

# The reform and practice of biology innovation and entrepreneurship education aiming at improving both ability and quality-- Southwest Forestry University explores the "industry-university-research" collaborative education model

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**Abstract.** "Industry-university-research" collaborative education mode is a kind of personnel training mode that closely combines industry, academia and research. This study aims to explore the reform and practice of biological innovation and entrepreneurship education with the goal of improving both ability and quality, and focuses on the application and effect of "industry-university-research" collaborative education mode. Through in-depth analysis of the current situation and problems of biology education, we aim to put forward targeted reform measures and methods to provide useful reference for the development of biology education.

**Keywords:** "Industry-university-research" collaborative education, Cooperative education, Innovation and entrepreneurship education, Teaching reform, Practical teaching.

## 1 Introduction

### 1.1 Importance of innovation and entrepreneurship education in biology

With the rapid development of the global economy and the continuous progress of science and technology, the development of biology is changing with each passing day, and the demand for innovative talents is also increasing. However, the traditional biology education modes often pay too much attention to the imparts of theoretical knowledge, and lack the training of practice and innovation ability, which makes it difficult for students to adapt to the needs of social development. In order to solve this problem, biology innovation and entrepreneurship education came into being, aiming at cultivating students' innovative consciousness, entrepreneurial thinking, entrepreneurial spirit, entrepreneurial skills and other comprehensive qualities, so as to promote the all-round development of biology

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education. With the development of higher education, industry-university-research cooperation has become an important way to cultivate college talents.

## **1.2 Overview of the collaborative education model of Industry-university-research**

Industry-university-research collaborative innovation refers to the collaborative innovation activities of science and technology development jointly implemented by three basic participants, such as enterprises, universities, research institutes, using corresponding superior resources and skills with the help of government policies, enterprises and other relevant subjects. This model breaks the limitations of the traditional education system, makes education closer to the actual needs, and improves the quality and adaptability of talent training. This mode is also conducive to promoting scientific and technological innovation and industrial development, and provides strong talent support for economic and social development.

## **2 Current situation and problems in the reform and practice of biology innovation and entrepreneurship education**

### **2.1 Current status and challenges of biology education**

In recent decades, the field of biology research has achieved rapid development, and new technologies, new theories and new concepts have emerged one after another. However, due to the limited updating speed of teaching materials, the teaching content can not reflect the latest research results on time. How to stimulate students' interest in learning and let students take the initiative to learn is a major challenge facing biology education. Finally, biology is a highly experimental subject, and experimental teaching is an important part of biology education. However, due to the limitations of experimental equipment, teaching resources and teachers, some universities may not be able to provide enough opportunities for students to experiment. How to use the limited resources to provide effective experimental teaching is a problem worthy of attention.

### **2.2 Current situation and problems of innovation and entrepreneurship education**

With the rapid development of science, technology and knowledge achievements, innovation ability and practical ability have become the core requirements of application-oriented personnel training. Since the government successively promoted and deepened innovation and entrepreneurship education in colleges and universities, universities have improved national competitiveness and eased the employment pressure of college students through the training of innovative talents, and rely on the training of innovative talents to transform knowledge into a driving force for promoting economic and social development. Due to the growing development and deepening of science and technology entrepreneurship education in universities in China, there is more demand for the biology curriculum system. On the basis of learning theoretical knowledge, students are required to improve their entrepreneurial ability and innovative spirit under the leadership of teachers for biology majors.

### **2.3 Practice status and problems of the "industry-university- research" collaborative education model**

"Industry-university- research" mode is an important way to cultivate innovative and entrepreneurial talents and improve the innovation and entrepreneurship education system in colleges and universities. The characteristic of biology education is to regard the combination of industry, university and research as the foundation of education, and to form an effective practical education relationship through cooperation with industry. This method combines the educational theory of the school with the actual production practice of the enterprise, helps the students to improve the level of analyzing and dealing with the practical problems of the enterprise, and also solves the practical problems of some enterprises to a certain extent so to achieve the purpose of both theoretical and practical harvest.

In practice, this model is also faced with some problems and challenges. First of all, the cooperation depth of "industry-university-research" collaborative education mode in practice is not enough. Although all parties have recognized the importance of industry-university-research cooperation, actually cooperation often lacks deep interaction and integration. This may lead to poor cooperation results and difficulty in achieving the expected goals; Secondly, the cooperation mechanism is not perfect enough. An effective cooperation mechanism needs to be established to ensure the smooth progress of cooperation. However, the actual cooperation mechanism is often imperfect and lacks effective communication, coordination and decision-making mechanisms, leading to low efficiency and poor results. Finally, the practical teaching link is weak. Practical teaching can help students understand and apply what they have learned better. But in practice, imperfect facilities and insufficient teachers lead to poor effect of practice teaching.

## **3 Strategies and methods for the reform and practice of biology innovation education**

### **3.1 Curriculum and teaching content optimization**

The content of biology teaching should pay attention to systematicness to ensure the integrity of knowledge structure and the closeness of internal relations. At the same time, we should pay attention to the latest trends and introduce, the latest research results and academic progress in time to broaden students' horizons and stimulate their learning interests. In addition, it should emphasize comprehensiveness, covering the basic knowledge and core concepts in various fields of biology, so as to build a comprehensive knowledge system for students to broad vision and innovative ability.

### **3.2 Innovation of teaching methods and means**

The core of the teaching methods reform is to change from the traditional "teacher-centered" to "student-centered", stimulate the initiative and enthusiasm of learning, and cultivate students' innovative ability. This goal can be achieved better by guiding students to learn independently, carrying out inquiry-based learning and using information technology to assist teaching. At the same time, teachers also need to update their educational concepts and improve their own quality in order to adapt to the new teaching methods and meet the learning needs of students.

### **3.3 Practical teaching and project activities**

In order to cultivate students' innovative thinking in research and development, teachers should guide students to participate in scientific research projects. At the same time, it is suggested that they should incorporate the various topics they are responsible for into the practical teaching so as to stimulate their active spirit of learning, practice and enhance their awareness of innovation.

In terms of practical teaching, biological laboratory resources are used to provide students with practical operation opportunities to cultivate their experimental skills and observation; Secondly, organize students to participate in field trips to understand the actual environment of biodiversity and enhance their practical ability; Finally, cooperate with relevant enterprises to provide internship opportunities for students to understand the needs of the industry and cultivate practical work ability. In terms of project activities, students should be encouraged to participate in the projects to develop innovative thinking and abilities by solving practical problems. Organize students to participate in biology-related innovation and entrepreneurship competitions to stimulate the sense of teamwork.

## **4 Practice and exploration of "industry-university-research" collaborative education model in biology innovation and entrepreneurship education**

### **4.1 Basic concepts and principles of "industry-university-research" collaborative education mode**

Industry-university-research collaborative education should take innovation as the core and promote the deep integration of knowledge, technology and talents. All parties should give full play to their respective strengths, promote the reform and innovation of personnel training models. At the same time, collaborative education should focus on system development and ensure coordination and cooperation among various elements to maximize the overall effect.

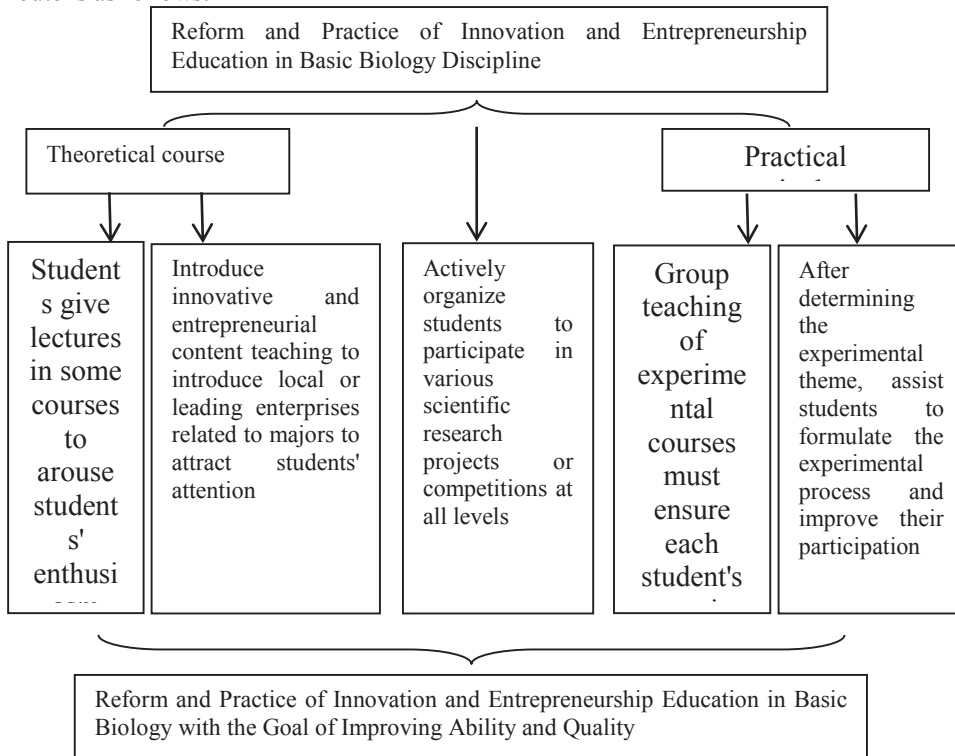
Secondly, this mode should be open and diverse, and involve various subjects, including enterprises, universities, scientific research institutions, governments and industry associations. Exchanges and cooperation between different subjects can bring diversified perspectives and rich resources, which will help improve the effect of collaborative education.

Finally, the government should play a guiding role in the collaborative education of enterprises, universities and research institutes and promote such cooperation through policy formulation and financial support. The role of the market mechanism should be fully brought into play to promote the free flow and optimal allocation of innovation factors such as talent, technology and capital too.

### **4.2 Specific implementation plans and measures for the "industry- university-research" collaborative education model**

"Industry-university-research" collaborative education mode is a talent training mode that closely combines industry, academia and research. Through the implementation of the in-depth cooperation between the industry and the university, the promotion of academic exchanges, the joint development of scientific research projects and the establishment of the evaluation mechanism, it can effectively promote the development of the "industry-university-research" collaborative education mode, cultivate more outstanding talents, and

provide strong support for the social and economic development. The specific technical route is as follows:



**Fig. 1.** The process route of this article.

## 5 Conclusions

The "industry-university-research" collaborative education mode is an innovative education mode, which aims to enhance the ability and quality of students and cultivate high-quality talents to meet the needs of society through close cooperation between industry, academia and research. This model focuses on the combination of practical teaching and scientific research innovation, encourages students to participate in practical projects and scientific research activities, and cultivates their innovative thinking and problem-solving ability.

Through the implementation of "industry-university-research" collaborative education model, students' ability and quality can be improved. Practical teaching and scientific research innovation provide students with rich practical experience and innovation opportunities, and help to cultivate students' practical operation ability and innovative thinking. Personalized education and teamwork focus on students' personal development and the cultivation of teamwork ability to help students better adapt to the needs of society.

In addition, the "industry-university-research" collaborative education model also helps to promote the deep integration of industry, university and research, and promote the organic combination of scientific and technological innovation and talent training. This model can make education closer to actual needs and improve the pertinency and practicability of personnel training.

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