A Study on Enhancing the Innovation and Entrepreneurship Capabilities of Chemical Engineering Students on the Platform of Student Associations

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Abstract: Associations are important platform to enrich students' study and life and promote their comprehensive growth. For enhancing the innovation and entrepreneurship capabilities of chemical engineering students, associations are also playing many roles, e.g., enriching innovation and entrepreneurship cultures on campuses, building up innovation and entrepreneurship platforms for students, and improving students' comprehensive quality in terms of innovation and entrepreneurship. Starting from the functions and significance of associations in cultivating the innovation and entrepreneurship abilities of chemical engineering students, this study briefly analyzes the problems existing in the formation of chemical associations and proposes some countermeasures for reference.

1. Introduction

Student associations are important carriers for colleges to build campus culture and implement educational functions, constituting an integral part of students' extracurriculum activities[1]. In recent years, colleges and universities have continuously improved the functions of student associations, which have become essential to students' learning as well as overall development. Chemistry is a discipline that is closely connected to production and application processes. Therefore, the key to improving the innovation and entrepreneurship capabilities of Chemical students lies in strengthening their innovation thinking, engineering capabilities and hands-on skills on the platform of student associations.[2] It is rewarding for colleges and universities to address how to give full play to the functions of student associations in respect of educating people and providing conditions for training application-oriented innovative talents.

2. The Functions and Significance of Student Associations in Training Innovative and Entrepreneurial Talents

2.1 Enrich Innovation Culture on Campus

Student associations are the useful addition to the first classroom, where students are encouraged to practice self-learning, self-management, and serve each other. They play the role in enriching college innovation culture from the following two aspects. First, compared with traditional classroom teaching, student associations enjoy much more freedom, which are better able to implement the student-oriented education concept. The members of associations can freely choose partners across grades and majors according to their interests and specialties. Through communicating with those of culture and social science majors, Chemical students can have a deeper understanding of their discipline and derive knowledge and ideas from different backgrounds and professional knowledge, which may pave the way for their later innovation and entrepreneurship. Second, the transformation of association structure, management model and development goals can give rise to diverse extracurricular activities. Especially for Chemical students, student associations can provide multiple practical activities that are absent in traditional classrooms, which are crucial to college culture building and renewal.[3]

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2.2 Build Innovation Platform for Students

Student associations are platforms for students to improve innovative thinking and entrepreneurship. On the one hand, college students, by participating in various innovative and entrepreneurial activities, could exchange and share new ideas and methods in the process of project planning and operation, and implement their innovative thinking and entrepreneurship[4]. For students majoring in Chemical Engineering, association activities could be perfect complement to daily courses that usually lack in elements of humanities and social sciences. On the other hand, unlike classrooms, associations focus on practicality. As diverse social practice opportunities are inviting to students themselves, student associations can build or serve as special innovation platforms to conduct practice activities on campus, which, in turn, will enhance the influence of innovation and entrepreneurship education. These efforts can ready student associations to develop cooperation with enterprises or industries, and seek more resources and opportunities for the organization and members.

2.3 Cultivate the Quality of Innovation and Entrepreneurship

Student associations play the role of improving students' innovation and entrepreneurship capabilities from three aspects. First, inspiring their awareness of innovation and entrepreneurship. Students usually join associations upon enrollment, and innovation and entrepreneurship classes are usually held in the second or fourth semester. Through social practice activities such as student associations construction, discipline competitions, and company visits, students can understand the meaning and basics of innovation and entrepreneurship and apply it to actual scenarios. Second, the comprehensive improvement of innovation and entrepreneurship quality. After the enlightenment stage, students need to deal with “concept internalization and behavior externalization”, carrying out innovation and entrepreneurship programs as soon as possible.[5] It is necessary to leverage the associations as a platform to launch innovation and entrepreneurship competitions and science competitions, allowing students to put ideas into action. Third, through organizing association activities, associations will bridge the gap between students and industries, helping them have a comprehensive understanding of the hiring requirements and industry development prospects, and know more about the innovation and entrepreneurship status quo so as to strengthen their innovation and entrepreneurship quality.[6]

3. Constraints on Student Associations as a Platform to Improve Students' Innovation and Entrepreneurship Capabilities

3.1 Lack of Professionalism

Student associations are prone to a development trend of “pan-entertainment”. For example, associations of ideological theory, academics and technology, and practical service are less attracting to students.[7] It is demanding on professionalism to use associations as a platform to improve the innovation and entrepreneurial capabilities of Chemical students. Different from other majors, Chemical Engineering focuses more on professionalism and practices, and hinges on the development of the industry. However, there is no dedicated innovation and entrepreneurship education courses for students of different majors in the first classroom. Program mentors are usually school counselors. These disadvantages combine to result in a universal homogenization of innovation and entrepreneurship education in the first classroom. Owing to the lack of professional teachers, funds and other necessary resources, student associations usually run in an amateurish manner. There is an extreme lacking of company visits and apprenticeship opportunities. Students’ innovation and entrepreneurship capabilities are unhooked with industrial needs and development trends.

3.2 Chaotic Management System

Generally, the college Youth League Committee is in charge with student associations. As an important organization for students’ self-management and self-learning, student associations should

establish a management system that conforms to its positioning and development objective while following the relevant rules and regulations of the college. At present, many associations are lax and derelict in implementing their regulations and management systems. The effectiveness is even more unsatisfactory. To improve students' innovation and entrepreneurship capabilities on the platform of student associations, we should aim at improving students' comprehensive skills, professional qualities, and innovation and entrepreneurship concepts. Conventional associations perform poorly in building a flat and flexible management system. It is difficult for students to find opportunities that suit their interests and skills not to mention the improvement of innovation and entrepreneurship capabilities.[8]

3.3 The Shortage of Professional Guidance

To use student associations as a platform to improve innovation and entrepreneurship skills, we need to hire professional teachers or industry consultants inside and outside the school for guidance according to specialty characteristics and actual conditions. Although associations are mainly run by students, it needs teachers to provide guidance in various aspects such as organization operation, management, and technical guidance. Especially for innovation and entrepreneurship education, highly competent mentors are required to steer classroom theories and practical activities. At present, the mentors for student associations in most colleges and universities in China are school counselors, who are more skilled in providing management advice rather than chemical industry development prospects and emerging technologies. It is an impediment for students to apply the ideas of innovation and entrepreneurship to practical activities. In addition, the guidance is mostly offered in a monotonous way such lectures, forums and other activities confined to the classroom.

3.4 Defects in the Evaluation System

The effectiveness of association education programs should be supported by a comprehensive evaluation system that defines the role of associations in improving students' innovation and entrepreneurship capabilities and is also a powerful tool to sustain the sustainable development of associations. The problems in the evaluation system of student associations are as follows. First, flawed indicators. At present, most colleges conduct the evaluation of associations from top to bottom. Generally, the Youth League Committee of the college conducts evaluation on the completion of the goals and tasks within a certain period and reviews the size, staffing, and use of funds. This evaluation method can give us an overall picture on the development of associations, but fail to reflect the education effectiveness and the improvement of students' innovation and entrepreneurship capabilities. Second, the lack of continuous improvement. It is impossible to detect problems of various participants such as students, teachers, and enterprises. Associations are short in both pertinence and flexibility to commit optimization and improvement.[9]

4. Approaches for Student Associations as a Platform to Improve Students' Innovation and Entrepreneurship Capabilities

4.1 Association Construction Should Highlight the Features of Chemical Engineering

We need to stress the uniqueness in improving the innovation and entrepreneurship capabilities of Chemical students. Therefore, the construction of associations should be professionalism-orientated and ban homogeneousness. Specifically, the School of Chemical Engineering should, in joint efforts with other engineering departments, lead the cooperation on chemical engineering with enterprises, and build an innovative and entrepreneurial apprenticeship platform that provides more specialty relevance. We can also set up modules with lower professional thresholds to reinforce the core modules, such as Chemical Industry Trade & Practice Department and the Media Department, recruiting non-Chemical students to exchange ideas. It helps to optimize the team structure, and emphasize organizational flexibility and inclusiveness. In addition, as permitted by national and school policies, students are supported and encouraged to establish profitable associations to implement the student innovation and entrepreneurship concepts.

By providing services to enterprises, associations are able to replenish funding and allow members to explore market development trends and needs of the chemical industry, improve their professional qualities, and enhance their awareness of innovation and entrepreneurship.

4.2 Train Application-Oriented Talents and Implement Enterprise Operation Modes

Training of application-oriented talents of Chemical Engineering should meet the needs of society and follow logic steps. The purpose of students' innovation and entrepreneurship programs is to improve students' comprehensive qualities and enhance their professional qualities. Therefore, association run according to the enterprise operation methods can enable students to understand the tick-tock and concepts of modern businesses, and acquire practical skills. In this regard, it is necessary for associations to adapt the experience of advanced enterprise management models and carry out institutional innovation by considering the features of Chemical students, and highlighting the practicality of associations. Carry out the enterprise operation within the association, and hire and assign personnel according to organizational functions. Association activities should also focus on the production and service of the enterprise and industry.

4.3 Optimize the Mentor Team and Carry through All-Round Education of “Classroom, Association, and Innovation Platform”

To improve the innovation and entrepreneurship capabilities of Chemical students, we can neither afford to abandon the first classroom nor ignore the guidance and teaching of professional teachers. Mentorship is particularly significant for associations to realize the benign and sustainable development and to give full play to the role of students as participants and executors. Therefore, associations should hire high-quality mentors, make full use of resources inside and outside the college to seek guidance on students' theory and practice, laying a solid foundation for the students' innovation and entrepreneurship skills.[10] First, we should introduce the industrial emerging technologies and development prospects, teach business models, entrepreneurial models and innovative thinking in the first classroom so as to help students acquire knowledge of innovation and entrepreneurship;[11] second, associations need to organize teacher-guided practical activities, such as company visits, industry exhibitions, and culture experiences to enhance students' awareness of the industrial status quo and connection with actual needs; third, exploit resources such as teachers, business experts, and entrepreneurial stars on campus to assist students with executing innovation and entrepreneurship programs, select outstanding students to participate in discipline competitions and entrepreneurial competitions, and create an environment of innovation and entrepreneurship in the college. With a multi-level and multi-guidance system, it will promote the comprehensive development of students' qualities and advance the high-quality and high-level growth of associations.[12]

4.4 Optimize the Evaluation System and Improve the Effectiveness of Association Education

The school should also cooperate with the college, enterprises, and related industrial sectors to optimize the evaluation mechanism in order to improve the effectiveness of associations on education and ensure the sustainable development of associations. First, introduce more evaluation subjects. Include the comments of students, teachers, enterprises, and colleges into the evaluation system to reflect the problems of association operation from multiple perspectives. Particularly, schools and colleges are responsible for the effectiveness of associations on improving students' innovation and entrepreneurship capabilities and the completion of various tasks. Enterprises are responsible for the operation and learning. Students are responsible for the guiding methods and teaching effects of enterprises and teachers. Teachers are responsible for the process evaluation of students' performance in various stages. [13] In addition, it is suggested to introduce a continuous improvement mechanism of the manufacturing industry, classifying the results of different evaluation subjects, and developing a continuous improvement plan by grading the funds, manpower, and cycles required. Carry out 1 to 2 optimizations each semester so that associations can, with a high degree of flexibility, adapt to the progress of students' innovation and entrepreneurship capabilities and needs of the chemical industry.

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