

Research on the Upgrading Development Path of Collaborative Innovation of Production-Study-Research in Private Vocational Colleges

--Take Kunshan Dengyun College of Science and Technology for Example

Changwei Chen, Zheyu Xu

DengYun College of Science and Technology, Kunshan, Suzhou, China

Keywords: Collaborative Innovation of Production-Study-Research, Private Vocational Colleges, Upgrading Development, Path.

Abstract. The upgrading development of private vocational colleges is an important part of constructing the modern vocational education system. Research on collaborative innovation of production-study-research is an important subject for the industry transformation and upgrade serviced by contemporary colleges. The shortage of teachers and equipment resources, to some extent, restricts the innovation of the private vocational colleges. This paper studies Kunshan Dengyun College of Science and Technology. It is found that the college insists the combination of working with learning to deepen the industrial basic advantages of school-enterprise cooperation. The college also has built a platform of production-study-research innovation of Yangcheng Lake in Kunshan by integrating the government, colleges and research institutes to serve regional economic development, so as to explore the upgrading development path of private colleges. It is not only an attempt of reform and innovation, but also a breakthrough in innovation and development of regional economic transformation and upgrade serviced by higher vocational colleges. It has very important realistic and popularization significance.

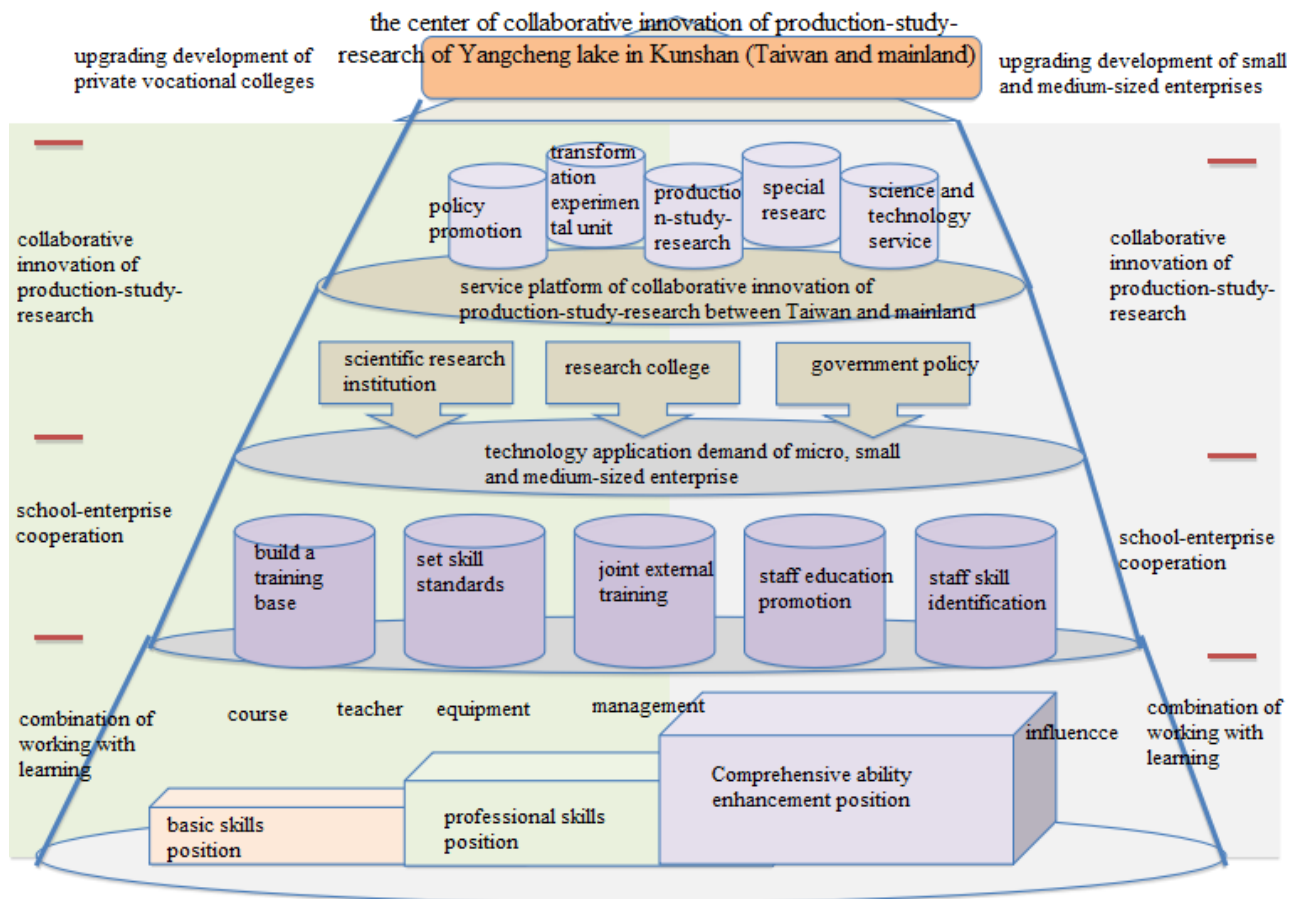
Introduction

In the critical period of the innovation and development of industry transformation, it is the key to improve the overall competitiveness of most small and medium-sized enterprises. However, most of the research of production-study-research innovation focuses on the research achievements and industrial incubation of public and research universities and the cooperation with large-scale enterprises. It is an important subject on how to excavate and solve the common technical demand or application problems of enterprises, especially for small and medium-sized enterprises; how can the government policy effectively guide the transformation and upgrade of small and medium-sized enterprises, and how to carry out the collaborative innovation of production-study-research in higher vocational colleges, especially in private vocational colleges. Therefore, this paper, through the empirical analysis of the development path of production-study-research in Kunshan Dengyun College of Science and Technology in the past six years, puts forward the upgrading development path direction of the collaborative innovation of production-study-research in private vocational colleges.(Details in Figure 1)

Form a Solid Foundation for School-Enterprise Cooperation by Using Flexible School Management System to do a Combination of Working with Learning

Compared with public colleges, the management organization forms, resource utilization mechanism and personnel incentive system of private vocational colleges are more entrepreneurial and vivid. Based on this, with the advantage of Taiwan-funded education, Kunshan Dengyun College of Science and Technology combines the mode of technical and educational cooperation of Taiwan with the internship in the mainland. The college successfully initiated the "class of combination of

work with learning" in Jiangsu of 2010. It represents a training mode that according to the enterprise job demand and skills training law, school and enterprise jointly build "three stages post", school and enterprise jointly implement the "three curriculum system" to achieve the organic combination of working and learning, school and enterprise jointly cultivate the industry required high-quality technical skills talents. Based on the "class of combination of work with learning", the college has built four mechanisms for strengthening the basis of cooperation between schools and enterprises, made a combination of working with learning and solved the survival problem of private vocational colleges.



Source: organized by this research

Figure1: the upgrading development path of the collaborative innovation of production-study-research in private vocational colleges

Constructing "Three Stage Post" is the Key Way to the Combination of Working with Learning. The practice proves that the key to the combination of working with learning is to mobilize the enterprises to "cultivate talents", deeply analyze the enterprise talent demand structure and cycle plans and build a "three stage post" according to the skill level and learning rules of the post. It includes basic quality cultivation stage(learning by doing), professional skills enhancement stage (doing by learning) and comprehensive vocational skills upgrading stage. It combines the demanding quantity and time of the enterprises, systematically determines majors, classes and practice time interval with plans. Students are promoted according to their skill level, which can lead and support each other in "doing" and "learning", and achieve the learning goal of combining with each other. And then the new students can do effectively connection, make a talent training program that meets the needs of enterprises to mobilize the enterprises to "cultivate talents". Therefore, it is the best way to do the combination of working with learning and also the first step in the interactive integration of "triple-win in two-way" between schools and enterprises which see the "interests" of students, enterprises and schools as the core.

Constructing "Three Curriculum System" is an Important Starting Point for the Combination of Working with Learning. The "three curriculum system" is designed according to the cognitive rule of mastering skills of students which starts from shallow to deep. The system is operated step by step and continuously improved. It allows students to learn according to the "basic operation- skills training - technical skill mastery" plan and complete the transition from "student" to "student + employee". The "three curriculum system" with "skills" as the main line is formed and perfected in the cultivation process of "three stage post". It mainly combines the skill requirements of "three stage post" and the in-depth analysis and reflection of "traditional knowledge and skills curriculum system". It is based on the post skill requirements of enterprises which represents that it is the core curriculum that requires the necessary professional knowledge and skills and the new skills of the development trend of the industry with the principle of "take enough to use as the limit"; it is the practical curriculum that requires students to learn and master the basic skills and operational skills for the practice position; it is the project curriculum that is built by analyzing the working procedure of enterprises, and combines the professional theory with the main practical skills. The implementation of the "three curriculum system" is to implant the pre-employment, on-the-job and improvement training courses into talent training programs. It has not only saved enterprise training resources, but also deepened the curriculum reform. In this way, it is an important starting point for the combination of working with learning.

Constructing "Mutual Appointment Team" is the Core Measure of the Combination of Working with Learning. The "three stage post" has mobilized the enthusiasm of the senior management and the human resources department. The "three curriculum system" has aroused students' enthusiasm for learning. The enterprise technology and management personnel become the key point of the combination of working with learning. The college actively recruits executives to undertake the teaching of the "three curriculum system", and the enterprise appoints teachers to take the duties of supportive skills and research and development by making full use of the college teachers' theoretical skills and the practical guidance function of the combination of working with learning. The "double jobs, double salaries" builds a "mutual appointment team" which becomes the core measure of the combination of working with learning and has mobilized the enthusiasm of "common education" of colleges and enterprises.

Constructing "Department Cooperation and Development Mechanism" is the Basic Guarantee for the Combination of Working with Learning. The implementation of "three stages post" and "three curriculum system" derives the "department cooperation and development mechanism". It is a mechanism that the production and study department of the college conducts enterprise development, inspection and evaluation with professional teacher team. The college specially establishes the cooperative development office of production and study which is responsible for investigating the concept of cooperative enterprise, the health of internal training mechanism, management mechanism and social responsibility and so on. The department of majors investigates professional aspects such as degree of specialty, post skill level, internal training courses, equipment resources. The "cooperation on the basis of division of labor" in the inspection link guarantees the continuous operation of the combination of working with learning. It is more important that the two can do the work of "division of labor based on cooperation" in time, effectively and flexibly which makes the teaching reform of the college realize the collaborative innovation of professional direction setting, curriculum reform, teaching management mode and so on.

By carrying out these measures, Kunshan Dengyun College of Science and Technology stably maintains 65 cooperative enterprises (cooperate for more than three years), owns 298 part-time teachers formed by enterprise engineers and management personnel, opens 82 project courses and the average annual total class period is 6753. (source: Dengyun College e - system data) It has greatly improved the employment competitiveness of college graduates. It has an 83 percent vocation counterpart employment rate. The salary level of graduates ranks first in the province of similar institutions after six months. (Source: data from Mckenzie, jiangsu province, 2014)

Deepen Cooperation between Colleges and Enterprises, Construct Platform of Collaborative Innovation of Production-Study-Research

Kunshan Dengyun College of Science and Technology has built stable cooperative enterprise basis of combination of working with learning based on the teaching mode "classes of working with learning, education by colleges and enterprises". It has made up for the shortage of the construction and cultivation of teacher teams in private vocational colleges and the shortage of equipment resources. It has also done well in combining working with learning and made a valid link for the internal and external training bases. The college has built the first "provincial advanced manufacturing technology sharing training base" among private colleges. Besides, it has also built some bases such as the first "electromechanical integration training base supported by the central finance", the first Commerce Department "E-commerce talent training base", etc. The measure has facilitated the in-depth cooperation between the college and enterprise in the aspects of staff skills appraisal project, customized training program and equipment donation cooperation, etc. Meanwhile, special investigation data of enterprises shows that it will take seven days for a basic operator to work in the production line after being hired. The cost of hiring, the cost of training and other management costs of the enterprise is estimated to be 1.5 times of the national salary standard. A year later, the loss of the personnel who become the backbone of the enterprise will be an important factor to weaken the core competitiveness of the enterprise. As a result, the college has adopted a solid foundation of corporate cooperation and incorporated the grassroots supervisors into the continuing education system, which is another step in deepening the cooperation between the college and enterprises. And these enterprises must have certain industry representative, core competence and influence in the education concept, management system, management teams. In the 2015-2016 academic year of Dengyun college, there are 42 skills training programs and customer training programs. There are 4799 people who attended enterprise customization training, and 985 enterprise employees improved their education background. The income from self-resource integration of private colleges accounted for 23% of the total income of the college. (source: Dengyun College 2015-2016 annual report) The expansion of diverse cooperation projects of colleges has opened channels and has deepened the cooperation between colleges and enterprises. The stable cooperative foundation of colleges and enterprises is the very urgent need of colleges with strong abilities of research and development, scientific research institutions, transformation and upgrade of tutorship institutions and public service platforms in both Taiwan and mainland. Therefore, private vocational colleges with scarce resources but stable enterprise basis and flexible mechanism have successfully built a bridge of production-study-research between the government, colleges and enterprises and established the cooperative innovation service platform of production-study-research on the basis of the "interest" in Taiwan and mainland, converged the resources of teachers, equipment, and tilted policies for the development of private vocational colleges and solved resource problems of the development of private vocational colleges.

Marketize the Operation of Collaborative Innovation Center, Promote Upgrading Development

Collaborative innovation of production-study-research refers to that with the support of the related subjects such as the government, science and technology service intermediary agencies and financial institutions, three basic subjects include enterprises, colleges and scientific research colleges (research institutions) put their respective advantages of resources and capabilities into collaborative innovation activities.

Through the integration of resources, collaborative innovation of production-study-research service platform enhances the integration of technology services. Through regular contact and exchange mechanism, the foundation of the production-study-research cooperation is better. How to integrate the platforms effectively such as the technology transfer service platform, the science and technology service platform and the equipment sharing platform and establish effective management mechanism of project operation is the key to improve the operation effectiveness of small and

medium-sized enterprises. How to participate in the collaborative innovation for private vocational colleges which lack core technology research and development skills and teacher force becomes an important research topic. Facing the technical application and transformation problems proposed by the cooperative classes and enterprises, Dengyun College utilizes the advantage of Taiwan-funded education to collect resources from colleges and research institutes of both Taiwan and mainland, connects the production-study-research project by establishing the collaborative innovation service platform of production-study-research of Yangcheng lake in Kunshan (Taiwan and mainland). The results of the platform's initial operation are recognized by Kunshan Industry Technology Research Institute which established collaborative innovation center of production-study-research of Yangcheng lake in Kunshan (Taiwan and mainland) with Kunshan Dengyun College. They explored the market operation mode of mixed ownership, aiming at meeting the industrial demand with their research and technological achievements. Therefore, the college undertakes the government policy promotion and research service through this center; It broadens the channels for professional teachers to grasp the trend of industrial development; Through the technical service project, it connects effectively the government policy with the industry demand; By undertaking the pilot project of industrial transformation and upgrading, the college introduces Taiwan's innovative resources and scientific research resources of cross-strait colleges, carries out the diagnosis and counseling of production-study-research projects, and enhances the ability and level of academic research and management of teachers and enterprises, and finds the shortcuts of self-cultivation and training of teachers.

By undertaking policy adjustment special research project of industry talents and highly skilled talents of Kunshan Science and Technology Bureau and Kunshan Human Resources and Social Insurance Bureau, the college found 42 industry counseling experts, 221 production-study projects of enterprises and 21 science service projects. (source: Key Report on the Adjustment of Talent Policy of Key Industry in Kunshan, 2016). The college for the first time gained profit from science and technology service which greatly enhanced the confidence and enthusiasm of teachers in the college. It also achieved the breakthrough of teachers' horizontal research project in the college which reached more than 10 projects. At the same time, it enhanced the college's influence in the government departments and different industries.

Different from the platform type hosted by the government and research colleges which focuses on technology transfer and achievement transformation, private vocational colleges need to utilize the stable basis of college-enterprise cooperation and build the collaborative innovation platform of production-study-research. They should link the resources of the government, cross-strait higher education and research institutions through the purchase service projects getting from the government, such as special investigation and research, technology service declaration, cooperation pilot projects of production-study-research, to solve the problems of the technology application in small and medium-sized enterprises, improve the ability and function of teachers, innovate the precise positioning of operation mechanism. It opened a way of upgrading development of private vocational colleges.

References

- [1] Xu Zhang. Reflections on the Management Mechanism of Public Vocational Colleges and Private Vocational Colleges [J]. Research on Higher Vocational Education in China, 2014 (87) .
- [2] Ting Liu, Xiaoye Xu, Chenzhi Liang. Analysis on the Operation Mode of Technology Transfer Service Platform [J]. Public Technology, 2012 (154) .
- [3] Yi Xu. A Preliminary Study on Establishing Collaborative Innovation Mechanism of Production-Study-Research [J]. Times Report, 2014(6): 263-265.
- [4] November 21, 2014, Public Service Platform of Production-Study-Research in Kunshan Dengyun College of Science and Technology—Intelligent Robot Symposium Meeting Material

- [5] June 18, 2015, Material of the Establishment Meeting of collaborative innovation service platform of Production-Study-Research in Kunshan Dengyun College of Science and Technology
- [6] April 19, 2016, Key Industry Talent Policy Adjustment Transformation Research Meeting Material of Kunshan Human Resources and Social Insurance Bureau