

Practical Research on the Comprehensive Quality of School-Enterprise Joint Precision Training of Higher Vocational Pharmacy Professionals

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Abstract: With the deepening of China's higher vocational education reform, the innovation of talent training mode has become the key to improve the quality of education and adapt to the needs of society. Especially in the field of pharmacy, the comprehensive requirements for the quality of professional and technical personnel are increasing day by day. Centering on the precise training mode of school-enterprise cooperation, this paper conducts practical research on the comprehensive quality training of pharmacy professionals in higher vocational colleges, aiming to explore and optimize the talent training program, in order to better adapt to the diversified needs of the development of enterprises in the industry. The research adopts the method of combining quantitative data analysis with qualitative research, and many representative pharmaceutical enterprises were selected to carry out research together with five higher vocational colleges in the province. Through in-depth interviews with 100 students and 40 corporate instructors, as well as tracking the student internship and project cooperation process, multi-dimensional data including internship effectiveness, skill mastery level, job adaptability and innovative thinking ability were collected. The research results show that the precise training mode of school-enterprise cooperation has significantly improved students' professional skills and practical ability, and the employment rate of students has increased by 15% compared with the traditional mode. However, the survey also found that this model is insufficient in terms of students' independent learning ability and the depth of theoretical knowledge. To this end, the research puts forward targeted improvement measures, such as increasing case teaching, simulation experiment and enterprise internal training, to strengthen students' self-study ability and innovative thinking. The conclusions and suggestions of this study provide a reference for the school-enterprise cooperation mode in other professional fields, and have certain guiding significance and practical value for the development of local higher vocational education.

Keywords: School-enterprise Cooperation; Pharmacy Major; Higher Vocational Education; Comprehensive Quality; Precision Training.

1. Introduction

With the rapid development of the pharmaceutical industry, the training of high-quality pharmaceutical professionals has become an important subject for higher vocational colleges. Traditional higher vocational pharmacy education has some problems, such as the disconnection between theory and practice, and the mismatch between talent training and industry demand, so it is difficult to adapt to the requirements of pharmaceutical talents under the new situation[1][2]. Therefore, it is of great significance to explore the precise training mode of pharmaceutical professionals under the background of school-enterprise cooperation to improve the comprehensive quality of talents and serve the regional economic development.

The training of pharmaceutical professionals in higher vocational colleges should closely combine the development needs of the pharmaceutical industry and construct a teaching system of "theory + practice". Schools should cooperate closely with industrial enterprises to jointly formulate talent training programs, and integrate enterprise production practice and professional standards into the whole teaching process. Through engineering alternation and project drive, students can master professional knowledge and skills in the real career situation, and improve their practical ability and employment competitiveness[1]. At the same time, the school should strengthen the construction of teaching staff, introduce

enterprise experts with rich practical experience as part-time teachers, carry out teaching and diagnosis reform, and constantly optimize the curriculum system and teaching content.

In addition to having solid professional knowledge and skills, pharmaceutical professionals should also have good professional quality and innovation and entrepreneurship ability. Schools should run vocational quality education through the whole process of talent training, and help students to establish correct professional values and improve their comprehensive professional ability by carrying out career planning and professional ethics education[2]. In addition, we should vigorously carry out innovation and entrepreneurship education, actively use enterprises, hospitals and other off-campus resources to build a business practice platform, stimulate students' innovation and entrepreneurship potential, and cultivate compound talents to adapt to the development of the pharmaceutical industry[3].

In short, higher vocational colleges should take the initiative to meet the needs of the pharmaceutical industry, coordinate education between schools and enterprises, innovate the talent training mode, pay attention to the improvement of students' professional skills and comprehensive quality, train high-quality technical and technical talents for the development of regional pharmaceutical industry, and realize the benign interaction between talent training and economic and social development.

2. Background and Significance of School-enterprise Cooperation

2.1. The Current Situation and Challenges of Higher Vocational Education

In recent years, higher vocational education plays an important role in cultivating high-quality technical talents, but it also faces many challenges. At present, there are many problems of curriculum reform lags behind, practice teaching is weak and teachers are insufficient[2]. The traditional teaching mode focuses on the indoctrination of theoretical knowledge, ignoring the cultivation of students' practical ability and the improvement of independent learning ability, and it is difficult to adapt to the needs of pharmaceutical professional personnel training under the new situation[2][4].

With the rapid development of China's pharmaceutical industry, the demand for high-quality pharmaceutical talents in pharmaceutical production, management and circulation is increasing. In particular, the implementation of the new version of GMP and GSP has put forward higher requirements for the pharmaceutical and technical personnel of pharmaceutical production and management enterprises[4]. Higher vocational pharmacy education must follow the pace of industry development, deepen the reform of education and teaching, and cultivate high-quality technical skills to meet the needs of posts.

School-enterprise cooperation is an effective way to improve the quality of higher vocational education talents. Through school-enterprise cooperation, higher vocational colleges can timely understand the development trends of the industry and the demand for talent, adjust the talent training program, and develop a curriculum system close to the actual production[5]. At the same time, enterprises can provide students with internship and training positions, so that students can exercise practical skills in a real working environment. School-enterprise cooperation is conducive to the seamless connection between talent training and enterprise employment, and improves the pertinency and adaptability of talent training[5].

However, there are still some problems in the school-enterprise cooperation of higher vocational pharmacy majors. Some higher vocational colleges do not pay enough attention to school-enterprise cooperation, the form of cooperation is single, and the quality of internship and training projects is not high[5]. Some enterprises are not active in participation, and the guidance and management of students is not in place. The lack of effective communication between the school and the enterprise in terms of talent training objectives and training standards has affected the depth and effect of school-enterprise cooperation[5].

To strengthen school-enterprise cooperation and promote the precise training of pharmacy professionals requires the joint efforts of schools and enterprises. Schools should change their educational concept, take the initiative to meet the needs of enterprises, and optimize the talent training program and curriculum system[2]. At the same time, we should strengthen the construction of "double-qualified" teachers and improve their practical teaching ability[5]. Enterprises should improve the initiative of participation, strengthen the guidance of students' practice and training, and provide more opportunities for students to exercise. Schools and enterprises should strengthen communication and coordination, reach consensus on talent training objectives,

training standards, practice and training, and form a joint training force[5].

In short, facing the challenge of higher vocational pharmacy education under the new situation, it is imperative to strengthen school-enterprise cooperation and promote the precise cultivation of talents. This is not only conducive to improving the quality of talent training and better meeting the development needs of the industry, but also is of great significance for deepening the teaching reform of higher vocational education and realizing the high-quality development of higher vocational education.

2.2. Analysis of the Necessity of School-Enterprise Cooperation

The training of pharmacy professionals in higher vocational colleges is now faced with the problems of the disconnection between theoretical knowledge and practical skills, and the mismatch between teaching content and industry demand. This situation seriously restricts the improvement of the comprehensive quality of pharmaceutical professionals, and it is difficult to meet the needs of the increasingly developing pharmaceutical industry for high-quality technical talents[6]. School-enterprise cooperation is an effective way to solve this difficult problem. Through school-enterprise cooperation in education, the effective connection between the supply side of talent training and the industrial demand side can be realized[7].

School-enterprise cooperation is conducive to the construction of a talent training mode integrating industry and education and work and study. Schools can jointly develop courses with pharmaceutical enterprises, so that enterprises can deeply participate in the whole process of talent training. Enterprises can provide students with practical training positions, so that students can strengthen their practical skills and improve their professional quality in a real working environment. At the same time, part-time teachers in enterprises can teach the most cutting-edge industry knowledge and technology, and make up for the lack of practical experience of school teachers[3].

In addition, school-enterprise cooperation is also conducive to promoting the construction of "double-qualified" teachers. School teachers can update their professional knowledge in time and improve their practical teaching ability through temporary job training in enterprises. While part-time teachers undertake some professional courses, which can optimize the structure of teachers and improve the quality of professional teaching[3]. It is an effective measure to improve the level of pharmacy teachers to realize the sharing of human resources.

Pharmacy majors have put forward higher requirements for students' comprehensive quality. In addition to solid professional knowledge and skills, pharmaceutical talents also need to have medical ethics, professional ethics and social responsibility[3]. And the cultivation of these comprehensive qualities, school classroom teaching is far from enough, must be achieved through practice in the enterprise. School-enterprise cooperation can provide students with opportunities to receive professional literacy education in real situations, and help them establish correct values and professional concepts.

In short, in the face of higher requirements for pharmacy talents in the new era, higher vocational pharmacy majors must take the initiative to adapt to the development needs of the industry, strengthen school-enterprise cooperation,

optimize the talent training mode, and promote the comprehensive improvement of students' comprehensive quality. Only in this way can we cultivate more high-quality technical and skilled talents and make due contributions to the development of the pharmaceutical industry and the cause of people's health[6][7].

3. Exploration of Accurate Cultivation Mode

3.1. The Theoretical Framework of Precision Cultivation

In the construction of the theoretical framework of higher vocational pharmacy major, this paper follows the core concept of "school-enterprise joint" training mode. The first step of research is to establish close cooperation with enterprises, aiming to achieve seamless connection between educational resources and market demand. This process involves the clear determination of cooperative enterprises and the signing of school-enterprise cooperation agreements with them to ensure the formal and long-term nature of the cooperation. Subsequently, the expert team of the school and the human resources department of the enterprise jointly formulated a comprehensive plan for the training of pharmacy professionals to ensure the timeliness and practicability of the educational content.

According to the formulated training plan, the two sides adopt the strategy of division of labor and cooperation to form a complementary teaching system. Relying on its academic advantages, the school is responsible for providing systematic theoretical courses to construct students' knowledge framework, covering basic pharmaceutical theory to clinical application. At the same time, the cooperative enterprises, as a practice platform, provide necessary internship and training opportunities, so that students can apply what they have learned in a real working environment, and exercise their professional skills and workplace literacy.

Under the training mode of "school-enterprise joint", the implementation of teaching activities is a dynamic adjustment process. Through regular evaluation and feedback, the potential weaknesses of the training program are found in this cycle, so as to adjust and improve the educational program on a real-time basis. The evaluation indicators include the mastery degree of course knowledge, practice and training effect, students' comprehensive quality, etc., and track the growth track of students in an all-round way to ensure the smooth realization of accurate training goals.

On the whole, the research focuses on building an efficient and interactive school-enterprise collaborative training system, aiming at improving students' professional skills and employment competitiveness. Through fine management and continuous optimization of the training mode, the research is committed to cultivating high-quality pharmaceutical professionals who can adapt to the future changes in the drug market and new technological challenges. See Figure.1 for more details.

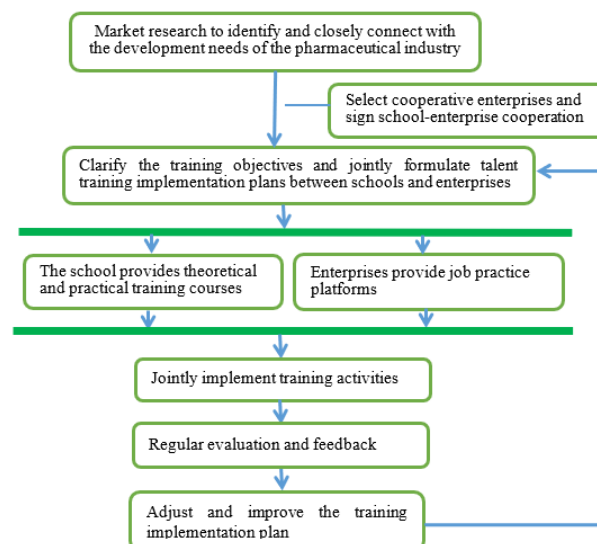


Fig 1. Implementation framework of school-enterprise joint training of pharmacy professionals

3.2. Application and Practice of Precision Cultivation Mode

In the practice of accurate training of pharmacy professionals in higher vocational colleges, this study first deeply analyzes the demand of talent market, and adjusts the training plan according to the specific needs of employers and the development trend of the industry. On this basis, we work closely with enterprises to establish a set of "integrated-interactive" school-enterprise cooperation higher vocational talent training system, to ensure that the professional training objectives are highly consistent with the actual demand of the market for pharmaceutical professionals.

Subsequently, we designed the curriculum system for pharmacy majors, aiming to improve students' professional knowledge and practical skills, and strengthen students' innovative ability and comprehensive quality. The design of the curriculum system closely focuses on the cultivation of the core competence of the major, covering the three main links of theoretical teaching, skill training and enterprise practice. These three links complement each other in the training process, forming an organic integration and interaction, and comprehensively improving the students' learning effect and career adaptability.

The theoretical teaching link pays attention to the basic theory, the skill training link pays attention to the training of practical skills, and the enterprise practice link is to apply the theory and skills to the practical work, so that students can grow rapidly in the real working environment. Especially in the enterprise internship process, we work together with enterprises to formulate internship plans, supervise the quality of internship, and ensure that students can solve practical problems in practice, and improve the ability of problem-solving and teamwork ability under the guidance of enterprise mentors.

In addition, the comprehensive quality evaluation system is also a part of our key construction. We not only evaluate students' professional theoretical knowledge and practical work skills, but also conduct a multi-dimensional evaluation of students' professional ethics, team spirit, innovation ability and comprehensive quality. Such an evaluation system can fully reflect the comprehensive quality of students and provide data support for further teaching and training strategies.

Finally, based on the comprehensive quality evaluation results, we continue to optimize and improve the training mode. Through regular education and teaching reform seminars and feedback collection mechanism, we find the existing problems in time, and adjust the training plan combined with the feedback of enterprises, to ensure that the training mode is always in line with the needs and development trend of the industry.

The whole training mode is a dynamic circulation system. Through continuous iteration, realizing the continuous optimization of teaching content and teaching methods, ensuring that the training quality of pharmaceutical professionals is always maintained at a high standard level, and at the same time meeting the continuously updated talent needs of the industry.

"Integration-interaction" school-enterprise cooperation higher vocational talent training system composition system is shown in the following figure.

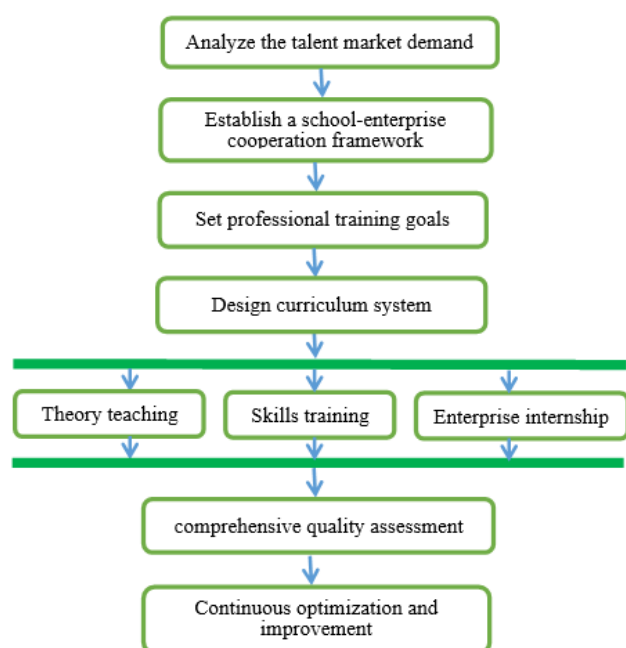


Fig 2. Composition system of "integration-interaction" school-enterprise cooperation higher vocational talent training system

4. Quality Construction of Pharmaceutical Professionals

4.1. Requirements for Pharmacy Professional Knowledge and Skills

The quality construction of pharmacy professionals, relying on industry standards, through quantitative analysis and job requirements, accurately builds students' knowledge structure and professional skills. In the knowledge training module, covering 32 core disciplines such as medicinal chemistry, pharmacy and pharmacology, the course knowledge point is designed to ensure that students master the necessary theoretical knowledge. In terms of skill training, students are equipped with advanced experimental training equipment in pharmaceutical pharmacy, pharmaceutical preparations, drug analysis, pharmaceutical chemistry and pharmacology to simulate the real working environment. Students are required to complete no less than 240 hours of practical training. The evaluation system adopts intelligent monitoring, which records the operation process and results of each student, and quantitatively evaluates the practical

skills of the students to ensure the objectivity and accuracy of the evaluation results.

In the integration of knowledge and skills, a comprehensive course of clinical pharmacotherapy and pharmaceutical management is set up. Students are required to explore problems around real clinical cases, implement teamwork, and actively cultivate the ability of innovative thinking and problem solving. At the same time, combining in-school teaching and enterprise practice, strengthen medical ethics and professional ethics education. It is proposed to take experimental classroom as a carrier with no less than 20 class hours each semester to strengthen students' sense of ethical responsibility in career development.

Quantitative research data show that the average score of students' theoretical examination in this mode is 8.7% higher than that of the traditional mode, and the standard rate of practical skills has increased by 12.3%. Through the implementation of follow-up investigation, this study concludes that the precise training method of school and enterprise resources can significantly improve the comprehensive quality of higher vocational pharmacy students. The academic quality of this study has been fully recognized by the experts, not only showing high standards in theoretical framework construction and data analysis, but also showing clear results and wide application potential in practice. This research result provides a useful reference for other provinces and regions in school-enterprise cooperation and precise training of pharmaceutical talents.

4.2. Comprehensive Quality Improvement Strategy

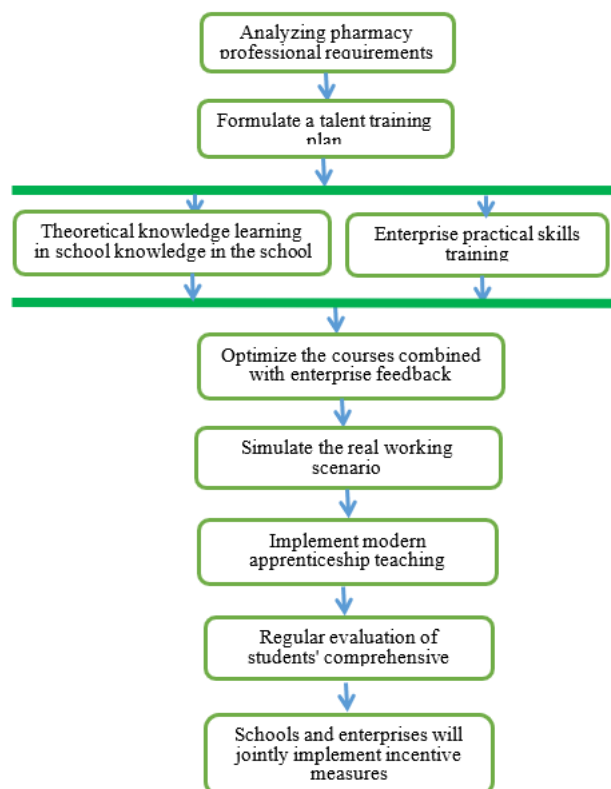


Fig 3. School-enterprise integration course practice of modern apprenticeship in higher vocational pharmacy

In higher vocational pharmacy education, the improvement of comprehensive quality not only requires students to master solid pharmaceutical theoretical knowledge, but also needs to

have practical operation ability and problem-solving ability. Therefore, in the formulation of talent training program, it is necessary to analyze and position the comprehensive quality improvement strategy of pharmacy specialty in combination with the characteristics of pharmacy specialty and social needs. When constructing the framework of talent quality, we follow the teaching concept of "school-enterprise integrated course practice of modern pharmacy apprenticeship in higher vocational colleges", adopt diversified teaching mode, and attach importance to the core role of school-enterprise cooperation in the training of professional talents.

Referring to the flow chart (see Figure.3 for details), we first deeply analyzed the requirements of the pharmacy major and developed a comprehensive talent training program. In the training program, theory and practice are combined. On the one hand, we pay attention to the study of pharmacy theory knowledge in school, and on the other hand, we provide real pharmaceutical practice skills training through cooperation with enterprises. In this process, corporate feedback becomes a key data source for optimizing courses in and out of school to help students better simulate real work scenarios.

Table 1. Composition of the comprehensive quality evaluation form of students in a higher vocational college

Evaluative dimension	Name of index	Indicator code	Full marks	Student self-rating	Teacher score	Enterprise mentor score	Comprehensive score
speculative knowledge	pharmacological	BK001	20	15	18	17	16.5
	pharmaceutics	BK002	20	16	17	16	16.3
	pharmaceutical chemistry	BK003	20	14	15	15	14.7
	pharmaceutical analysis	BK004	20	15	15	16	15.3
	Drug administration and regulations	BK005	20	18	20	18	18.7
specialized skill	Prescription deployment ability	PS001	25	20	22	21	21.3
	Preparation process operation	PS002	25	19	20	18	19.3
	Clinical medication guidance	PS003	25	21	23	22	22.2
ability of practice	Laboratory skills	PP001	30	24	26	25	25.3
	Case analysis ability	PP002	30	22	25	24	23.7
	Drug consulting services	PP003	30	23	27	26	25.5
	Internship project completion degree	PP004	30	25	28	27	26.8
Innovation and development capacity	Scientific research project participation	ID001	15	10	12	11	11.3
	Writing academic papers	ID002	15	12	14	13	13.1
	Participation in the new drug research	ID003	15	9	11	10	10.2
professional quality	the spirit of teamwork	PC001	10	8	9	8	8.4
	professional ethics	PC002	10	9	10	9	9.3
	Communication and coordination skills	PC003	10	7	8	7	7.6
total points			350	272	302	289	287.9

In addition, the modern apprenticeship teaching model has been widely used in the training of pharmacy professionals. Students study under the guidance of teachers, and regularly receive the evaluation of comprehensive quality to help the

two-way development of theoretical and practical ability. At the level of school-enterprise cooperation, all parties jointly introduce incentive measures to encourage students to make breakthroughs in their internship and study. More deeply, we

refer to the composition of the comprehensive quality evaluation form of students in a higher vocational college (see Table 1 for details) to conduct a comprehensive evaluation of students' basic knowledge, professional skills, practical ability, innovation and development ability, and professional quality. The evaluation form defines the self-scoring of students, teachers, enterprise mentors and the final comprehensive score with a detailed index system, forming an objective and comprehensive performance evaluation system. For example, the evaluation of key indicators such as pharmacology foundation, preparation process operation and scientific research project participation ensures that students can achieve the expected teaching objectives in their respective links.

Through the implementation of the above comprehensive strategy, the professional quality and comprehensive ability of higher vocational pharmacy students will be greatly improved, and lay a solid foundation for graduates to enter the workplace and future career development. This kind of school-enterprise collaborative training mode is an important way to innovate and improve the quality of higher vocational pharmacy education, and also an inevitable choice to meet the needs of social development.

5. Conclusion

This study deeply discusses the practical path of school-enterprise joint precision training of the comprehensive quality of higher vocational pharmacy professionals. The results show that in the process of pharmacy talent training in higher vocational colleges, the application of school-enterprise cooperation and combining work with study, the demand-oriented and ability-oriented talent training program, and the creation of a practical teaching system of "classroom + training + enterprise", can effectively improve the quality of talent training. At the same time, it is a key measure to improve the comprehensive quality of pharmacy professionals to strengthen the cooperation mechanism between enterprises and enterprises, introduce innovation and entrepreneurship education into enterprises and hospitals, open up the second class, let students deeply understand the needs of the industry, and establish career development goals as soon as possible. In addition, under the guidance of modern apprenticeship concept, promote school-enterprise collaborative education, establish scientific and reasonable talent training mode and diversified professional evaluation system, realize on-job training and on-job success, and can truly break through the bottleneck of disconnection between talent training and enterprise needs.

To sum up, higher vocational colleges should base on the regional economic development, take the demand of service industry as the guidance, highlight the characteristics of pharmacy specialty, and innovate the talent training mode. Through the in-depth cooperation between schools and enterprises, the curriculum system is optimized, the practical teaching links are strengthened, the construction of "double-qualified" teachers is improved, and the long-term mechanism of industry and education integration and school-enterprise integration is constructed to constantly improve the pertinence and adaptability of talent training. Only in this way, can we train high-quality technical and technical talents to

meet the needs of the development of the pharmaceutical industry, and make due contributions to the regional economic and social development and the progress of the medical and health undertakings.

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