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Reform and exploration on experimental teaching of animal biochemistry under the background of double first-class construction

Wei Hu [1], Xiangfeng Huang [2*], Ye Yang [3*], Hanwen Yuan [4]
[1-4] Yangtze University, Jingzhou, Hubei, China

* Corresponding Author: **Xiangfeng Huang, Ye Yang**

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Abstract
"Double first-class" construction is a key construction project in the field of higher education in China. Taking the experimental teaching of animal biochemistry of aquaculture of Yangtze University as an example, the problems existing in the teaching process were analyzed, and teaching reform from the aspects of teaching content, teaching process and exploring the ideological and political elements were carried out, so as to cultivate students' practical and innovative ability, improve the teaching quality and cultivate high-quality applied talents of aquaculture specialty.

Keywords: "Double First - Class" construction, biochemistry experiment, teaching reform

Introduction

"Double first-class" construction refers to the construction of world-class universities and first-class disciplines. It was proposed by the state council of the people's republic of china in the overall plan for comprehensively promoting the construction of world-class universities and first-class disciplines in 2015 [1]. It is also another national key construction project in the field of higher education in China after the "211 Project" and "985 Project" [2]. The construction of "double first-class" aims to realize the connotative development of China's higher education and cultivate outstanding top-notch talents with innovative ability, and enhance the core competitiveness of China's higher education in the new era[3]. How to achieve "double first-class" construction? In the final analysis, it should cultivate first-class talents. First class undergraduate education is an important way to achieve the goal of first-class talent training [4]. And it is an important platform for universities to show their own school running quality, serve the society, fulfill their mission and run a characteristics schools. The construction of courses and majors is the starting point and foothold of first-class undergraduate education. Course teaching is the core element of talent training mode and the basic content of higher education. To build a first-class undergraduate and major, it is necessary to do a good job in the teaching of each course. Yangtze University belongs to a local university in Hubei Province. At present, the major of "aquaculture" is listed as the first-class undergraduate construction major in Hubei Province. And animal biochemistry, which is a professional basic course in the talent training plan of aquaculture undergraduates of Yangtze University, plays a vital role in the process of professional talent training. Therefore, doing well in each teaching link of animal biochemistry can not only serve the construction of aquaculture major, but also better promote the realization of the overall goal of the construction of "first-class discipline" in Yangtze University.

Animal biochemistry is a discipline that takes the individual animal as the research object, studies its chemical composition, nutrient metabolism, enzymatic function and genetic information by the relevant theories and methods of chemistry and then elucidates the essence and phenomenon of animal life [5]. And it is a course with a close combination of theory and practice. Animal biochemistry courses include theoretical courses and experimental courses. Comparing with the abstraction of animal biochemistry theoretical knowledge, practical course, belongs to the supplement and expansion of theoretical teaching knowledge, has the advantages of intuition, participation and practicality.

In addition, the practical course can not only train students' basic operating skills, cultivate students' rigorous scientific research literacy and improve their innovative and creative thinking ability, but also cultivate and stimulate students' strong interest in animal biochemistry knowledge. Under the double first-class background, how to effectively connect the experimental teaching of animal biochemistry with the provincial first-class discipline construction of "aquaculture" in our university, achieve the promotion of teaching, to assist teaching by experiments, and better serve the discipline construction has become an important research topic. Therefore, the author rational thinks about some common problems exposed in the teaching process of animal biochemistry experimental course in the talent training program of aquaculture major of Yangtze University, and discusses that how to improve the teaching effect of animal biochemistry experimental course.

2. Current situation and problems of animal biochemistry experimental teaching

The students enrolled in aquaculture major of Yangtze University from two parts: ordinary high school and vocational high school. Compared with ordinary high school students with a certain biological foundation, vocational high school students generally have a weak foundation. And even some vocational high schools do not set up biology-related courses. Students have no biological knowledge background and feel obscure and difficult to understand the theoretical knowledge of animal biochemistry, but in the animal biochemistry experimental course, the enthusiasm, initiative and practical ability of vocational high school students have been significantly improved, and they are full of strong interest in animal biochemistry experimental course. It can be seen that the implementation of practical course is helpful to this kind of students' learning and understanding of theoretical course knowledge to a certain extent. In the present study, we analyses the following problems in the teaching process of animal biochemistry experimental course of aquaculture specialty in Yangtze University.

2.1 The differences in the composition of teaching objects are prominent

The enrollment types of aquaculture major in Yangtze University in recent 5 years was analyzed (Fig.1 and Fig.2). There are differences in the composition of students. The average number of vocational students accounts for 62% of the total number, however, the average number of ordinary students accounts for 38% of the total number (Fig.1). The proportion of vocational undergraduate students in grades 2017 to 2019 has increased year by year, and the proportion of general undergraduate students has decreased year by year, while the proportion of vocational undergraduate students and general undergraduate students in grades 2000 to 2021 have an opposite trend (Fig.2). Although the proportion of vocational students is significantly higher than that of ordinary students in recent five years, the basic knowledge of animal biochemistry of them is weak. Therefore, in view of the phenomenon of the differentiation of teaching objects, we must abide by according to teach students in accordance with their aptitude to form characteristic experimental courses.

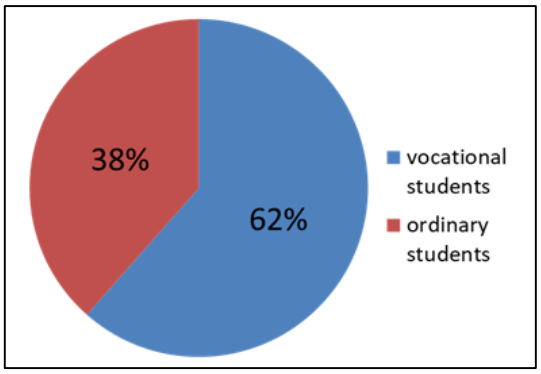

Fig 1: Proportion of vocational students and general students in the total number in recent 5years.

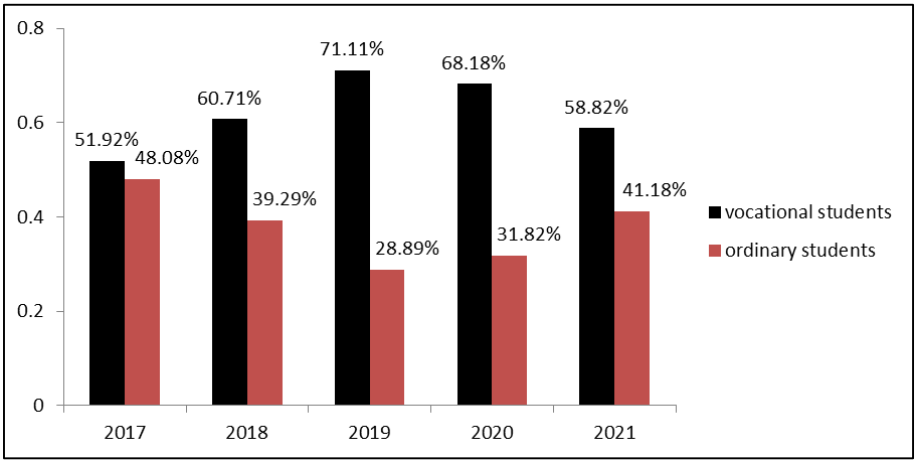

Fig 2: Proportion of vocational and general students in the total number of students per year in recent 5 years.

2.2 The experimental content is outdated, and the experimental credit hours are too few

Animal biochemistry is the basic course of aquaculture major of Yangtze University. At present, the experimental course is slowly updated and outdated. And students' access to the latest research progress in animal biochemistry is not timely. In animal biochemistry experimental course, the majority of confirmatory experiments are set up, while the proportion of innovative, design and comprehensive experiments is less. In addition, the total class time of animal biochemistry in aquaculture major is 64 credit hours. Due to the limitation of total credit hours, the experimental credit hours of this course were compressed to 20, and the credit hours of school hours were too few. Many experiments such as gel filtration

chromatography, protein separation and enzymatic kinetic properties were not allowed to be set up, and students' understanding of animal biochemistry experiments were seriously inadequate.

2.3. Experimental teaching means and examination methods are single

The teaching of animal biochemistry experimental course is still adopts the traditional "indoctrination" mode (Fig. 3): the experimental assistant prepares experimental animals, experimental drugs and experimental instruments, etc., teacher explains the experimental purpose, principle, operation process and precautions in class, and teacher reviews the students' experimental report after experimental class. In the traditional teaching process, students complete the experiment according "step by step", and the teaching information is unidirectional flow (teacher explain and student listening). Additionally, students' initiative and participation are not strong, and students' passive acceptance, which is not benefit for the cultivation and exercise of their independent thinking and innovation ability. Moreover, in terms of experimental assessment, it still depends on the single index of experimental report for evaluation. Each experiment has a fixed experimental report format (experimental purpose, experimental method, experimental process and experimental results), and the submitted experimental report is "the same" and "almost the same". Collecting, it is not possible to comprehensively assess and evaluate the authenticity of students' grasp of experimental courses depend on a single index.

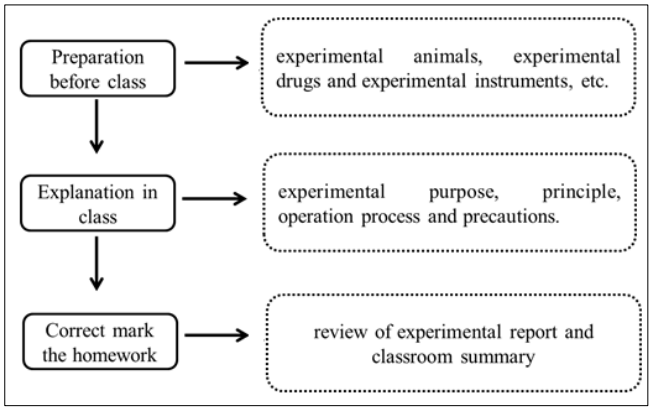

Fig 3: The teaching process of a typical animal biochemistry experimental courses.

2.4. Lack of integration of ideological and political elements in the curriculum

Constructing the general pattern of "whole process education, whole staff education and all-round education" is the ultimate goal of curriculum ideological and political education and the fundamental manifestation of college education in the new era [6]. The spiritual essence of developing curriculum ideological and political education is to practice "building morality and cultivating people", which is also the embodiment of the all-round development of college students' morality, intelligence, physique and beauty. The "practicality" of practical teaching is a powerful way to achieve the ideological and political purpose of the course. In addition to professional theoretical knowledge, animal biochemistry experimental course also needs to cover many ideological and political elements, such as cultivating students' patriotism and cultural self-confidence, professional ethics, legal awareness, innovation awareness and social responsibility [7]. At present, the teaching still focuses on the explanation of theoretical knowledge, and ignores the integration of ideological and political elements related to animal biochemistry experimental course, and it does not provide enough guidance for students' professional ideological and political aspects.

3. Teaching reform of animal biochemistry experimental course

3.1. Optimize teaching content

Combined with the characteristics of students' composition differentiation and the credit hours restriction of animal biochemistry experimental course, formulate appropriate experimental syllabus, keep pace with the times, reasonably increase or decrease verification experiments, and introduce comprehensive and design experiments to continuously optimize the teaching content. In the teaching process, the international cutting-edge trends of the course can be introduced into the teaching links, and special discussions can be carried out to expand the academic vision, fully stimulate students' interest in learning, and improve students' innovative ability and innovative thinking. In addition, according to the different training programs, syllabus and teaching objects, the animal biochemistry experiment teaching materials close to the development of students in this major are dynamically compiled in real time, so as to achieve the purpose of teaching students in accordance with their aptitude.

3.2. Optimize the teaching process

Teaching process is not only the core element of implementing talent training, but also a favorable starting point for realizing the construction of "double first-class". The construction of a first-class university is student-centered, and both teachers and students participate in the whole teaching process. Based on the normalization of the current epidemic situation, this experimental course can be carried out in a mixed mode of online and offline; Make full use of internet and information technology to build a virtual simulation experiment of animal biochemistry; "flipped classroom" experimental teaching to stimulate students' subjective initiative and other curriculum means to carry out diversified "second classroom" teaching. Give correct guidance to the cultivation of students' innovative ability and independent consciousness, so as to comprehensively improve students' comprehensive quality.

3.3. Change the assessment method

Breaking the single assessment method of experimental report in the past, and introduction of scientific literacy, practical operation and combination of experimental design assessment elements to execute assess. Scientific literacy is composed of conceptual knowledge such as the purpose and principle of target experiment. Practical operations is made up of the correct use of on-site assessment instruments, reagent preparation, sample collecting, standardized treatment of waste liquid and animal welfare. Experimental design can design diversified experimental methods for existing experiments in groups [3]. After changing the assessment, more emphasis is put on the requirements of practical links, which can comprehensively reflect the

learning effect of students in practical courses, mobilize students' enthusiasm and initiative in practical courses, and then improve the quality of teaching.

3.4. Integrate ideological and political elements

In the construction of professional courses, fully integrating ideological and political elements is a practical and effective means for the construction of "double first-class" disciplines. Taking professional knowledge as the carrier, fully excavate and refine the relevant ideological and political elements in animal biochemistry experimental courses, such as protein denaturation experiment, integrate the deeds of Wu Xian, who is the founder of biochemistry in China, to enhance students' patriotism and cultural confidence; Research and experiment on enzymatic properties, such as solve urban domestic and industrial sewage and factory exhaust by using enzymatic catalytic characteristics, turn waste into treasure, and convey the ecological protection concept of "green water and green mountains are golden mountains and silver mountains"; Nucleic acid separation and extraction experiments, introducing the application of genetic engineering (Chinese scientists transferred human growth hormone gene to fish fertilized egg for the first time) in fish breeding, so as to improve students' professional confidence; Fatty acid beta oxidation is good for cultivating students' innovative consciousness, etc. Helping students establish a correct outlook on world, life and values, and cultivating high-quality applied talents majoring in aquaculture.

4. Conclusion

Implementing the "double first-class" construction, building first-class courses and cultivating first-class talents are not only the foothold of improving the quality of undergraduate teaching, but also the fundamental task of higher education. Animal biochemistry is a course combining theory and practice, and the experimental course is the position of practical teaching. Optimize the content and teaching methods, excavate ideological and political elements in this major, improve the teaching quality of this course, and then realize the goal of comprehensively cultivating high-quality professional talents with innovative thinking and practical ability.

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