Research on Talent Cultivation in University-Enterprise Collaboration for Pharmaceutical Engineering Based on Local Industrial Development

Dai Decai

Hainan Vocational University of Science and Technology, Haikou Hainan,571126 China

Abstract: The local pharmaceutical industry is a crucial component of the biopharmaceutical sector, evolving toward refinement, intelligence, and sustainability. This advancement demands higher standards for the knowledge structure and practical skills of professionals. As a primary source of talent supply, the pharmaceutical engineering program in universities can establish in-depth collaborations with regional pharmaceutical enterprises. Such partnerships ensure effective alignment between talent cultivation and industrial needs, inject specialized expertise into industrial upgrading, promote the connotative development of professional education, and foster a virtuous cycle of "industry empowering education and education reciprocating industry." This approach contributes to the high-quality development of the local biopharmaceutical industry.

Keywords: Pharmaceutical Engineering; Industry-Education Collaboration; Talent Cultivation; local industry

DOI:10.12417/3029-2344.25.12.018

Introduction

With the biopharmaceutical industry becoming a new growth point for high-quality local economic development, local pharmaceutical enterprises increasingly require versatile talent with solid professional foundations and strong practical skills to meet their needs in technological innovation, product R&D, and production capacity upgrades. Universities serve as the primary hub for talent cultivation, and the training model for pharmaceutical engineering professionals should closely align with the actual conditions of local industrial development, breaking down barriers between academia and industry. Industry-academia collaboration acts as a bridge connecting education and industry, integrating resources from both sides to improve talent cultivation methods. This approach not only addresses the shortage of industrial talent but also enhances the adaptability and effectiveness of specialized education, reflecting universities' role in serving local economic development.

1.The Significance of Pharmaceutical Engineering Talent Cultivation through University-Enterprise Cooperation Based on Local Industrial Development

1.1 Supporting the High-Quality Development of the Local Pharmaceutical Industry

The transformation and upgrading of the local pharmaceutical industry cannot be achieved without the support of professional talents. In key areas such as new drug research and development, drug production, and quality control, there are high standards for the professional level and operational ability of talents. Collaboration between universities and local pharmaceutical companies can accurately grasp the development trends and job demands of the industry, cultivate talents that meet the actual needs of the industry, and fill the talent gap in enterprises. Through cooperation, universities integrate cutting-edge technologies and industry standards into talent cultivation, enabling the trained talents to quickly adapt to the job requirements of enterprises, shorten the adaptation period of positions, provide intellectual support for technological innovation and process improvement of enterprises, promote the transformation of local pharmaceutical industry from scale expansion to quality improvement, enhance the core competitiveness of the industry, and ensure the sustainable development of local biopharmaceutical industry.

1.2 Improve the construction of pharmaceutical engineering majors in universities

The development of local industries brings fresh practical scenarios and clear development directions to the

Biographical Sketch: Dai Decai (born in April 1985), male, Han ethnicity, from Yichun City, Heilongjiang Province. He has a master's degree and holds the title of associate professor. His research interests lie in the fields of pharmaceutical engineering and pharmacy.

construction of pharmaceutical engineering majors in universities. By leveraging the practical resources of enterprises, universities can make up for their shortcomings in practical teaching facilities, faculty, and other aspects, and improve their professional curriculum system and teaching content. The participation of enterprise technical backbone in teaching can integrate the latest industry development trends and practical work experience into the classroom, thereby solving the problem of the separation between theoretical teaching and practice, making professional teaching more targeted and practical. The industry demand feedback from cooperation will also prompt universities to adjust their professional construction direction, update teaching content, improve talent training plans, enhance professional connotation and educational level, make pharmaceutical engineering more in line with local industrial development needs, and improve students' professional competitiveness and social recognition.

1.3 Enhance the core competitiveness of graduates in employment

As the competition in the job market becomes increasingly fierce, the formation of the core competitiveness of pharmaceutical engineering professionals relies more on a solid theoretical foundation, which in turn forms strong practical abilities and enhances their match with the job[1]. The school enterprise cooperation creates an integrated talent cultivation system of "theory+practice", where students learn professional theoretical knowledge while participating in actual production, research and development, quality inspection and other work in enterprises, and turn the theoretical knowledge they learn into practical abilities. Participating in real enterprise projects can help students understand industry standards, master job skills, cultivate innovative thinking and problem-solving abilities, and enhance their core competitiveness in employment.

2.Talent cultivation strategy for university pharmaceutical engineering cooperation based on local industrial development

2.1 Deepen the integration of industry and education, and solve the problem of talent cultivation and industry disconnection

With the transformation and upgrading of the local pharmaceutical industry, enterprises have put forward higher requirements for professional and technical talents. The integration of industry and education has become the main way for school enterprise cooperation to cultivate talents. Only when higher education resonates with local industries can talent cultivation be matched with industry demand. Universities should actively connect with local pharmaceutical industry development plans, establish long-term stable partnerships with key pharmaceutical enterprises in the region, and create a cooperation mechanism of "school enterprise collaboration and two-way empowerment". In the process of talent cultivation, both parties participate together in the formulation of talent cultivation plans, curriculum development, teaching implementation, practical guidance, and other stages to ensure that the direction of talent cultivation is closely aligned with industry needs.

For example, based on the advantages of local biopharmaceutical industry agglomeration, universities and key biopharmaceutical enterprises in the region establish long-term school enterprise cooperation relationships to jointly build a production education integration education base. Both parties jointly establish a Talent Training Guidance Committee, led by the Enterprise Technical Director and university professional leaders, to revise the talent training plan according to the production needs of the enterprise. The latest production processes, quality standards, research and development technologies, etc. will be added to the curriculum system, and special courses such as biopharmaceutical training and drug quality testing practical operation will be added. Enterprises provide real production workshops and R&D laboratories as practical teaching places for universities, equipped with professional technical backbones as practical mentors, guiding students to participate in practical work such as drug raw material extraction, formulation production, and quality inspection. In the process of practice, students not only master the practical skills required by the position, but also become familiar with the production management process and industry standards of the enterprise. After graduation, they can quickly start working, effectively solving the problem of theoretical and practical detachment in talent cultivation and poor adaptability of students to the position. It also

cultivates a group of professional talents that meet the job requirements for the enterprise.

2.2 Optimize the curriculum system to meet the demand orientation of local industrial talents

Optimizing the curriculum system according to the development needs of the local pharmaceutical industry is an important way to improve the quality of talent cultivation. A scientific and reasonable curriculum system should be established based on the characteristics of the industry and the job requirements of enterprises. Based on the characteristics of local pharmaceutical industry development and the needs of core positions in enterprises, establish a curriculum system consisting of three categories: basic, core, and characteristic. Exclude teaching content unrelated to industry development and increase the proportion of cutting-edge knowledge and practical skills courses in the industry. Basic courses focus on laying a solid theoretical foundation for students' majors, core courses focus on cultivating pharmaceutical engineering abilities, and characteristic courses are designed based on local industrial advantages, highlighting regional industrial characteristics.

For example, in response to the developed characteristics of the local traditional Chinese medicine pharmaceutical industry, special courses such as traditional Chinese medicine processing technology, research and development of traditional Chinese medicine preparations, and quality control of traditional Chinese medicine should be added to the curriculum system, while reducing the content of courses with less connection to local industries. In the teaching of core courses, actual production cases and technical standards of local pharmaceutical companies are incorporated. In the course of drug production quality management standards, local pharmaceutical companies' production practices are connected to explain the key points of quality control and operational norms in the drug production process, so that students can understand the actual business requirements of the enterprise. At the same time, lectures on the forefront of the industry will be added, inviting technical experts and R&D backbone from local pharmaceutical companies to carry out lectures on the forefront of the industry at the school, elaborating on the current new technologies, development trends, and job demands in the pharmaceutical industry, and broadening students' horizons. Universities will promote both practical and theoretical courses, with each core course having corresponding practical training sessions. After completing the course, students will be arranged to conduct drug synthesis experiments, drug structure analysis, and other work in enterprise R&D laboratories to transform theoretical knowledge into practical abilities, making the curriculum system more in line with the needs of local traditional Chinese medicine pharmaceutical industry talents.

2.3 Building a practical training platform to enhance the effectiveness of practical teaching and education

Cultivating the practical ability of pharmaceutical engineering professionals requires solid practical teaching support. Building practical training platforms is an effective way to solve the shortage of practical resources in universities and significantly improve the educational effect of practical teaching. Universities and local pharmaceutical companies each contribute their own strengths and jointly invest to establish on campus and off campus training bases, creating a dual training model of "on campus training+enterprise internship". The on campus training base mainly focuses on the cultivation of basic skills, equipped with corresponding experimental equipment and teaching facilities, which can meet the requirements of students' basic practical teaching; The enterprise training base mainly focuses on the training of job skills, relying on the production workshop, R&D center, etc. of the enterprise to provide students with a real environment for enterprise production, project research and development, so that students can participate in the actual production and project research and development of the enterprise, and improve their practical and innovative abilities[2].

For example, a university and a local comprehensive pharmaceutical company jointly build an on campus and off campus training platform. The on campus training base is jointly invested and constructed by both parties, equipped with advanced experimental equipment such as drug synthesizers, high-performance liquid chromatographs, microbiological detectors, etc., to meet the teaching needs of students' basic experiments, skill training, etc; The enterprise training base is based on the production plant area and R&D center of the enterprise,

divided into specialized training areas, arranged with professional technical backbone as training mentors, and formulated detailed training plans. In the second semester of their sophomore year, students will undergo basic experimental skills training at the on campus training base, learning basic skills such as drug testing and experimental operations; In the second semester of my junior year, I went to the enterprise training base to participate in the actual production process of the enterprise, from raw material screening, process improvement to finished product testing, and participated in job practice throughout the entire process. During the practical training process, students are trained under the guidance of the training teacher to solve various problems that arise in actual operations. After adopting the dual training mode, students' practical operation ability has significantly improved, and they have also developed a sense of teamwork and responsibility, laying a good foundation for their future employment and career development.

2.4 Strengthening the dual teacher team and consolidating the foundation of talent cultivation and teaching staff

The improvement of the quality of talent cultivation in school enterprise cooperation requires a high-quality teaching staff to support and build a dual teacher team with both theoretical knowledge and practical ability. This is the main measure to consolidate the foundation of talent cultivation. Universities should establish a sound system for cultivating and introducing "dual qualified" teachers. On the one hand, it should encourage teachers on campus to conduct on-site research and internships at local pharmaceutical companies, participate in research and development, production and other activities of the companies, enrich their practical experience, and strengthen their practical teaching capabilities. On the other hand, it should attract technical backbone and industry experts from enterprises to serve as part-time teachers in universities, enrich the teaching staff, and provide students with teaching guidance that is more closely related to the actual industry.

For example, developing a "dual teacher" teacher training plan, selecting about 10 professional teachers from the school to participate in local cooperative pharmaceutical companies' new drug research and development, production process optimization, quality control, and other work for no less than one month each year. In the process of practice, teachers learn advanced technology and management experience from enterprises, integrate them into classroom teaching, and make teaching more practical and targeted. Universities have also introduced 5 experienced technical backbone and R&D experts from local cooperative pharmaceutical companies as part-time teachers, responsible for teaching practical courses and providing practical training guidance. Based on their own job experience, they will teach students internship content and introduce the latest industry trends. In addition, establish a system of school enterprise teacher exchange symposiums, organize quarterly exchange activities between university teachers and enterprise technical personnel, and carry out exchanges on various aspects such as talent training programs, curriculum development, and practical teaching, to promote the improvement of the teaching ability of the teaching staff and solve problems such as the detachment of teaching content from the industry.

2.5 Establish a sound cooperation mechanism to ensure the long-term operation of school enterprise collaborative education

The sustainable development of talent cultivation through school enterprise cooperation cannot be supported without a sound cooperation mechanism. Universities and local pharmaceutical companies should establish mechanisms for communication and coordination, benefit sharing, risk sharing, assessment and evaluation, clarify the rights and obligations of both parties, standardize the cooperation process, and promote the orderly development of school enterprise cooperation. Establish a regular communication and coordination mechanism, and hold regular cooperation meetings to address any issues that arise during the cooperation period; Establish a mechanism for sharing benefits, so that both parties can benefit from each other in various aspects such as talent cultivation, technology research and development, and achievement transformation; Design a risk sharing mechanism to jointly face the risks that arise during the cooperation process; Establish a scientific assessment and evaluation mechanism

to comprehensively evaluate the quality of talent cultivation in school enterprise cooperation, ensuring the achievement of talent cultivation goals[3].

For example, universities and multiple local pharmaceutical companies have jointly established a school enterprise cooperation management committee, which is jointly chaired by the vice president in charge of the university and the person in charge of the enterprise. The committee coordinates various affairs related to school enterprise cooperation, holds quarterly communication meetings, and promptly resolves issues such as talent training program adjustments, practical training arrangements, and faculty exchanges that arise during cooperation. Through the mechanism of benefit sharing, universities provide talent support and technical services to enterprises, helping them overcome technical difficulties encountered in the research and development process. Enterprises provide practical resources, teaching staff, and employment opportunities to universities, giving priority to the employment of students trained through cooperation, ensuring mutual benefit between both parties. Utilizing the risk sharing mechanism, clarify the division of responsibilities around risks such as training safety and project development failures that arise during the cooperation period, and jointly develop corresponding response measures to reduce cooperation risks. With the help of the assessment and evaluation mechanism, the school enterprise cooperation work is comprehensively assessed from various aspects such as talent cultivation quality, practical teaching effectiveness, and enterprise satisfaction. The assessment results are linked to the depth of cooperation and resource investment of both parties. Those who perform well in the assessment will be given more cooperation resources, while those who fail the assessment will be rectified to ensure the long-term and orderly development of school enterprise collaborative education work.

3.Closing remarks

The development of local industries and the cultivation of talents in universities promote and constrain each other, and school enterprise cooperation is an important bridge connecting the two. It is also an important way for the high-quality development of pharmaceutical engineering majors in universities and the transformation and upgrading of the local pharmaceutical industry. By deepening the integration of industry and education, improving the curriculum system, jointly building training bases, strengthening the construction of dual teacher teams, and improving cooperation mechanisms, the goal of accurately matching talent cultivation with industry demand can be achieved. On the one hand, it provides composite talents with professional competence and practical ability for the local pharmaceutical industry, and on the other hand, it promotes the connotative development of pharmaceutical engineering majors in universities, reflecting the function of universities in serving local economic development. The collaborative education model can promote the deep integration of education and industry, form a virtuous cycle, and provide talent support for the high-quality development of the local biopharmaceutical industry.

References:

[1] He Xiaoxue Exploring the Path of Promoting Employment through University Enterprise Cooperation[J].Journal of Jiamusi Vocational College,2024,40(12):175-177.

[2] Zhu Qianqian Research on Innovative Models for Deepening School Enterprise Cooperation Reform[J].Henan Education(Teacher Education),2024,(12):6-7.

[3] Yang Cangjun Exploration of Effective Connection between Vocational Education Professional Chain and Local Industrial Chain[J].Modern Vocational Education,2023,(34):153-156.