievements in Discipline Competitions

The course achieved success in discipline competitions, winning over 40 awards including a national second prize, two national third prizes, and one provincial-level award. Over 20 utility model patents were obtained, and the teacher team received accolades, including a "Teaching Master" title and the 2020 Course Reform Annual Teacher Award. These achievements showcase progress in teaching and research, reflecting the payoff from "Data-Intelligence-Innovation" teaching resource construction efforts.

5. Characteristics and Innovations of the "Railway Station Operation Organization" Course

(1) Progressive Teaching Approach

Adopting an integrated "Prod-Edu-Res" teaching approach with "Data-Intelligence-Innovation" tracks. Connects student learning, teacher instruction, and enterprise production. Incorporates digitalization, intelligence, and innovation, integrating teaching, production, and research.

(2) Student-Centered Teaching Philosophy

Incorporates ideological-political elements, emphasizes student comprehensive abilities. “Four Stages and Six Ladders” methodology aids student growth, inspiring a scientific outlook on life, values, the overall situation, and their profession.

(3) Integration of Online and Offline Teaching Resources

Reconstructs curriculum system, combines on-site practices, and integrates ideological-political education. Uses online and offline teaching methods to strengthen foundation, broaden horizons, and enhance skills.

(4) Emphasis on Industry-Education Integration Achievements

Teaching closely links to industry practices. Fully stimulates student innovation, problem-solving in practical scenarios, and self-challenge. Encourages achievement output for students and teachers’ continuous improvement, forming a virtuous cycle.

6. Conclusion

The “Railway Station Operation Organization” course is constructed based on enterprise work requirements, integrating industry, education, and research to combine theoretical and practical knowledge. It utilizes digital platforms, teacher research, and industry practices to enhance student learning enthusiasm, innovation, and comprehensive qualities. The construction has significantly improved student training quality and excelled in competitions, demonstrating the effectiveness of “Data-Intelligence-Innovation” resources. With unique teaching approaches, philosophy, resources, and industry integration, it serves as a model for other courses. Continuous innovation will further enhance its role in cultivating high-quality transportation talents and industry development.

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