



Research and Exploration of School-Enterprise Collaborative Education Mechanism of Intelligent Manufacturing Professional Group under the Background of Modern Apprenticeship

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Abstract. Modern apprenticeship is an effective and important talent training model in line with the law of vocational education in order to adapt to the Made in China 2025 strategy and cultivate high-quality and high-skilled talents in the field of advanced manufacturing. Therefore, the implementation of modern apprenticeships is of great strategic importance for improving the quality of vocational education. However, at present, the implementation of modern apprenticeship in higher vocational colleges is facing many problems, and deepening the integration of industry and education, further improving the school-enterprise collaborative education mechanism, and cultivating innovative technical talents are the only way for the development of higher vocational education.

Keywords: Modern Apprenticeships; School-enterprise cooperation; Collaborative education.

1 Introduction

The modern apprenticeship system is a vocational education system that combines traditional apprenticeship training with modern school education, and is implemented through cooperation between enterprises and schools. It is a new type of apprenticeship system characterized by the close integration of school-based education and job based training. It focuses on skill development for students through deep cooperation between schools and enterprises, as well as joint teaching by teachers and masters. It is the basic trend and dominant mode of vocational education development internationally.

The birth of modern apprenticeship system is marked by the German dual system. Nowadays, many Western countries have implemented modern apprenticeship systems, but the models adopted by each country are diverse. In different modes of modern apprenticeship, either process management and quality control are emphasized, or result control is adopted.

In recent years, the research and practice of modern apprenticeship system have rapidly advanced in China. Vocational colleges are the main battlefield for cultivating

practical and applied talents with excellent practical skills, outstanding professional qualities, and adaptability to local economic development. The implementation of modern apprenticeship system is a major measure of vocational reform in China, which will play an important role in improving the country's vocational system^[1].

2 Establishing a Collaborative Educational Operation Mechanism Between Schools and Enterprises

Both schools and enterprises have established a dual main sports personnel model through sharing resources, co building courses, integrating teachers, and conducting joint evaluations.

One is to rely on school enterprise cooperation platforms such as "Industry College Enterprise College", with talent cultivation as the center, to build three types of "dual subject" school enterprise collaborative innovation platforms: "School+Industry Education Integration Training Base", "School+Industry College", and "School+Industry Association". As shown in Figure 1.

The second is to break through traditional forms of cooperation, integrate resources and fully connect with industry clusters and enterprise clusters, and build a "1+1+N" integrated collaborative education pattern that integrates schools, core enterprises, and numerous small and medium-sized enterprises, achieving the maximization of the composite effectiveness of education^[2].

The third is to establish a collaborative information sharing mechanism between schools and enterprises, jointly build industrial colleges for intelligent manufacturing majors, fully leverage the core role of leading enterprises in standard guidance, technology demonstration, etc., share information on technology needs, talent supply and demand, internships and training, etc., so that students can timely understand the latest trends and technologies in industry development, and achieve dual improvement of knowledge transfer and skill adaptation ability.

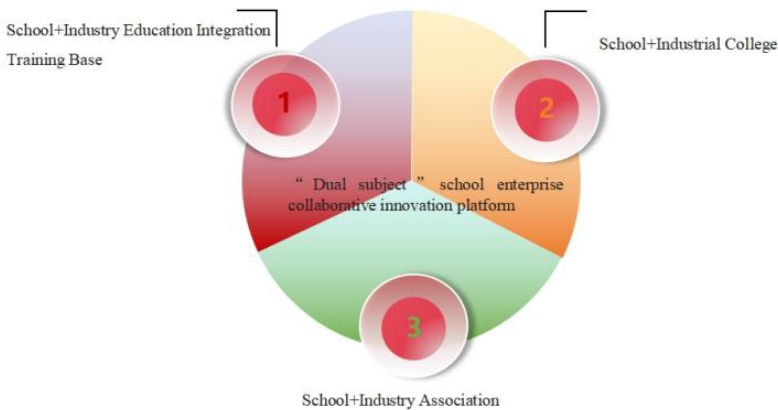


Fig. 1. "Dual subject" school enterprise collaborative innovation platform

3 Innovative Talent Cultivation Model

Based on the existing equipment manufacturing category, establish a professional cluster industry college. Targeting the transformation and development of manufacturing industry, with the goal of strengthening students' vocational competence and sustainable development ability, and focusing on improving students' practical and innovative abilities. Using the Industrial College as a platform, we aim to attract enterprises to join our school and education, continuously deepening the integration of industry and education, and enhancing the depth of cooperation between schools and enterprises. Implement a new apprenticeship system for enterprises and promote the construction of the "four integrations" of course positions, course certificates, course competitions, and course innovation(As shown in Figure 2). Promote the reform of heuristic and exploratory teaching methods, as well as the comprehensive reform of collaborative, task-based, project-based, and enterprise practical teaching modes, to promote the connection between curriculum content and technological development, the integration of teaching process and production process, and the integration of talent cultivation and industry demand^[3-4].

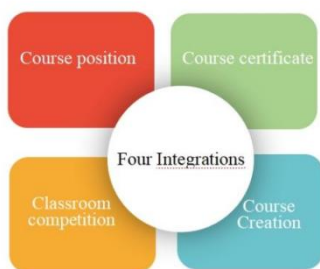


Fig. 2. Construction of "Four Integrations"

4 Building a Teaching Platform for Vocational Ability Development

In school enterprise cooperation, a talent cultivation model centered on ability development is implemented, with the goal of enhancing students' abilities through specialized training, professional internships, on-the-job internships, and teacher training. A vocational ability cultivation teaching platform is established.

4.1 Based on the Three Teachings Reform

Taking teacher reform as the fundamental principle, combining guidance and training, expanding professional leading teams, classifying and promoting teacher training systems, and building a "mixed teacher team" composed of enterprise experts, skilled craftsmen, and teachers; Based on textbook reform, closely following the development

of intelligent manufacturing industry, student-centered, job oriented, and connected with intelligent manufacturing application scenarios, a new type of textbook is jointly developed by schools and enterprises; Through the reform of teaching methods and the reconstruction of interdisciplinary courses, the integration of scientific research achievements into teaching, and the promotion of teaching implementation through competitions, we aim to improve the quality of talent cultivation and open up the implementation path of vocational ability training.

Focusing on top-notch quality as the breakthrough point.

4.2 Taking Excellence in Quality as a Breakthrough Point

Persist in cultivating virtue and nurturing people. Cultivate students' craftsmanship spirit, encourage them to learn from masters and model workers, and possess excellent qualities of hard work and perseverance; Cultivate a sense of social responsibility, clarify the combination of personal goals and national development, and the combination of personal responsibility and national rejuvenation; The "dual drive of morality and technology" cultivates students' innovative consciousness, promotes student entrepreneurship and excellent job compensation, and becomes the main force of "mass entrepreneurship and innovation".

4.3 Focusing on Improving Abilities as the Key Point

Promote the integration of on-the-job courses, competitions, and certificates. Connect with industries, clarify job competency standards, analyze and condense the competency standards of job groups in intelligent manufacturing application scenarios, and explore the characteristics and commonalities between positions; Integrate courses, upgrade digital teaching resources, and achieve deep integration of information technology and education teaching; Using competitions to promote learning and teaching implementation, enabling students to understand the latest developments in their major and master theoretical knowledge and practical skills related to the training objectives of their major. The vocational ability training teaching platform is shown in Figure 3.

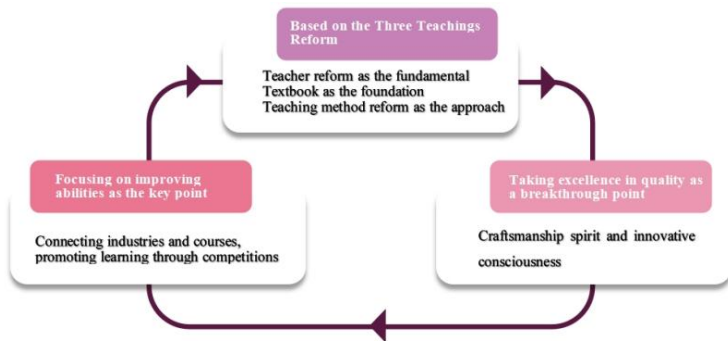


Fig. 3. Vocational Ability Training Teaching Platform

5 Building a Practical Platform for Vocational Ability Training

Co construction and sharing between schools and enterprises, establishing a deep integration of industry and education in education, building a vocational ability training practice platform with "one park, one base, and three supports" as the main line, and establishing a "co construction, co management, and co sharing" training base between schools and enterprises to improve teaching quality and ensure talent cultivation. The five majors within the professional group are closely connected to the industry, and there are increasingly more intelligent production application scenarios for intelligent connected new energy vehicles; Having the same professional background, all majors within the group belong to the category of equipment manufacturing; Related to employment positions, mainly engaged in operation and management positions related to the production and manufacturing of intelligent connected new energy vehicles; Professional courses are interconnected, and platform courses cover a comprehensive range of core courses with cross integration^[6-7]. The practical platform is shown in Figure 4.

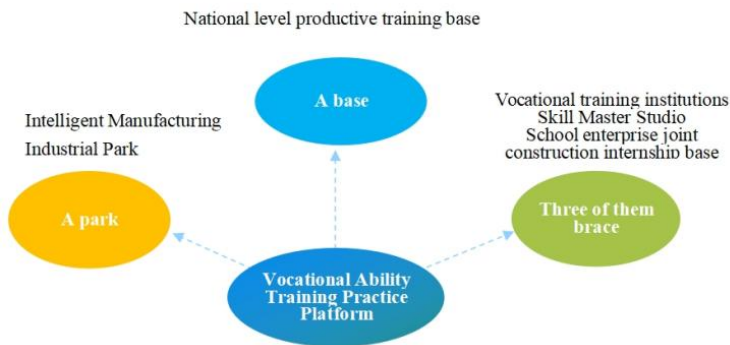


Fig. 4. Vocational Ability Training Practice Platform

6 Building a Dual Education Model Between Schools and Enterprises

One is the dual configuration of mentors. Implement the "dual mentor" system between schools and enterprises, with full-time teachers appointed by the college as on campus academic mentors responsible for theoretical knowledge and tracking learning progress. Enterprises appoint technical backbones as enterprise mentors to carry out interdisciplinary and cross professional innovation training and production training at all levels in the form of master apprentices.

The second is the implementation of dualization in teaching. On campus academic mentors and corporate mentors, combined with the requirements of vocational qualification certificate levels, design teaching processes such as learning, practical training,

social services, innovation and entrepreneurship to cultivate practical operational abilities.

The third is the dualization of teaching evaluation. Mainly focusing on college teaching management, supplemented by production training, evaluating and monitoring theoretical learning; Mainly focusing on production training, supplemented by college teaching management, conducting professional standard assessments for production training^[5].

The fourth is the dualization of teaching venues. Carry out integrated learning of theory and practice with schools as the main focus and enterprises as the auxiliary, and conduct production training and project services with enterprises as the main focus and schools as the auxiliary.

By implementing the dual education model between schools and enterprises, we can effectively solve the problem of insufficient connection between vocational education and industrial development in terms of demand, standards, processes, certificates, and learning, and improve students' employability.

7 Conclusion

Under the background of modern apprenticeship system, achieving high-quality development through school enterprise collaboration is not only the future development path of vocational education, but also a key measure to practice new development concepts and build a modern talent training pattern. It is of great significance for students' better development, improving the quality and efficiency of education, and optimizing employment structure. The establishment and improvement of the training system and operational mechanism for deep cooperation and collaborative education between schools and enterprises is a long-term process. In this article, only preliminary research and exploration have been conducted on the mechanism construction of the school enterprise cooperative education system, the construction of the industry education integration training platform, and the modern apprenticeship talent training model.^[8-9]

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