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Research on Craftsmanship Spirit Cultivation for Students of Big Data Technology Major in Higher Vocational Colleges based on Integration of "Position, Course, Competition, Certification"

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Abstract: In the context of modern vocational education, the spirit of craftsmanship is embodied in the integration of the pursuit of excellence, innovation and creativity, and continuous learning. Higher vocational colleges are the main battleground for cultivating blue-collar talents in big data technology. However, the students cultivate generally suffer from issues such as a lack of independent problem-solving skills, weak communication skills, insufficient professional technical abilities, and a weak sense of professional ethics and discipline, which severely impact their employability. Therefore, it is crucial to strengthen the quality of education and improve employment capabilities by cultivating the spirit of craftsmanship among students, thereby promoting the development of higher vocational education from the supply side. The proposal of the four-in-one integration concept of "Position, Course, Competition, Certification" provides new impetus and development direction for the reform and innovation of talent cultivation models in vocational education. Jiangsu Maritime Institute leverages the integration of "Position, Course, Competition, Certification" to enhance the adaptability and quality of vocational education and talent cultivation. By closely aligning the curriculum system with job demands, deeply integrating practice with theory, promoting teaching and learning through competitions, and facilitating school-enterprise cooperation and industry-education integration, the college has effectively promoted the cultivation of the spirit of craftsmanship among students specializing in big data technology in higher vocational education.

Keywords: Big Data Technology; Craftsmanship Spirit; Integration of "Position, Course, Competition, Certification"; Ideological and Political Education in Courses; Project-Based Teaching.

1. Introduction

The spirit of craftsmanship embodies professional ethics, abilities, and qualities, representing practitioners' value orientations and behaviors. The "Implementation Plan for National Vocational Education Reform" emphasize the need for vocational education to cultivate and pass on the spirit of craftsmanship. As important bases for cultivating technical talents, higher vocational colleges should integrate the spirit of craftsmanship into moral education and personal development, exploring effective cultivation pathways to nurture more innovative and versatile technical talents [1]. The spirit of craftsmanship is not limited to traditional handicrafts but is a spirit that should be pursued in all walks of life. Amidst the era transformation led by information technology, a large number of big data professionals with both professional skills and the spirit of craftsmanship are needed. Therefore, in the process of cultivating big data professionals in higher vocational colleges, it is particularly important to promote the spirit of craftsmanship, which helps to cultivate high-quality big data technical talents that meet the needs of the times. The integration of "Position, Course, Competition, Certification" serves as an educational model that highlights the characteristics of type-specific education, with its core lying in the comprehensive integration at the teaching level, aiming to deeply advance the cultivation process of high-skilled talents [2].

The big data technology major of Jiangsu Maritime Institute, based on the integration of "Position, Course, Competition, Certification", constructs a talent cultivation model that fosters the spirit of craftsmanship among students, organically integrates ideological and political elements into talent cultivation, and promotes the enhancement of students' professional qualities and abilities in a subtle and gradual manner.

2. Craftsmanship Spirit

2.1. Connotation of Craftsmanship Spirit

In recent years, with the nation's emphasis on high-quality development in manufacturing, the spirit of craftsmanship, as a crucial factor in driving industrial upgrading and high-quality development, has received widespread attention. Government work reports have repeatedly mentioned the need to cultivate a craftsmanship spirit of striving for excellence, increasing product variety, improving product quality, and creating brands [3]. Amidst increasingly fierce market competition and industrial upgrading and transformation, skilled talents with exquisite techniques and the spirit of craftsmanship have become highly sought after by various parties. The promotion of the craftsmanship spirit is of great significance for enhancing the overall level of the nation's manufacturing industry and driving economic and social development. The term "craftsmanship spirit" first appeared in China in 2000, but for more than a decade thereafter, related research remained stagnant, with shallow and scattered research outcomes. Since 2014, there has been a breakthrough in research on the craftsmanship spirit, especially after the broadcast of the "Craftsmen of a Great Nation" series in 2015, which made the craftsmanship spirit a mainstream topic of discussion in the vocational education

circle and even among the general public. After Premier Li Keqiang first mentioned the craftsmanship spirit in the government work report in 2016, related research showed an explosive growth [4]. Research on the craftsmanship spirit has become a hot area of academic interest, covering various aspects such as its connotation, characteristics, value implications, and cultivation pathways.

Although there is currently no clear definition of the connotation of the craftsmanship spirit in academia, striving for excellence, attention to detail, and the pursuit of perfection have become recognized as its core connotations. Additionally, professional dedication and vocational qualities are also important components of the craftsmanship spirit.

2.2. Necessity of Cultivating the Craftsmanship Spirit in Higher Vocational Big Data Talents

The development of the big data industry cannot be separated from a large number of knowledgeable and skilled talents with the craftsmanship spirit, namely big data blue-collar workers. The big data industry is evolving rapidly, with new technologies emerging constantly, making good learning ability the core competitiveness for the development of big data talents. Innovation is the fundamental driving force behind the development of the big data industry, and without innovation, one can quickly be surpassed in this field. For big data blue-collar work, innovation means using creative thinking to solve practical problems in work. Whether it's data analysis, big data platform operation and maintenance, or data visualization, various unknown errors and problems will be encountered, and problem-solving requires innovative craftsmanship. The big data industry is generally project-oriented, and the completion of projects requires the cooperation of multiple individuals. Big data professionals need to not only understand theory and be skilled in practice but also be good at communication and coordination, as well as teamwork and collaboration. The work in the big data industry is mainly mental and intellectual labor, which makes it difficult to measure work quality and efficiency. The success of big data projects relies on the strong sense of responsibility of team members and requires the joint efforts of the team.

The development of higher vocational big data majors faces many external challenges. Although the " Implementation Plan for National Vocational Education Reform" clearly state that vocational education and general education are two different types of education with equal importance, it will still take some time for the integration of vocational and general education. The public still discriminates based on educational background, which is particularly evident in the information technology industry. Most undergraduate institutions in China have established data science and big data technology majors, and the development and expansion of undergraduate institutions have increased the pressure on higher vocational big data majors. The core of the development of higher vocational big data majors is market orientation and student employment as the goal. Cultivating the craftsmanship spirit in higher vocational big data majors aligns with the goals of professional development and adapts to the mission of industrial development. The craftsmanship spirit is crucial for the career development of big data practitioners. Big data jobs not only require technical skills but also craftsmanship qualities such as innovation and communication. The success of big data practitioners' careers is largely determined by their vocational qualities, which become increasingly important for higher-level positions. The competitiveness of big data talents not only depends on the improvement of professional skills but also requires a strong professional spirit and good craftsmanship spirit.

2.3. Research Status of Cultivating Craftsmanship among Vocational College Students

The new round of technological revolution and industrial transformation has posed new demands on vocational education, which has already oriented towards cultivating craftsmanship among students. The academic community is paying increasing attention to the study of the contemporary connotations and characteristics of craftsmanship. Research on the elements and structural model of craftsmanship among vocational college students has revealed four key components: pursuit of excellence, patience and concentration, pursuit of values, and exploration and innovation, along with 11 sub-dimensions [5]. In terms of the current status of cultivation, issues such as insufficient recognition and identification among student groups, limited integration into professional courses, and inadequate collaborative education mechanisms persist [6]. Regarding cultivation methods, scholars have proposed diverse approaches such as transforming educational concepts, innovating curriculum and teaching, attempting school-enterprise collaborations, seeking institutional guarantees, improving cultivation environments, strengthening faculty development, and stimulating intrinsic motivation [7-9]. In terms of evaluation, the current evaluation methods for craftsmanship among vocational college students generally prioritize material achievements over the cultivation of inner qualities and mostly rely on outcome evaluations based on students' skill levels. Further research is still needed to establish a systematic mechanism for cultivating craftsmanship. Existing research mainly focuses on the construction of curriculum systems and the exploration and practice of talent cultivation modes that integrate "Position, Course, Competition, Certification" for specific majors or courses, while research findings on cultivating craftsmanship among vocational college students within this educational mode are rare [10].

3. Cultivating Craftsmanship based on Integration of "Position, Course, Competition, Certification"

As shown in Figure 1, the big data technology major of Jiangsu Maritime Institute focuses on the integration of "Position, Course, Competition, Certification" to promote the cultivation of craftsmanship among students. The major designs its curriculum system based on job requirements, ensuring that the course content closely aligns with the actual job skill standards of the big data industry. This allows students to clearly understand their career direction and the importance of craftsmanship in practical work during their learning process. This "Position-Course" linkage not only enhances students' professional skills but also cultivates their dedication to work and pursuit of excellence. The major considers skills competitions as an important means of testing teaching achievements, providing students with a stage to showcase themselves and challenge their limits. In big data skills competitions, students need to comprehensively apply

their learned knowledge to solve practical problems, which not only exercises their professional skills but also enhances team collaboration, innovative thinking, and problem-solving abilities—all important embodiments of craftsmanship. Through "promoting learning through competitions and promoting teaching through competitions," craftsmanship takes root in students' hearts. The major deeply integrates the assessment requirements of professional qualifications with the course content, enabling students to smoothly obtain industry-recognized professional qualifications while completing their studies. This not only enhances their employment competitiveness but also facilitates the effective integration of "courses" and "certificates." In the process of pursuing professional qualifications, students continuously hone their skills, improve their professional qualities, and further promote craftsmanship.

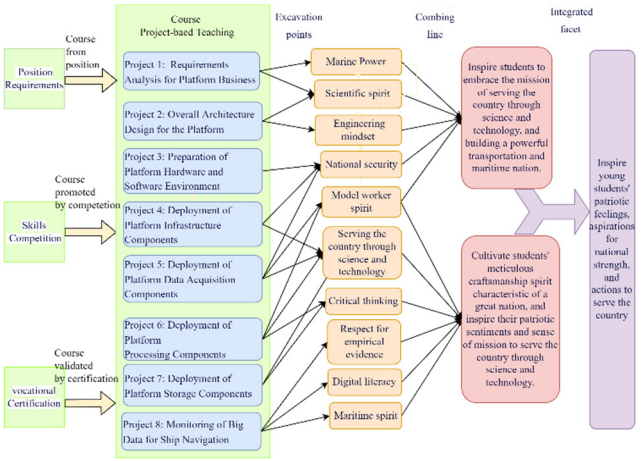

Fig 1. Cultivating the spirit of craftsmanship under the integration of "Position, Course, Competition, Certification"

The big data technology major of Jiangsu Maritime Institute guides students in cultivating craftsmanship in talent cultivation, starting from various aspects such as aligning with job competency standards, establishing a four-level competition mechanism, focusing on ideological and political education, and integrating courses with certifications. This enables students to practice job responsibilities, job disciplines, and team collaboration, internalizing craftsmanship and externalizing it in their actions. Each unit of the course corresponds to a specific ideological and political "point" (theme), which is integrated throughout the project and internalized in practical exercises. The main "thread" is to cultivate big data technology application craftsmen who possess social responsibility, patriotic feelings, and a maritime spirit. The socialist core values, the spirit of the 20th National Congress, and other ideological and political elements are organically incorporated, systematically outlining the supply of ideological and political content as a "plane". Combining the characteristics of the school, maritime spirit and the strategy of building a marine power are integrated into the course content, guiding students to accurately grasp the unique needs of shipping, utilize interdisciplinary knowledge systems for innovative design, and develop comprehensive coordination abilities after thorough research, thereby cultivating high-skilled talents in shipping big data who are both virtuous and talented, and urgently needed by the country.

3.1. Aligning with Job Competency Standards and Implementing Project-based Teaching

By aligning with job competency standards, real-world project cases from the smart industry, such as the shipping big data platform as shown in Figure 1, are introduced. These cases are implemented throughout the core courses, serving as a common teaching carrier to organically link the core courses and form a project-based curriculum system oriented towards job skills. In talent cultivation based on this project-based curriculum system, the teaching process is designed with an engineering process orientation, achieving "learning by doing and doing by learning." This cultivates students' professional abilities in a simulated real-work environment. In the process of completing projects, students not only need to comprehensively apply professional knowledge and exercise operational skills but also cultivate abilities such as autonomous learning, innovative thinking, team collaboration, pressure endurance, and responsibility-taking. Relying on the shipping big data workshop, enterprise projects are undertaken, organically combining the construction of stations, workshops, and craftsmanship cultivation as an important supplement to the project-based curriculum system. In the workshop, by establishing real-work scenarios, students' skills and professional spirit are cultivated, enabling them to adapt to job requirements ahead of time.

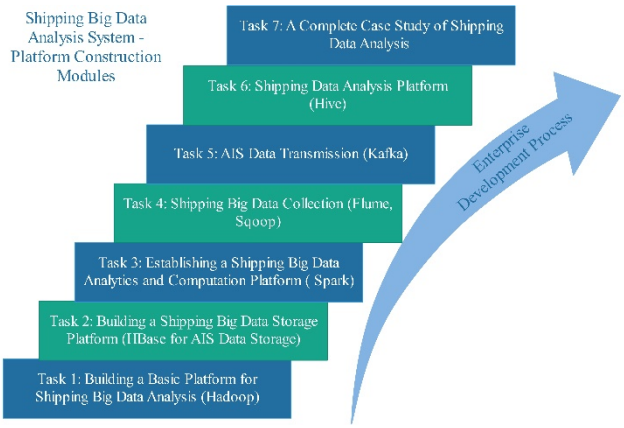

Fig 2. The project-based teaching task

3.2. Establishing a Four-Level Competition Mechanism and Realizing Teaching Promotion Through Competitions

A four-level competition and training integration mechanism of "school-level - industry-level - provincial-level - national-level" is established. School-level skill competitions are designed, regulated, and judged by frontline skill masters and experts from enterprises. The school-level skill competition platform is fully utilized to cover over 60% of students in the professional group, cultivating students' fighting spirit, educating them on rules and regulations, exercising their psychological qualities, and guiding them towards pursuit of excellence. Leveraging the advantages of competition content aligning with industry standards and advanced technologies, high-quality resources from both schools and enterprises are integrated to enrich the connotation of craftsmanship and boost the innovation of teaching methods. Through the school-level skill competition platform, outstanding students are selected to enter the skill competition station, where training programs are formulated, technical skills are strengthened, and students' innovative

abilities are enhanced. In the station, participation in high-level skill competitions and obtaining high-level professional skill certificates are encouraged as goals. Through the personal instruction of enterprise craftsmen, skill masters, and school teachers, students' enterprising and innovative spirit, sense of responsibility, and courage to take on responsibilities are strengthened, inspiring them to aspire to become great craftsmen of the new era.

3.3. Focusing on Ideological and Political Education and Course-Certification Integration, Achieving Verification through Certifications

Combining the characteristics of vocational education, a project-based and modular knowledge and skill system is designed, integrating content into different cases. Based on "1+X" certificates such as big data platform operation and maintenance, big data analysis, etc., teaching content closely integrated with actual production is constructed, achieving course-certification integration. When designing course teaching content, certificate standards and specifications are incorporated, and the learning characteristics of teaching objects in course learning are analyzed. The teaching content is based on curriculum standards, the learning situation of vocational college students, and the background of the times. Modern information technology means are employed, adopting the OBE teaching concept and the "learning community" form to help students establish "wanting to learn" with intrinsic motivation and "being able to learn" based on self-awareness development. This also helps students achieve "knowing how to learn" and "persisting in learning" based on mastering certain learning strategies and evaluations. The Big Data major promotes the reform of curriculum ideology and politics, organically integrating ideological and political elements, professional knowledge, and skills, as well as integrating professional skill level certificates with course teaching content and professional job skills with practical teaching links.

4. Conclusion

The integration of "Position, Course, Competition, Certification" is an innovative talent cultivation mode that integrates job requirements, course content, skills competitions, and professional qualifications to build a student-centered, competency-based educational system, providing new ideas for cultivating high-skilled talents that meet market demands. In the cultivation of big data skilled talents, this mode plays a significant role in promoting craftsmanship. The big data technology major, based on the integration of "Position, Course, Competition, Certification", provides strong support for cultivating craftsmanship among big data skilled talents through the deep fusion of job requirements, course content, skills competitions, and professional qualifications. This mode not only enhances students' professional skills and employment competitiveness but also fosters their dedication to work, pursuit of excellence, and bravery in innovation—the essence of craftsmanship, thereby supplying society with more high-quality skilled talents that meet industry needs.

Human society has rapidly developed through continuous creation, and the value implications of craftsmanship have also constantly evolved and improved alongside the development of the times. The cultivation of craftsmanship among vocational college students specializing in big data technology needs to keep pace with the times, continuously inheriting and developing as the industry progresses, vocational education reforms, and social concepts update.

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