

# Research on the Cultivation of Innovation and Entrepreneurship Ability Based on the Laboratory of Chemistry and Chemical Engineering

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**Abstract:** To enhance the ability of innovation and entrepreneurship of college students majoring in chemistry and chemical engineering and cultivate high-level talents needed for national construction, using "Laboratory of Chemistry and Chemical Engineering" as the second classroom to cultivate students' ability of innovation and entrepreneurship is discussed in this paper. We also analyze the current research status and existing problems, and put forward corresponding strategies and suggestions for cultivating the ability of innovation and entrepreneurship of college students majoring in chemistry and chemical engineering.

**Keywords:** Innovation and entrepreneurship, Second classroom, Laboratory of chemistry and chemical engineering, Cultivating the ability

## 1. Introduction

Today's world is fiercely competitive, and the core of competition lies in innovation. Cultivating the spirit of innovation and practical ability is an important content of the current quality education. Innovation is a comprehensive quality, a state of active development, a burst of potential ability, and in its essence it is the result of the free and all-round development of human beings. The innovation and entrepreneurship ability of college students plays a decisive role in the future development of our nation. The second classroom opened on the platform of "Laboratory of Chemistry and Chemical Engineering" extends the teaching of professional classrooms and provides a steady source of intelligence for the development of professional classroom teaching. As the second classroom, "Laboratory of Chemistry and Chemical Engineering" pays more attention to students' learning autonomy and subjectivity, and attaches great importance to the flexible application of knowledge in classroom learning, which increases the depth and breadth of classroom learning, and enhances students' practical innovation ability. It has improved the comprehensive quality of students majoring in chemistry and chemical engineering.

Chemistry and chemical engineering are experiment-based disciplines, and the cultivation of students' practical ability is an important teaching goal. The basic chemistry experiments in the teaching course content are far from enough to cultivate the innovative ability of college students majoring in chemistry and chemical engineering. Therefore, the development of the second classroom based on the "Laboratory of Chemistry and Chemical Engineering" will help college students to develop good innovative thinking ability and lay a good foundation for them to carry out innovation and entrepreneurship in the future work and life.

## 2. Current Status and Existing Problems

Our country's traditional culture attaches great importance to the cultivation of the commonality of human nature, and often ignores the personal value. Therefore, in the cultivation of college students' innovation and entrepreneurship ability, our country's traditional culture has certain limitations, which is not conducive to the development of individual uniqueness and autonomy. In order to better cultivate the innovation and entrepreneurship ability of college students majoring in chemistry and chemical engineering, we need to pay more attention to the independence and autonomy of individuals, which is an indispensable and important prerequisite for the development of innovation ability, which requires

selective application of the essence of traditional culture to guide students accordingly. In the current complex social environment, there are not only positive favorable factors, but also negative unfavorable factors for the cultivation of college students' innovation and entrepreneurship ability, which will cause certain restrictions and influences on students' innovation and entrepreneurship.

According to the preliminary interviews and investigations conducted by undergraduates majoring in chemistry and chemical engineering in our college, we found that from the perspective of cultivating innovation ability, the education of students majoring in chemistry and chemical engineering has the following deficiencies:

### ***2.1. There Are Many Theories in Classroom Teaching and Students Lack Practical Ability***

At present, most of the teachers of chemistry and chemical engineering courses adopt the method of theoretical explanation, and the classroom has become a platform for simply imparting basic theoretical knowledge. The Practical problem solving requires the classroom teaching not only to impart basic knowledge, but also to link basic theory and practice together. However, in actual classroom teaching, there is usually a lot of theoretical knowledge, but relatively little knowledge in practical teaching. This teaching mode causes a serious disconnect between classroom theoretical teaching and practice, and results in students not being able to understand and master classroom theoretical knowledge through practice. In this case, students' enthusiasm for learning has been seriously weakened, and their practical ability cannot be improved. From the long-term perspective of students' development, this teaching mode will inevitably affect the improvement of the practical ability of students majoring in chemistry and chemical engineering, and will also have an adverse impact on students' future entry into society.

### ***2.2. The Basic Experimental Teaching is Mostly Held By Theoretical Teachers, and the Experimental Teaching Course is Too Stylized***

From the current point of view, the learning methods of students majoring in chemistry and chemical engineering are basically the common "middle school-style" learning mode, and corresponding changes and innovations have not yet occurred. This kind of learning mode is not conducive to students majoring in chemistry and chemical engineering to some extent. Many students' learning goals are only to follow the teacher's ideas to acquire knowledge, or to find a good job after graduation, or to take the career and postgraduate entrance examinations, and lack the necessary attention to the improvement of learning ability and comprehensive quality. In the process of chemistry and chemical engineering experiment teaching, confirmatory experiment means that students verify the existing knowledge in the textbook through experimental operation. This kind of confirmatory experimental operation is too stylized, which cannot stimulate students' interest in learning during the experimental operation, and is not conducive to the cultivation of students' innovative ability. During the experimental process, the confirmatory experiment operation can neither impress the students, nor help them better understand and master the chemical knowledge they have learned. Such an experiment teaching mode is not conducive to the cultivation of students' innovative ability.

### ***2.3. The Degree of Students Participating in Teachers' Scientific Research is Not High, and They Lack Innovation Ability***

At present, the second classroom based on the "Laboratory of Chemistry and Chemical Engineering" is still in its infancy. The activities are carried out randomly, the design is not scientific enough, and there is a lack of more systematic and standardized management methods and mechanisms. The lack of emphasis on the second classroom by teachers and students is also one of the main problems. Teachers' tasks of teaching and scientific research are relatively heavy. At present, the second classroom guidance work has not been included in the teaching performance assessment in our college, which dampens the enthusiasm of teachers to invest more time in the second classroom teaching implementation research to a certain extent. For most students, colorful cultural and sports activities are more attractive. Relatively speaking, innovative academic activities cannot make students feel the fun due to the lack of professional guidance, and lose the value of the second classroom. Due to all the above reasons, the enthusiasm of students to participate in the teachers' scientific research is frustrated [1].

### **3. Measures to Improve Students' Ability of Innovation and Entrepreneurship in the Second Classroom Using "Laboratory of Chemistry and Chemical Engineering" as the Platform**

To improve the students' ability to practice, analyze and solve problems, build an independent learning platform for cultivating students' innovative and entrepreneurial spirit and practical ability in chemistry and chemical engineering, so as to improve their' innovation and entrepreneurship ability, using the open "laboratory of chemistry and chemical engineering" as the second classroom is a good way. To successfully complete the experiment, it is necessary to comprehensively apply the theoretical knowledge learned, complete some basic innovative experimental teaching, design some experimental projects by yourself, design the experimental plan, operate the experimental equipment, master the experimental methods, and flexibly use the knowledge to solve the problems in the experiment. Therefore, the first classroom and the second classroom are effectively and closely linked together, and students' thinking is inspired through the innovation-based second classroom, thereby cultivating their innovation and entrepreneurship ability<sup>[2]</sup>. Relying on the laboratory of chemistry and chemical engineering to enrich the second classroom, combining the theory and practice effectively, the following measures can be taken:

#### ***3.1. Establishing the Concept of Innovation and Entrepreneurship Education, and Introducing Relevant Professional Teachers***

To improve the ability of innovation and entrepreneurship, it is necessary to establish a solid concept of innovation and entrepreneurship education. In addition to the theoretical classroom, through professional teachers' lectures, online video clips and various competitions held by the college based on the concept of innovation and entrepreneurship, the various social situations we face are presented to students through the above channels, so that students majoring in chemistry and chemical engineering can experience innovation. The importance of entrepreneurship education, through various social realities, allows college students to have a clearer position for themselves, and deeply root the concept of innovation and entrepreneurship education in their thoughts. Under the guidance of professional teachers, students can determine a more suitable direction for innovation and entrepreneurship according to their own abilities.

#### ***3.2. Carrying Out Various Innovative and Entrepreneurial Activities***

Combining the characteristics of our college's chemistry and chemical engineering specialty, with the goal of consolidating students' professional theory and improving their technical practice ability, and relying on innovation and entrepreneurship activities, we actively carry out various activities such as vocational skills competitions, career planning competitions, and simulated recruitment of enterprises and companies. During the above activities, students majoring in chemistry and chemical engineering develop a sense of identity with a variety of occupations and skills during job interviews. Under the encouragement and guidance of professional teachers, students can participate in various activities of high interest, such as the University Challenge Cup, the Chemical and Chemical Innovation and Entrepreneurship Skills Competition etc. By carrying out a variety of innovation and entrepreneurship activities, on the one hand, the students' horizons are broadened from the activities, and on the other hand, the activities can guide students to combine the theoretical knowledge learned in the classroom with the practical activities of innovation and entrepreneurship, so as to make the students majoring in chemistry and chemical engineering more successful.

#### ***3.3. Innovation and Entrepreneurship Education Resources Play a Greater Role Through the Internet***

In the year of 2015, Premier Li Keqiang first proposed the "Internet+" action plan. How to use the Internet to drive the development of various industries is a new challenge for economic development and education reform in the new era. For innovation and entrepreneurship instructors and college students themselves, if entrepreneurship education is limited to campuses or in a certain province, do not understand the development situation of the external environment, and do not have a clear understanding of entrepreneurial risks, which is very unfavorable to the development of teachers and students<sup>[3]</sup>. The Internet not only allows teachers and students to access a wider range of innovation and entrepreneurship education resources and the latest entrepreneurial ideas, but also greatly reduces the cost of education. The Internet provides a more convenient channel for college students to understand the entrepreneurial experience of outstanding graduates majoring in chemistry and chemical

engineering in various colleges and universities, lays a good social environment foundation for college students to enter the society, avoids unnecessary experiences.

#### 4. Conclusions

The second classroom based on the "Laboratory of Chemistry and Chemical Engineering" is an important means to cultivate students' comprehensive quality, and plays an active role in the process of cultivating college students' innovative ability. In the process of participating in the experiment, students can have more space and time to think independently and learn independently under the guidance of teachers. The Chemistry and Chemical Engineering Experimental Center of our college conscientiously implements the principle of "teaching students in accordance with their aptitude and various forms" of open laboratories for all undergraduates, and provides more opportunities for students to participate in hands-on experiments in combination with the existing conditions of the laboratory and the research direction of teachers. The opening of the chemistry and chemical engineering laboratory not only cultivates students' basic experimental skills, but also stimulates their innovative and entrepreneurial spirit, cultivates more comprehensive talents for the society, comprehensively improves their employment competitiveness. It has become the guarantee of comprehensive quality education in colleges<sup>[4]</sup>.

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