

"Five in One" Innovation and Entrepreneurship Education System Construction Taking the Environmental Science and Engineering Major of Xiamen Huaxia University as an Example

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ABSTRACT

With the development of environmental economy in China, the demand for environmental professionals is increasing. On the other hand, the Ministry of education pays more attention to the innovation and entrepreneurship education in Colleges and universities. By studying the main problems in the cultivation of professional talents, the environmental science and engineering major of Xiamen Huaxia university has developed a five in one innovation and entrepreneurship education system based on curriculum optimization, project support, industry university collaboration, system guarantee, communication and promotion, which has been applied in the actual talent training process and achieved good results.

Keywords: *environmental science and engineering, five in one, innovation and entrepreneurship, education system*

I. INTRODUCTION

In recent years, the great emphasis on environmentally friendly economic development and environmental protection industry development has provided a good environment for the environmental protection service industry. However, there are still many problems existing in this process, including the lack of professional talent resource, the weaker innovation ability and the failure of service supply to meet the needs of the market. Therefore, how to improve the education quality of "entrepreneurial innovation" among environmental protection application talents, and better serve the industry has become the practical task in the education reform of environment-related professions in colleges and universities, especially the specific teaching process. To implement the spirit of the Fifth Plenary Session of the Eighteenth Central Committee of the Party and the National Science and Technology Innovation Conference, thoroughly implemented the national mid- and long-term education, science and technology and talent planning outlines, as well as comprehensively improve the innovation abilities of colleges and universities, the Ministry of Education issued the *Thirteenth Five-Year Plan for Science and Technology Development in Higher Education Institutions* in December 2016 according to the *National Innovation-*

Driven Development Strategy Outline and the Five-Year National Science and Technology Innovation Plan, thus improving the requirements for the cultivation of innovation and entrepreneurship in Chinese universities. Thus, it can be said that innovation and entrepreneurship education is an important project in the education reform of environmental science major currently.

II. RESEARCH ON INNOVATION AND ENTREPRENEURSHIP EDUCATION REFORM OF ENVIRONMENTAL SCIENCE AND ENGINEERING MAJOR

Chinese scholars have studied the innovation and entrepreneurship education among universities from different perspectives. Wang Xu et al. proposed to focus on the innovation and entrepreneurship training in the professional education, especially the combination with various teaching links in the four-year university can help achieve the integrated innovation and entrepreneurship education and talent training system model.[1]Based on the principles of analytic hierarchy process, Wang Shengqiang and other scholars have built an evaluation system for college students' innovation and entrepreneurship from the innovation ability, entrepreneurial practice ability and non-intelligence factor, which provide a basis for the

education and teaching effectiveness.[2] Through studying the domestic practice teaching of environmental science major, Li Yukui et al. proposed the reform path for integrating the education teaching system of innovation and entrepreneurship.[3]Based on the development process of domestic innovation and entrepreneurship education, Zhang Gang and other scholars explored the innovation and entrepreneurship education mechanism of environmental science from the levels of creativity, innovation and entrepreneurship, and further proposed methods for carrying out innovation and entrepreneurship education.[4]Starting with the "problem-oriented" feature of environmental science major, Zhang Zhanmei et al. proposed to construct the corresponding talent training model based on the social demands.[5] Through studying the relationship between the cultivation of environmental professionals and local environmental protection, Tang Bo proposed the reform approach to integrate the innovation entrepreneurship education with professional education based on the characteristics of local environmental business.[6] By comparing the innovative talent training models of universities between China and the United States, Sun Ping found that there is the similar characteristic in the setting of creative courses and the guiding of teachers, but there are differences in specific training goals, teaching systems and training environment , which can further provide the reference for establishing an innovative talent training model with Chinese socialist characteristics.[7]

Based on these research results, it can be found the innovation and entrepreneurship educational reform in environmental science major mainly solves how to effectively integrate the education with the construction of talent training system, curriculum system and practical teaching activities, in order to explore a talent training meeting the requirements of professional development.

III. "FIVE IN ONE" INNOVATION AND ENTREPRENEURSHIP EDUCATION SYSTEM CONSTRUCTION

A. Reform background

Environmental Science and Engineering in Xiamen Huaxia University, established in 2015, is not only a subordinate major of the College of Environment and Public Health, but one of the first five majors for the further education. Since its establishment, the university has actively explored how to organically integrate the innovation and entrepreneurship education with professional talent training.

The reform of professional innovation and entrepreneurship education actually should consider the following aspects: firstly, innovation and

entrepreneurship education should be oriented by the needs of social talents to clarify the positioning of professional talent. Secondly, innovation and entrepreneurship education should be organically integrated with the professional curriculum system to form the comprehensive multi-level, multi-directional and diversified educational activities at the undergraduate level. Thirdly, the environmental major should emphasize the deep integration of innovation and entrepreneurship education and professional practice teaching, meaning the important role of innovation and entrepreneurship education in practical teaching and the better achievement of the improved educational goal. Fourthly, innovation and entrepreneurship education should own the sufficient guarantee conditions, specifically including internship practice teaching venue construction, scientific research platform, school-enterprise cooperation project, teacher construction and system guarantee. Fifthly, innovation and entrepreneurship education of environmental science major should pay attention to wider reference and exchange, which can help form an innovation and entrepreneurship education model suitable for professional talent training goals and the full promotion through the exchange and learning of other innovation and entrepreneurship education reform experience.

B. Main existing problems and reform ideas

In the specific practice process of talent training, the major of environmental science and engineering has concluded the following main issues:

Firstly, the curriculum setting deviates from industrial demands: the talent training system and curriculum setting fail to fully meet the industrial needs, while the new technology achievements do not integrate into the specific courses, and even the professional talent training deviates from the industry needs.

Secondly, the teaching content fails to sufficiently combine with the actual situation, leading to the lack of real cases in the teaching process. Students often wonder "what is the use of this course?" Generally, teachers lack the industry experience and just focus on the theoretical teaching, making the experimental projects only limited to the simulation of actual tasks and even out of connection with actual job requirements. The lack of full combination of practical application with theory has hindered the cultivation of students' innovative consciousness and capabilities.

Thirdly, the cultivation of innovation and entrepreneurship is difficult to be implemented in practice. The lack of the project support has led to the fewer personalized training methods for undergraduate students, the lower participation of undergraduate students in teachers' scientific research projects, and the

fewer number of students undertaken scientific research service projects.

Based on the innovation and entrepreneurship research results of the domestic environmental science major, the science and engineering major has proposed to establish a "five in one" innovation and entrepreneurship education system, which aims to build an education system cultivating innovation and entrepreneurial awareness based on five measures: integration of curriculum optimization, project support, industry-university collaboration, system guarantee, as well as exchange and promotion. In detail, it is characterized by fully mobilizing all superior resources inside and outside the school and relying on projects and industry needs to promote the optimization of professional courses, in order to realize the current educational training mechanism and timely integrate into the entire process of talent training.

C. Specific reform practice

1) *Optimizing professional courses, and the organic combination between the discipline construction and innovation and entrepreneurship education:* It is necessary to further improve the professional talent training program, highlight the cultivation of innovative spirit, entrepreneurial awareness and even the innovative entrepreneurial ability. Through setting up an extracurricular innovation and entrepreneurship practice education module and the effective credit recognition, it can expand students' extracurricular quality development, reduce their academic pressure, and further encourage them to participate in innovation and entrepreneurship activities. Enriching the relevant courses of innovation and entrepreneurship education constantly, forming a multi-level innovation and entrepreneurship curriculum system with the combination of the basic training and professional innovation and entrepreneurship practice, thus making innovation and entrepreneurship education run through the entire process. Regarding the construction of basic training courses, we can not only set up *Innovative Thinking Training and Method, Foundation for College Students' Entrepreneurship, Employment and Entrepreneurship Guidance* and other innovative and entrepreneurial courses, but the professional comprehensive practice courses of *Environmental Science and Technology Frontiers, Document Search and Scientific Paper Writing, Environment Monitoring and Environmental Management* and other in-class professional innovation and entrepreneurship education courses. What's more, it is also necessary to construct concentrated innovation and entrepreneurship practice courses of *Professional Cognitive Internship, Professional Career Planning, Production Internship*

and *Graduation Design*, as well as construction of extracurricular practice courses of *Special Skills and Technology and Skills Activities*.

2) *Utilizing the scientific research project platform to serve innovation and entrepreneurship education, and supported by various participation methods:* Through making full use of the horizontal and vertical scientific research project of the teachers, combining with the "College Students Innovation and Entrepreneurship Training Program", as well as the "Seedling Program" independently developed by the department, we should create multiple platform resources to provide students with innovative and entrepreneurial practices. In the specific implementation process, the seedling funding can guarantee the normal development of projects, and the formulated academic mentor system can provide practical guidance for students. Through participating in college students' innovation and entrepreneurship training, competitions and other activities, it can also test students' abilities to innovate and practice, and actively guided students to participate in scientific research and innovation practices, and further enhance students' innovative thinking and entrepreneurial practice abilities. What's more, various projects undertaken by industry-university-research platforms and laboratories can provide the innovation and entrepreneurship education with the insufficient support, thus leading students to participate in the social service and entrepreneurship practice, enhancing their awareness of professional entrepreneurship practice with knowledge and skills, as well as fully giving full play to the advantages of students' innovation and entrepreneurial awareness, in order to create a platform for their personalized development.

3) *Relying on enterprises to open up industry-university channel, and realizing the innovation and entrepreneurship education in the industry-university coordination:* On the one hand, the built entrepreneurship education teacher team outside the school can help accumulate high-quality industry resources for professional entrepreneurship education. And there are many ways for cultivating students' entrepreneurial awareness, including employing the experts and enterprise lecturers to become the entrepreneurship instructors, holding the disciplinary frontier exchange lectures and entrepreneurship project guidance. On the other hand, the reliance on the school-run enterprises and cooperative enterprises can help create innovative and entrepreneurial practice bases, which can provide the industry education atmosphere for cultivating innovation and entrepreneurial awareness of students through the business visits and

exchange activities, regional environmental protection service practical training projects, as well as professional cognitive learning activities.

4) *Building a perfect innovation and entrepreneurship education management system to provide an institutional basis for educational reform:*

Based on the current credit system, it is important to build a sound innovation and entrepreneurship education management system to provide an institutional basis for the educational reform. Through creating the "seedling fund" and formulating the detailed supporting and management systems, it can provide the effective funds support and ensure the standard implementation of the plan. In addition, the quality expansion credit management system also can help formulate credit recognition methods for innovative and entrepreneurial activities, and further provide incentives for participating in innovation and entrepreneurship training activities. The improvement of the management system of experimental facilities can ensure the orderly teaching and project research activities, as well as the full use of experimental resources. Through further improving the management system of off-campus training activities, it can also provide the corresponding institutional guarantee for teachers and students.

5) *Building the platform for diverse communication and achievement promotion:* The innovative exchanges can be conducted by building a diverse communication platform, relying on "Innovation and Entrepreneurship Achievement Reporting Conference", "Academic Report Exhibition", "Academic Forum" and other activities. Moreover, the Innovation and Entrepreneurship Park and the related practice technology fairs can further encourage students to better display and promote their achievements, enhance their self-confidence and also form a "ripple" effect in the cultivation of innovation and entrepreneurship awareness, thereby creating the whole innovative and entrepreneurial culture atmosphere.

IV. CONCLUSION

The "five in one" innovation and entrepreneurship education system is an environmentally-applied talent training model focusing on the vocational ability and multiple coordination. Relying on the construction and opening of platform and team, as well as the optimization of curriculum system, it can avoid the deviation of professional setting and the development industry. Through actively developing various industry-university-research projects, it can better serve the personnel training and teaching reform, and avoid the disconnection between the theory and practice, thus creating conditions for cultivating students 'all-round

innovation and entrepreneurship qualities. Moreover, the establishment of the sufficient system and the expansion of multiple communication platforms can fully contribute to the high-efficient teaching, knowledge learning and available innovation.

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References

- [1] Wang Xu, Ge Chengjun, Li Jialing, etc. Construction and Practice of the Cultivation System of Innovation and Entrepreneurial Ability of College Students Majoring in Environmental Ecology[J]University Education, 2016: 125-126, 143.
- [2] Wang Shengqiang, Wang Qing, Yu Hongbing. Construction of Education Teaching Effect Evaluation Method of Innovation and Entrepreneurship for College Students[J]Education Teaching Forum, 2018, (16): 56-57.
- [3] Li Yukui, Liu Fei. Construction of Teaching System of Environmental Science Major under the Cultivation Perspective of Innovative Practice Ability[J]Journal of Chuzhou University, 2017: 19 (2): 122-124.
- [4] Zhang Gang, Li Yehong, Bian Hongfeng, etc. Environmental Practice Undergraduate Innovation and Entrepreneurship Practice Education Based on Practice Experiment[J]Laboratory Science, 2018, 21 (3): 152-162.
- [5] Zhang Zhanmei, Chen Zhe, Zhou Fuchun. Research on the Innovation and Practice of Talent Training Model Oriented by Social Demand[J]Journal of Chongqing Jiaotong University, 2016, 16 (5): 126-130.
- [6] Tang Bo. Research on the Integration Ways of Innovative Education and Professional Education of Environmental Major [J]Anhui Chemical Industry, 2017, 43 (5): 134-140.
- [7] Sun Ping. A Comparative Study of Innovative Talent Training Models in Chinese and American Universities[J] Coastal Enterprises and Science & Technology, 2015, (5): 74-76.