

Enhancement of innovative/entrepreneurial ability of students with professional education and the driving mechanism under “industry-education integration and science-education integration”

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Abstract: Innovation and entrepreneurship education has gradually become a new development trend in the higher education. The improvement of college students' innovation and entrepreneurship ability is one of the important teaching objectives of higher education. However, there is often a disconnect between professional education and innovation-entrepreneurship education. How to organically integrate professional education and innovation-entrepreneurship education is a key issue to be solved urgently. This study deeply introduces the current situation of innovation and entrepreneurship education of modern college students, the connotation of “industry-education integration and science-education integration”, and the ways to promote the integration of professional education and innovation-entrepreneurship education. Through the analysis of the importance of “industry-education integration and science-education integration”, the necessity of strengthening professional education and innovation-entrepreneurship education is clarified, and the idea of organic integration of professional education and innovation-entrepreneurship education is put forward.

1. Introduction

In today's fast-changing and competitive social environment, innovation and entrepreneurship have become important engines for driving social development and economic growth. As the new-generation target talents, the cultivation of innovation and entrepreneurship ability of college students has attracted much attention. However, there are some problems in the training of innovative and entrepreneurial talents. On the one hand, the traditional education mode pays attention to the teaching of theoretical knowledge, but often neglects the training of practical ability and innovative thinking. On the other hand, innovation and entrepreneurship and professional education have not been effectively integrated in practice [1]. Therefore, how to improve college students' innovation and entrepreneurship ability has become an urgent problem to be solved.

The concept of “industry-education and science-education integration” has been put forward and widely practiced, which is the key to solving this problem [2]. "Industry-education and science-education integration" refers to the close combination of scientific research, education and teaching with industrial economy. Schools, enterprises and scientific research institutions are cooperated to cultivate the innovation and entrepreneurship ability. The concept of “industry-education and science-education integration” is to break discipline boundaries and institutional barriers, promote the combination of knowledge and practice, and cultivate students' innovative thinking, practical ability and entrepreneurial awareness [3]. However, at present, there are some problems and challenges in the practice of “industry-education and science-education integration”. Firstly, the current education system limits the deep development of “industry-education and science-education integration”. Secondly, the government's policy supports are not perfect enough, and there is a lack of effective guidance and incentive mechanism for “industry-education and science-education integration”. In addition, the innovation and implementation of industry-university-research cooperation model also faces certain difficulties and resistance. Therefore, the application and practice of “industry-education and science-education integration” in training innovative and entrepreneurial talents has become a hot issue.

2. Current situation and problems of innovation and entrepreneurship education for college students

At present, there are three main models of innovation and entrepreneurship education for college students, including innovative education model, quality education model and practical education model [4]. The innovative education model is a reformative education model and a new mission of the university to adapt. It is an innovative thinking education in addition to basic theoretical knowledge. The in-depth implementation of the innovative education model will comprehensively improve the quality of talent training and promote the development of students. The quality education model focuses on improving students' comprehensive quality. By strengthening the innovation and entrepreneurship quality education of college students, it is conducive to providing the correct ideological and scientific guidance for the cultivation of college students, improving the personality education of college students and promoting their all-round development. The purpose of practical education is to master rich practical skills, cultivate independent practical ability and the ability to analyze and solve problems. The main paths are various practical activities to improve the comprehensive quality of college students, including experimental practical operation, various internships, social research and other activities.

Higher education is keeping up with the development trend of new age and actively carrying out innovation and entrepreneurship education for college students. However, we have been influenced by exam-oriented education for a long time, and there are obvious problems in innovation and entrepreneurship education in universities. On the one hand, innovation and entrepreneurship courses in universities mainly focus on theoretical knowledge, lacking specific practical courses. The teaching method is mainly taught by teachers in the classroom, and students passively accept the knowledge in traditional classes. In the whole teaching process, it is easy to neglect the cultivation of students' independent thinking and innovative thinking ability, and it is easy to make students' practice become a weak link. As a result, it is difficult to achieve the teaching effect of innovation and entrepreneurship education.

3. Concept of “industry-education integration and science-education integration”

Understanding the concept of “industry-education integration” and “science-education integration” is the premise for the appreciation of “industry-education integration and

science-education integration”. The “industry-education integration” is the integration of industrial enterprises and personnel training. The purpose of “industry-education integration” is to promote and realize the joint development of education and industry. From the external perspective of higher education, the “industry-education integration” is the close integration between institutions of higher learning and industrial enterprises [5]. Among them, industrial enterprises are the demand side of talents, and education is the supply side of talents. The integration of production and education is to strengthen the organic integration of education and industry and integrate the knowledge and practice of the government and enterprises into the main body of teaching, and adjust the teaching methods and methods according to the market demand. In the process of higher education training, the strategy can effectively improve the training level of applied talents. The concept of “industry-education integration” has promoted the comprehensive reform of teaching in universities, effectively connecting teaching and production processes, and achieving a win-win situation in many aspects. Therefore, the integration of production and education, school-enterprise cooperation and collaborative education are important measures for application-oriented undergraduate colleges to promote the all-round development of talents and economic and social development.

With the continuous progress of the times and the continuous improvement of national requirements for innovative and entrepreneurial talents, it is difficult for talents trained by pure “industry-education integration” or “science-education integration” to adapt to the rapid development of society. Therefore, the dual integration of “science and education” and “industry and education” has come into being, which is an important measure to train top-notch innovative and entrepreneurial talents. The both “industry-education integration and science-education integration” refers to the close combination, mutual integration and mutual promotion of scientific research, industry and education. The “science-education integration” focuses on the cultivation of teachers’ ability to assist teaching with scientific research and to carry out scientific research together with students. The “industry-education integration” focuses on the cultivation of teachers’ practical ability to assist teaching with industrial practice and carry out industrial research together with students. This kind of dual integration of talent training can promote the in-depth development of teachers for actively studying and solving problems. And it can improve the mutual transformation and coordination ability of scientific research and teaching. In addition, both “industry-education integration and science-education integration” can cultivate talents with high quality innovation and practice ability. Then, the students can apply their knowledge, innovative thinking and practical consciousness in the real applications. The “industry-education integration and science-education integration” solves the steady state of the driving force for the further development of colleges and universities. Moreover, “teaching” has always been the core of “industry-education integration and science-education integration” and we should not simply emphasized “scientific research” and “industrial research” and talk about the “industry-education integration and science-education integration” without teaching. We should serve students and teachers through “industry-education integration and science-education integration”, so as to meet the needs of industry and society.

4. The paths to cultivate college students' innovation and entrepreneurship ability based on “industry-education integration and science-education integration”

It takes ten years to grow trees and a hundred years to cultivate people. There is no end to education. Based on the new concept of “industry-education integration and science-education integration”, the construction of an integration system of professional education and innovation and entrepreneurship education will effectively improve students' innovative practical ability, cultivate

students' entrepreneurial interest and awareness, and add new elements for students to meet the needs of contemporary society. In this research, the construction of “whole oriented-whole staff help-all round integration” of innovation and entrepreneurship education system has been constructed. The paths to cultivate college students' innovation and entrepreneurship ability based on “industry-education integration and science-education integration” mainly include the following three parts.

4.1 The construction and reform of professional education guided by the whole process of “research-teaching-industry”

Universities should enhance the understanding of innovation and entrepreneurship education from the height of national strategy. Universities should also adapt the quality of talent training and professional structure to the needs of social development and industrial structure. The goal is to comprehensively improve the compatibility of innovative and entrepreneurial talents with social development. Based on the new concept of "industry-education integration and science-education integration", the latest research trends in professional fields and the latest needs of industrial fields are integrated into professional basic courses and professional orientation courses, so that students can learn the skills of reviewing the latest scientific and technological literature and understanding the latest industrial trends. Teachers should grasp the relationship between the present and the long term of personnel training. Universities should optimize the internal structure of talent training for innovation and entrepreneurship, not only to meet the needs of the overall scale of talent training, but also to meet the development needs of the times in terms of talent training quality. We should build innovative general education courses and characteristic practice courses to cultivate students' ability to break through subject knowledge, understand the world from different dimensions and innovate practice. Innovation and entrepreneurship education should focus on the whole career process of college students. Innovation and entrepreneurship education should lay a solid foundation for the all-round, diversified and personalized development of college students. “Industry-education integration and science-education integration” is to integrate the cultivation of innovation and entrepreneurship into the education of disciplines and majors, to ensure that the training of innovative and entrepreneurial talents in colleges and universities is highly consistent with economic and social development.

4.2 Cultivation of innovation and entrepreneurship talents helped by the “research-teaching-industry”

Innovation and entrepreneurship education and talent training in colleges and universities should be based on the concept of “knowledge-action integration”. Students should not only pay attention to the study of theoretical knowledge, but also pay attention to the practical education study, so as to focus on training students' ability to analyze and solve problems. We should encourage college students to deeply integrate learning knowledge with the problems of industries, industries and enterprises, exercise their ability to connect with the market and adapt to society, and cultivate their innovation awareness and entrepreneurial ability during the innovation and entrepreneurship education. Innovation and entrepreneurship education cannot be limited to the schools and classrooms, the process of education and teaching should adopt more heuristic teaching forms. Organic integration of innovation and entrepreneurship education with professional education and practical education can strengthen the effective connection with professional teaching practice and ensure that students can devote themselves to innovation and entrepreneurship practice. We can establish a dual tutorial system of “academic tutor + professional tutor” for students, and the students can be taught according to their aptitude based on their scientific research, teaching and

industrial expertise. We can also construct some small classes in the teaching process to facilitate the development of practical activities. The “second classroom” of scientific research laboratories and enterprises should be established to train students in scientific research innovation and enterprise practice, and cultivate students' innovation awareness and understanding of industrial needs.

4.3 Establishment of a comprehensive integration system of professional education and innovation- entrepreneurship education

By deeply integrating the concept of “industry-education integration and science-education integration” into professional education and innovation-entrepreneurship education, the goals and teaching systems of professional education and innovation-entrepreneurship education will reach a high degree of consistency. By continuing to strengthen professional education, students will develop a solid theoretical knowledge foundation. Through strengthening innovation and entrepreneurship education, students' innovation consciousness and entrepreneurial practice ability are cultivated. Therefore, the comprehensive integration system of professional education and innovation-entrepreneurship education is naturally formed. There are several measures to improve the organic integration of professional education and innovative education. First of all, cutting-edge lectures can be conducted. Professional knowledge and ability in professional education are the foundation and bridge of innovation and entrepreneurship education. We can set up cutting-edge lectures according to professional characteristics, so that students can understand and master the latest cutting-edge scientific and technological achievements, and serve the foundation of society. Secondly, let students actively participate in scientific research training and publish scientific research results. Schools should encourage teachers to integrate scientific research projects and invention achievements into classroom teaching, lead students to actively research, and stimulate students' innovation awareness and entrepreneurial inspiration. Thirdly, encourage students to actively participate in various disciplines and innovation and entrepreneurship competitions. At the same time of professional education, we guide students to combine professional learning with scientific and technological competitions, and test their learning ability and practical ability through competitions.

5. The driving mechanism of “industry-education integration and science-education integration” for the innovation and entrepreneurship ability of students

Xu et al. analyzed the driving mechanism of science and education integration under the background of new engineering, which was mainly divided into two aspects: internal driving and external driving [6]. Inspired by this, the mechanism of “industry-education integration and science-education integration” to drive the improvement of college students' innovation and entrepreneurship ability can also be divided into internal driving mechanism and external driving mechanism (Fig. 1). Among them, the internal driving mechanism comes from the “double integration” actively carried out by schools, teachers and students due to development needs or interests. The high standards and high requirements of the country for innovative and entrepreneurial talents make the “double integration” an inevitable choice for the development and progress of universities. The external driving mechanism is mainly the “double integration” carried out under the national and social needs, policy guidance, and the positive influence of the international environment.

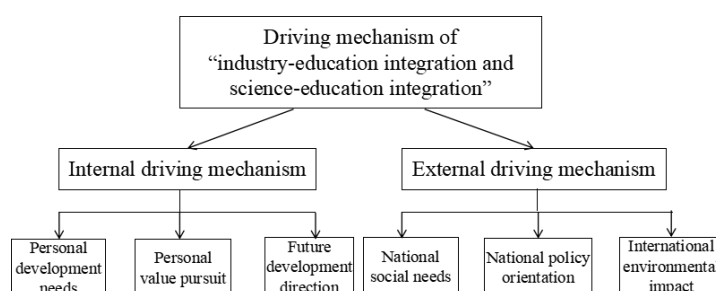


Figure 1: Driving mechanism of “industry-education integration and science-education integration”

6. Summary

Under the background of “industry-education integration and science-education integration”, colleges and universities are facing new missions and challenges. The organic integration of innovation-entrepreneurship education and professional education is also called inevitable. This study deeply introduces the current situation of innovation and entrepreneurship education of modern college students, the connotation of “industry-education integration and science-education integration”, and the ways to promote the integration of professional education and innovation-entrepreneurship education. Students with excellent innovation and entrepreneurship skills will contribute positively to building a more prosperous and progressive society.

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