

Research on the Ways of Collaborative Education Between Schools and Enterprises in Applied Undergraduate Colleges

Lan Cui^{1,*} Hongcheng Duan¹ Shuai Qu¹ Nannan Xu¹

¹Harbin Finance University, Harbin, Heilongjiang 150030, China

*Corresponding author. Email: 2005032@hrbfu.edu.cn

ABSTRACT

The integration of production and education is an important measure to promote coordinated economic and social development during the 13th Five-Year Plan in China. As the main form of integration of production and education, the collaborative education between schools and enterprises has strong theoretical and practical significance for improving the social service function of applied undergraduate colleges. In this paper, document literature, investigation and analysis, practice and summary, comparative analysis and other methods are used to study the relevant national policies. It analyzes the project data of collaborative education published on the official website of the Ministry of Education, investigates the actual situation of collaborative education implemented by schools and enterprises, and analyzes the advantages and necessity of collaborative education between schools and enterprises. It is proposed that the collaborative education between schools and enterprises of applied undergraduate colleges should be realized through the joint cooperation of schools and enterprises to build the "five platforms", the joint construction of professional teaching teams, and the collaborative construction of an education and training system.

Keywords: applied undergraduate, collaborative education, integration of production and education

I. INTRODUCTION

In China, school-enterprise collaborative education mode has a history of nearly 30 years. Chinese scholars engaged in theoretical research of higher education have made more achievements in the research of school-enterprise collaborative education mechanism. And some colleges and universities have carried out practical exploration of school-enterprise collaborative education in teaching. In the past research, the research objects of school-enterprise collaborative education are mainly higher vocational colleges. In undergraduate colleges, the practice of school-enterprise collaborative education focuses on science and engineering, and only explores specific disciplines and professional cooperation from the cooperation between enterprises and schools, which are manifested as preliminary coordination, single collaboration, but there are few deeper explorations on multi-agent collaboration, diversified exploration of collaborative mechanism.

Foreign research on collaborative education mechanism is mainly reflected in the integration of

*Fund: This paper is the phased achievement of the key commissioned project of the 2018 Heilongjiang Province Higher Education Teaching Reform Research Project. The project number is: SJGZ20180021.

professional education and innovation and entrepreneurship education, with rich research results. Collaborative education has a history of more than 100 years in the United States and Germany. At present, it has entered the mature stage, the concept has been popularized, and the education, teaching and practice system has been formed. In foreign countries, it mainly advocates the idea of entrepreneurship education and the talent training mode of "collaborative practice education". The representative mode is the cooperative education mode in the United States, the campus-factory education mode in Singapore and the "dual system" in Germany.

With the change of social talent demand and the development of China's higher education, collaborative education model has shown a trend of diversification and popularization in recent years. Due to the huge differences in the system of higher education and national conditions in China and foreign countries, it is difficult to directly copy the mode of collaborative education between schools and enterprises in foreign countries. In this context, there is a large research space for studying the ways of school-enterprise collaborative education in application-oriented universities.

II. THE SIGNIFICANCE AND ADVANTAGES OF APPLYING COLLABORATIVE EDUCATION BETWEEN SCHOOLS AND ENTERPRISES

A. The significance of developing collaborative education between schools and enterprises

The 19th National Congress of the Communist Party of China embarked on a new historical journey to accelerate the modernization of education and build a powerful country of education. China's economic development has entered "the 13th Five-Year Plan" stage. In this new period, the technological revolution brought about by the rapid development of new technologies has become a prairie fire. "New", "innovative", and "changeable" have become popular keywords. Colleges and universities that are responsible for training talents must make new choices in the face of the new situation. The State Council's "Several Opinions on Deepening the Integration of Industry and Education" (hereafter referred to as "Opinions") proposed that, the integration of industry and education should be taken as an important measure to promote the coordinated economic and social development, integrate into all links of economic transformation and upgrading, throughout the entire process of talent development, and form a work pattern of government, enterprise, school, industry, and social collaboration. According to the "Opinions", the main goal of deepening the integration of industry and education is: "to gradually increase the degree of participation of industry and enterprise in running schools, to improve the diversified school running system, and to comprehensively promote collaborative education between schools and enterprises." collaborative education between schools and enterprises is a new form of education reform in applied undergraduate colleges. Its various forms can break the situation of "one thousand of schools with same pattern", promote the reform of the education mechanism of applied undergraduate colleges, promote applied undergraduate colleges and universities to run their own characteristics, and improve the level of education and teaching to make it meet the needs of local economic and social development, which has strong theoretical

and practical significance for improving the social service function of applied undergraduate colleges.

B. Advantages of developing collaborative education between schools and enterprises

1) *Strongly national policy support:* In 2017, the State Council's "Opinions" proposed to implement the spirit of the 19th National Congress of the Communist Party of China, deepen the integration of industry and education, comprehensively improve the quality of human resources, take school-enterprise collaboration and cooperative education as its principles and goals, and build a long-term mechanism for school-enterprise cooperation. After the "Opinion", at the beginning of 2020, the "Administrative Measures for Industry-Academy Cooperation and Collaborative Education Projects" issued by the Ministry of Education elaborated on the subject, positioning, specific management system, and management rights and responsibilities of the Industry-Academy Cooperation and Collaborative Education Projects, fully encouraged the establishment and development of collaborative education between schools and enterprises projects, and promoted collaborative education projects through multiple channels such as policy trends, financial support, funding platforms, and auxiliary supervision.

In order to improve the quality of undergraduate talent training and deepen the integration of industry and education, the Department of Higher Education organized the collaborative education projects development of enterprise-university industry-academy cooperation. From 2016 to 2019, more than 40,000 projects were carried out in two batches each year (see "Table I"), with more than 6,100 participating schools and more than 1,700 enterprises. As can be seen from the statistical table in "Fig. 1", the number of projects of collaborative education between schools and enterprises has increased significantly, from more than 2,000 initially to more than 10,000, and to more than 18,000 in 2018. With the support of the national policy, more and more schools and enterprises have seen the advantages of the collaborative education project and quickly launched this project.

TABLE I. STATISTICAL TABLE ON THE NUMBER OF PROJECTS APPROVED FOR THE FIRST AND SECOND BATCH OF PROJECTS OF COLLABORATIVE EDUCATION BETWEEN SCHOOLS AND ENTERPRISES FROM 2016 TO 2019

	The first batch in 2016	The second batch in 2016	The first batch in 2017	The second batch in 2017	The first batch in 2018	The second batch in 2018	The first batch in 2019	The second batch in 2019
<i>The number of approved projects</i>	851	1180	3203	6692	7376	10288	6767	8211
<i>The number of enterprises</i>	34	44	90	194	393	355	297	324
<i>The number of schools</i>	311	448	742	911	965	990	871	918

^a. Source: official website of Ministry of Education.

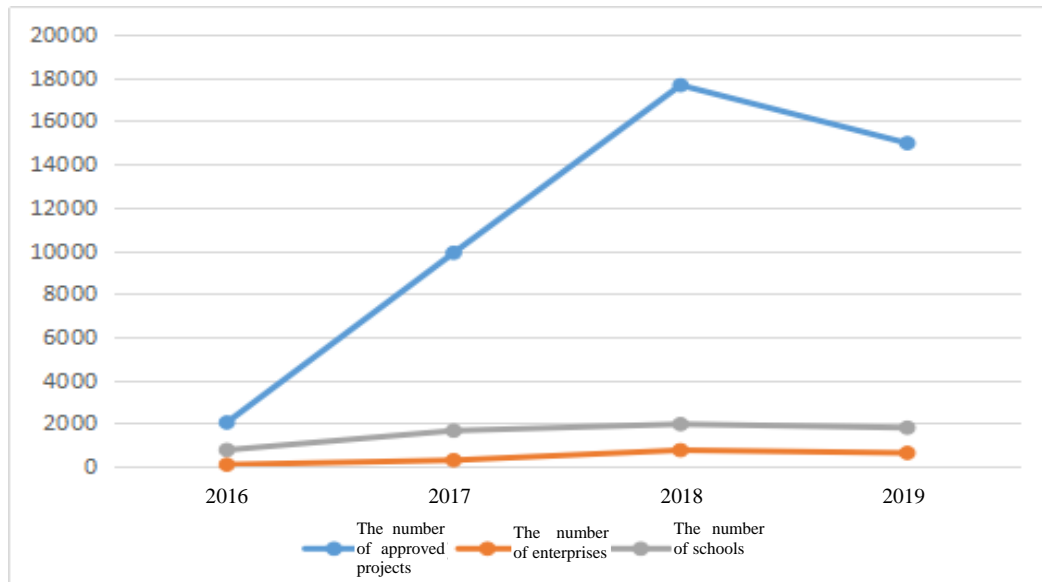


Fig. 1. Statistics of the approved projects of collaborative education between schools and enterprises from 2016 to 2019.

2) *High-quality resource support from schools and enterprises:* Industry-academy cooperation and collaborative education is to make full use of the high-quality resources of both schools and enterprises to train students. The school has a wealth of teachers, a good learning environment and a complete curriculum system. Students receive a comprehensive and systematic education of subject knowledge in the school to lay a solid theoretical foundation. The enterprise has a broad training platform, advanced front-line work experience and sufficient training materials, etc. Students can transform theory into practice in the enterprise, perform drill and operation in real scenarios, further improve the level of practical operation, increase knowledge, broaden horizons, and strengthen cognition, so as to more effectively create high-level professional talents. Under the implementation of the training model of industry-academy cooperation and collaborative education, it is necessary to directly connect with enterprises and accurately locate the needs of the current talent market, so that education and teaching are more targeted and can better meet the actual business needs of enterprises.

3) *Multi-subjects achieve a win-win situation:* Students are the most direct beneficiaries of the collaborative education training model. They can not only enjoy policy dividends, get the support of the dual resources of schools and enterprises, but also be promoted and grow up quickly and efficiently. They can more accurately grasp the pulse of the industry, understand the frontier dynamics, use practice to test theories, use theories to drive practice, improve their academic level, and cultivate innovation capabilities. At

the same time, in actual scenarios, they experience the working environment, test their abilities, identify the skills to be strengthened, constantly hone themselves, choose suitable positions, and make full preparations for more precise employment.

Schools and enterprises, as the cooperative parties and subjects of collaborative education, will achieve a win-win situation for the common goal through continuous efforts in resource exchange and information transmission. As a link between schools and enterprises, students can not only bring cutting-edge subject theory into production practice, but also integrate advanced work experience into knowledge theory, find more ways to update and enrich practice and theory, and use the school's scientific research theories to solve practical problems and provide more motivation and methods for the development of the enterprise in completing the exchange of resources and information transmission between the school and the enterprise. The valuable experience in the enterprise can be used to give feedback to teaching, adding more cases to teaching and more innovation points to theoretical research.

Talents cultivated through school-enterprise cooperation and the integration of production and education can gain more social recognition, and the school will also gain public trust. The school does not blindly train students, but accurately connects high-quality enterprise resources, outputs high-level talents, and provides higher-quality services to the society. And enterprises can also expand their publicity through this project, win public praise, and increase popularity and national recognition degree. The school and the enterprise jointly cultivate high-level applied talents, which can not only fulfill the school's mission of

cultivating applied talents, deliver high-quality talents to the society, increase employment rates, and expand reputation, but also can be used by the enterprise, become a vital force for the enterprise, and accumulate energy for its growth and development. The collaborative education project has delivered fresh blood for the enterprise, played a great "catfish effect", added vitality, and brought more new ideas for the development of the enterprise.

III. THE NECESSITY FOR APPLIED UNDERGRADUATE COLLEGES TO DEVELOP COLLABORATIVE EDUCATION BETWEEN SCHOOLS AND ENTERPRISES

A. The need to cultivate high-level applied talents

The training of high-level applied talents with strong professional skills, good professionalism, good creativity and plasticity, and who can be unique in actual work is not accomplished overnight, nor can it be achieved by studying complete and systematic theoretical knowledge alone. It also requires practical training in the workplace, first-line work experience, and comprehensive learning in theory and practice. At present, simple school education can often only solve the problems of theoretical study and part of practical training. If you want to integrate theory with practice and seek comprehensive development, collaborative education between schools and enterprises is one of the best ways.

High-level applied talents should not only master knowledge, but should also be thorough, flexible, and can draw inferences about other cases from one instance. They should also have insight into industry trends and grasp the frontiers of science and technology. However, the updating of textbooks is not as fast and direct as the direct work in enterprises. Collaborative education between schools and enterprises is to bring students into enterprises, allowing students to intuitively contact and understand first-hand vocational skills and industry information.

The test of high-level applied talents requires a platform. The excellent test and examination results of the school does not mean that a student is already a qualified high-level applied talent. Only when they play a role in the actual work, have accurate judgment of the industry, can give full play to the theory in the appropriate field, have unique insights and acute vision, and can create practical value for the enterprise, can they better measure the level of high-level applied talents. At the same time, the experience in the enterprise can not only test the students' mastery of the knowledge learned in the university, but also make the students aware of their own shortcomings and understand the importance of learning knowledge. In the future study and work, their theoretical level will be

improved in a targeted manner, so that their knowledge system can better meet the needs of the industry, and it is also more conducive to the precise employment of themselves.

B. Strategic choice to improve the education system

The traditional education system is centered on schools. All majors use a unified talent training program, set up a curriculum system, and use school resources to conduct a "big and comprehensive" education and training for students, and ultimately output homogeneous and versatile talents for the enterprise. Such a model is often not aimed at a certain industry or a specific field. Students have too much knowledge but not enough depth to meet the needs of enterprises for specific talents. They still need to constantly run, try and fail, and improve and strengthen learning at work, which also adds higher costs and risk to the employment of enterprises. The training model of collaborative education between schools and enterprises can solve the above pain points. While receiving college education during school, students are also exercising in the enterprise. They can learn theoretical knowledge and practical skills in response to the actual needs of the industry and enterprises. And the integration of production and education can comprehensively and systematically improve the comprehensive quality and ability of students, which is more conducive to the cultivation of high-level applied talents, and it is also a more complete education system. In addition, when enterprises participate in joint training, they can promptly discover talents suitable for their enterprises and departments and make reservations, which not only saves the recruitment and employment costs of the enterprises, but also provides a strong guarantee for the employment of students.

C. Effective means to improve the level of running a school

The school-running philosophy of applied undergraduates is often developed, advanced, and scientific, and is set to create high-level applied talents, but the school-running methods to support and realize the concepts are relatively backward and insufficient. Collaborative education between schools and enterprises, adopting the method of jointly training students between schools and enterprises, not only retains the existing school-running advantages of the school, but also adds the excellent culture and advanced thinking of the enterprise, which is more conducive to the improvement of school-running level.

In addition, students can more efficiently and conveniently grasp the frontiers of the industry, the latest format, and the prospects of subject development in the enterprise, accumulate richer scientific research materials, and have more innovative ideas that can be used for essay writing and scientific research, so as to

better accumulate results for the school and enhance the comprehensive strength of the school.

IV. WAYS OF COLLABORATIVE EDUCATION BETWEEN SCHOOLS AND ENTERPRISES IN APPLIED UNDERGRADUATE COLLEGES

A. School-enterprise cooperation to create "five platforms"

Collaborative education should focus on the integration of high-quality resources of schools and enterprises, and build a broad education platform for students. Through the creation of "five platforms" of curriculum teaching, internship training, innovation and entrepreneurship, employment guidance and information exchange services, it can bring the effect of "one plus one is greater than two" for the cooperation between schools and enterprises. With the joint efforts of schools and enterprises, high-level applied talents can be cultivated.

1) Jointly building a course teaching platform: Aiming at the characteristics of collaborative education, schools and enterprises need to jointly create an "online + offline" course teaching platform. Offline training is carried out in schools and enterprises to improve students' theoretical and practical abilities in all aspects. MOOC resources such as basic theoretical knowledge series, case analysis, enterprise culture, and industry norms are provided online, allowing students to freely choose to study, expand their horizons, and increase their knowledge.

2) Jointly building an internship training platform: Schools and enterprises collaborate to manage students' internship training, make overall arrangements for internship training plans, formulate internship training management norms, and clarify training goals. It needs to set up on-campus training centers, laboratories, practical operation centers, and simulation classrooms. It needs to build a corporate training base, educates students on the real post, and combines industry and education.

3) Jointly building a platform for innovation and entrepreneurship: It provides a platform for innovation and entrepreneurship for aspiring and capable students, conducts innovation and entrepreneurship education, builds investment and financing platforms, and establishes innovation and entrepreneurship funds and bases. Every year, it selects high-quality innovation and entrepreneurship projects for funding, and attaches importance to the cultivation of students' innovation and entrepreneurship ability.

4) Jointly building an employment service platform: The student employment service platform built by

school-enterprise cooperation directly connects with the employment market, observes market trends and the latest job demands, and creates a personalized profile for each student, records students' growth trajectory, knowledge system composition and past achievements and other competitive advantages, letting potential talent demanders see more advantages of students. It needs to percolate false recruitment information and false news for students, avoids the risks faced by newcomers to society, and allows students to study at ease and get a job steadily.

5) Jointly building an information exchange platform: It is supposed to provide students with a network platform for information acquisition, knowledge sharing, thought exchange, and answering questions. It needs to update industry trends and fresh information daily, set up interactive exchange areas, and open school-enterprise forums to allow students and enterprises' employees to freely conduct academic and skill discussions.

B. School-enterprise cooperation to build a professional teaching team

Collaborative education needs to integrate the excellent teachers of schools and enterprises according to the training objectives, and form a professional teaching team. First, schools and enterprises collaborate to form a high-quality teaching team with high professional level, great cultural literacy and strong technical ability. The ability of teachers often affects the effect of talent training. Therefore, teachers should be trained and assessed regularly to improve the overall quality of the teaching staff. Second, attaching importance to the construction of double type teachers. It is necessary to encourage the improvement of teachers' technical titles and professional abilities, strengthen the interactive communication between teachers and enterprises, arrange teachers to experience learning in enterprises, and improve the level of practice. Third, it's needed to rationally allocate teachers, accurately and comprehensively cover disciplines and skill systems, center on discipline and training construction, internally train and introduce excellent teachers from outside, and comprehensively select outstanding talents with research directions and backgrounds such as multidisciplinary, emerging disciplines, and applied disciplines.

C. School-enterprise cooperation to build an education and training system

1) Schools and enterprises jointly formulate distinctive talent training programs: The talent training program under the collaborative education between schools and enterprises model should break the "big and comprehensive" education model, not pursuing the

construction of a broad and superficial knowledge system and homogenous and versatile talents, but considering students' majors, development space and industry characteristics, paying attention to training students' ability for specific industries or positions, and jointly designing a personalized training program for students by schools and enterprises.

2) *Schools and enterprises jointly carry out curriculum system construction:* Schools and enterprises should jointly conduct curriculum discussions, jointly develop and write comprehensive textbooks that integrate theory and practical training, and jointly develop new courses. It is necessary to set up the curriculum structure system of connecting theory with practice, connecting course with post, and connecting work with study, attach importance to curriculum ideological and political construction, update the professional curriculum system, embed courses of job ability training, incorporate content that adapts to changes in the industry and meets the needs of corporate talents into professional courses, and comprehensively improve the comprehensive quality of students.

3) *Schools and enterprises jointly build a two-way evaluation mechanism:* In terms of assessment and evaluation, it's needed to focus on the assessment of students' comprehensive abilities, and use a combination of multiple assessment methods. The assessment team shall be jointly formed by class teachers, student counselors and enterprise mentors, include political quality, usual performance, theoretical literacy, innovation ability, and professional skills in the scope of the assessment, and conduct comprehensive appraisal to the student's whole level through multiple channels such as paper examinations, industry competitions, display of practical training results, and graduation thesis design.

V. CONCLUSION

Through the construction of the above-mentioned approach, it solves the problem of inconsistency between college talent training and market demand, especially the problem of docking with industries and enterprises in the construction of applied undergraduate colleges. It provides direction for teaching reform in universities, provides ideas for the construction of disciplines, promotes colleges and universities to improve teaching standards, and enhances students' professional quality, comprehensive literacy and sustainable development capabilities, thereby enriching higher education theory, and providing constructive suggestions for applied undergraduate colleges to develop collaborative education between schools and enterprises.

References

- [1] Zheng Hao. Research on the training model of innovative talents based on collaborative education between schools and enterprises [J]. University Education, 2019, 106(04):176-178+191. (in Chinese)
- [2] Ye Xinzhi. Collaborative education of teaching and scientific research: a first-class undergraduate education path for "double first-class initiative" construction of universities [J]. Education Science, 2019, 035(005):10-11. (in Chinese)
- [3] Wang Xiaolei, Lin Yanmei. Research on curriculum construction and reform and development path of applied undergraduate colleges and universities [J]. Vocational & Technical Education Forum, 2019, 000(012):34-38. (in Chinese)
- [4] Liu Jianping, Song Xia, Yang Zhi, et al. "Industry-education integration, school-enterprise cooperation" to build a practical teaching system in colleges and universities [J]. Research and Exploration in Laboratory, 2019. (in Chinese)
- [5] Li Z. Exploration and Practice of Modern Apprenticeship Model under the Integration of Industry and Education and Dual Education of School and Enterprise [J]. The Theory and Practice of Innovation and Entrepreneurship, 2019.
- [6] Huang W, Qiu N, Wang F, et al. Exploration and Practice of School-Enterprise Collaborative Education of Applied Talents [J]. 2019.
- [7] Zheng Yifeng, Wang Jiachun, Wang Jin, et al. Practice and exploration of collaborative education between schools and enterprises in the cultivation of students' innovative ability in applied undergraduate colleges [J]. Science & Technology Economic Guide, 2020, v.28;No. 710(12):106-107. (in Chinese)
- [8] Wang H, Yu L, Geng X, et al. Construction of Practical Education System for Innovative Applied Talents Cultivation under the Industry-Education Integration[C]// the 5th International Conference. 2019.