

Exploration and Practice on Reinforcing Opening Laboratory and Cultivating Innovative Ability of Local Medical Undergraduates

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Abstract: According to the requirements of society for the cultivation of innovative talents in colleges and universities, in view of the characteristics of innovative and entrepreneurial training of college students in local medical colleges and universities and the actual situation such as long opening time, high frequency, strict requirements and many hidden dangers of safety, etc, the strategies in laboratory opening were analyzed to be helpful to innovative talents cultivation in medical colleges and universities. Reinforcing laboratory opening was discussed and started from the current status and the aspects of laboratory construction and management, opening and sharing of resources and construction of experiment technician team, respectively. The approaches and practical effects were discussed so as to be beneficial to the cultivation of innovative talents in local medical colleges. It fully reflected that opening laboratory was an important measure for the cultivation of innovative talents in colleges and universities.

1. Introduction

As we all know, the competition of comprehensive national power is actually the competition of high-quality innovative talents and innovative ability. Cultivating the innovative consciousness and ability of college students is the requirement given to the cultivation of talents in colleges and universities in the era of "mass entrepreneurship and innovation", and it is also the essence and main goal of the cultivation of first-class professionals. I believe that the laboratory is an important position for the cultivation of innovative talents in colleges and universities, and it is the main measure to cultivate undergraduates' innovative ability by strengthening the opening of the laboratory [1-4]. In order to meet the needs of society, the medical students trained by local medical colleges and universities should get out of the barriers of traditional education, strengthen the practice link [5], and pay attention to creation education [6,7]. Based on the specific situation of the college and the practice process of opening laboratory, this paper discusses how to cultivate the innovative consciousness and ability of students in local medical colleges and universities, in order to provide a certain radiation effect for the cultivation of talents in colleges and universities.

2. The significance of strengthen the management and operation on opening laboratory

For a long time, due to the influence of deep-rooted traditional education, the professors have only kept a watchful eye on the indoctrination of knowledge in local medical university by "cramming" teaching. They overemphasized on teaching and neglected undergraduates' subjective consciousness and position. Skill training and hands-on ability exercise of undergraduates have not paid close attention. On the contrary, high score goal and the guidance of commonness have paid more attention as a examination means. So that students often pay more time to learn by rote, and it do not match with the social requirements for talents. It obviously shows that the cultivation of students' innovative ability is insufficient. In practice, most of the trained undergraduates are manifested in the theoretical and poor scriptures. They are in accordance with the rules and lack of innovation consciousness and adaptability. Students who can score high or are regarded as excellent in school do not necessarily achieve good achievements in society, which has become a "strange phenomenon" in the field of education. Therefore, the cultivation of undergraduate with innovative consciousness and ability is demand of the times and the inevitable trend of economic development

to a certain stage. Society calls for innovative education and the cultivation of innovative talents in colleges and universities.

In the past 20 years, a large number of enrollment at local medical colleges has expanded for training talents at the primary hospital, which has limited experimental teaching within the specified time. It led to weak practical teaching and basic training skills, resulting in an indifference innovation awareness. Problems such as laboratory opening and lack of management experience are highlighted. As a result, local medical college graduates are at a disadvantage in the market competition with more work experience and famous universities, and the employment pressure is increasingly severe. Therefore, it has become a consensus to reform the traditional experimental teaching mode and strengthen the opening of laboratories to cultivate innovative talents.

3. Broken the traditional experimental teaching and laboratory management mode

The traditional experimental teaching and laboratory management mode has the characteristics of conservatism and closeness [5], which seriously restricts the cultivation of students' ability to analyze and solve problems, and even can not embody individualized innovative thinking. The performances are as follows: (1) The content of the experiment is fixed, most of which are based on the verification of the experimental content. (2) The experimental time is fixed, and the undergraduates must complete the experiment within the specified time and lesson hours. (3) The laboratory and experimental platform are fixed, and the experimental teachers are fixed. So much "fixed" leads to undergraduates not have to use their brains too much, just to complete the experiment step by step like grasping traditional Chinese medicine according to the formula. Undergraduates are not being impressed after the experiment and unable to experience the sense of accomplishment of finding and solving problems. It is also easy to waste the resources of large precision instruments, but the ordinary laboratory is overloaded and students lack autonomy and innovation. Therefore, the cultivation of innovative talents must break the traditional experimental teaching and laboratory management mode, out of the barriers of traditional education.

4. Strengthen laboratory opening with undergraduates as the main body

In order to make undergraduates meet the needs of society, we should pay attention to strengthening the practical teaching link by opening and sharing the experimental resources to the students. Let the students become the main body of the experiment and realize independent experiment. It can not only stimulate undergraduates' enthusiasm and initiative in learning and can also improve practical and innovative ability by providing them with an independent experimental environment such as opening experimental time and space, opening experimental courses, opening experimental items and research topics, opening laboratory management, opening experimental resources and guidance teachers, respectively. So much "opening" results in students have full autonomy. They are allowed to choose freely experimental content, experimental time and shared platform space according to personal interests and professional characteristics. They have opportunity to stand on their own themes and carry out innovative practical activities such as "Innovation Project", "Internet+", "Challenge Cup" and other training projects and competitions. Undergraduates can choose their own tutors, reserve the time, place and experimental equipment for the experiment on the internet. Undergraduates can enter the open laboratory for experiments independently after being examined and approved by the supervisor and the experimental management teacher. They must carry out the experiment with the guidance of the teacher including completing literature review, designing the scheme of the experimental project, using the experimental instrument and equipment, writing the summary report of experimental analysis, and so on. The comprehensive application ability of students' theoretical knowledge and experimental skills can be fully exercised by planning and designing the whole experimental process so as to cultivate their innovative thinking and innovative ability.

5. Strengthen laboratory construction and open management mechanism

There are many undergraduates in local medical colleges and universities and their foundation is weak. In addition, There are several characteristics in opening laboratory such as long time, high frequency and many hidden dangers, etc. So it is necessary to strengthen the management mechanism of laboratory construction and opening. The author admires the field management theory of "7S" [8,9], that is seiri, seiton, seiso, seiketsu, shitsuke, safety and save. The measures to strengthen the construction and open management of the laboratory are as follows: (1) An open laboratory resource sharing platform should be built by adjusting the laboratory structure. Each platform with special management personnel and each laboratory with a special safety administrator, even each large instrument is managed by a special person in order to form a four-in-one open management mode (director-experimental management technicians - guidance teachers - undergraduate students). (2) An experimental center website and laboratory access control system should be established. The website should set up a lot of information such as multimedia courseware, interaction system for instrument operation, laboratory equipment introduction and management system, experimental online reservation system and other management information. (3) The team of experimental management technicians should be stabilized and be conducted to train regularly or irregularly at technical level so as to ensure the normal operation and management quality of laboratory construction. (4) An incentive mechanism should be established to encourage students to declare actively undergraduate' innovative and entrepreneurial training projects and encourage teachers to guide actively experimental projects. The full utilization and operation of laboratory open resources must be carried out so as to realize the organic combination of experimental teaching, scientific research and students' scientific and technological innovation activities.

6. Exploration and practice in cultivating innovative ability of local medical undergraduate

At present, we has constructed Drug Research Institute including four scientific research platforms by adjusting the laboratory structure. They were Drug Analysis and Test Center, Drug screening and efficacy Evaluation Center, Natural Drug Synthesis and Drug preparation experiment Center, respectively. Each platform has special managers and each laboratory has a special safety manager, and each large instrument is managed by a special technician, who provide a guarantee for overall safety and orderly opening laboratory. We aims mainly at four aspects such as undergraduate' innovation and entrepreneurship training project, designing experiment, graduation design and participation in teachers' scientific research experiment. At the same time, the website of the experimental center and the online reservation system should be established. The management system of opening laboratory should be established and perfected. For the expensive large-scale precision instruments and equipment, the guidance teacher responsibility system and the consent can be adopted to open to the students according to undergraduates' personal assessment.

Before opening laboratory, we recorded a lot videos about the operation specifications, safety education, standard operation training and assessment, the use and protection of important dangerous chemicals, the safety emergency plan of laboratory and equipment, and so on. We shared them on the website of the experimental center to ensure students' understanding and emergency. In order to strengthen opening laboratory, we also recorded the actual conditions and equipment of our laboratory into practical operation videos. In addition, we had the videos taken the standardized operation of the instrument in the experiment course of pharmaceutical analysis and eight important experimental projects. Then they were edited professionally and shared to the network platform of Wisdom Tree so as to realize classroom flipping and MOOC mode.

Now the students' attention and interest in the "undergraduate innovation training project" and designing experiment are increasing year by year. At the same time, it also stimulates the teachers' enthusiasm for guidance. The quantity and quality of the experiment have been greatly improved in recent years (showed in Figure 1 and Figure 2). The admission rate of the postgraduate entrance examination (seen in Figure 3) and the quality of admission university are also obviously improved.

And the number and quality are also increasing in undergraduate publishing scientific research papers as the first author. As a result, our research group won the second prize in teaching achievement award in 2018. And we declared and established a course of Shaanxi Province innovation and entrepreneurship education in colleges and universities. At the same time, the undergraduates took part in all kinds of competitions. Almost in recent years, our students have taken part in the "Internet", "Qingchuang", "Challenge Cup", "Microsoft" and other competitions, but also achieved gratifying results. The operation skills and innovation consciousness of undergraduates have obviously increased year by year.

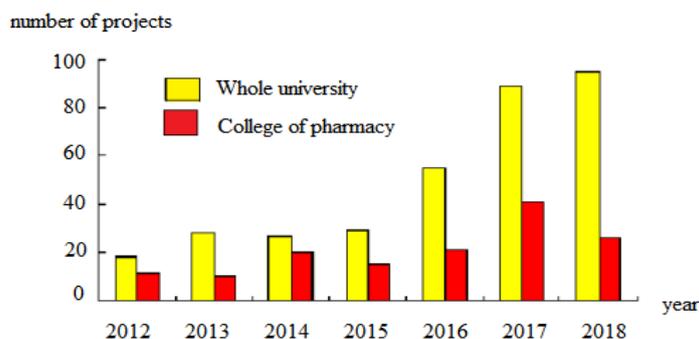


Figure 1 Training projects for undergraduate' Innovation and Entrepreneurship in 2012~2018 year

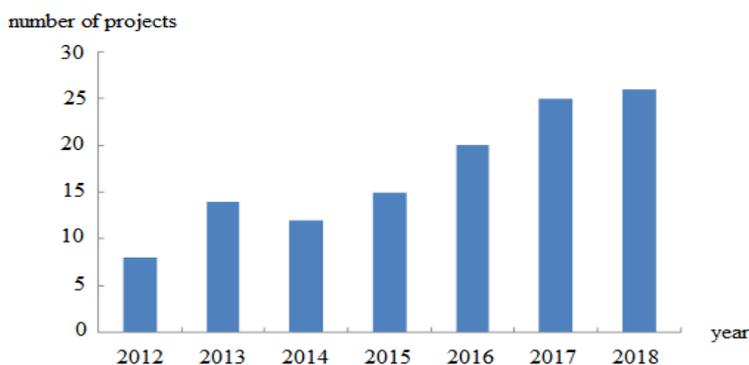


Figure 2 Design experimental projects in College of Pharmacy in 2012~2018 year

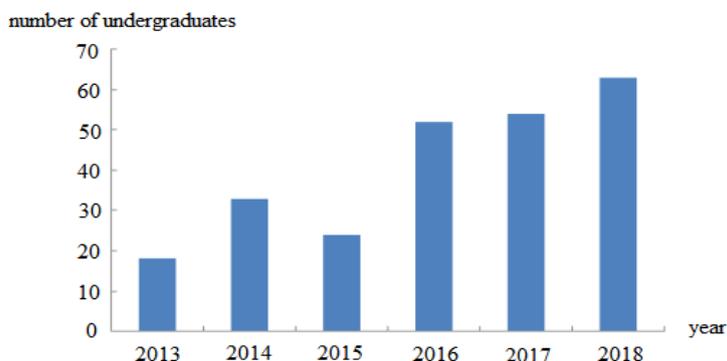


Figure 3 Undergraduates admitted to postgraduate in College of Pharmacy from 2013 to 2018 year

7. Conclusion

It is an important measure to cultivate high-level and high-quality innovative talents by strengthening opening laboratory in colleges and universities. It can not only improve the utilization

rate of laboratories and instruments, but also enhance the practical and innovative ability of undergraduates. In the process of strengthening opening laboratory to undergraduate, the operation mechanism of open management should be constantly perfected. We must adhere to the core position of talent training, adhere to the dominant position of students, adhere to discipline leading professional development, adhere to scientific research feeding teaching, persist in the reform and innovation in education and teaching, and improve comprehensively the quality of talent training. This is a systematic project, and still need us to continue to make unremitting efforts for it.

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References

- [1] Kuang Sunqiong, Yang Dingxin, Tao Limin. Construct opening experimental teaching model to cultivate innovative talents. *Journal of Higher Education Research*, 2012, 35(3): 100-101, 114.
- [2] Tao HuiJin, Yin Jian, Zhou Shan, et al. The practice and exploration of open laboratory management of innovative personnel training. *Experimental Technology & Management*, 2017, 34(3): 25-27.
- [3] Huo Xuehui, Bi Jianjie, Fang Xinsheng, et al. Strengthening the open teaching of laboratory to improve the creative ability of undergraduate students. *Laboratory Science*, 2018, 21(4): 237-240.
- [4] Zhuang Wenqin, Cheng Xiaogang, Liu Feng, et al. A probe into the opening mode of laboratory and the cultivation of innovative talents in colleges and universities. *Laboratory Science*, 2016, 19(1): 125-127.
- [5] Huang Chuanyan, Yao Guangqing, Mei Lianfu. Research on laboratory open management based on innovative talent training. *Laboratory Science*, 2016, 19(5): 154-156.
- [6] Yang Hua. Analysis of internet use behaviors among clinical medical students in China. *BMC Medical Education*, 2014, 14: 67.
- [7] Diane Mizrahi, Marcia J. Bates. Undergraduates' personal academic information management and the consideration of time and task - urgency. *Journal of the American Society for Information Science and Technology*, 2013, 64(8): 1590-1607.
- [8] Yu Qiong, Wang Xiaolin, Guo Xiaofeng, et al. Discussion on the construction of open laboratory of chemistry. *Laboratory Science*, 2019, 22(1): 169-172.
- [9] Zhang Yan, Ling Yun. Exploration and practice of 6S management method in open laboratory management. *Modern Business Trade Industry*, 2019, 12: 168-170.