

Research and Practice of Pharmaceutical Engineering Course Based on the Background of Innovation and Entrepreneurship

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Abstract: As a strategic industry in the 21st century, the pharmaceutical industry is a special industry with knowledge-intensive and innovative capabilities. The pharmaceutical engineering profession is the cradle for cultivating talents for the pharmaceutical industry. It is required that the talents cultivated should have the engineering quality, the ability to innovate and start a business, and be able to adapt to the development of the industry. This requirement poses new challenges for the direction and goals of pharmaceutical engineering professionals. Therefore, it is imperative to provide innovation and entrepreneurship education in colleges and universities, and to provide corresponding research and practice for pharmaceutical students. This article starts from the practical education of pharmaceutical engineering, and promotes the independent innovation and entrepreneurship of pharmaceutical talents. It can not only improve students' engineering quality, innovation and entrepreneurship, but also provide reference for innovation and entrepreneurship education of pharmaceutical engineering majors in related universities.

1. Introduction

The pharmaceutical engineering major is a cross-application discipline based on chemistry, biotechnology, pharmacy and engineering. Undergraduate education is an application-oriented talent that can complete many aspects of drug synthesis, pharmaceutical process optimization, and drug production management. With China's accession to the WTO and the continuous improvement of quality management practices such as GMP, GSP, GCP, GLP, and GAP, China's pharmaceutical industry will gradually become internationalized and directly participate in the international pharmaceutical market competition. In the past, backward production conditions and unreasonable management New varieties, new technologies, and new dosage forms with slower update speeds will no longer have sufficient market competitiveness. To change this, we must start from education.

Pharmacy educators should cultivate a development that caters to the times and can grasp solid theoretical knowledge and courage. Innovation, a complex and innovative talent that can be correctly practiced in various technical positions in modern pharmaceutical companies. Based on the background of the era of innovation and entrepreneurship, this paper proposes relevant reform policies as long as the engineering curriculum and practice, and hopes to help the pharmaceutical engineering profession.

2. The Necessity of Improving College Students' Autonomous Learning Ability under the Background of Innovation and Entrepreneurship

Innovation and entrepreneurship education is an inevitable trend of higher education reform, and it is a high-level requirement for talent quality under the conditions of social development and market competition. The goal of innovation and entrepreneurship education is to cultivate a comprehensive talent with high comprehensive quality, strong adaptability and innovative entrepreneurship and ability. In the context of innovation and entrepreneurship education, the talent training model has already broken the past model of step-by-step, passive acceptance, and score-based theory. Instead, it requires learners to first establish a spirit of breaking the rules and being brave in innovation, and then form self-knowledge, self-expansion, and self-growth. Courage and ability. Therefore, innovation and entrepreneurship education have high requirements for college students' independent learning ability.

2.1. The Accumulation of Innovative Entrepreneurial Knowledge is Inseparable from the Ability of Independent Learning

Innovation and entrepreneurship cannot be achieved by courage or spirit alone, but relying on a solid knowledge base, with solid professional knowledge and relevant knowledge in other fields as capital, under certain conditions, it can be transformed into a certain commercial nature. Product or opportunity. Therefore, a strong independent learning ability is a necessary condition for college students to achieve self in the future. Only through active learning can they lay a solid foundation for their own innovation and entrepreneurship. Because the study at the university level is mainly based on students' self-motivated and spontaneous voluntary learning methods, only under the guidance of independent learning ability, students can effectively use all leisure time to be able to turn all kinds of learning resources inside and outside the school into their own. Accumulate a strong knowledge base and provide a continuous supply of knowledge for its future innovation and entrepreneurship.

2.2. The Development of Innovative Entrepreneurship Depends on the Process of Independent Learning

Innovative entrepreneurship requires not only a knowledge base, but also a spirit and character that is hard-working, courageous, and daring to try. This character is related to each person's first weather quality and character, but it is also inseparable from the shaping of the acquired environment. The process of autonomous learning itself is a relatively boring process. In the long-term independent learning process, college students must develop a strong courage to overcome inertia, in order to generate a positive desire for independent learning. Only with perseverance and perseverance can we continue to Expand self-learning. Therefore, in the process of autonomous learning, college students can not only accumulate a large amount of knowledge, but also exercise their spirit, will and character.

2.3. The Ability to Innovate and Create Entrepreneurship Comes from the Experience of Independent Learning

People who are good at self-learning have the agility to learn from practice. They are good at grasping all favorable opportunities, applying their own learning to practical activities, and learning from them, accumulating experience and improving their abilities. Innovative entrepreneurship requires the perfect combination of knowledge and ability. Without the ability, it is difficult to achieve the goal of innovation and entrepreneurship, and even lead to failure, and through self-learning, personal ability can be improved to some extent. People with strong self-learning ability have the incomparable ability of others. This ability is indispensable for innovation and entrepreneurship.

3. The Status Quo of the Pharmaceutical Profession in the Engineering Design Teaching Practice

At present, most of the pharmaceutical engineering majors in China's polytechnics are from bioengineering and chemical engineering. Currently, there are two professional directions: biopharmaceuticals and chemical pharmaceuticals. At present, some pharmaceutical engineering majors on pharmaceutical engineering design are set up as "pharmaceutical and workshop design". The teaching method is to teach and teach, and then directly enter the graduation design process in the eighth semester. This kind of curriculum has certain advantages, which enables students to learn some basic concepts and basic theoretical knowledge about pharmaceutical engineering design in the classroom, and then combine the small papers related to various pharmaceutical production methods arranged by teachers. Can have a certain grasp of the content, work procedures, skills, etc. of various pharmaceutical preparations and chemical pharmaceutical engineering design. In the graduation process, students can apply the knowledge they have learned in the course to the actual design to achieve a certain training effect.

However, this teaching method has its shortcomings. Although the students have rich theoretical knowledge, there is no preliminary analysis ability for some problems in the actual design because of the lack of actual design and operation exercises. Due to various factors, the students are not well trained, in order to cultivate students' attitudes towards seeking truth from facts, and the ability of students to analyze and solve practical problems in engineering, and gradually form correct design concepts; At the same time, in order to cooperate with the Ministry of Education's assessment of the pharmaceutical engineering profession, the pharmaceutical engineering professional curriculum system is more standardized, we need to make corresponding reforms to the existing curriculum system, and increase the teaching links of the "pharmacy engineering curriculum design". "Pharmaceutical Engineering Course Design" is a comprehensive and practical teaching session. The course can develop students' comprehensive ability, so that students can use the work well and help to enter the "engineering role" as soon as possible after graduation.

4. The Guiding Principles of Pharmaceutical Engineering Curriculum Design

The design topic should be derived from the engineering design and research projects that the teacher or the medical design institute has undertaken or is currently hosting, so that the course is closer to reality, allowing students to carry out the design of "real guns" to motivate students and increase their sense of responsibility. The following guidelines should be determined.

4.1. Strengthen Students' Sense of Responsibility and Engineering Perspective

In the design, students are required to make a full comparison from a variety of programs to select the best, advanced, and safe operation. In order to change the students' attitude towards the curriculum, in addition to letting students know the meaning of the curriculum design, they are allowed to carry out tasks such as research and development as much as possible in order to mobilize the students' interest and enthusiasm, and have a strong sense of responsibility for the results of the design.

4.2. Inspired Inspirational Questions and Flexible Teaching Methods

Since different students have different design tasks and different foundations and abilities, it is normal to encounter problems that they cannot solve in the design process. When instructing teachers to answer questions, students should not be too specific in their questions, but should adopt inspiration-inducing methods to try to allow students to think and solve problems independently. According to the training objectives, determine the teaching mode of this link. It can be changed from the old-fashioned teaching to the following three modes. Classroom teaching heuristic, comprehensive open, and open guidance. These three modes are applicable to the initial, mid-term and revision summary phases of the design.

4.3. Focus on Ability Development

The curriculum design is characterized by a strong integration. In the design of pharmaceutical engineering courses, attention should be paid to the ability of students to train the collection and analysis of basic data, the ability to compare and select programs, computing power, engineering drawing skills and engineering language skills.

5. The Exploration of the Cultivation Path of Pharmaceutical Engineering Innovation and Entrepreneurship

5.1. Adapt to the Needs of Transformation, the Classification of Personnel Training Programs

The pharmaceutical engineering undergraduate applied talent training program was further refined and revised, and the "3+1" talent innovation training model was adopted, and the concentrated practice teaching time accounted for more than 30% of the total academic hours. The Chinese medicine pharmaceutical technology higher vocational talent training program is refined and formulated, adopting the "2+1" talent innovation training mode, and the concentrated practice teaching time accounts for more than 50% of the total academic hours. The purpose is to focus on cultivating students' experimental skills, process operation capabilities, and engineering design. Ability and social practice.

5.2. The Cultural Atmosphere of Chinese Medicine is Reshaped, and the Student's Personality is Sound

For the newly established pharmaceutical majors in local colleges and universities, students should be the center, cultivate students to form healthy personality, establish a correct world outlook, outlook on life and values, integrate Chinese medicine culture into teaching, infiltrate personnel training and growth, organize Students went to Zhangzhou Pharmaceutical Group Co., Ltd. to understand the internship, increase the perceptual knowledge and experience of the

equipment, process flow and management system of modern Chinese medicine pharmaceutical companies, and lay the foundation for in-depth study of professional knowledge. Organize participation in pharmaceutical engineering design and traditional Chinese medicine skills competition, stimulate students' initiative and enthusiasm, and improve their ability to innovate and start a business.

5.3. Reasonable Arrangements to Strengthen Practical Teaching Links

In order to reduce the burden on students, let students have more time to self-study, participate in social activities and extracurricular technology practice, our school has adjusted the teaching process arrangement. The public foundation courses and professional foundation courses are completed in the first 4 semester. Completed in the 5th, 6th, and 7th semester, no classroom teaching will be arranged in the 8th semester. In the 7th semester, only the drug synthesis reaction, pharmaceutical engineering design, pharmaceutical technology and pharmaceutical literature search and special lectures will be arranged. During the 7th semester, students will be given a certain amount of time. According to their own interests, hobbies and development direction, they will choose their own learning and Electing other knowledge and courses can reduce the burden on students on the one hand, and help students to enrich themselves and achieve more comprehensive development on their own.

5.4. In-depth Excavation of the Practical Teaching Connotation of "There is A School in the Factory"

The curriculum reform of the "school in the factory" is to move the teaching class from the conference room classroom directly to the field teaching of the pharmaceutical enterprise workshop, teach the actual production process and the real product from the enterprise, take the typical drug production process or the quality inspection management standard as the main line of practice teaching, and make the enterprise industry resources become education. The extension of the resources. The field teaching of the pharmaceutical technology production process and the post production operation workshop takes the content of the theory in the production workshop directly to the characteristic advantages of the brand products of the enterprise and the actual unit operation of the production process. Knowledge points docking and integration to achieve integration of theoretical study and actual scene.

5.5. The Optimal Control Method in the Pharmaceutical Process

Estimating method of the actual process derivative

In the proposed derivative estimation method, the finite difference method and the Broydon algorithm, where the former adopts the following simple finite difference formula:

$$F'(V) = \frac{F(V + \delta) - F(V)}{\delta} \quad (1)$$

Here the δ is a small perturbation to the F . As each iteration process, coupled with the noise pollution in the actual industrial process, the inevitable measurement error, affect the derivative estimation result and increase the calculation burden. The Broydon algorithm is approximated by using the following Broydon iteration formula:

$$F'(V) = F'(V_{K-1}) + \frac{Y - Y_{K-1} - F(V)}{V_K} \quad (2)$$

Although the BR algorithm is relatively simple, each update needs to be replaced by the BR formula, which will produce a large error.

5.6. Quality Standard Analysis of Pharmaceutical Engineering

Table 1. Standards for the pharmaceutical engineering process

Grade	Maximum allowable gap of the process	Minimum allowable gap of the process
1	200	100
2	350	90
3	400	80

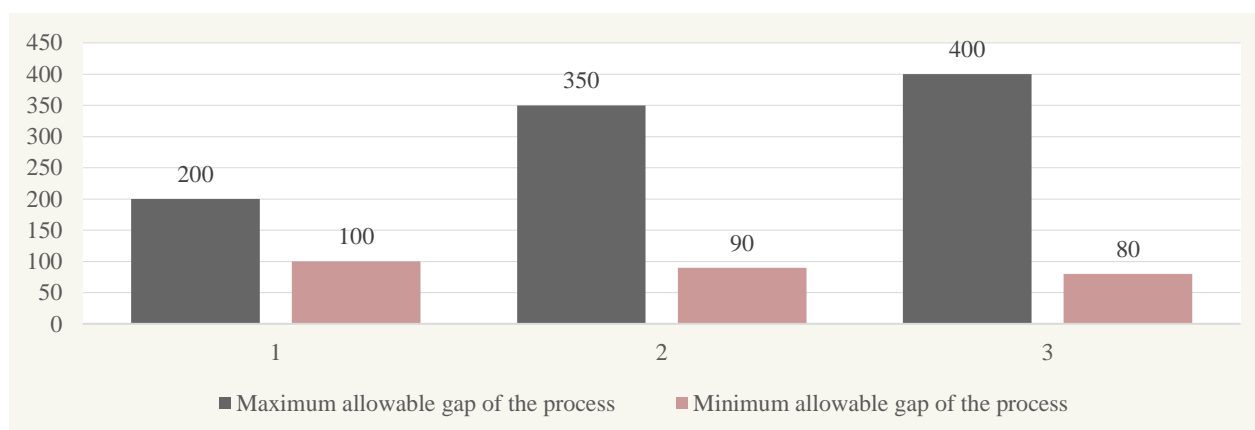


Figure 1. Standards for the pharmaceutical engineering process

It is seen from Table 1 and Figure 1 that when the standard of pharmaceutical engineering is divided into three levels, the minimum gap in the process production of pharmaceutical engineering is controlled between 80 and 100, while the maximum gap is controlled between 200 and 400.

6. Conclusion

The talents training program, the reform of the practice teaching mode, the combination of production, research and research and the cooperation of school and enterprise have realized the sharing of resources, the complementary advantages, the joint training of the pharmaceutical engineering professionals, the improvement of the teaching quality and the efficiency of education, which can make the students pay more attention to the ability of engineering technology while paying attention to the theoretical knowledge and learning. Raise. Teaching reform strengthens the training of students' engineering practice, emphasizes the cultivation of innovation ability and entrepreneurial ability, attaches importance to the knowledge of methods, techniques and processes in the research and development of new drugs, emphasizes the combination of technology and engineering technology, strengthens the cultivation of engineering concept and innovation ability, and shows the "thick foundation, wide caliber, heavy practice and high quality". The whole idea of "creativity" enables the students to play a role in the research and development of pharmaceutical companies' new drugs, and form a special training mode with the theory and practice of this specialty.

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Conflict of Interest

The author states that this article has no conflict of interest.

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