

Innovation Research on Practical Teaching Mode for Bachelor of Normal Biological Science Based on OBE Concept

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Abstract: Practical teaching is the key link to improve the practical innovation ability of undergraduates, and has become one of the focuses of the future development of colleges and universities. In view of the main problems existing in practical teaching under the current situation, how to effectively improve students' scientific literacy and innovation ability through practical teaching is crucial. Based on this, this article is based on the new concept of OBE teaching of normal undergraduate practical teaching mode innovation research of biological sciences, students' practical innovation ability training as the core, build a biological science undergraduate professional practice teaching mode, and establishes a multi-level practical teaching system and practical training mode of the undergraduate major of biological sciences in normal universities, with the cultivation of students' practical innovation ability as the core, in order to provide theoretical reference for the optimization of relevant teaching activities.

1. Introduction

Innovative research and practical teaching is the key link to improve the practical innovative ability of college students. In order to solve the problems existing in the practical teaching of normal biological science undergraduate majors, strengthen the cultivation of students' practical and innovative ability^[1], we introduce the concept of OBE, with the cultivation of students' practical and innovative ability as the core, and strive to innovate and reform the practical teaching model of undergraduate students in biological science. Outcome Based Education (OBE) is an education concept based on the learning achievements or result^[2], which emphasizes student centered, output oriented, and continuous improvement, with results output reverse to guide professional education curriculum planning and design, promote the students' practical ability, to guide, guide the goal of education in colleges and help improve the quality of college classroom teaching, to meet the needs of talent market^[3]. Therefore, from the perspective of OBE concept, this paper mainly discusses how to innovate the new mode of practical teaching mode of biological science major in colleges and universities, so as to students' scientific literacy and innovation ability can be effectively improved

through practical teaching.

2. The Main Problems in Practical Teaching of Bachelor of Normal Biological Science

2.1 The Training Mode of Practical Teaching System was Single

The practical teaching system has some deficiencies in teaching students in accordance with their aptitude and cultivating students' individuality, and has not considered students' cognitive rules and personalized development^[4]. The practical teaching content lacks comprehensive and designed experiments, which was difficult to exercise students' ability to solve practical scientific problems, and was not conducive to cultivating students' innovative thinking. The design of practical teaching content system was unreasonable, and the practice links such as experiment, curriculum design, professional practice and graduation design were relatively independent and poorly correlated, which makes it difficult to truly improve students' practical ability^[5].

2.2 The Concept of Practical Teaching was Dis-connected from Social Needs

Practical teaching was mainly limited to the verification of basic knowledge. It was not based on the overall development of students, has not to established a practice teaching system independent of theoretical teaching, was divorced from the actual production, unable to improve students' practical innovation ability, and can't meet the social demand for innovative application talents^[6,7].

2.3 The Practice Evaluation System was not Perfect

The practice teaching was lack of interactivity and can't inspire and guide students' creative thinking through examples, which makes students lack the ability to comprehensively use the knowledge they have learned to draw inferences from others and understand by analogy, leading to students' lack of enthusiasm for learning the course, which was not conducive to stimulating students' creativity^[8]. The assessment method of practical teaching was single. Most teachers of normal biological science major regard the experiment report and practice report as the important basis to judge the completion of students' practical teaching, or even as the only evaluation criteria. In fact, it was difficult to reasonably evaluate whether students have reached the expected ability goal in the practice link through this single evaluation method, and it was impossible to make a comprehensive evaluation of students' ability.

3. Building the Practical Teaching System of Normal Biological Science Specialty Based on OBE Concept

3.1 With Innovation and Practical Ability as the Goal, Reverse Design the Practice Curriculum System

According to the needs of cultivating innovative application talents, it set up three levels of practice content, namely "basic type, comprehensive design type and research innovation type", gradually improve students' experimental skills and practical innovation ability, and embodies the educational concept of "students as the main body, teaching students in accordance with their aptitude"^[9]. The basic experiment mainly focuses on course experiment and course design, which mainly inspects students' understanding of the knowledge they have learned, their mastery of scientific experimental methods and basic experimental skills, and plays an important role in cultivating practical innovation ability. Comprehensive design experiment mainly focuses on

professional practice, comprehensive experiment and graduation design to improve students' ability to apply knowledge learned to solve practical problems and comprehensive design ability. The research and innovative experiment focuses on school-enterprise cooperation and science and technology competition projects to cultivate students' ability to apply their knowledge and skills to comprehensive innovation and strengthen their practical innovation ability.

3.2 Students as the Center, Optimize the Methods and Means of Practical Teaching

3.2.1. On Personal Cultivation

We should establish a variety of practical training methods. According to the characteristics of students, we should adopt a variety of training methods such as tutorial, interest group, open laboratory, and competition. We should advocate students self-study combined with teacher guidance. Teachers should guide students to participate in various scientific and technological competitions to improve their practical and innovative abilities.

3.2.2. Practical Teaching Was Closely Combined with Theoretical Teaching

The teaching method of combining theoretical teaching and practical projects enables students to master the methods and skills to implement practical projects, so that students are more welcomed by primary and secondary schools, enterprises and research institutions. At the same time, we should establish cognitive practice before class and perfect practice after class learning mode.

3.2.3. Increase Investment in Infrastructure to Ensure the Orderly Development of Practical Teaching

We will increase efforts to open undergraduate specialized laboratories, scientific research laboratories and large experimental instruments to all undergraduate in the college, so as to ensure the high-quality and efficient implementation of practical teaching. In addition, increase the purchase of experimental equipment, equipment maintenance, and improvement of laboratory hardware facilities^[10]. In the practice of students' innovation and entrepreneurship, the number of verification experiment projects should be gradually reduce, and constantly improve the proportion of experiments such as design and comprehensiveness, so as to achieve the basic guarantee for students' cultivate of their innovation ability.

3.2.4. Establish a Comprehensive Practice Base Combining Production, Education and Research

The college should fully rely on the professional advantages of the biological science to achieve school-school cooperation and school-enterprise integration. It should sign cooperation agreement on the construction of student practice base with a number of primary and secondary schools and enterprises, and arrange students to practice in primary and secondary schools and enterprises for more than three months. Students can get familiar with the real situation of primary and secondary school classrooms, the operation process of enterprises and research institutes, master the basic practice and production technology, and enhance their work awareness by going deep into the classroom and production line of primary and secondary schools.

3.2.5 Strengthen the Construction of Double-Qualified Teachers

On the one hand, the college should actively invite experts from relevant enterprises and research institutes to serve as part-time professors of practical teaching to guide students to conduct practical

teaching. On the other hand, it provides necessary practice opportunities for school teachers, especially young teachers, so that teachers enter the production line to accumulate practical experience. In addition, the dual tutor system is advocated, that is, the campus tutors and enterprise and research institute tutors work together to guide students to complete practical activities.

3.3 With Professional Practice as the Driving Force, Establishing a Diversified Practical Teaching Evaluation System

Based on the OBE education concept and driven by the continuous improvement of talent training quality, the practical teaching evaluation system with evaluation objects, evaluation subjects, evaluation dimensions and evaluation methods was constructed. Establish evaluation methods with learning achievements as the core, introduce other evaluation subjects other than teachers, set evaluation proportion, and evaluate students more scientifically and comprehensively. The status and method of teacher evaluation remain unchanged. The evaluation was still based on attendance, classroom discussion, experiment report and practice report, but the content of the evaluation focuses on ability and takes ability assessment as the goal. The introduction of students' evaluation was the key to multi-dimensional evaluation. Firstly, the introduction of students' self-evaluation. Students' evaluation of their abilities and give quantitative scores; Secondly, the introduction of mutual evaluation between students can not only provide another dimension of evaluation, but also help students get familiar with the practical content and improve their thinking level. In addition, in some practical links, guide primary and secondary schools, enterprises and research institutes to evaluate students' performance as an important reference.

4. Conclusion

Based on exploring the innovative research on the practical teaching mode of teacher training biological science undergraduate majors under the concept of OBE teaching, clarifying the goal of innovation and practical ability, reverse design practical curriculum system, the core of students' practical innovation ability, practical task as a driver, and a three-level practical teaching model supported by the subject-based science and education integration to ensure practical teaching The main position of the students' main position guarantees the main position of students in the practice of practical teaching, and establish a multi-level practical teaching system and practical training method for normal biological science undergraduate majors to improve students' practical and innovative ability and comprehensive literacy.

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References

- [1] Zhang Ying, Sun Ran. *The path exploration of OBE concept into college student education management*. *Teacher*, 2022, (08): 12-14.
- [2] Zhao Ge. *Exploration and practice of chemistry experiment teaching based on OBE concept*. *Chemical Design Newsletter*, 2022, 48 (08): 134-136.
- [3] Liang Le. *Research on strategies for improving college Students' autonomous learning ability based on OBE concept*. *Technology Wind*, 2022, (03): 28-30+52.
- [4] Liu Haibin. *Project teaching reform of college students' innovation and entrepreneurship course based on OBE teaching concept*. *Science & Technology Economy Market*, 2021, (08): 151-152.
- [5] Li Zhen, Sun Qing. *Construction and practice of innovative and entrepreneurial talents cultivation system for*

- pharmaceutical engineering specialty based on OBE idea. Guangdong chemical, 2021, 48 (18): 238+261.*
- [6] Xiong Pingsheng, Wang Peng. *Study on geographical science specialty practical teaching system based on ideas of OBE in local colleges. Journal of Science of Teachers' College and University, 2021, 41 (10): 108-110.*
- [7] Huang Wei. *Innovation Mode and Reform Strategy of Practice Teaching for Law Undergraduate. Journal of HUBEI Open Vocational College, 2021, 34 (19):1-2+14.*
- [8] Liu Jia, Jia Nan. *The Influence Mechanisms of the Practical Teaching Effect among College Students Majoring in Tourism Management. Review of Higher Education, 2019 (02): 37-47+2.*
- [9] Ren Tingyan. *OBE-guided reform of practical teaching for Python course of information management specialty. Computer generation, 2021 (08): 98-100+104.*
- [10] Fu Kun, Liu Xuejun, Wang Wenquan. *An Exploration of Performance Management on University Practice Education. Research and exploration in laboratory, 2018, 37 (04): 210-213.*