

Discuss the Experimental Teaching Model and Method of Biochemistry and Molecular Biology

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Abstract

There are many questions exist in the current experimental teaching of Biochemistry and Molecular Biology, the limits of experimental settings and equipment, as well as the predictability of results and other factors directly affect the effectiveness of experimental teaching. For the deficiencies of the current experimental teaching, we make a systematic analysis about the teaching idea, teaching methods, laboratory equipment and assessment methods, and put forward some specific recommendations of Biochemistry and Molecular Biology experimental teaching reform, in order to effectively improve the quality of teaching.

Keywords: Biochemistry and Molecular Biology, experimental teaching, teaching innovation, teaching reform

1. Introduction

Training students' practical capacity and innovative ability is the goal of the Biochemistry and Molecular Biology experimental teaching. In the bio-technology personal training system, we should place the theoretical teaching and experimental teaching into an equal important position. Starting from the overall personal culture system, with capacity-building as the core, according to the principle of emphasize foundation, strong practice, multi-level and innovation, we aim to build three-level experimental teaching system: the bio-technology basic experiment, comprehensive and innovative experiment, and combined with applied experiment. For engineering and biotechnology academy, participating in experimental researches is necessary to increase "understanding, confidence and awareness" for students, and stimulate their interest and enthusiasm for science, and make them "think and work more like a scientist"[1-4].

While, comprehensive understanding and grasping the professional course of Biochemistry and Molecular Biology is much more required for the experimental teaching. Experimental teaching of Biochemistry and Molecular Biology has become an indispensable part of this professional course teaching system. Basic experiments of Biochemistry and Molecular Biology being opened to students of related majors not only gives students a preliminary concept of molecular biology techniques, but also could stimulate students' interest in learning and knowledge in the future desire to explore.

The present status of Biochemistry and Molecular Biology experimental teaching is not optimistic, basically follow the past patterns of traditional teaching, which is "teachers demonstrate-students follows-experimental reports writing", and experimental settings are not systematic and applied. The aforementioned teaching model is common, which not only confines to the students' experimental thinking and initiative, and the limitations of the experimental material, facilities and purposes also have

been far behind the rapid development speed of biology techniques. Based on the experience in Biochemistry and Molecular Biology experimental teaching, in order to improve the teaching quality and effectiveness and train students' comprehensive capacity, innovative and comprehensive practical ability, we explore the experimental teaching model and methods that adapted to the development of modernization.

2. Discuss the model and methods of Biochemistry and Molecular Biology experimental teaching

2.1 Energetically carrying out innovative practices

In order to better train students' innovative ability, experimental centers or laboratory schools should regularly carry out "Biochemistry and Molecular Biology experimental innovative design" contest, enable students to design experimental projects from everyday practical applications, organize innovative group in students of different major, and guide students to participate in innovative activities, establish tutorial system, carry out various types of innovative activities combined with college students' innovative training program at all levels. In the economic affordable range of school, schools should improve environment of experimental centers and teaching conditions, introduce modern advanced experimental techniques and equipment into experimental teaching, which not only makes students access to the basic experimental techniques, but also enables students to learn and master advanced experimental methods, laboratory method and laboratory equipment, and further develop the students' innovative capacity.

By adjusting and integrating experimental curriculum, experimental teaching should divide all of experimental projects into three categories: verified experiments (including demonstrate experiments), integrated experiments and innovative experiments, and the innovative experiments strives students to design and complete all the experiments from the learned curriculum, enables students to improve the ability of comprehensive utilization of the learned knowledge.

2.2 Integrated innovative experimental projects combined experimental teaching and practical application

According to the characteristics of Biochemistry and Molecular Biology discipline, experimental teaching should be closely combined with practical applications, and solved scientific problems by experimental methods. In the process of experimental teaching, provide various means that combined scientific researches and practice for students:

1) Refine and set up an integrated, systematic design experiment from research projects and practical applications;

2) Understand the significance of disciplines from the process of solving practical problems, such as cooperate with hospitals and medical inspection institutions, and guide student develop experiments and detection methods with strong application and simplicity.

Through combining teaching and practice, continuously improve and update experimental projects to form a more systematic and integrated innovative projects, and enable students become scientific research or applied talent as soon as possible.

2.3 Experimental teaching opening-up

In order to make full use of students' spare time and interests in experiments, school should full-scalely operate opening experimental teaching, carry out the interested personnel training system which is followed "combination of curriculum and extra-curriculum, excellent students

and excellent training", open the lab to students, and let students responsible for the experiment, enable time and place liberalization, so students have enough time to develop experimental interests. Moreover, Biochemistry and Molecular Biology experiments should be carried out not only in the laboratory, but also out of the lab. The teacher provides off-campus practice platform, where students can take initiative to find experimental projects in the practical applications, and conduct experiments.

2.4 Experimental means diversification

Experimental means diversification refers to not only use oral presentation and demonstration of teachers, but also should make more use of modern multimedia teaching methods, such as video, simulation experiments. During the teaching process of using multimedia, the teacher should describe experimental procedures in detail to enable students to deeply understand the meaning of each operation, do not rush students to imitate after interpretation, but operate activities of instruments-awareness: dividing the team, adopting the assessment between teams to deeply familiar with the structure of laboratory instruments. Only fully familiar with laboratory equipment can the student easily operate each experiment. Teachers should make full use of video, and arrange different recording tasks for each group, enable each group responsible for an experimental project video acquisition and making. Students explain and demonstrate the video in front of everyone, which can not only deepen the understanding of the professional knowledge, but also mobilize the interest of students. Excellent test videos should be put on the Internet, so students can easily access to video information, and complete experimental projects independently.

2.5 Evaluation methods totalization

Evaluation methods of experimental courses should not be solely based on the quality of experimental reports, but also comprised with the usual performance, experimental operation, data processing and test reports, and the practical ability. The ability of analyzing and solving problems should be put in an important position, teachers should appropriately give bonus points for the innovative experimental projects, and announce score standard to the student. If experimental operations and data processing have problems, students should be given the opportunity to change, solve the problem in given time should not be penalized. Finally aggregate the scores to give students the final test result.

3. Conclusions

Biochemistry and Molecular Biology experimental teaching is an important part of biology teaching discipline. With continuous developing of the discipline, how to improve practical capacity of students and explore students' innovative ability have become roadblocks which hinder the development of the subject. Continuing reform and innovation through Biochemistry and Molecular Biology experiment teaching, not only gives a relaxed experimental environment for the student, making full use of their spare time and resources also improves students' enthusiasm for experiments, cultivates students' innovation, stimulates students' curiosity. Experimental teaching should be focused on the combination of theoretical and practical applications, on the basis of enhancing students' proficiency of the experimental operation, developing students' ability to solve practical problems, and fundamentally improving the quality and effect of Biochemistry and Molecular Biology experimental teaching.

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