

# Innovation Practice of University Laboratory Construction and Management Mechanism under the Background of Innovation and Entrepreneurship Education

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**Abstract:** Innovation and entrepreneurship education is an innovative and applied talent training method, which has high requirements for university laboratories. However, the current laboratory construction and operation management mechanism in China are mostly inconsistent with this training mode. This paper analyzes the current situation of laboratory construction and management in Chinese universities. Combining the actual conditions in Faculty of Electrical and Information Engineering, Oxbridge College, Kunming University of Science and Technology. Corresponding countermeasures were put forward for laboratory construction and management under the background of innovation and entrepreneurship education. Constructing a laboratory construction and management model oriented by "open sharing, cooperation and exchange, collaborative innovation", and achieved good results in the process of cultivating college students' innovative and entrepreneurial ability.

## 1. Introduction

Innovation and entrepreneurship education is a kind of education and teaching method which pays attention to practical teaching and can cultivate students' pioneering consciousness, innovative spirit and entrepreneurial ability, and stimulate their creativity <sup>[1]</sup>. As an innovative and applied talent cultivation mode, innovation and entrepreneurship education is not only the fundamental demand of the current economic and social structure transformation, but also an important exploration of the comprehensive reform of China's higher education.

University laboratory is the key place for experimental teaching and scientific research, and play an important role in cultivating college students' innovative spirit and entrepreneurial ability. However, at present, many universities in China are affected by many factors such as the concept and system of traditional education, and the laboratory construction and operation management mechanism is inconsistent with the training methods of innovation and entrepreneurship education. Taking college students' innovation and entrepreneurship projects as the carrier, the innovation and entrepreneurship education practice system is constructed to strengthen innovation and entrepreneurship training and enhance innovation and entrepreneurship ability, which undoubtedly poses new challenges to the construction and management of university laboratories. Taking Faculty of Electrical and Information Engineering, Oxbridge College, Kunming University of Science and Technology as an example, this paper expanded the teaching and research level and functional orientation of university laboratory under background of innovation and entrepreneurship education. Exploring and practicing the construction and management mode oriented by "open sharing, cooperation and exchange, collaborative innovation".

## 2. Analysis of the Status Quo of University Laboratory Construction and Management

From the perspective of innovation and entrepreneurship education background, university

laboratory is not only an important base for jointly cultivating innovative talents, but also a good platform for providing technical support for basic innovation and discipline construction by sharing high-quality resources with collaborative innovation subjects [2]. It also plays an important role in the cultivation of students' innovation and entrepreneurship ability. However, there are some problems in the construction and management of laboratories in universities, which restrict the cultivation of innovative and entrepreneurial talents.

(1) Most of the management systems have problems such as unclear division of labor between schools and departments, lack of coordination and poor communication, resulting in unreasonable laboratory construction, inadequate overall management and equipment allocation, and high-quality resources cannot be shared.

(2) Most laboratories are established on the basis of professional courses, which can only meet the experimental and practical needs of some professional courses. It is impossible to carry out interdisciplinary and inter-professional collaborative innovation experiments and interdisciplinary cooperation and exchange.

(3) The laboratory is not open enough, the experimental equipment and resources cannot be fully utilized, and the discipline competition cannot be strongly supported, which is not conducive to the individualized training of students.

(4) Lack of high level, high quality teachers, and the comprehensive ability of guidance teachers is not high, experimental quality and innovation ability is weak, neglecting the cultivation of talents and the introduction of high-quality talents.

(5) It failed to build a high-level comprehensive experimental and training demonstration base with its own school-running characteristics in light of the actual development of the school, and lacks large-scale scientific research and experimental projects with design, comprehensiveness and demonstration.

### **3. Research on University Laboratory Construction under the Background of Innovation and Entrepreneurship Education**

University laboratories should carry out comprehensive planning and reasonable reconstruction on the basis of their hardware facilities to improve the current situation that was not compatible with innovation and entrepreneurship education. The following put forward some countermeasures for university laboratory construction under the background of innovation and entrepreneurship education.

(1) Extensively carry out intra-school, school-enterprise cooperation, and build an interdisciplinary and inter-professional comprehensive experimental teaching platform [3]. Faculty of Electrical and Information Engineering makes full use of the discipline resource advantage of the school sponsor, the practice base and the resource advantage of "double-qualified" teachers of state-owned large enterprises, and extensively carries out diversified cooperation with overseas, provincial, school-enterprise and school-school. Now we have established school-enterprise cooperation with many well-known international and domestic enterprises. For example, Oxbridge College-Cisco Network Technology Institute, Oxbridge College-Huawei Network and Information Technology College and other school-enterprise cooperation colleges, as well as Oxbridge College-STC Joint Laboratory, Oxbridge College-Tektronix Network Laboratory, Tarena Science and Technology Training Base and more than 20 practice and training bases have achieved full professional coverage. Every year, 2200 students were organized to participate in various professional practice and experiments. After many years of pilot operation of Multi-Certificate training, the College has been fully equipped to assist students to obtain vocational skills certification. Some statistics are shown in Table 1.

Table 1. Some Statistics of professional skills and certifications

Certificate name	Network Engineer	Software designer	CCNA/ CCNP	National electrical operation certificate	Information processing technician / Information Office
Number of success	29	20	7/2	423	273/43
Adobe Certificate name	Flash CS3	Photoshop CS3	Illustrator CS3	InDesign CS3	Acrobat 8.0
Number of success	48	118	81	51	51

(2) Combining with the training objectives of innovation and entrepreneurship education, according to the idea of multi-disciplinary integration and collaborative innovation, resources integration was carried out on the basis of the original laboratory, and experimental teaching center and innovative entrepreneurship incubator were established. Therefore, since 2016, Faculty of Electrical and Information Engineering has established an experimental teaching center and an innovation and entrepreneurship office, which is responsible for managing 8 laboratories, 6 studios and 3 activity rooms of the school, realizing the effective integration and full utilization of resources.

(3) Combining the various needs of students of different grades, levels and professions for discipline competition, scientific research, practice, innovation and entrepreneurship, this paper explores and constructs a diversified laboratory open mode driven by innovation and entrepreneurship projects and discipline competition. Therefore, Faculty of Electrical and Information Engineering has introduced the intelligent door lock information management system and established the laboratory open log management system. So as to provide strong guarantee for students to teach students in accordance with their aptitude and self-directed learning, and realize the advantage sharing and effective utilization of laboratory resources. According to the statistics of the last 4 years, a total of 175 awards were awarded to above the municipal level, of which include 4 awards at the international or regional level, 61 awards at the national level, 106 awards at the provincial level and 4 awards at the municipal level. Take part in 45 projects of innovation and entrepreneurship training programs for college students, including 23 projects at the national level and 5 projects at the provincial level.

(4) In order to stimulate college students' innovation consciousness and cultivate their innovation ability, it is necessary to build a high-level teaching staff to meet the needs of innovation and entrepreneurship education practical activities. In view of the relevant curriculum system, scientific research projects, laboratories and innovation and entrepreneurship studios, a number of innovative and entrepreneurship pilot projects with demonstrative benefits will be constructed, which will play a leading role in the development of innovation and entrepreneurship education. Based on this, Faculty of Electrical and Information Engineering under the support of the "Innovation and Entrepreneurship Education Reform Pilot Academy (Department) Project of Undergraduate Higher Education Institutions in Yunnan Province", with innovation activities driving the development of entrepreneurial employment as the core content, and the cooperation between teachers and students under the guidance of key teachers as the learning method. With the project research and application, participation in various competitions and innovative entrepreneurial activities as the carrier of practice, the high-quality training of innovative and entrepreneurial practical talents was carried out.

#### **4. The Construction of University Laboratory Management Mechanism under the Background of Innovation and Entrepreneurship Education**

On the basis of reasonable construction of the laboratory, a sound operation management mechanism should also be provided to realize the open sharing and maximum utilization of all laboratory resources. The following Suggestions are put forward for the operation and management of the laboratory.

(1) Establish the development concept of complementary advantages and resource sharing. Based on the advantages of the college's electrical information disciplines and the school-running characteristics of the Pioneering Institute for Innovation and Entrepreneurship Education, a sound

cooperation and sharing model is established.

(2) According to the allocation and use of laboratory resources, the authority of all kinds of personnel and interest subjects was defined [2]. The Academy has signed the Agreement on the Responsibility for the Objectives of Laboratory Construction and Management with the relevant personnel, which achieved effective measures, complete records, evidence-based evaluation, rewards and punishments in place, and laid a good foundation for laboratory operation management under the background of innovation and entrepreneurship education.

(3) Build a refined and flexible laboratory operation management system. According to the use of the laboratory, the college has established a resource information platform to achieve refined management of laboratory resources and equipment. At the same time, combined with the cultural background and subject characteristics of the laboratory, the flexible management mode of co-management and sharing of "laboratory Director + academic leader + experimenter + student" has been formed.

(4) In accordance with the principle of mutual benefit and common development, a sound and reasonable benefit distribution and coordination mechanism was established. The College has established a scientific comprehensive evaluation method and risk compensation standard, and incorporated the construction, use and operation management of the laboratory into the annual performance appraisal, so as to drive the healthy and orderly development of the laboratory with incentive measures. The laboratory comprehensive performance evaluation index system is shown in Figure 1.

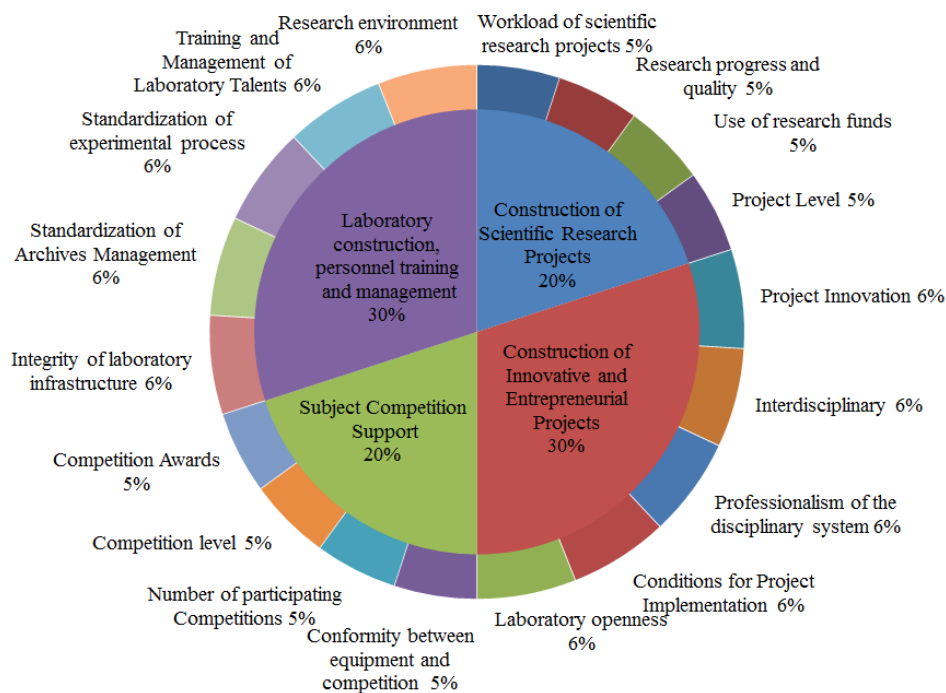


Fig. 1. The laboratory comprehensive performance evaluation index system

## 5. Summary

The construction of university laboratory and its management mechanism under the background of innovation and entrepreneurship education is a systematic project, which requires overall planning, linkage, and cooperation between teachers and students. Only by establishing reasonable laboratory infrastructure, perfect resource information sharing platform and supporting operation and management mechanism can laboratory resources be maximized. Create a good environment for the smooth implementation of innovation and entrepreneurship education, so as to improve the innovation and entrepreneurship ability of college students.

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