

Research on Biochemical Personalized Education based on Applied Education Mode

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Keywords: Application Type, Education Mode, Biochemistry, Personalize Education

Abstract: Majors like food, biological and pharmaceutical, etc. in institution of higher education includes the compulsory foundation course- biochemistry, the new course of “chemistry teaching basic content of science chemistry major and applied chemistry major” edited by the steering ministry committee of science chemistry teaching education has also include biochemistry. Even though biochemical course is only the basic course of biological technology professional, its theory knowledge and skills operation are essential to biotechnology professional. Therefore, the success of biochemistry teaching reform is conducive to the application of biotechnology majors. Moreover, the basic course of biological engineering, food science and engineering and food quality and safety is biological chemistry course, and all three majors teach students the course of biochemistry by adopting education modes of hierarchical education and personalized education, aims to cultivate students' interest in learning, effuse students' thinking, improve students' autonomous learning ability, improve teaching quality and classroom efficiency, so as to cultivate students become applied talents eventually.

1. Introduction

In recent years, high-tech school construction basically leads the development of education for application-oriented undergraduates. With the rapid development of China's economy, advanced mathematics has been widely used in daily life. Therefore, the popularization of education for application-oriented undergraduates can improve the basic quality of people, contribute to the economic development and social stability of China, and cultivate high-quality talents for country.

The main research content of biochemistry is chemical composition and its metabolic rules of life. It uses chemical knowledge theory and research method to reveal the chemical composition, structure distribution and changes of chemical substances in the body during the growth of life. The discipline is not only the basic discipline of life science, but also a frontier discipline, which promotes the progress of food science, medicine, bioengineering technology, fermentation engineering, environmental science and other fields. With the rapid development and wide application of biotechnology in recent years, many universities have included biochemistry courses as platform course.

From teaching reform and practical experience, it is concluded that the key to achieve the goal of improving teaching quality, to co-develop with higher education, and to cultivate students' innovative ability and consciousness is to reform teaching concept, method and course. Therefore, the cultivation mode of application-oriented talents is applied to biochemistry teaching courses to conduct teaching research, cultivate students' innovative ability and consciousness, and train students to become application-oriented undergraduate talents in the end.

2. Start of the Art

With the initiation and development of industrial revolution, capitalist economy has developed

rapidly, and education model has also been changing with it. Capitalist countries like Britain, France, the United States and others promote and develop application-oriented education, so as to provide excellent talents for their economic development and industrial revolution. With the development of society, foreign industrial economy has gradually changed to knowledge economy, and higher education has also changed from elite education to mass education, therefore, their application-oriented education has developed to a mostly perfect one. However, applied education in China is still in its infancy stage. Application-oriented education gradually attracts people's attention, and colleges and universities begin to adopt application-oriented education mode to cultivate talents.

Literature related to application-oriented talent training includes: "curriculum model research and practice of application-oriented talent training" from Li Xingwang; "training standard and models of higher education application-oriented talents" from Teng Yumei; "discuss how to construct application-oriented talent training mode in local undergraduate colleges" from Zhang Jiandong; "creating a new mode of undergraduate application-oriented talent training" from Zhang Rixin; "exploration on the construction of application-oriented talent training mode" from Li Guixia; "research on the mode of training applied innovative talents by combining production, education and research" from Lin Yongbai.

In the research of orientation of applied talents, some representative literatures are listed as follows: "quality requirements and cultivation of undergraduate engineering applied talents" from Zheng Feng; "research on how to cultivate application-oriented talents' objective orientation, knowledge, capacity and quality structure" from Liu Yingchun; "rational thinking on the quality framework of engineering application-oriented undergraduate talents" from Huang Xinhua; "correctly positioning and training application-oriented undergraduate talents to meet the requirements of regional economic development" from Liu Jian; "Discuss the orientation training of application-oriented talents in newly-built undergraduate colleges" from Zhou Guping; "exploration and analysis on education talent training objectives of applied undergraduate course" from Su Kairong and Dai Lijian.

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In addition, relevant literatures on application-oriented education and application-oriented talent cultivation in specific universities are as follows: "a new exploration on application-oriented talent cultivation in colleges and universities" by Jin Guohua and "the road to build an application-oriented university" by Kong Fanmin.

To sum up, scholars believe that there are three advantages to develop application-oriented education in local institutions of higher education: to provide excellent talents for social and economic development and reform, responding to the requirements of higher education classification rules and the scientific and conform to the positioning of accurate and science in institutions of higher education. These three advantages also reveals the internal motivation and basic mechanism of developing application-oriented education model and cultivating application-oriented talents.

Scholars have combined the concept of application-oriented education with the principle of comparison to answer the problems related to application-oriented talent cultivation, but have hardly explored the aspects like the quality of application-oriented talent cultivation based on specific school majors. Scholars believe that relevant problems of application-oriented talent cultivation mode can be solved by optimizing curriculum mode, practice mode and school-

enterprise joint training mode. At present, the research status of applied education is that relatively more theoretical research but less practical research. Therefore, specific universities should be taken as research object to analyze and study relevant problems of application-oriented education in practice.

3. Methodology

3.1. Biochemistry Curriculum Reform Based on Application Education Model

Reorient course. Biochemistry is a difficult subject with many abstract knowledge points, and the connection between different knowledge points is very close. The purpose of biochemistry curriculum reform is to not only impart these trivial, complex and closely related knowledge to students in a simple way, but also enable students to deeply understand and flexibly master biochemistry knowledge, use the same learning methods learned in class to solve practical problems in other disciplines.

According to the requirements of biotechnology courses reform, all courses are optimized and reintegrated in a teaching modular method. The basic module of biotechnology is the key in the whole biochemistry course. Figure 1 is composed of theoretical courses, experimental courses and independent learning sections. The class hours and credits are showed below respectively: 64 class hours and 4.0 credits; 24 class hours, 1.5 credits; 24 hours.

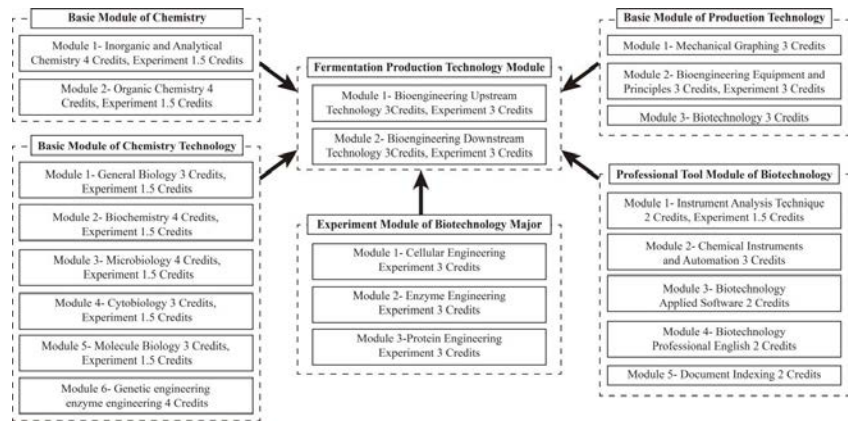


Figure 1 Curriculum setting module of biotechnology major

Revise syllabus. In order to cultivate applied talents of biotechnology, the biochemistry teaching syllabus is revised to divide biochemistry course to three modules: theory, practice and independent learning through optimization and integration, which can stimulate the interest and enthusiasm of students and improve teachers' teaching quality. See figure 2.

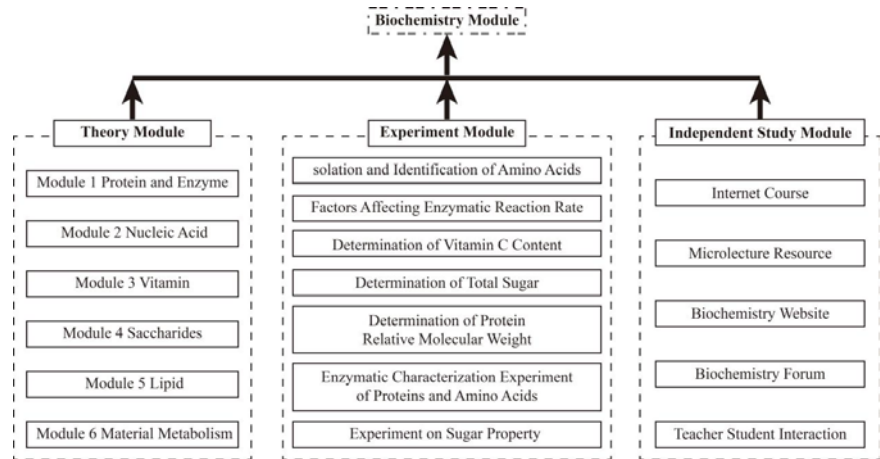


Figure 2 Biochemistry course module

Upgrade teaching methods. It is the process of integrating emerging teaching technology such as

modern multimedia technology and digital network technology with biochemistry classroom teaching.

Multimedia technology is conducive to teaching. Biochemistry has a many abstract knowledge points, which is difficult for students to understand and master. Through multimedia technology, teachers can show pictures to students and play video to present knowledge points more vividly in front of students, which is conducive to students' understanding, memorizing and mastering of knowledge points.

Application of models and teaching aids in biochemistry class. In teaching process, the application of models and teaching aids can make the teaching content easier for students to understand, smother for teachers to teach, which not only helps students to learn easily, but also improves teaching quality and classroom efficiency. Take double helix structure of DNA molecule as example, the picture in the textbook is two-dimensional structure, which make it difficult for students to imagine three-dimensional structure of the double helix of DNA molecule, as well as the formation process and biological significance of DNA molecule in learning process. When teachers use teaching aids, they can show the three-dimensional structure of DNA molecule double helix and demonstrate the formation process of DNA molecule double helix, so as to make abstract knowledge points concrete and facilitate students' understanding and mastery of knowledge.

Use internet resources to promote teaching. Biochemistry is an emerging discipline with fast development, whose theory are upgrading rapidly with time. Teacher can provide students with professional journals and BBS with network to help students to get access to the latest development and status of biochemistry both at home and abroad timely, which can not only broaden students' horizons, but also enrich students' knowledge. In addition, students can learn related professional journals include "Chinese journal of biochemistry and molecular biology", "progress in biochemistry and biophysics", etc. autonomously after class.

Offer help after class. If students cannot understand and digest the teaching content from class, teacher should provide assistance to students after class by traditional method like face-to-face Q&A, or new methods like QQ, WeChat to communicate and answer questions.

3.2. Innovation of Biochemistry Teaching Methods based on Applied Education Model

In the applied education mode of biochemistry teaching, the speed of knowledge update is accelerated as the complex and changeable course content of biochemistry. Therefore, in order to improve teaching effect, the teaching method is innovated from four aspects: case analysis, demonstration teaching, inspiration teaching and discussion teaching.

First, case analysis teaching. Some typical cases are implanted to classroom teaching to help students to improve learning effect by combining cases in the process of learning theory. For example, when students learn about mutations in the primary structure of proteins and molecular diseases, they can use sickle anemia as an implantation case to help them understand that the disease is caused by mutations from normal Glu in position 6 amino acid residue of red blood cells β subunit to Val. Which help student to have deeper understanding of abstract knowledge points with the case study.

Second, demonstration teaching. In order to facilitate students to complete experimental and practical operations, the application of this teaching method in practice will help students to master theoretical knowledge ever better. At the same time, with the help of the demonstration of base staff and teachers, the process and principle are clearer to students. For example, in order to help students successfully complete the experimental operation of protein content, teachers can make a step-by-step demonstration to help students understand the operation, purpose and principle of the experiment.

Third, heuristic teaching. In order to liven the learning atmosphere in class and inspire students' learning and thinking abilities to some extent, some daily life knowledge related to biochemical knowledge can be implanted to cases for better guidance to students. For example, when introducing the case of carbon monoxide poisoning to the blocking agent of electron transport chain in biological oxidation, the theoretical knowledge and practical cases can be fully combined to

inspire students' learning and help students understand the complex oxidation process of biology.

Fourth, discussion teaching. The teaching method is used to guide students to collect relevant materials after class and conduct some discussion and communication in class by combining with teaching contents when students encounter practical problems of biochemistry. For example, when teachers is teaching glycolysis, a chemical problem, they can guide students to have a discussion to stimulate their interest in learning in class, and improve teaching effect by enumerating the phenomenon that athletes eat more chocolate or drink more glucose drink before match. The method is not only good for cultivating students' thinking ability, but also promotes students' ability to learn complex knowledge independently.

3.3. Innovation of Biochemical Assessment Method based on Application Education Mode

Process assessment, namely biochemistry course examination, based on the guiding ideology of valuing more on process, is the process evaluation on examination results of student's final paper. The assessment method of curriculum examination is "N + 2": the number of assessment of a student in the teaching process in stages called "N", and the parameter can be set according to practical teaching; Final exam and study notes are the "2". There are three process assessments set in theoretical module teaching of biochemistry courses, and independent learning content was added to assessment process in an appropriate proportion as bonus point to promote students' independent learning ability. The following is the comparison of theoretical module assessment methods before and after biochemistry courses reform, as shown in table 1.

Table 1 Comparison of Theoretical Modules in Biochemistry Courses Before and After Reform

	Before Reform	After Reform
Attendance and Homework	30%	10%
Learning Notes	0	10%
Process Evaluation	0	30%
Final Examination Results	70%	50%

In the teaching of experiment module, biochemistry course also adopt above assessment method.

Curriculum reform evaluation can guide teachers to carry out teaching activities to promote the reform of classroom teaching mode and effectively improve teaching effect. See table 2.

Table 2 Comparison Before and After Teaching Reform

	Before reform	After reform
Teaching Method	Multimedia Teaching	Multimedia teaching and other teaching methods
Teaching Mode	Traditional Teaching Mode	Modern Teaching Mode
Teaching Pattern	The main part of teaching is teachers' instruction.	Students are the main body of learning, and teachers should guide them appropriately.
Student Status	Students learn passively.	Students learn initiatively.
Students' Ability	Lack of practical ability	Enhance independent learning ability, thinking ability and operational ability.

4. Discussion

4.1 Cultivation Mode of Biochemistry for all based on Applied Education Mode

Based on the characteristics of biochemistry courses, students can use a variety of teaching methods to master the basic principles, basic knowledge and basic concepts of biochemistry courses. In the learning process, not only students' ability to apply the knowledge learned in class to solve

problems, but also reading ability, memory and comprehension will be improved, so as to help students better understand the basic contents of biochemistry on original basis. Schools should stimulate and cultivate students' interest in learning as interest is the best teacher, which is Einstein's famous saying. In the teaching of biochemistry, teachers should inspire students' interest in learning the basic knowledge of biochemistry with the basis of cultivating student's learning interest, so as to help students take the initiative in learning sooner and faster.

It is necessary to pay attention to the cultivation of students' ability and expand their thinking space, especially for biochemistry major students. Teacher should encourage students to use extracurricular information such as various online databases, periodicals of library and biochemistry teaching materials written by other authors as reference, so as to help students understand basic knowledge and know more extracurricular knowledge to expand student's thinking ability.

Students should build a solid knowledge base, master key points and attach importance to difficult points. To help students to build a solid foundation for subsequent course and establish a more solid professional basic knowledge of biochemistry, teachers can teach from three professional basic course in biochemistry teaching. However, the course content is usually involved with complex metabolic pathways and molecular structure, which belongs to the difficult knowledge for students to understand. To solve the problem, teachers can use examples in the teaching process to explain the difficult points in teaching one by one, and then focus on the analysis of key points in teaching, step by step, head first, so as to guide students to understand biochemistry knowledge more easily.

With the principal line of "chemical structure-chemical properties- metabolic rule" as basis, teachers should use static knowledge of biochemistry and analyze structure of biochemical substances to learn chemical properties and then the metabolic change rule, whose method can facilitate students to better master and understand the content and knowledge of biochemistry.

The emphasis of biochemical substance metabolism is protein metabolism, lipid metabolism and sugar metabolism in the teaching content of biochemistry, which is not only the difficult points of biochemistry course, but also key points within it. When explain these contents to students, teacher should follow below order: first, teach students to understand that the biological oxidation in biological metabolism is the main form of energy production of organisms; second, interlude the calculation of producing energy and its step introduction in the introduction of protein metabolism, lipid metabolism, sugar metabolism. Therefore, after learning the calculation of energy gain and loss in sugar metabolism, students can complete the calculation of energy gain and loss in the teaching process of lipid metabolism and protein metabolism, which is convenient for students to construct the concept that an organism is an organic integrity. When teacher introduces the basic knowledge of material metabolism, he will combine energy and material metabolism, material decomposition and anabolism to extend the explanation, mainly explaining catabolism, but including some explanation of anabolism content as well. From above, the teaching process is interwoven with the three metabolic associations, so as to help students to understand mutual relations of a variety of biochemical and various substances reaction.

4.2 Stratified Biochemical Cultivating Mode based on Application Education Mode

Teachers should adopt stratified cultivation method for students with different learning level, and guide them correspondingly. Three aspect including innovation, practice and learning should be cultivated as key points and individualized teaching can help students make progress in learning. In addition, the establishment of hierarchical teaching methods can not only stimulate the enthusiasm of students in learning, but also improve the overall performance of students. Although students in the same class are of the similar age, they have different family backgrounds and different life experiences. Therefore, they have different psychology, world outlook and values. Some students with high self-requirements have clear goals, high learning enthusiasm is looking forward to their future life. For such group of students, teachers need to play their guiding role to broaden students' learning horizons from the perspective of knowledge level, to help them find the skills to obtain knowledge resources, and then to guide them to develop towards a healthy learning direction, which

in the end helps them fulfill their learning goal in university.

For students with certain knowledge foundation, good psychological quality, full of personal characters but lack of clear goal, teachers should play the role of inspiring and provide some learning method in the process of teaching and relevant successful story of previous students to help these students to establish correct three outlooks. By doing which, teacher can guide them to learn from passively to actively, so as to form active learning ability, make corresponding study plan according to their own circumstance and fight for their wonderful life. Students in last layer have good basic knowledge, but their body and mind is not mature yet given the influence of family environment, and their behavior and habits is in the process of establishment. For students like that, teachers should be more strict, regulate their code of conduct from time to time, supervise and urge them to form good behavior habit and help they become useful mature young man to society.

4.3 Personalized Cultivation Mode of Biochemistry based on Application Education Mode

As early as the era of Confucius, the teaching principle of individualized teaching has emerged, which was put forward based on different talents and personalities of students: he believed that different education should be conducted according to different students' strengths and personalities to help them develop towards a better direction. In order to develop each student's creative potential and autonomy, education should take subject knowledge as the basis of teaching and the development of students as the core of teaching. Then, appropriate guidance should be given based on the different needs of students to develop themselves. Based on the knowledge base of students and their future development plan, students should participate in activities including teacher's business plan, professional qualification certificate examination, college students' innovative practice project, open experiment project and scientific research, etc., thus cultivating students' innovation consciousness to realize their dream and goal.

For students with lofty goals, the knowledge of postgraduate students should be introduced, such as the preparation of examination content, the choice of majors and the schools they apply for, and some guidance should be provided to help them realize their dreams. Some students begin to prepare for postgraduate entrance examination in their sophomore year in order to achieve their goal as soon as possible. For students with strong operational ability, teachers should encourage them to participate in college students' practice innovation training program or open experiment, and invite them to participate in teacher's graduation design experiments, scientific research, which not only cultivate students' scientific literacy and rigorous thinking ability, but also cultivate students' question-asking, problem analysis and problem-solving ability by inviting student to participate in practice activity. For students full of entrepreneurial passion, teachers need to guide them from relevant entrepreneurial materials, knowledge and market analysis, especially provide them with free office space in the science and technology park for college students to help them accumulate more entrepreneurial experience, enhance entrepreneurial confidence, and provide them with a shortcut to entrepreneurship.

5. Conclusion

To sum up, from the perspective of cultivating applied talents with the help of biotechnology major, the paper discusses three modules of biochemistry course, and fully prove the reform from five aspects including practice conditions, teaching methods, teaching means, teaching outline and curriculum positioning is effective in perfecting biochemistry teaching evaluation system: meet the needs of transformation, cultivating employment ability and effective learning result of students.

Based on students' personalized development demands, teachers teach based on students' different characteristics and aptitude in teaching process and promote their reading ability, memory and understanding. For different courses and knowledge structure, students should use different learning methods, for example, one study plan for each semester. By using these methods, students can find the suitable learning methods, which can further broaden their learning mentality and improve their learning effects and learning ability. Based on all-round applied education mode, however, there are many content can be explored and discussed. How to choose an effective

teaching method in biochemistry course? No matter what kind of teaching method, the key point is that teachers should be student-oriented, from various aspects arouse student's study enthusiasm, stimulate students' interest in learning based on actual situation, teach them some learning methods to help them grow better and become useful people to society.

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