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Research on the Reform of the "Smart Transportation Operations" Course in Higher Vocational Education Based on the Integration of "Post, Class, Competition, Certification, and Innovation"

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Abstract: This paper addresses the issues in the teaching of the "Smart Transportation Operations" course in higher vocational colleges, such as the disconnection between teaching content and job requirements, weak practical teaching, and insufficient student innovation capabilities. It proposes a teaching model based on the integration of "Post, Class, Competition, Certification, and Innovation." By reconstructing the curriculum system, innovating teaching strategies, and implementing a diversified evaluation system, the model combines job requirements, course teaching, skill competitions, vocational certifications, and innovation and entrepreneurship. The aim is to enhance students' professional skills, innovation capabilities, and overall competencies. The research results demonstrate that this model effectively addresses the shortcomings of traditional teaching, providing an effective approach for cultivating high-quality technical and skilled talents in the field of smart transportation. It holds significant practical implications for the reform of higher vocational education.

Keywords: Post-Class-Competition-Certification-Innovation; Smart Transportation Operations; Higher Vocational Education; Teaching Reform.

1. Introduction

With the widespread application of emerging technologies such as the Internet of Things, big data, artificial intelligence, and cloud computing in the transportation sector, smart transportation operations have become an inevitable trend in industry development. The demand for high-quality, innovative talent in smart transportation operations is increasingly urgent. To better adapt to the development needs of the smart transportation industry and enhance the professional skills and employability of higher vocational students, the reform of higher vocational education continues to advance.

In the curriculum system of logistics management and related majors in higher vocational education, the "Smart Transportation Operations" course is a highly relevant professional course that aligns with the development needs of the smart transportation industry. It lays a solid theoretical and practical foundation for students to engage in smart transportation operations in the future.

However, traditional teaching of the "Smart Transportation Operations" course often suffers from issues such as a disconnect between teaching content and actual job requirements, weak practical teaching components, low student motivation, and insufficient innovation capabilities. To address these challenges, this paper proposes a teaching model based on the integration of "Post, Class, Competition, Certification, and Innovation." The model aims to improve the quality of course teaching by organically combining job requirements, course teaching, skill competitions, vocational certifications, and innovation and entrepreneurship. This approach seeks to comprehensively enhance students' overall competencies and professional skills, cultivating high-quality talent that meets industry demands.

2. The Connotation of the Integration of "Post, Class, Competition, Certification, and Innovation"

The integration of "Post, Class, Competition, Certification, and Innovation" refers to the organic combination of five elements—job requirements, course teaching, skill competitions, vocational certifications, and innovation and entrepreneurship—to form a teaching model that fosters mutual promotion and collaborative development. This model emphasizes job requirements as the guiding principle, course teaching as the foundation, skill competitions as the driving force, vocational certifications as the evaluation mechanism, and innovation and entrepreneurship as the ultimate goal, aiming to achieve comprehensive talent cultivation. Job requirements serve as the basis for curriculum design, while courses provide students with knowledge and skills, forming the core cornerstone of teaching reform. Skill competitions enhance students' practical and adaptive abilities, serving as an important benchmark for skill development. Vocational certifications effectively validate students' mastery of knowledge, and innovation and entrepreneurship cultivate higher-order capabilities and a pioneering spirit, representing the advanced objectives of talent cultivation.

3. Research Status of the Integration of "Post, Class, Competition, Certification, and Innovation"

In China, with the continuous deepening of vocational education reform, research on the integration of "Post, Class, Competition, and Certification" has gradually become a hot topic. In terms of theoretical research, some scholars have explored the path of teaching reform based on the "1+X"

certification system, integrating the standards of the "1+X" certification into curriculum teaching reform practices from the perspectives of teaching objectives, content, assessment methods, and teaching resource development [1][2][3]. Other scholars have examined the logistics service specialist role from the four aspects of "Post, Class, Competition, and Certification," exploring reforms in digital transportation management courses to enhance the quality of logistics talent cultivation in the context of digitalization [4]. Additionally, some researchers have conducted studies on the construction of higher vocational curriculum systems based on the integration of "Post, Class, Competition, and Certification" [5], while others have investigated the connotation and pathways of comprehensive talent cultivation through "Post, Class, Competition, and Certification" in higher vocational institutions [6]. However, there is still a lack of systematic research and practical experience on how to achieve the integration of "Post, Class, Competition, Certification, and Innovation" in the "Smart Transportation Operations" course in higher vocational education.

4. Research on the Reform of the Smart Transportation Operations Course Based on the Integration of "Post, Class, Competition, Certification, and Innovation"

4.1. Current Status of the Smart Transportation Operations Course

Currently, the following problems are commonly found in the teaching of the "Smart Transportation Operation" course in higher vocational colleges:

Firstly, the course content is divorced from the actual needs of the industry and fails to promptly reflect the latest technologies and development trends in the field of smart transportation. Secondly, the teaching methods are monotonous, still mainly relying on traditional lectures, lacking practicality and innovation. Thirdly, the evaluation system is incomplete, making it difficult to comprehensively reflect students' comprehensive abilities. Finally, the cultivation of students' innovation and entrepreneurship abilities is insufficient, making it difficult for them to adapt to the rapidly changing industry environment.

The main reasons for these problems include: Teachers lack practical industry experience, and the course update speed is slow; the school-enterprise cooperation is not in-depth enough, resulting in a shortage of practical teaching resources; the teaching concept is outdated, and the cultivation of students' innovation abilities has not been fully emphasized; the evaluation mechanism is rigid, making it difficult to stimulate students' learning enthusiasm. These problems severely restrict the improvement of the course teaching quality and the effect of talent cultivation, and urgent reforms and innovations are needed.

4.2. Construction of the Curriculum System Based on the Integration of "Post, Class, Competition, Certification, and Innovation".

Implementing the integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship" in the "Smart Transportation Operation" course, the reconstruction of the curriculum system is of crucial importance.

Firstly, based on the corresponding positions in the "Vocational Classification Dictionary of the People's Republic of China (2022 Edition)", fully combined with the vocational ability requirements of logistics transportation enterprises for talents, the standards of intelligent logistics vocational skills competitions, and the cultivation needs of college students' innovation and entrepreneurship abilities, the curriculum cultivation objectives such as professional knowledge objectives, professional skills objectives, and professional quality objectives of the course should be clarified. On this basis, carefully set the curriculum standards around these objectives to effectively achieve the organic integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship".

Secondly, when designing the teaching content, follow the basic idea of "specific job positions - job vocational ability analysis - extract textbook content modules - design typical work tasks - design teaching content - design practical training projects" [7]. Organize the curriculum content in a modular teaching method, and reconstruct the teaching content of "Smart Transportation Operation" according to the principle of knowledge from shallow to deep.

Relying on the established teaching objectives and teaching content, reselect, combine, and develop the teaching resources for smart transportation operation. When carrying out education practice around the constructed teaching resources, integrate the concept of lean management into the classroom, closely combine the teaching objectives and teaching content, precisely arrange the teaching modes and teaching methods, optimize all aspects of teaching, and in terms of assessment and evaluation, construct a diversified evaluation system to promote the improvement of teaching quality through evaluation and promote students' learning and growth through teaching.

Through the optimization and integration of curriculum content, a curriculum system oriented by job requirements, with the work process as the main line, and the integration of knowledge and skills has been constructed. This curriculum system not only enables students to systematically master the core knowledge and skills of smart transportation operation, but also cultivates students' comprehensive application ability and innovative thinking ability, enabling students to quickly adapt to the work requirements of smart transportation operation positions after graduation and contribute to the development of the smart transportation industry.

4.3. Teaching Strategies Based on The Integration of "Positions, Courses, Competitions, Certificates, and Innovation and Entrepreneurship"

In the teaching mode based on the integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship", innovative teaching strategies need to be adopted to cultivate high - quality technical and skilled talents that meet the needs of modern industries.

Firstly, implement the project - based teaching method. Using real enterprise projects as the carrier, construct a "learning situation integrating teaching, doing, and learning". For example, carry out in - depth cooperation with well - known logistics enterprises and undertake their intelligent distribution route planning projects. In the project practice, students convert theoretical knowledge into the ability to

solve practical problems by analyzing enterprise transportation big data, integrating real - time traffic information, and optimizing delivery timeliness, thus achieving an effective transition from knowledge learning to skill application.

Secondly, promote the "dual - tutor" collaborative education mechanism and build a teaching team with deep integration of schools and enterprises. Full - time school teachers focus on the systematic explanation of theoretical knowledge and basic skills training, while enterprise tutors are responsible for introducing cutting - edge industry technologies and sharing practical experience. For example, in the intelligent logistics scheduling module, enterprise tutors can deeply explain the intelligent scheduling strategies for handling logistics peak periods such as "Double Eleven" in combination with actual cases, keeping the teaching content updated in line with industry needs.

Thirdly, introduce virtual simulation technology to create a smart training environment that combines virtual and real. By constructing a virtual simulation training platform for smart transportation operation, students can immerse themselves in experiencing core business scenarios such as intelligent warehouse management systems and intelligent transportation monitoring platforms. Through training, students can not only improve their practical operation ability but also cultivate their comprehensive qualities to deal with complex work scenarios.

In addition, implement a hierarchical and classified teaching mode and establish a personalized training mechanism. According to students' cognitive levels, skill bases, and development potentials, formulate differentiated teaching objectives and requirements. By flexibly using various teaching methods such as case - based teaching, task - driven teaching, and group collaboration, give full play to the main role of students and stimulate their learning enthusiasm and creativity. This teaching - according - to - students' - aptitude training mode can better meet the learning needs of students at different levels and provide professional talents for various positions in the industry.

Through the systematic implementation of the above innovative teaching strategies, the deep integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship" can be effectively achieved. High - quality technical and skilled talents with a solid theoretical foundation, practical skills, and innovative awareness can be cultivated, providing strong talent support for industrial transformation and upgrading.

4.4. The Implementation of Teaching Based on the Integration of "Positions, Courses, Competitions, Certificates, and Innovation and Entrepreneurship"

4.4.1. The Process of Teaching Implementation

The implementation of smart transportation operation based on the integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship" requires teaching in combination with resources.

Firstly, conduct in - depth enterprise research to clarify job requirements and formulate talent cultivation plans. Hold talks with multiple smart transportation enterprises to understand their knowledge, skill, and quality requirements for talents in different positions, and formulate talent cultivation plans that meet enterprise needs based on this.

Secondly, integrate school - based and off - campus resources to build a teaching platform for the integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship". Cooperate with enterprises to establish off - campus internship bases, and at the same time, build a smart transportation training center on campus, equipped with advanced training equipment and software.

Thirdly, carry out modular teaching, organically combining theoretical instruction, practical operation, skills training, and innovation and entrepreneurship. In each module of teaching, first explain theoretical knowledge, then arrange practical operation sessions, followed by organizing students to participate in skills training, and finally guide students to think about innovation and entrepreneurship.

Then, organize students to participate in various skill competitions at all levels to promote learning through competitions. Encourage students to participate in national vocational college skill competitions, competitions held by industry associations, etc., and improve students' practical ability and competitive awareness through competitions.

In addition, encourage students to obtain relevant vocational qualification certificates to enhance their employment competitiveness. Provide certificate - examination guidance for students to help them obtain certificates such as the Logistics Management Vocational Skill Level Certificate and the Intelligent Transportation Management Specialist Certificate.

Finally, the school sets up an innovation and entrepreneurship fund to support students in carrying out innovation and entrepreneurship projects in the field of smart transportation. Provide financial support and mentor guidance for potential innovation and entrepreneurship projects proposed by students.

4.4.2. Establish a Diversified Evaluation System

In the teaching implementation, to ensure the effectiveness of the teaching mode integrating "positions, courses, competitions, certificates, and innovation and entrepreneurship", information - based means such as Vocational Education Cloud can be utilized, and an online - offline integrated approach can be adopted to establish a diversified evaluation system. This system should include process - based evaluation, outcome - based evaluation, and value - added evaluation, covering multiple dimensions such as knowledge acquisition, skill level, innovation ability, and professional quality. A combination of self - evaluation by students, peer - to - peer evaluation, teacher evaluation, and enterprise evaluation can be used to comprehensively assess students' learning outcomes. In terms of knowledge acquisition, evaluation is carried out through methods such as classroom quizzes and assignments. The skill level is reflected through practical operation assessments and the results of skills competitions. Innovation ability can be evaluated from aspects such as students' innovation and entrepreneurship project achievements and the innovative solutions they propose. Professional quality is assessed through students' performance in team projects and feedback from enterprise internships.

The course should set detailed teaching evaluation indicators, which can include: the degree of mastery of course knowledge, practical operation ability, competition award - winning situation, acquisition of vocational certificates, innovation and entrepreneurship project achievements, etc. The degree of mastery of course knowledge is comprehensively evaluated through usual assignments, examination results, etc. The practical operation ability is

scored based on students' performance in the training center and enterprise internships. The competition award - winning situation serves as a bonus item to encourage students to actively participate in competitions. The acquisition of vocational certificates reflects students' mastery of vocational standards. The innovation and entrepreneurship project achievements are evaluated from aspects such as the innovation, feasibility, and market prospects of the projects.

4.4.3. Establish a Continuous Improvement Mechanism

The construction of the curriculum should establish a continuous improvement mechanism, regularly collect feedback from students, teachers, and enterprises, and adjust the curriculum content and teaching methods in a timely manner. This can be achieved by establishing a teaching quality monitoring system and regularly conducting teaching diagnosis and improvement. Organize student symposiums every semester to gather students' opinions and suggestions on curriculum teaching. Invite enterprise experts to evaluate the teaching and propose improvement directions. Teachers should carry out teaching seminars among themselves to share teaching experiences and reflect on teaching problems. Through these measures, it is ensured that curriculum teaching is always in line with industry development and continuously improves the quality of talent cultivation.

5. Conclusion

The teaching mode of the "Smart Transportation Operation" course based on the integration of "positions, courses, competitions, certificates, and innovation and entrepreneurship" has effectively addressed the problems in traditional teaching, such as the disconnection between theory and practice, lagging teaching content, and insufficient innovation ability of students. Through reconstructing the curriculum system, innovating teaching strategies, and implementing diversified evaluation, this mode has significantly enhanced students' vocational abilities, innovation capabilities, and comprehensive qualities, providing an effective way to cultivate high - quality technical and skilled talents in the field of smart transportation.

In the future, school - enterprise cooperation can be further deepened, practical teaching resources can be expanded, and the evaluation system can be improved to continuously promote curriculum teaching reform and provide strong talent support for the development of the smart transportation industry. In terms of deepening school - enterprise cooperation, models such as the in - depth participation of enterprises in curriculum development and the joint construction of industrial colleges can be explored. Expanding practical teaching resources can be achieved by introducing more actual enterprise projects and building shared training bases. To improve the evaluation system, evaluation indicators can be further refined and more evaluation methods can be introduced. Through these continuous explorations and improvements, more remarkable results will be achieved in the teaching of the Smart Transportation Operation course.

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