

Research on the Pathway for Cultivating Practical Competence of Applied Talents in Pharmaceutical Majors in Universities under the Guidance of "Dual-Teacher" Faculty

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Abstract: To effectively enhance the practical abilities of applied talent in pharmaceutical-related majors in universities, this paper briefly outlines the background and concept of "dual-qualified" faculty. It analyzes the necessity of cultivating practical skills for applied talent in pharmaceutical-related majors, and subsequently proposes feasible pathways for developing such skills under the guidance of "dual-qualified" faculty. These pathways are explored from four perspectives: faculty team, teacher evaluation, curriculum system, and university-enterprise collaboration. The aim is to provide some reference for relevant researchers.

Keywords: Dual teacher type; Higher education institutions; Pharmaceutical majors; Applied talents; practical ability

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Introduction

Since China has explicitly required the strengthening of the teaching staff in higher education and the improvement of the quality of higher education, various universities have begun to carry out teacher construction work. The "dual teacher" teaching team initially originated from vocational colleges, but later became increasingly popular due to its good results and outstanding talent practical ability training. Therefore, it has gradually been absorbed by universities as the main way of teacher team construction. The pharmaceutical industry has high requirements for the practical ability of talents. How to cultivate the practical ability of pharmaceutical professionals and create truly competent applied talents is currently a problem that universities need to solve. Exploring the path of cultivating practical ability of pharmaceutical professionals under the guidance of "dual teacher" teachers also has high research significance.

1. Overview of "Dual Teacher" Teaching Staff

In recent years, the national higher education policy has continuously promoted the construction of an applied talent training system. The Guiding Opinions of the Ministry of Education on Guiding Some Local Ordinary Undergraduate Universities to Transform into Application oriented Universities clearly require universities to strengthen the construction of "dual qualified" teacher teams, promote talent cultivation and industry demand docking^[1]; The 13th Five Year Plan for the Development of National Education in 2017 proposed to promote the joint construction of "dual teacher" teacher training bases between universities and enterprises; The 2020 "New Engineering Construction and Development Plan" further requires the proportion of "dual qualified" teachers in engineering majors to reach a high level. Under the guidance of national policies, universities are actively exploring the path of "dual teacher" faculty construction with higher education characteristics. In the field of pharmaceuticals, universities have established school enterprise cooperation workstations, formed industry professor teams, improved teacher practical ability standards, and systematically promoted the construction of "dual teacher" teaching staff.

Specifically analyzing the "dual teacher" teaching staff, specifically referring to individual teachers and teacher teams who possess both the ability to educate students in higher education and the ability to provide professional practical guidance. In depth analysis of the connotation of "dual teacher" teaching staff is mainly reflected in three levels. Firstly, individual teachers have both the ability to conduct teaching and research in universities and practical experience in industries; The second is that the teacher team is composed of academic teachers and industry experts,

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and the third is that the teacher team has the ability to integrate theoretical teaching with practical teaching. In pharmaceutical majors, "dual teacher" teachers need to master cutting-edge knowledge in the field of pharmacy, be familiar with the production standards and quality management systems of pharmaceutical enterprises, and be able to transform drug research and development, production, quality control and other pharmaceutical related cases into teaching resources. The "dual teacher" faculty structure can provide support for the cultivation of practical and innovative abilities of pharmaceutical majors, and provide high-quality applied talents for the pharmaceutical industry.

2.The necessity of cultivating practical abilities of applied talents in pharmaceutical majors in universities

2.1 Urgent needs for the development of the pharmaceutical industry

The pharmaceutical industry is closely related to the national economy and people's livelihood, and its development is characterized by knowledge intensity, rapid technological updates, and strict regulatory requirements. The global pharmaceutical industry is currently undergoing profound changes, with rapid development of innovative drug research and development, intelligent manufacturing technology, and precision medical solutions. China's pharmaceutical industry is also in a stage of transformation and upgrading from mainly relying on imitation to emphasizing both independent innovation and imitation improvement^[2]. The industry has a huge demand for high-level applied talents. Pharmaceutical majors in universities are the only channel for the pharmaceutical industry to obtain fresh blood, and universities must place the cultivation of students' practical abilities at the core. Students can only adapt to future job requirements by receiving systematic and high-quality practical training during their school years, mastering core skills in the pharmaceutical industry including drug production, quality control, and process optimization. If graduates have only theoretical knowledge but lack practical abilities, it will naturally be difficult to meet the expectations of pharmaceutical companies for talent job capabilities, and even to some extent affect the speed of technological innovation and quality improvement in China's pharmaceutical industry. Therefore, cultivating the practical ability of applied talents in pharmaceutical majors in universities is an inevitable choice to serve the transformation and upgrading of the pharmaceutical industry and support the implementation of the Healthy China strategy.

2.2 Fundamental Requirements for Higher Education Objectives

Higher education bears the important mission of cultivating advanced specialized talents and developing science, technology, and culture. For pharmaceutical majors, the educational goal is not only to impart knowledge of pharmaceutical science, but also to shape students' ability to solve complex practical problems. Pharmacy is a highly practical discipline, and theoretical knowledge must be transformed into practical skills through experimental operations, process practice, clinical observation, and other links. The disconnect between theoretical teaching and practical training in traditional education models has to some extent affected the quality of talent cultivation. The cultivation of practical abilities can be understood as returning to the essential laws of higher education, allowing students to apply their learned knowledge to fields such as drug research and development, production, circulation, and use, reflecting the educational philosophy of integrating knowledge with action. This enables students to master the forefront of the discipline while possessing the practical ability to transform technological achievements into productivity. Therefore, cultivating the practical ability of applied talents in pharmaceutical majors in universities is to meet the fundamental goal of higher education.

2.3 Fundamental guarantee of drug quality and safety

The quality and safety of drugs are directly related to the lives and health of the people, as well as the social stability of our country. The research and development, production, distribution, and use of drugs require practitioners to possess rigorous and standardized operational skills, as well as a high level of quality awareness. However, such awareness cannot be fully implemented solely through classroom theoretical teaching, which means

that universities must provide students with repeated and systematic practical training. In the stage of university education, students need to operate equipment in a near real production environment, complete the complete process from raw materials to finished products, and have a deep understanding of the specific requirements of pharmaceutical production quality management standards. In the process of participating in practical learning, students can establish an understanding that drug quality comes from design, good practical skills, and excellent quality awareness. The abilities they acquire during their university studies will also become core competencies for their future careers^[3]. Therefore, cultivating the practical ability of applied talents in pharmaceutical majors in universities is the foundation for ensuring drug quality and safety, and it is also an inevitable requirement for ensuring public drug safety from the source.

2.4 Realistic needs for students' career development

The ultimate outcome of talent cultivation in higher education is reflected in whether students can find employment smoothly and achieve long-term career goals. Faced with increasingly fierce competition in the talent market, graduates majoring in pharmaceuticals must possess solid practical skills and job adaptability in order to meet the standards of employers for talent selection. Enterprises expect new employees to have good practical skills, a short training period, and the ability to quickly undertake specific work tasks. In order to meet the needs of enterprises and talents, universities must lay the foundation for vocational skills for talents' future employment. The practical ability training integrated into teaching can help students familiarize themselves with future work scenarios in advance, master the operation methods of commonly used instruments and equipment, understand the operational processes of pharmaceutical enterprises, and thus enhance their employment competitiveness. In addition, the career in the field of pharmacy is quite unique and requires students to continuously learn and develop. The practical foundation laid in the early stages is beneficial for graduates to demonstrate stronger adaptability and development potential in future technical title promotions, job transitions, and responding to industrial technological changes. Therefore, cultivating the practical ability of applied talents in pharmaceutical majors in universities is a necessary path to help students achieve personal career prospects and promote high-quality and full employment.

3.A feasible path for cultivating practical abilities of applied talents in pharmaceutical majors in universities under the guidance of "dual teacher" teaching staff

3.1 Establishing a "dual teacher" teaching staff

Universities need to establish rules and regulations for the transition, improve the mechanism for introducing teachers, and expand the number of teaching staff. On the one hand, universities should focus on improving the practical literacy of existing teachers on campus, establish a system for regular full-time or part-time training of professional teachers in pharmaceutical companies, research and development institutions, or hospital pharmacy departments. During the training period, teachers need to deeply participate in new drug research and development, pharmaceutical production line process optimization, quality management internal review, and other projects directly related to production, accumulate first-hand industry experience, and use their own experience to feed back teaching; On the other hand, universities should vigorously introduce or hire outstanding technical and management talents from the industry. These experts from enterprises can serve as industry professors, part-time mentors, or full-time teachers, bringing the latest technological trends, real case resources, and strict industry standards directly to the campus.

Within the "dual teacher" teaching team, it is necessary to establish an efficient collaborative teaching and research mechanism. On campus teachers and industry mentors jointly form a curriculum group, responsible for teaching specific courses or practical modules. On campus teachers are mainly responsible for providing theoretical support to the teaching team, grasping teaching methods, while industry mentors are mainly responsible for designing and guiding practical activities. Both on campus and off campus teachers prepare lessons together, seamlessly connecting teaching content. When teaching pharmaceutical formulation engineering, on campus teachers

explain basic theories, and industry mentors immediately lead students to verify the process flow based on actual equipment. In addition, cross team teaching and research activities should be regularly organized to jointly apply for industry university research cooperation projects and collaborate in writing practical teaching materials based on real cases.

3.2 Improve the Teacher Evaluation Mechanism

Building a scientific and clearly oriented evaluation mechanism is a key link in guiding "dual teacher" teachers to continuously engage in practical teaching and ensuring the quality of training. Universities need to reform their existing teacher evaluation system, incorporating practical teaching abilities, industry service contributions, and applied research results into core evaluation indicators. The evaluation criteria should be specific and measurable, for example, examining the results of teachers guiding students to participate in high-level subject competitions and innovation and entrepreneurship projects, evaluating the funding and technical value of teachers hosting or participating in horizontal projects of school enterprise cooperation, and recognizing the quantity and quality of teachers transforming enterprise practice results into teaching cases^[4]. In the promotion and evaluation of professional titles, an independent evaluation channel should be established for practical teaching achievements, giving them equal or even higher weight as academic papers and longitudinal topics, and affirming the value of practical teaching from the institutional level.

When implementing the evaluation process, multiple subjects should be introduced and multiple evaluation methods should be adopted. The evaluation subjects can include academic committees of departments, enterprise experts, peer teachers, and even alumni. The evaluation methods can use various means such as classroom observation, student questionnaire surveys, practical achievement reviews, and industry benefit evaluations. In terms of evaluating teachers' practical teaching abilities, the focus is on whether teachers can effectively integrate new industry knowledge into the classroom, design and organize high-quality experimental training projects, and guide students to solve complex engineering problems with practical results. For the evaluation of the effectiveness of teacher industry services and industry university research cooperation, objective evidence such as appraisal opinions provided by cooperative enterprises, technology transfer contracts, or economic benefits generated by process improvement plans can be used.

3.3 Refactoring the Professional Curriculum System

Integrate industry standards and practical skill requirements into the curriculum framework of pharmaceutical majors. Led by a team of "dual qualified" teachers, based on their own industry practical experience, the existing professional course syllabus is revised to increase the proportion of experimental class hours. The core content of the industry, including drug production quality management standards, drug research and development processes, and pharmaceutical equipment operation principles, is transferred to the teaching objectives, teaching content, and assessment standards of professional courses. Taking drug analysis courses as an example, teachers can incorporate the current quality standards of enterprises into the evaluation criteria for experimental courses; Taking pharmacy courses as an example, students need to complete the trial production of drug formulations according to the actual drug production prescription process.

Under the framework of refactoring, "dual teacher" teachers are responsible for developing project-based courses guided by abilities, with course content consisting of comprehensive tasks that simulate the complete workflow. If teachers can design a project on the synthesis and purification of a certain chemical raw material drug in teaching, students need to complete a series of tasks including literature research, synthesis path design, small-scale process exploration, product structure, and purity analysis. Teachers play the role of project mentors in this process, guiding students to apply knowledge from multiple courses to solve complex problems encountered in the project. The assessment method has shifted from a single test paper to a process based evaluation, with a focus on students' operational norms, data processing abilities, and problem-solving skills.

3.4 Building a collaborative platform between schools and enterprises

Universities should jointly invest resources with enterprises to establish a physical operation center that integrates teaching, research, and production functions. Among them, universities are responsible for providing venues and basic equipment, while enterprises are responsible for investing in production line models, quality control instruments, and production software systems that meet industry standards. The school and enterprise jointly establish a management committee to manage the platform, jointly formulate operating regulations and teaching plans. The "dual teacher" teachers in universities are responsible for integrating the teaching syllabus and training objectives into the platform, while the technical experts appointed by enterprises are responsible for synchronizing practical teaching content with the current progress of industrial technology development, thus providing a good environment for practical teaching in pharmaceutical majors in universities.

On the basis of jointly building the platform, the "dual teacher" teacher team leads the design of a series of practical teaching projects. Teachers can decompose the complete chain of drug development to production into several teaching modules, including drug synthesis simulation, formulation workshop operation, and drug quality inspection. Enterprise experts are responsible for transforming actual cases, such as the production process documents of a certain drug or a typical quality audit process, into teaching tasks that students can practice. In the training platform, students complete a series of operations from raw material feeding to finished product packaging by hand under the joint guidance of teachers and enterprise mentors^[5]. The platform can also undertake enterprise research and development trials or process optimization tasks. Students can participate in some non core work under the guidance of teachers, allowing them to access real job content in pharmaceutical companies without the need for internships.

4. Conclusion

In summary, cultivating practical abilities of applied talents in pharmaceutical majors in universities is an urgent need for the development of the pharmaceutical industry. The fundamental requirements of higher education goals, the fundamental guarantee of drug quality and safety, and the practical needs of students' career development are of great necessity. In the process of applying the "dual teacher" teaching staff to cultivate practical abilities of applied talents in pharmaceutical majors in universities, universities need to first establish a "dual teacher" teaching staff team, then improve the teacher evaluation mechanism, reconstruct the professional curriculum system, and finally jointly build a collaborative platform with enterprises.

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