

Exploration and Practice of the Training Mode of Innovation and Entrepreneur Talents in Bioengineering Specialty

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Abstract: The world today is an extremely competitive world. The competition between countries is ultimately the competition of creativity among nationals. The cultivation of creative talents is a common requirement of this rapidly changing era and society. Therefore, it has become the primary task that colleges and universities should now undertake. In order to cultivate innovative talents in bioengineering, in view of the problems existing in the training of bioengineering professionals, this paper has determined employment-oriented, engineering-based, chemical engineering as the basis, and based on biology, developed a bioengineering professional training program to meet the needs of the society, and proposed a new talent training model based on social needs, student quality and future employment direction. Work hard on the individualization of students and cultivate the needs of different types of bioengineering professionals in different industries in the same industry.

1. Introduction

Bioengineering is an old and young discipline, the professional setting originated in 1998. The fermentation engineering, biochemical, biopharmaceutical and other majors were adjusted to bioengineering. The subject background involves biological theory and technology, combined with chemical engineering, modern engineering techniques such as physics, mechanics, and computers. As an emerging comprehensive and practical profession, it is required to cultivate advanced application talents with certain knowledge, ability and comprehensive quality, which are oriented to production, construction, management and development with sustainable development potential. This paper starts with the bioengineering profession and discusses the way from the variability of classroom teaching mode to the selectivity of experimental teaching mode to the integration of social practice activities and the construction of innovative entrepreneurship system. By promoting the reform of open-ended inter-departmental entrepreneurship classroom teaching, developing different types of experimental teaching in various types of majors, strengthening various benign

interactions between schools and enterprises, schools and entrepreneurial parks, creating a campus entrepreneurial culture atmosphere, and promoting the construction of innovative and entrepreneurial teachers, and then shaping students' sustainable innovation and entrepreneurship, broadening the contact and employment channels of students and society, and forming a customized training model that is tailored to each other and varies from person to person.

2. There is a Problem with the Training Mode of Bioengineering

1) The teaching system pursues one-sided pursuit of “big and complete” and is out of touch with reality. At present, the training mode, teaching system and curriculum of bioengineering in various universities are mostly based on the establishment of bioengineering colleges and universities, and have not been reformed for many years. They lack their own characteristics and cannot be in line with the needs of enterprises.

2) The content of the professional courses has not been optimized and integrated, and the curriculum knowledge is lack of coherence or even repetition. For many years, the bioengineering courses have been taught in the basic courses, professional basic courses, and professional courses. This mode focuses on the gradual progress of teaching, but ignores the convergence of the content of each course, and even causes some knowledge to be repeated.

3) The practical teaching links in the school are weak, students' poor hands-on ability and weak innovation ability can't meet the needs of the society. Due to the limitations of funds, venues, teachers and understanding, the bioengineering profession generally has problems in the practice of teaching in the school and the effect is poor. Most of the practical teaching is a confirmatory experiment, lacking the cultivation of students' practical ability and innovative ability. In the talent market, there is a strong demand for graduate students with good research and innovation capabilities, and fewer job opportunities for undergraduate graduates.

4) There are few off-campus practice bases, and students have no direct contact with the company, resulting in a lack of professional recognition. Many bio-enterprises are mostly reluctant to accept undergraduate interns, taking into account operating costs, personnel management and other factors. Students can't reach the enterprise before they graduate, they are embarrassed about the application prospects of the knowledge they have learned, and their enthusiasm for learning is not high. They even think that there is no future, denying the profession, denying the industry, and denying themselves.

3. The Idea of Reforming the Talent Training Model

The reform of the bioengineering professional talent training mode aims at cultivating high-quality applied technical talents that meet the needs of economic construction and industry development under the new form, focusing on the cultivation of students' engineering application ability and basic innovation ability. In the curriculum setting, the emphasis is on the cross-integration of the three disciplines of chemistry, biology and engineering. The counterpart education in the context of a single discipline is a multi-disciplinary wide-caliber education, which constructs a curriculum system that combines science foundation, engineering characteristics, science and technology, and strengthens the combination of skills training and innovation ability training. In the teaching mode, the emphasis is on the student-centered and teacher-led teaching philosophy, from teaching the predecessors' knowledge to cultivating students' cognitive ability and skill quality, from the one-way knowledge transfer to the two-way teacher-student interaction, the research-based teaching mode that guides students to learn independently. In the ability and quality

training, respect the development of students' personality, adhere to the multi-oriented, classified guidance, focus on cultivating students' engineering application ability, initiative innovation consciousness, courage to explore and continuous entrepreneurial quality. In the teaching organization, from the basic professional skills training, the comprehensive application of theoretical knowledge, the ability of analysis and problem solving and the cultivation of engineering application ability, construct a teaching system that combines teaching and learning, theoretical teaching and practical training, and in-class and extra-curricular teaching to coordinate the development of students' knowledge, ability and quality.

4. Investigation on the Status Quo of Innovation and Entrepreneurship Training Models for Bioengineering Majors

4.1. Purpose of the Survey

The questionnaire survey of the current status of the innovation and entrepreneurship training model for bioengineering majors is mainly centered on the satisfaction of the current training model and the suggestions for the current training model. The result analysis provides relevant information for the innovation and entrepreneurship training model for the bioengineering major. Data basis

4.2. Questionnaire Survey Development Steps

This survey is aimed at the current status of the innovation and entrepreneurship training model for bioengineering majors. In order to reduce the difficulty of carrying out survey activities, this survey is mainly conducted in this city, in order to facilitate the development of survey activities, and to ensure that the survey results have enough data as a Therefore, it is determined that the location of the survey is the bioengineering major of the city's colleges and universities, and 3 colleges and universities with different reputations are randomly selected for the survey. Since this activity is mainly aimed at colleges and universities in this city, the results are not universal, so this The second results cannot explain the status quo of innovation and entrepreneurship training models for bioengineering majors in other regions.

The establishment of the number of questionnaires is the most basic step of the survey activity, because the number of questionnaires is related to the validity of the survey results. If the number of questionnaires is set too low, the results of this survey will be questioned because the base of the data is not large enough, and the results of the survey are not large enough. It is universal. The number of questionnaires is set too high, and the difficulty of the questionnaire survey activity increases. Therefore, the number of questionnaires this time is set to 200 according to the minimum sample size proposed by the experts and the technical conditions of this survey.

The issuance of this questionnaire is mainly divided into two stages. The first is the issuance of the questionnaire, and the second is the recovery of the questionnaire. In order to ensure that the results of this survey have greater authenticity, the recovery of the questionnaire will be completed after the questionnaire is issued. Recovered in the next six days, given time to fill out the questionnaire completely. 189 questionnaires were recovered, and the recovery rate this time was 95%.

4.3. Data Processing

When performing correlation analysis on the collected data, the data must be classified and

sorted. This will not only increase the utilization rate of the data, but also promote cross-data analysis. Therefore, the main consideration is the completeness and accuracy of the data. First of all, about data integrity. When the questionnaire is delivered to the sample subject for completion and collection, some sample items are arbitrarily completed, or their selection cannot be completed, which will cause some data sorting problems, but because the retrieved data accounts for the majority, So deleting the lost data means deleting the lost data. Secondly, the precision and accuracy of the data. When conducting an audit, the main consideration is to check whether these data are inconsistent with other choices, or the principle that conflicts with it should be selectively removed but retained as much as possible.

The main meaning of a correlation relationship in the objective correlation analysis method is to generally refer to a certain relationship between various objective phenomena, but they are not strictly corresponding to each other in quantity. There are two main forms of determining the relevant properties of objective phenomena here: qualitative analysis and quantitative analysis. The main purpose of qualitative analysis is to rely on the scientific theoretical knowledge and practical experience of the researcher to accurately determine whether there are correlations between various objective phenomena. Or what kind of factor, the subjectivity of this analysis method is relatively strong. Among them, the commonly used calculation formula is expressed as:

$$r = \frac{S^2_{xy}}{S_x S_y} = \frac{\sum(x - \bar{x})(y - \bar{y})/n}{\sqrt{\sum(x - \bar{x})^2/n} \sqrt{\sum(y - \bar{y})^2/n}} \tag{1}$$

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}} \tag{2}$$

5. Analysis of Survey Results

5.1. Satisfaction with the Current Training Model

The questionnaire is used to investigate students' satisfaction with the current training model. The results of the survey are shown in Table 1:

Table 1. Satisfaction with the current training model

	A college	B college	C college
Dissatisfied	42%	44%	43%
General	33%	32%	34%
Satisfaction	25%	24%	23%

It can be seen from Figure 1 that the students are not satisfied with the current agricultural innovation and entrepreneurship talent training model. Those who are dissatisfied with it account for more than 42%, and those who think it is average account for about 32%. From this it appears that the reform of the current training model is necessary.



Figure 1. Satisfaction with the current training model

5.2. Suggestions for the Current Training Model

Through the questionnaire survey of students and teachers' suggestions on the reform of the training model, the results of the survey are shown in Table 2:

Table 2. Suggestions for the current training model

	A college	B college	C college
Teaching is determined by post, academic work alternates	45 %	46%	48%
Cooperation effectiveness needs to be improved	36%	33%	32%
Guidance to students in a timely manner	19%	21%	20%

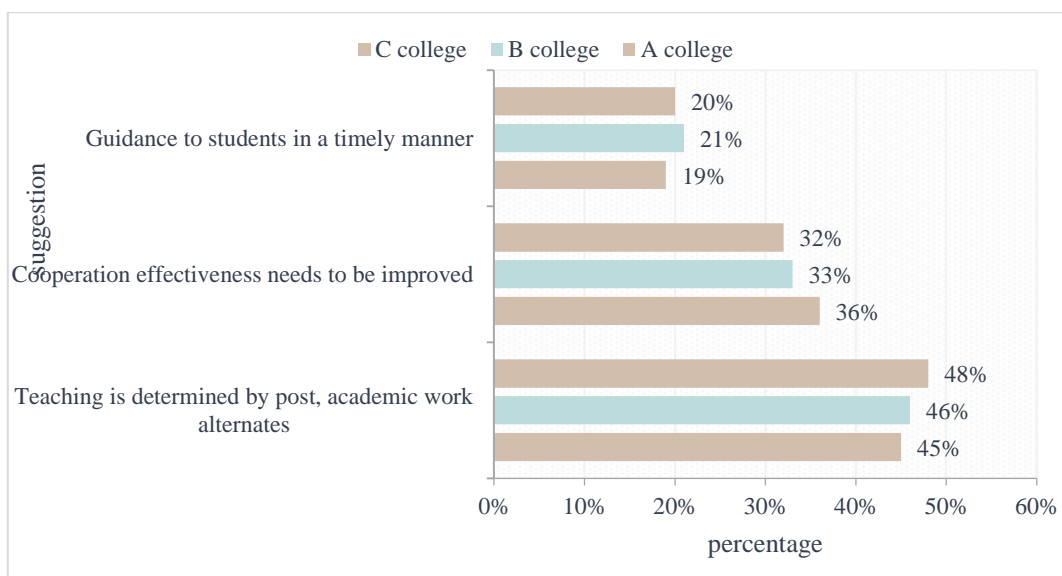


Figure 2. Suggestions for the current training model

It can be seen from Figure 2 that more than 45% of students and teachers in the suggestions given believe that schools should train talents based on the needs of the enterprise, rather than divorce the actual talent needs and emphasize theory rather than practice.

5.3. Consolidate the Basic Theory Course of Pharmacy

Focusing on the concept of “thick foundation and wide caliber”, the pharmaceutical engineering profession combines with the actual production of the enterprise on the basis of the original curriculum group, focusing on strengthening the biology curriculum group (including cell biology, microbiology, biochemistry, microbial genetics and breeding, physiology, molecular biology and other courses) and the basic theoretical courses of pharmacy (including the principles of biopharmaceutical synthesis, pharmacology, medicinal chemistry, natural medicinal chemistry, etc.). On the one hand, it highlights the characteristics of “biopharmaceuticals”, expands the coverage of the basic course teaching content, and increases the cross-cutting of pharmacy courses and engineering courses while updating the knowledge points of basic theory courses in biology and pharmacy. On the other hand, introduce excellent teachers, reform and innovation of the teaching content and teaching methods of the basic theory of pharmacy, optimize the curriculum structure system. By encouraging the teachers of each course group to actively participate in the curriculum reform seminars inside and outside the school, the teaching and research room will hold a class teacher exchange meeting, review the teaching plans from time to time, and urge teachers to revise the syllabus to update and increase the cutting-edge content of the course. It enhances the quality of teaching in each theoretical course group and further consolidates the basic theoretical knowledge of pharmaceutical engineering pharmacy.

5.4. Improve the Practical Teaching Curriculum System

In order to improve the practice and innovation ability of pharmaceutical engineering students, they can adapt to the related work of biomedical enterprises more quickly after graduation. We reform and improve the practical teaching links consisting of three systems: experimental skill training, engineering ability training and innovation ability training. On the basis of consolidating students' mastery of basic experimental principles, experimental methods and experimental skills, we ensure the coordination of theoretical teaching and experimental teaching, and strengthen the cultivation of students' innovative spirit, comprehensive ability, engineering practice ability, scientific research ability and scientific quality. At present, an experimental skill training system consisting of basic experiments, bioengineering process experiments, graduation thesis, vocational skill training, and biological experiment skill competition has been formed; Engineering capability training system consists of engineering course teaching (process drawing, chemical engineering principle, pharmaceutical engineering equipment and workshop design, etc.), course design (chemical engineering course design and pharmaceutical engineering course design), engineering practice (production internship, graduation internship) and graduation design; Innovative ability training system consisting of “Challenge Cup”, “College Student Innovation and Entrepreneurship Training Program” and “Rotation Plan”.

5.5. Actively Explore the Second Classroom Form and Content

Compared with traditional first classroom acceptance learning and training learning, the second classroom focuses on thematic, comprehensive, practical and open content, focusing on the

students' subjectivity, exploration and cooperation. Actively guide students to carry out the second classroom technology innovation activities, focusing on the development and innovation of the functions and content of the second classroom.

(1) Creating an atmosphere of scientific research activities on the theme of scientific and technological innovation activities

Through the holding of scientific and technological works exhibitions, expert forums, postgraduate academic forums, excellent graduation papers and conferences, and viewing of educational material images, the campus science and technology activities will be created to enable students to learn more about academic and technological activities and stimulate interest in scientific research, encourage more students to participate in academic and scientific activities. In combination with the national "Challenge Cup" extracurricular scientific and technological achievements competition, students are provided with material conditions and technical support to achieve independent design and independent innovation, and advocate students to participate in academic activities. Establish an undergraduate research fund to support outstanding students to carry out academic research projects for college students. Teachers will provide training and guidance to project students, expand the number of students participating in research activities, and provide students with working conditions for project development. Continuously increase the opening of laboratories and experimental projects, and expand the level and scope of scientific research in the spare time of students.

(2) Strengthen and improve social practice activities and extend the space and scope of student activities

Establish a fixed social practice base, select teachers with high enthusiasm and strong sense of responsibility to guide social practice activities, allocate special funds to support and reward, and promote the smooth development of theoretical and practical work. Establish student associations such as the Life Science Enthusiasts Association and the Young Volunteers Association to give play to the leading role of the student associations in the second classroom activities. Teachers actively guide the development of student associations, help students to increase their knowledge, broaden their horizons, advocate science, and serve the society, so that the overall quality of students can be comprehensively improved and social competitiveness will be further enhanced.

5.6. Create an Innovative and Entrepreneurial Culture Atmosphere and Strengthen Teacher Training

First of all, we must focus on building a culture of innovation and entrepreneurship in the campus. Only with culture and an atmosphere can we have motivation. It is necessary to intensify the experience of innovation and entrepreneurship education in universities at home and abroad with ingenuity, brainstorming and learning from each other. Universities and relevant departments should vigorously build a campus entrepreneurial ecosystem, truly build a bridge that is conducive to students' innovation and entrepreneurship, and truly become a viable entrepreneurial model of "ideas-selection-operation-link-practice". Colleges and universities should set up a special technology licensing office to provide services for student entrepreneurship, abandon performance-based formalism, face up to existing shortcomings and retreats, and gather existing strengths to continue this talent cultivation model in a solid and sustainable manner.

Secondly, we must develop an effective teacher training program. A strong team of entrepreneurial instructors is a strong intellectual support and guarantee for cultivating innovative and entrepreneurial talents. At present, most college teachers do not have enterprise work

experience, and it is difficult to train innovative and entrepreneurial talents on paper. This requires teachers to continuously improve their ability to update their professional knowledge, integrate with international cutting-edge technology, and improve teaching methods, especially to change the cramming style of education, and open a new interactive training mode. More importantly, it is necessary to strengthen teacher training, regularly send teachers to the company to participate in practical training, enhance their corporate awareness, entrepreneurial awareness and practical ability, and train composite or dual-type instructors. Only in this way can it be possible to give students a sense of identity and a sense of production process, and to convey to students the professional information from the front line of work, in order to be convincing. It is necessary to create and explore talented teachers to become entrepreneurial catalysts, and select a group of trainers with innovative technology research and development capabilities and entrepreneurial experience to provide more targeted entrepreneurial guidance for more high-tech young people in the school, and help innovative technology and angel investment, venture capital and other investors to contact.

6. Summary

This paper expounds the significance of innovation, creation and entrepreneurial talent training in bioengineering. After years of exploration and practice, it still needs to further improve its effectiveness. Innovation and entrepreneurship education is a long-term systematic project. The road to the future still needs one or more generations to work together to contribute to the solid advancement of this work. All local colleges and universities need to combine their own current conditions, be good at using existing foundations and conditions, fully mobilize the enthusiasm of all parties, rely on local advantages and educational resources, improve the quality of students' innovation and entrepreneurship education, and thus achieving the goal of improving students' innovative spirit, entrepreneurial awareness and entrepreneurial ability.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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