

Exploration and Practice on the Cultivation Mode of Independent Innovation Ability of Undergraduate Students Majoring in Biology under the Scientific Research Tutorial System

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Abstract

Under the background of building "double first-class" University in China, how to cultivate talents who adapt to social development, serve the society, have strong practical ability, innovative spirit and initiative innovation ability are the important issues facing colleges and universities, especially local colleges. Biotechnology and biopharmaceutical specialty have the characteristics of application and practice. The system of scientific research tutor for undergraduates is the reform mode of practical teaching which meets the needs of innovation ability cultivation. This paper, based on the development status of undergraduate scientific research tutor system, which has been implemented for eight years in biotechnology and biopharmaceutical specialty of Weifang Medical College, expounds that it is imperative to improve the thinking, self-study and innovation ability of Undergraduates in scientific research and cultivate innovative talents with high-level application.

Keywords

Undergraduate; Scientific research tutor system; Innovation ability.

1. INTRODUCTION

Biotechnology is one of the fastest developing fields of high and new technology in the world, especially in the field of medicine and medicine. Developed countries in Europe and the United States are willing to spend a lot of money on life science research, and strive to gain an advantage in economic and social development. The cultivation of high-end innovative talents in biology is the key factor to determine this advantage. In addition, biotechnology plays an important role in solving the problems of environmental pollution, aging population and resource shortage caused by population growth, providing high-quality and most advanced pharmaceutical products and innovative drugs, developing new generation vaccines and biopharmaceutical drugs, and improving life expectancy and quality of life. The cultivation of College Students' scientific and technological innovation ability is the objective requirement of comprehensively promoting quality education. The outline of national medium and long term education reform and development plan puts forward the requirement of "supporting students to participate in scientific research and strengthening practice teaching". "Promoting the interaction between scientific research and teaching, combining with the cultivation of innovative talents" and "cultivating top-notch innovative talents" are also the top priority. China's Higher Education Law stipulates that "undergraduate education should enable students to systematically master the basic theoretical knowledge, basic skills, methods and relevant knowledge necessary for their own discipline and specialty, and have the ability to engage in

practical work and practice of their own specialty Preliminary ability of research work. " It can be seen that the state attaches great importance to the cultivation of Undergraduates' basic scientific research ability, and the cultivation of innovative talents in biotechnology is imminent. So, how to help undergraduates establish scientific research thinking, improve innovation ability, and complete scientific research tasks? It is very important to guide professional tutors, perfect research tutor system, good research environment and academic atmosphere [1].

The junior undergraduates majoring in Biology (Biotechnology, biopharmaceutical, Bioengineering) of Weifang Medical College first selected teachers and students according to the actual situation through two-way selection. After examination and internship, they entered the tutor's research group and participated in the tutor's sub topics. After having a certain theoretical and technical foundation, they chose the direction of interest and guided the students In accordance with the teaching method of inspiration discussion participation inquiry, and the educational philosophy of "student-centered" and "teaching students in accordance with their aptitude", teachers guide students to discover, discuss and solve problems, and cultivate their innovative thinking and innovative ability. In the whole process, the tutor's leading role has changed into the role of participating in the guidance, and the students have become the main body of learning. With the continuous development of the reform, the "four in one" undergraduate tutorial system of "tutor led, Department assisted, Graduate assisted, senior undergraduate participation" has been gradually constructed, and has achieved phased results [2].

2. THE CURRENT SITUATION AND DEFICIENCY OF THE CULTIVATION OF COLLEGE STUDENTS

2.1. The Lag of Theoretical Knowledge Is Not Enough to Support the Cultivation of Children's Innovation Ability

The cultivation and improvement of innovative thinking ability in scientific research is the most important task in the cultivation of biological talents. However, the current teaching materials and experimental teaching content lag behind, the separation of scientific research and teaching, and even the lack of experimental practice teaching in some courses. In addition, the emphasis on theoretical learning leads to students' low ability of experimental design and operation, lack of scientific research thinking, low academic interest and innovation Lack of ability.

2.2. Teachers and Students Are Not Clear About the Responsibilities and Obligations of the Tutorial System, and the Understanding Between Teachers and Students Is Not Enough, Which Leads to the Empty Name of Undergraduate Tutorial System

Teachers and students do not fully understand the scientific research tutorial system, the national talent training program does not have a clear goal of scientific research tutorial system and other details, tutors do not have a clear understanding of their own responsibilities and obligations, students can not actively participate in the tutor's topic, the choice of tutors is not carried out by year, usually one time to choose a tutor for four years, which leads to some problems During the whole undergraduate period, children lack the guidance of tutors, which eventually leads to the empty name of undergraduate research tutor system, and the form is greater than the content.

2.3. The Imperfect Assessment Mechanism Seriously Affects the Enthusiasm of Teachers and Students to Participate in the Research

At present, many colleges and universities for biological undergraduate students to participate in the project reward and punishment assessment mechanism is not perfect, the

implementation is not in place, affecting the enthusiasm of teachers and students to participate in scientific research practice. The author thinks that the cultivation of undergraduate talents should not only be based on books and paper examinations, but also the cultivation of hands-on ability and innovation ability is far greater than mechanical indoctrination teaching. At the beginning of implementing undergraduate scientific research tutorial system, some schools clearly put forward the evaluation mechanism of linking students' final scores, awards and scientific research, but they did not actively implement it, which could not arouse enough attention of teachers and students. The tutor system has lost its due function.

2.4. The Hardware Resources of Scientific Research in Most Universities Are Not Enough to Support Practical Teaching

Scientific research tutorial system is a systematic long-term project, which needs the joint efforts of the state, schools and tutors. It also means a lot of human, material and financial investment. With the state's emphasis on undergraduate scientific research in recent years, more and more students enter the laboratory. Life science experiments need a large amount of drugs and consumables, and equipment is expensive. Some schools are protected by instruments. Because of the high price of insurance, the parts are expensive, and the instruments are broken and can not be purchased and repaired in time, the use of some valuable instruments can not be guaranteed, and the hardware facilities are not enough to support the practical teaching.

2.5. The Students Are Too Dependent on the Tutor to Complete the Project Independently

After joining the research group, some students are easy to fall into a misunderstanding. They feel that the academic research guided by the tutor is a new course. The teacher can do whatever he says. He has no independent thinking and just passively accepts that the efficiency of "want me to learn" is naturally lower than that of "I want to learn". He only pursues the requirements to complete the task according to the regulations, not to mention the high-quality completion of the task, and there is no innovative thinking. It's worth mentioning.

3. MEASURES TO SOLVE THE EXISTING PROBLEMS

3.1. Taking the Latest Literature Instead of Traditional Textbooks as the Main Line of Theoretical Learning

Tutors are mostly the first line of teaching and scientific research. On the basis of explaining the basic contents of books, they can give full play to the advantages of the discipline, select the latest scientific research literature as the main line of theoretical learning, enrich the teaching content, let students understand the latest frontier progress, and organize students to listen to academic lectures regularly. It is also a way to broaden their horizons, and diversified learning content can stimulate students' interest. Develop students' interest in learning. Breaking through the boundaries of disciplines, interdisciplinary content, not limited to the field of study, broaden the scope of knowledge is also beneficial to the future development of students.

3.2. The School Defines and Refines the Responsibilities of Teachers, Refines the Steps of Mutual Selection Between Teachers and Students, and Makes Regular Assessment and Mutual Evaluation Between Teachers and Students, and Makes Timely Adjustment

Two way selection: tutors are selected by means of studying achievement, written examination and interview. Students choose suitable tutors and enter the laboratory. The enrolled students join the tutor team and participate in the research assistant projects during the undergraduate period. A few months' internship period is established. Teachers and

students are evaluated and scored regularly Quarterly, and the unsatisfied ones between tutors and students are adjusted appropriately.

3.3. Students' Final Achievements, Awards and Awards Are Linked with Their Scientific Research Achievements and the Scores of Teachers and Students' Mutual Evaluation, and Tutors' Performance and Bonus Are Linked with Students' Scientific Research Achievements

It is a measure to promote the teaching progress that the participation of scientific research experiment is linked with students' awards, tutors' performance and bonus. It is not conducive to the cultivation and selection of personalized talents if the evaluation and scoring of students is only based on the indoctrination of traditional knowledge and the examination, and only based on the results. The cultivation of hands-on ability and independent innovation ability is far greater than the mechanical indoctrination teaching. It is necessary to increase the proportion of students' scientific and research achievements in the final results. The evaluation standard of our college is "written examination results + subjects" The combination of research results and comprehensive quality evaluation results can help students find more development directions.

3.4. Open and Share the Public Experimental Platform, Give More Students Learning Opportunities, Use the Scientific Research Base to Serve Undergraduates, Sign Internship Contracts with Regular Enterprises, and Use the Company's Resources

Practice is the only standard to test the truth. Experiments can help students verify the correctness of theoretical knowledge, and help students to strengthen their understanding and mastery of knowledge. With the implementation of "undergraduate tutorial system", the demand for students to participate in scientific research activities is increasing, and the requirements for experimental equipment are also gradually increasing. The public experimental platform integrates the existing instruments and equipment to improve the efficiency The utilization rate of equipment, let more children really participate in scientific research.

Of course, public laboratories are facing unprecedented difficulties and challenges while bearing the increasing pressure of opening up. In order to ensure the safety of equipment and laboratory personnel, we should establish a strict access mechanism. Before entering, we must pass the training and examination, and only after passing the examination can we enter. For the "Xiaobai" who has just come into contact with the experiment, they need to follow their tutors or senior brothers and sisters for a period of time, and participate in the technical training provided by the experimental center before they can start to operate.

Sign contracts with regular biological companies and provincial and municipal scientific research bases, and send students to study as interns by using company and government resources.

3.5. "Lazy" Tutor Can Teach Fast Attendance Students

The tutor's position has changed from traditional "leading" to "guiding". Helping students solve everything will encourage students' inertia and dependence. The tutor should be "lazy" in a timely manner, return the initiative of learning to students, assign stage and long-term goals and tasks to students, point out the general direction, let students solve problems independently, and improve students' ability of active thinking and hands-on practice [3-4].

The tutor guides the students through regular group meetings, individual talks and other ways, and also through e-mail, telephone, wechat, QQ and other forms.

In the past five years, Weifang Medical College has achieved remarkable results under the influence of the research tutor system. By gradually guiding students to participate in the

research of the subject, it provides a stage for students to participate in the cultivation of scientific and technological innovation and practical ability, guides students to participate in the innovation and Entrepreneurship training programs and innovation and entrepreneurship competitions of college students. In the "national and school level university students' science and technology innovation and innovation competition, etc., Weifang medical college students have been guided to participate in the research of the subject gradually. The research results show that the students can participate in the The application of new fund project, Shandong University Students Medical Biotechnology competition and challenge cup have gained a lot of achievements. In the first to Fifth College Students' pharmaceutical biotechnology experimental skills competition and biochemical experiment skills competition in Shandong Province, the college has successively won the special prize, first prize, innovation ability award and Speech Competition Award. The college has been awarded the title of excellent organization and excellent presentation skills of the competition. He has won 34 projects of innovation and entrepreneurship training program of the Ministry of education, and won more than 60 awards in the national biological competition, Provincial College Students' medical biotechnology or biochemistry experiment skills competition. More than 70 articles were published by the first author or major participants, with a postgraduate examination rate of more than 40% and employment rate of more than 95%.

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