

Problems and Countermeasures in Biochemistry Teaching¹

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Abstract: Biochemistry is the most important basic course for biology majors and plays an important role in the teaching of life science majors. However, because of its many teaching contents, fragmented knowledge points, abstract teaching contents, strong systematism and logicity of knowledge, and the rapid development of disciplines, new theories and new methods are emerging, which is difficult for students who are new to Biochemistry. Based on practical teaching experience, the author puts forward some solutions to the common problems in Biochemistry.

Keywords: Biochemistry; Common problem; Countermeasure

1. Introduction

The 21st century is the century of life science. Biochemistry is a subject that takes life phenomena in nature as its research object. It is one of the basic courses for the study of life science. It has received widespread attention at home and abroad. Many famous universities have listed it as a compulsory and important course for arts and sciences. Biochemistry, as the core basis for the study of life science, mainly studies the chemical nature of organisms and the chemical change rules in the process of life activities at the molecular level. However, there are some problems in the classroom teaching of biochemistry in our school, which seriously affect the teaching effect of this course. In order to improve the teaching effect of biochemistry, we have carried out reform and practice aiming at the problems existing in classroom teaching and experimental teaching. Now we introduce them as follows.

2. Problems in biochemistry teaching in China

In recent years, the demand for biochemical talents is also increasing with the continuous development of biotechnology. In order to adapt to the change of talent demand, since 2006, although the Ministry of Education has also been reforming the biochemistry curriculum at the undergraduate level^[1]. But in general, there are still many problems to be solved.

2.1 Traditional teaching concept is deeply rooted

At present, the traditional teaching concept still occupies a dominant position, resulting in a single teaching form that emphasizes standardization and knowledge inculcation, rather than innovation and practice. In the teaching process of "biochemistry", because the principle is difficult to understand, if the traditional teaching method is used, students will feel boring, and it is difficult to achieve the desired effect^[2]. The teaching method under the traditional teaching concept neglects the existence of students as the teaching subject, which leads to weak participation of students, excessive dependence on teachers, loss of independent thinking and innovation ability, and reduced students' interest in learning^[3].

¹ **Fund projects:** 2019-2021"Biotechnology teaching team of Guangdong Ocean University school-level teaching reform project", Guangdong Provincial Department of Education (570219073)

2.2 Single teaching form focusing on "teaching"

"Biochemistry" teaching mostly adopts group and one-way teaching based on "teaching", pays attention to the initiative and authority of teachers, and neglects the role of students as the main body and the cultivation of innovative thinking^[4]. Teachers' teaching is limited by time and space, which is not conducive to teaching students in accordance with their aptitude. It is difficult to enable students to systematically master all the basic theories in the course within the limited class hours^[5]. Therefore, the students' fear of difficulties and boredom become more and more obvious, and the learning efficiency shows a downward trend.

2.3 Obsolete experimental contents and few types

As an important part of the teaching process of "biochemistry", experimental teaching aims to help students better understand the knowledge they have learned, help cultivate students' ability to use their brains, eyes and hands, and is of great significance to tap students' potential^[6]. In the process of experimental teaching, teachers guide students to observe, analyze and think about the experiment through experimental operation and demonstration. However, there are many problems in the traditional "biochemistry" experiment teaching. Among them, the main problem is that the content of the experiment is outdated, there are many classical experiments, and there are few comprehensive experiments and experiments reflecting new technologies in the field of "biochemistry"; most of the confirmatory or training experiments are of little type^[6].

2.4 Single course assessment method

For a long time, the common method of course assessment is still examination. Most universities still adopt the closed-book examination method of teachers' questions and students' answers. Teachers are active and free, while students are completely passive. At present, the assessment of "biochemistry" course mainly includes two parts: theoretical assessment and experimental assessment^[7]. The theoretical assessment is mainly based on the final examination, and the experimental assessment is mainly based on the experimental report. This assessment method is too simple, lacks scientificity and rationality, can not truly and effectively reflect the students' mastery of the knowledge learned in the curriculum, and the cultivation of students' innovation ability is not comprehensive.

3. Ways to Improve Teaching Quality

3.1 Improve the teaching mode of biochemistry course in combination with the international frontier

Under the background of "double first-class" construction, the role of biochemistry is becoming more and more important. Among biological science majors, biology, food science and engineering and bioengineering are the three most popular majors in the world. However, the biochemistry course is characterized by strong systematicness, high requirements for experimental instruments and equipment, and dull and difficult theoretical knowledge^[7]. Moreover, the teaching difficulty of its related courses is relatively high, which puts forward higher requirements for students' comprehensive ability.

3.2 Prepare lessons carefully and lay a good foundation for classroom teaching

"Everything is prepared before it is done, and nothing is done before it is done." Only by making good preparations before class can we better complete the teaching task.

3.2.1 Prepare teaching resources

Textbooks are the main resources for teaching and learning. Familiarity with textbooks is the primary and basic requirement for preparing lessons.

On this basis, the teacher should read the textbook according to the actual situation of the students, consider how the students understand, what questions they will ask, and how the teacher can answer them, and then collect reference materials in combination with the teaching objectives to enrich the teaching content and avoid simple repetition with the textbook content^[1]. Pay attention to the relevance of content and knowledge points when collecting reference materials.

3.2.2 Preparation

Know your enemy and know yourself, and you will win every battle. The object of teaching is students, and teachers must do a good job of learning situation analysis to ensure the quality of classroom teaching. Learning situation analysis is an important part of lesson preparation, and is the concrete implementation of the student-centered and individualized teaching concept^[2].

3.2.3 Prepare instructional design

Teaching design is the process of determining the appropriate teaching starting point and end point according to the teaching objects and teaching objectives, arranging the teaching elements orderly and optimally, and forming the teaching plan. Dif-

ferent teachers will have different teaching effects under the same teaching content. Therefore, in order to have a good class, we must understand the teaching content, objectives, key and difficult points, blackboard design, the law, the time distribution of each stage, and the transition from beginning to end are carefully designed, which is also the embodiment and forging cultivate teachers' innovative thinking. In teaching, we should pay attention to selecting fresh and flexible new topics and new materials, paying attention to society and living reality, creating new scenarios, stimulating students' interest in learning, and cultivating innovative spirit^{[1][4]}.

3.3 Emphasis on questioning skills and teaching methods

3.3.1 Enhance questioning skills and improve heuristic teaching effect

The teaching method is tactics, and the richness and flexibility of tactics are directly related to the teaching effect^[6]. For biochemistry, heuristic teaching is a particularly important teaching method, and questioning is an important means of heuristic teaching. However, we must pay attention to the skills of questioning, including whether the time of questioning is before or after the content, whether the way of questioning is open or closed, whether it is a single question or a series of follow-up questions, whether it is to take a student to answer or a group to answer, whether it is to ask to answer now or later, and so on. We should firmly hold the attention of students with unexpected questions, and lay a good foundation for the development of follow-up content.

3.3.2 Pay attention to the teaching of learning methods and enhance students' self-learning ability

Teaching people to fish is better than teaching people to fish. Teachers should attach great importance to the teaching of learning methods. In the teaching process, teachers play a leading role, and students are the main body of learning. No matter how detailed and comprehensive the teacher is in the classroom, it cannot replace the students' autonomous learning. Mastering effective learning skills and memory methods is extremely important to improve the efficiency of students' preview and review and increase their interest in learning. In teaching, we should face all students, pay attention to the differences in thinking between groups and individuals from different angles, guide students to change from passive to active learners, advocate students to actively participate in the communication between teachers and students, and equal dialogue, change from "teaching method" to "learning method", so that students can truly "learn". In addition, it is also very practical to use the method of rhyme and homophonic memory, which is introduced in many articles and will not be repeated here^[3]. As long as teachers continue to study, learn, summarize, and comprehensively use various effective teaching methods, they will change the difficult teaching and learning situation of biochemistry, greatly improve the teaching quality, and complete the teaching goals of the subject^[6].

4. Summary

Biochemistry, as a basic theoretical textbook for biology, food and medical colleges, has many contents, many knowledge points and some contents are difficult. By actively finding out the problems existing in the students' learning process, and by changing the assessment methods, introducing foreign teaching concepts, etc. from various angles, students can maintain their attention on the study of biochemistry, improve their interest, and change the previous exam-taking phenomenon. Through various information-based teaching methods, students can greatly enrich the resources of learning biochemistry and better play their potential of self-study. All these teaching practices lay the foundation for cultivating a new generation of innovative talents in China.

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