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How to Cultivate Students' Innovation Ability in the Teaching of Natural Pharmaceutical Chemistry

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Abstract

The goal of education is to cultivate students' innovative spirit, innovative thinking and innovative ability. Natural pharmaceutical chemistry is a required course for pharmacy majors, and plays an important role in the pharmaceutical courses. In order to meet the requirements of the society for innovative talents in pharmacy, this project, based on the teaching characteristics of the course "Natural Pharmaceutical Chemistry", combined with scientific research, explored and studied the teaching of natural pharmaceutical chemistry, and explored the ways and specific methods to cultivate students' innovation ability from the aspects of theoretical teaching, experimental teaching, graduation practice and undergraduate thesis design. The improvement of students' innovation ability plays an important role in promoting teaching work, improving teaching quality and students' employment level. With the deepening of the reform of higher education, we will also continue to explore new ideas, new ways and new measures that are conducive to pharmaceutical education, so that the teaching level of natural pharmaceutical chemistry will continue to improve and students' innovation ability will continue to strengthen.

Keywords: natural medicinal chemistry, teaching methods, innovation ability

1. Introduction

With the deepening of Chinese higher education reform, many experts and scholars have actively explored the cultivation of college students' innovation ability. However, different disciplines have different educational and teaching rules and requirements. The discussion on the cultivation of innovative ability of college students majoring in pharmacy has just started. There are still many theoretical problems and practical puzzles that need further exploration and research. In the current teaching practice of higher pharmacy education, there are also many practices that cannot meet the needs of the cultivation of innovative talents (Li & et al., 2020). It needs further improvement.

Natural pharmaceutical chemistry is a required course for pharmacy, traditional Chinese medicine and related majors, and plays an important role in pharmacy, traditional Chinese medicine, biopharmaceutics and pharmaceutical engineering. In particular, natural medicine has been recognized and accepted by the world, so the importance of natural medicine chemistry has become increasingly prominent. Almost all undergraduate medical colleges and universities have put this course in the forefront as a backbone course. The key content of natural medicinal chemistry is the extraction, separation and structure identification of various components, among which the structure identification of compounds is the difficult point of this course. Students often cannot comprehensively use various spectral data for structure identification. According to the traditional teaching methods, students' comprehensive ability and innovation ability cannot be fully developed, and students' enthusiasm for learning cannot be fully mobilized, which affects the teaching effect. At present, there are few researches on the teaching reform of natural pharmaceutical chemistry at home and abroad, and most of the explorations on the teaching reform of this course are directly aimed at the design of experimental content.

Natural medicinal chemistry is a subject with strong practicality. The development of many theories comes from the rapid development of scientific research in this subject. To teach this course well, it is not enough to rely only on the content in the textbook. We must also actively participate in scientific experiments, accumulate experience and experimental data through scientific research practice, and supplement and enrich the teaching content of natural medicinal chemistry.

2. Carefully Arrange Theoretical Teaching to Cultivate Students' Innovative Consciousness

First of all, encourage students' innovative spirit. In the basic courses and professional courses offered by the pharmacy specialty, the experimental content accounts for a large proportion. During the experiment, students often have some new ideas. However, due to the limitations of knowledge and ability, some ideas are inevitably childish in the eyes of teachers, which is completely normal. At this time, teachers should respect and encourage students' innovative consciousness and spirit, so that students can make bold attempts in a good academic atmosphere and continue to innovate and improve. Secondly, actively create an atmosphere of innovation. We should strengthen the construction of campus culture, focus on building a campus cultural environment and academic atmosphere suitable for college students to become talents, and fully mobilize the enthusiasm and initiative of students. Develop each student's specialty according to the students' psychology of seeking novelty and difference; improve students' sense of identity and belonging through multi-level teaching and various community activities. This is conducive to the healthy development of students' personality under the influence of the overall environment, so that students can constantly cultivate the spirit of innovation in activities. The school regularly holds cutting-edge lectures to introduce the current research hotspots and future key development directions of various disciplines to students, so that students can form an innovative consciousness in the background.

Natural medicinal chemistry is a discipline based on organic chemistry, spectral analysis and analytical chemistry, and is also inextricably linked with pharmacology, pharmacognosy and medicinal botany (Zhang & Wei, 2021). In the teaching of natural medicinal chemistry, it is undoubtedly the best way to consciously cultivate students' comprehensive analysis ability, consult literature and write a review paper. Teachers engaged in scientific research will organically combine the knowledge points in basic theories with the frontier of discipline development in teaching, which is a natural combination. This is because some of the frontier topics are teachers' own research fields or fields related to their own research topics. When teachers have a deeper understanding and accumulation of this research field, they can grasp the development characteristics and trends of this field as a whole. The author has studied systematically the chemistry and activity of the genus Pedicularis, among which iridoids are the characteristic chemical constituents of the genus. When teaching related knowledge of iridoids, let students consult relevant literature and materials to summarize the structural characteristics, common types, physical and chemical properties and biological activities of iridoids. Then the teacher explained the specific content of iridoids that he had studied. The students had a deep understanding of this part, and exercised their comprehensive analysis ability, and achieved good teaching results. We led students to mountain fields in Guangxi Province for field survey of medicinal plants. During the practice, students learned many famous medicinal plants with local characteristics. While introducing the functions and indications of each plant, students are encouraged to think about the material basis of these plants, and then combined with the knowledge of natural medicinal chemistry and their own scientific research projects, students can understand the active ingredients of various medicinal plants. This way not only increases students' knowledge, but also cultivates their thinking ability and practical ability. It has a good effect on improving teaching level, developing students' scientific thinking and enhancing their innovative consciousness.

3. Reforming Experimental Teaching and Paying Attention to the Cultivation of Students' Innovative Ability in Scientific Research

Natural pharmaceutical chemistry is a professional course for undergraduate pharmacy students, which is a subject with strong application. Experimental teaching is an important part of this course. Establish a mechanism to update the teaching content, strengthen the comprehensiveness and practicality of the curriculum, attach importance to the teaching of experimental courses, and achieve the goal of cultivating students' practical operation ability (Liu & Liu, 2022). The traditional natural medicine chemistry experiment is mainly confirmatory experiment, which lacks innovation, students' enthusiasm is not high, and the experimental teaching effect is poor. In order to enhance students' interest in learning and cultivate their innovative ability, we have carried out the following work in the experimental link: First, we introduced teachers' scientific research experiments into teaching experiments to provide students with an opportunity to carry out some research experiments, so as to learn more practical skills. Students' experimental results also provide materials for teachers' research work. Through the selection and updating of the experimental content, a confirmatory and comprehensive experimental teaching system has been formed, and students are actively attracted to participate in scientific research activities after class. In addition to the graduation internship, students are also organized to

participate in scientific research activities on weekends and in their spare time. In professional laboratories, the experimental conditions and equipment are relatively advanced. Through the use of instruments, students can initially master advanced experimental methods, and their knowledge, operating skills and ability to analyze and solve practical problems are improved (Wang, 2011). Second, in order to encourage students' innovation ability, the university has set up the innovative experiment program for college students, which aims to cultivate college students' innovation awareness and innovation ability. The students have two and a half years of pharmaceutical learning experience in school, and have a certain understanding of the development, production, circulation and use of natural drugs. In combination with the natural pharmaceutical chemistry they are learning, guide the students to study the extraction, separation, structural identification of the components of medicinal plants, and the material basis and mechanism of action of active components. Through the implementation of the project, not only the innovation ability of project team members has been improved, but also the enthusiasm of other students to participate in innovation experiments has been driven.

4. Strengthen the Guidance of Graduation Practice and Undergraduate Thesis Design, and Cultivate Practical Talents

Undergraduate graduation design is an important part of practical teaching. Its task is to comprehensively use the professional theoretical knowledge and practical skills learned in four years of college, analyze and solve problems in combination with practice, and write a graduation thesis. Through graduation design, students can improve their ability to analyze and research practical problems, cultivate their innovative thinking and sense of teamwork, improve their comprehensive quality, and lay a good foundation for their work after graduation. In order to improve the quality of undergraduate graduation design and cultivate students' innovation ability, this paper explores the following aspects: First, set graduation design topics scientifically to guide students to choose the right topics. The setting of graduation design topics is the key to the graduation design. Only by setting graduation design topics scientifically and reasonably can we reflect the students' comprehensive application ability of professional knowledge, so as to cultivate the students' practical ability to analyze and solve problems. In addition to being related to the development direction of the major, the graduation design should be combined with local natural medicinal resources. Secondly, appropriately extend the graduation design time. Generally, the graduation design is arranged to be completed in the second semester of the senior year, and students only have about 2-3 months to carry out the graduation design work. If the graduation design time is too short, it is difficult for students to complete high-quality graduation papers. The author thinks that we can consider to advancing the graduation design work from the second semester of junior year. With the extension of graduation design time, students have ample time to collect data and investigate the current situation at home and abroad, formulate detailed research plans, conduct in-depth theoretical analysis, and conduct repeated experiments and applications, which will help improve students' innovation ability.

Pharmacy majors in colleges and universities of traditional Chinese medicine are highly practical majors. Practical teaching, especially graduation project practice, is an important part of undergraduate teaching of pharmacy majors, a supplement and update of knowledge learned in the classroom, and an important means to test teaching effects (Fan & et al., 2018). Therefore, it is of great significance to seriously carry out the practice management of pharmaceutical students for cultivating students' innovation ability and practical talents. Since there are many botanical drug enterprises in Ji'an, Jiangxi Province, where the author is located, most students will go to these enterprises for graduation internship and work. The knowledge and skills related to natural drug chemistry are of greater significance to them. In view of the above situation, we have taken some relevant measures: first of all, because the school has a technical cooperation relationship with relevant botanical drug manufacturers, we are familiar with the separation and extraction production process of medicinal materials, guide students who practice in these enterprises, and introduce the extraction and separation of traditional Chinese medicine and the identification of active ingredients in combination with production practice, so as to lay a good professional foundation for students' internship work. Secondly, strengthen the contact with students during the internship. Due to the large number of practice places, students may encounter different production and practice problems, so they should contact the knowledge related to natural drug chemistry to communicate with students. Students should improve their skills in combination with production practice. Students not only solve practical problems, but also have a new understanding of natural drug chemistry courses. Finally, students should summarize in time after the internship. As the knowledge learned by students is applied to the front line of work, they have a deeper understanding of the relevant knowledge learned. On this basis, they asked for suggestions on improving the teaching of natural pharmaceutical chemistry, so as to improve students' practical and innovative abilities and cultivate more practical talents.

5. The Role and Significance of Research

Innovation is the soul of a nation's progress. Strengthening quality education and cultivating students' innovation ability is a new topic facing school education. The curriculum teaching of pharmacy specialty must also actively

explore new ways and methods to adapt to the current quality education. The course of natural pharmaceutical chemistry has its own advantages in cultivating students' innovation ability with its distinctive characteristics of strong practicality, rapid updating of theoretical content and technical methods, and obvious intersection with other pharmaceutical courses. The main objectives of the teaching of natural pharmaceutical chemistry are to cultivate scientific quality, improve the ability to solve problems, and cultivate innovative consciousness and ability. With the deepening of the reform of higher education, we will also continue to explore new ideas, new ways and new measures conducive to pharmaceutical education, so as to make the teaching of natural pharmaceutical chemistry step up to a new level (Wang & et al., 2011).

In this topic, we only take the teaching of natural pharmaceutical chemistry as an example to discuss the ways and methods of cultivating the innovative ability of pharmaceutical students from a general perspective. In fact, the cultivation of innovation ability of students in different courses and grades has different characteristics of development. In this regard, this topic has not been further studied. However, on the basis of the research results of this topic, researchers can combine their own work practice to carry out relevant research on the cultivation of innovation ability for other courses of pharmacy, explore the development characteristics of a wider range of pharmaceutical students, and then seek a more targeted and feasible innovative pharmaceutical talent training system. Continue to promote the research methods and results of this topic, so that our training methods and methods can achieve greater effect in a wider range and benefit more students (Li & et al., 2016).

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Conflict of Interest

There is no conflict of interest in this paper.

References

Fan, B. Y., Chen, G. T., Li, J. L., Yang, M., & Li, J. L., (2018). Exploration on the teaching mode of natural pharmaceutical chemistry guided by the cultivation of scientific research ability. *Journal of Modern Medical Health, 34,* 3844-3846.

Li, H., Qiu, P. C., Bi, L. L., Lu, Y. Y., Xin, C. Y., Tan, G. G., & Tang, H. F., (2020). Reformation and cogitation of teaching of medicinal chemistry of natural products in medical universities. *China Medical Herald, 17,* 60-63.

Li, Z. L., Zhang, X., Bai, J., & Sun, B. H., (2016). Discovery and cultivation of innovative talents in pharmacy in the teaching of natural medicinal chemistry. *Journal of Pharmaceutical Research, 35,* 550-552.

Liu, W. B., & Liu, Y. F., (2022). Exploration of the experiment teaching of natural medicinal chemistry for undergraduates. *Chinese Journal of Biotechnology, 38,* 1248-1256.

Wang, J. J., (2011). Thoughts on the construction of practice teaching base for pharmaceutical specialty. *Journal of Traditional Chinese Medicine Management, 19,* 233-234.

Wang, L. B., & Yang, C. J., (2011). Application of teaching-learning interactive in the course of natural products chemistry. *Pharmaceutical Education, 27,* 40-41.

Zhang, G. R., & Wei, Z., (2021). Teaching exploration of natural medicine chemistry course to cultivate undergraduate's scientific research ability. *Guangzhou Chemical Industry, 48,* 282-283.