

Implementation Path Exploration of Innovation and Entrepreneurship Education Reform under the Background of “New Engineering”

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Abstract

Under the background of “New Engineering”, innovation and entrepreneurship education has become an important breakthrough in the reform of education and teaching in colleges and universities in the new era. Deepening the reform of innovation and entrepreneurship education has also become an inevitable choice for promoting talent training in colleges and universities and an effective way to improve the quality of education and teaching. The reform of innovation and entrepreneurship education should start from the innovative education concept, innovative curriculum system and teaching methods, innovative practice mode, etc., and fully reflect the new concept of engineering education of “New Engineering”, the new structure of disciplines and specialty, the new mode of personnel training, and the new quality of education and teaching, so as to make positive contributions to achieve the “Two Centenary” goals and realize the great rejuvenation of the Chinese Nation, and cultivate innovative professionals, entrepreneurial top-notch talents and high-level comprehensive talents that meet the needs of the development of the times.

Keywords

New Engineering, Innovation and Entrepreneurship Education, Personnel Training, Creative Spirit, Entrepreneurial Ability

1. Introduction

In response to a new round of technological revolution and industrial transformation, and to support a series of national strategies such as service innovation-driven development and “Made in China 2025”, the Ministry of Education

actively promoted the construction of “New Engineering”, and successively formed the “Fudan Consensus”, “Tianda Action”, and “Beijing Guide” (Geng, 2022), and issued the “Notice on Launching New Engineering Research and Practice”, “Notice on Promoting New Engineering Research and Practice Projects”, and “Notice on Announcement of the First Batch of New Engineering Research and Practice Projects”. Explore and form a Chinese model and Chinese experience that lead the global engineering education, help build a strong country in higher education, and make positive contributions to building a world engineering innovation center and talent highland, realizing the “Two Centenary Goals” and the Chinese Dream of the great rejuvenation of the Chinese nation!

With the continuous development of my country’s economy and society, the state has put forward higher requirements for colleges and universities to cultivate innovative professional talents, entrepreneurial top-notch talents and high-level comprehensive talents. Deepening the reform of innovation and entrepreneurship education has become an inevitable choice for promoting talent training in colleges and universities and an effective way to improve the quality of education and teaching.

In June 2014, General Secretary Xi Jinping delivered a speech at the 17th Academician Conference of the Chinese Academy of Sciences and pointed out: “The cause of innovation calls for innovative talents, and it focuses on cultivating front-line innovative talents and young scientific and technological talents.” In May 2015, the state issued the “Implementation Opinions on Deepening the Reform of Innovation and Entrepreneurship Education in Colleges and Universities”, proposing to innovate the talent training mechanism, improve the curriculum system of innovation and entrepreneurship education, reform teaching methods and strengthen innovation and entrepreneurship practice. Innovation and entrepreneurship education has thus risen to the height of the national implementation of the innovation-driven development strategy. In October 2015, Premier Li Keqiang made important instructions to the first China “Internet +” College Students Innovation and Entrepreneurship Competition, pointing out that innovation and entrepreneurship education should be integrated into talent training, effectively enhance students’ entrepreneurial awareness, innovative spirit and creativity, and foster mass entrepreneurship, the soil of innovation, and provide a steady stream of talents and intellectual support for the construction of an innovative country. From 2015 to 2020, for 6 years, the number of participants in the “Internet +” College Student Innovation and Entrepreneurship Competition has reached a total of 3.75 million teams and a total of 15.77 million college students. The Entrepreneurship Competition was upgraded to “China International Internet + College Students’ Innovation and Entrepreneurship Competition”, and became a global event for college students to realize their dreams of innovation and entrepreneurship (Chen, 2021). On September 10, 2018, General Secretary Xi Jinping delivered a speech at the Na-

tional Education Conference and pointed out: “Innovative education should run through the whole process of talent training, cultivate creative talents with creative education, and create innovative countries with creative talents”.

2. Significance of Innovation and Entrepreneurship Education Reform

As the first move to deal with the new industrial revolution and promote the reform of higher education, the construction of “New Engineering” should not only be based on current initiatives, but also actively plan for the future, and fully reflect the new concepts of engineering education, the new structure of disciplines, The “Five New” such as the new mode of personnel training, the new quality of education and teaching, and the new system of classified development.

Under the background of “new engineering”, innovation and entrepreneurship education has become an important breakthrough in the reform of education and teaching in colleges and universities in the new era. Deepening the reform of innovation and entrepreneurship education in colleges and universities, integrating innovation and entrepreneurship education into the whole process of talent training in colleges and universities, and improving the ability of education to serve the development of the country have become the new theme of the development of higher education. They are also the urgent need for the country to implement an innovation-driven development strategy and promote quality and efficiency upgrades (Zhong, 2017; Wu, 2018).

Achieving the “Two Centenary Goals” and realizing the great rejuvenation of the Chinese nation ultimately depends on talents. Knowledge is power and talent in the future. In order for our country to take the lead in the world in technological innovation, we must discover talents in innovative practice and cultivate talents in innovative activities. As a new force in China’s future, college students are the new force in implementing the innovation-driven development strategy and promoting “mass entrepreneurship and innovation”, and play a vital role in the realization of the “Chinese Dream”. Cultivating college students with innovative and entrepreneurial abilities is an important part of the current and future educational reform practice. Establishing and improving the innovation and entrepreneurial talent training system for college students is an important measure to help students transition from school to society, and is of great importance to students’ future growth and development. Only by cultivating students’ innovation and entrepreneurship ability and improving their social adaptability can students integrate into society better and faster, make greater contributions to various construction undertakings in our country, and achieve the ultimate goal of education and teaching. Under the background of “Mass Entrepreneurship and Innovation”, colleges and universities across the country have successively set off a wave of deepening the reform of innovation and entrepreneurship education (Ma & Wang, 2021; Xu, Shen, & Zhong, 2021).

3. Path Exploration of Innovation and Entrepreneurship Education Model Reform and Education System Construction under the Background of “New Engineering”

3.1. Innovative Educational Concepts and Educational Models, Reflecting the New Concept of “New Engineering” Engineering Education

Innovation and entrepreneurship education is different from traditional professional education in educational philosophy and educational model. The traditional professional education is to cultivate professional skilled talents who are “specialized in the art industry” through the imparting of professional knowledge. Innovation and entrepreneurship education is an educational concept and model produced under the national innovation and development strategy. It must collect innovation and entrepreneurship education resources inside and outside the school and the whole society, cultivate students’ innovative spirit, innovative thinking, entrepreneurial awareness, and innovation and entrepreneurship ability, so as to improve the comprehensive quality of talents (Zhang, Yan, & Wang, 2021).

Deepening innovation and entrepreneurship education is a “Breakthrough” for promoting the reform of talent training in colleges and universities to achieve significant results. It is necessary to always establish the educational concept that innovation and entrepreneurship education is an important carrier of education in colleges and universities, deeply understand the essential connotation of innovation and entrepreneurship education, actively track the new trends and new models of higher education personnel training at home and abroad, and study new measures and new methods for the cultivation of innovative and entrepreneurial talents. In the top-level design of talent training, build a sound system and mechanism, integrate the concept of innovation and entrepreneurship education under the background of “New Engineering” into each link and the whole process of ideological and political education, general education, and professional education, and use ideas, theories and Model innovation and reform promote high-level innovation and entrepreneurship education, and form a new mechanism for the cultivation of innovative and entrepreneurial talents (Xiao, Zhong, & Zhong, 2021).

First of all, innovation and entrepreneurship education should be integrated with ideological and political education. Through “Integration of Thinking and Innovation”, students’ ideals and beliefs and socialist core values should be cultivated, and the fundamental task of morality and talent cultivation should be implemented.

Secondly, innovation and entrepreneurship education should be integrated with professional education. Through “Integration of Thinking and Innovation”, the quality of personnel training should be improved, a highland for technical and skilled personnel training should be created, and college students with innovative and entrepreneurial abilities should be cultivated.

In addition, innovation and entrepreneurship education should fully reflect the concept of engineering education and integrate into the whole process of engineering education. Colleges and universities should attach great importance to the professional certification and professional evaluation of engineering education, organize the directors of colleges and departments, directors of teaching and research offices and relevant teaching management personnel to actively participate in the professional certification training of engineering education, and promote professional construction with the professional certification standards of engineering education. According to the “New Engineering” training requirements required by typical international engineering certification, explore an educational model that integrates value shaping, ability training and knowledge transfer, stimulates students’ innovative spirit, innovative thinking, entrepreneurial awareness, and enhances college students’ ability to innovate and start a business. Build a new innovation and entrepreneurship education system as a whole (Zhao, 2021).

3.2. Innovating the Curriculum System and Teaching Methods, Reflecting the New Structure of “New Engineering” Disciplines

The construction of “New Engineering” puts forward new requirements for the knowledge system of talents. In order to cultivate “New Engineering” talents that meet the development needs of the new era, colleges and universities must optimize and reform the original training plan, curriculum system and teaching methods, and highlight the concept of “new engineering” (Zhao, 2020; Xu, 2020).

First of all, it is necessary to build a new training mechanism for innovative and entrepreneurial talents. Under the premise of fully understanding the needs of students, organize and carry out innovative and entrepreneurial practice activities according to different needs, select students to join teachers’ scientific research projects, guide students to participate in various discipline competitions, break down the barriers between disciplines and majors, between schools and enterprises, and achieve A new mechanism for training talents in innovation and entrepreneurship education with multi-disciplinary cross-integration, inter-disciplinary learning, and collaboration inside and outside the school. guided by “practice” and “competition”, let “innovation” and “entrepreneurship” be interpenetrated and integrated, so as to improve students’ ability to ask questions, analyze problems, and solve problems, and cultivate students’ comprehensive quality and innovation and entrepreneurship ability.

Secondly, under the requirements of facing the new economy, new business format and industrialization, informatization and intelligent development, based on the compound and innovative nature of talent training under the background of “New Engineering”, combined with the advanced concept of international engineering education OBE, it is necessary to actively reform The original curriculum system is built into a new curriculum system, focusing on the cultivation of

students' comprehensive quality and innovation and entrepreneurship ability.

In addition, in the context of the construction of "New Engineering", based on the OBE concept, after determining the basic requirements of the curriculum system according to the training objectives, it is necessary to optimize the implementation strategy of the curriculum system construction. Adopt the method of point-to-face, gradual promotion, team operation, and comprehensive driving, and build a new model of "course unit" that combines projects and courses. Each "course unit" forms a closely related whole with course unit projects, scientific research practice projects, discipline team projects and graduation design practical engineering projects as the main chain. Construct general education units, professional education units, interdisciplinary and new technology units, innovation and entrepreneurship education units, engineering and humanities education units, and build a new economy and new business model according to the concept of "New Engineering" of intersection and integration, coordination and sharing professional new curriculum system. Actively explore the "engineering + management" dual-creation model. On the basis of engineering courses, configure some related management courses for students to take electives, guide students to learn relevant knowledge of enterprise establishment, operation and management, and cultivate innovation in the integration of disciplines talent.

Finally, in the daily teaching, the design covers "ideological and political education, general education, professional education, innovation and entrepreneurship practice, enterprise operation management" and other courses, and emphasizes the teaching methods of "heuristic, discussion, participatory, and experiential" teaching methods. Application, fully integrate classroom lectures, group discussions, case analysis, scene simulation, social research, on-site visits, character interviews, etc., use new information technology to meet the diverse and personalized learning needs of students, and build a multi-level, three-dimensional, classified, innovative and entrepreneurial education model that integrates professional education, interdisciplinary and individualized tiered guidance, fully mobilizes students' enthusiasm for participation, and helps students understand the teaching content more deeply.

3.3. Innovating Practical Teaching, Deepening the Integration of Production and Education, Reflecting the New Model of "New Engineering" Talent Training and the New Quality of Education and Teaching

Innovation and entrepreneurship education is a great undertaking to promote individual development, education and teaching reform, human knowledge accumulation, and social and economic development under the background of "New Engineering". The value of innovation and entrepreneurship education is to carry out in-depth integration of production and education, school-enterprise cooperation, and adhere to the principle of "promoting learning by competition, teaching by competition, and promoting innovation by competition" under the

reform of traditional education and teaching methods, and cultivate students' awareness of innovation and entrepreneurship, thinking, new concept and new model of quality education for spiritual and professional ability.

3.3.1. Guided by Industrial Needs, Carrying out Industry-Education Integration and School-Enterprise Cooperation to Achieve In-Depth Integration of Industry, Education and Research

Guided by serving the development of national strategic emerging industries, aiming at cultivating technical talents with strong engineering practice ability, it actively connects and actively caters to the diversified, personalized and dynamic demands of industrial development for talents. Teachers bring new knowledge, new technologies and new methods into the classroom through continuous scientific research activities, students stimulate scientific and technological innovation passion and sense of innovation through practical scientific research problems, and promote the “teaching” of scientific research and teachers and the depth of scientific research and students’ “learning” Fusion (Li, Qin, & Tie, 2021).

Colleges and universities should jointly determine professional courses that meet the needs of the industry according to the actual needs of enterprises, sign cooperation education agreements, jointly establish off-campus internship training bases for college students, on-campus joint education practice bases, and build a multi-subject collaborative education platform to achieve the goal of multi-subject collaborative education in industries, enterprises and schools, further promote industry-academia cooperation and integration of industry and education, and achieve personalized selection, practical training, cutting-edge leadership, and quality training.

3.3.2. Carrying out Normalized Innovation and Entrepreneurship Practice Activities to Stimulate the Innovation and Entrepreneurship Potential of College Students

Professional teachers are one of the core subjects in the implementation of innovation and entrepreneurship education. Teachers should be guided to change their traditional teaching concepts through the work of “passing, helping, and leading” in combination with professional characteristics and teachers’ subject backgrounds, encouraging teachers to undertake discipline competitions, scientific and technological innovation project guidance, and actively participate in professional construction and innovation and entrepreneurship education activities.

Actively and orderly organize students to participate in the China “Internet +” College Student Innovation and Entrepreneurship Competition, the “Challenge Cup” National College Students Extracurricular Academic Science and Technology Works Competition, the National College Student Robot Competition, and the “Creating Youth” National College Student Entrepreneurship Competition and other discipline competitions. Carry out normalized innovation and entrepreneurship practice activities based on science and technology competitions, from the cultivation of topics, the preparation of entries to the writing of

project books, and the on-site participation of competitions, the implementation of whole-process intervention and all-round guidance for discipline competitions, through active learning, Inquiry, exchange and thinking, and gradually carry out in-depth exploration and development, thereby stimulating students' practical ability, innovation ability, teamwork ability, enhancing students' self-confidence, and forming a good leading role among students.

Encourage freshman to senior students to actively apply for various innovative projects at the college, school, municipal, autonomous region and even national level individually or in teams, or participate in the mentor's vertical projects, horizontal projects, school-enterprise cooperation, industry-university-research projects Cooperation and other scientific research projects, relying on the Innovation and Entrepreneurship Practice Center, learn cutting-edge professional knowledge in related fields, and deeply experience the process of implementing innovative ideas through program design, project declaration, and carrying out scientific and technological innovation projects in practice, so as to cultivate students' innovative thinking, teamwork ability and scientific research ability. Through the practice of practical projects, students can deeply feel the concept of entrepreneurship and effectively cultivate entrepreneurial enthusiasm and potential.

Carry out normalized innovation and entrepreneurship practice activities based on subject competitions, innovative projects, mentor scientific research projects, etc., and give full play to the main role of students and the leading role of teachers. Senior and junior students take projects as a unit, through active learning, inquiry, communication and thinking, and gradually carry out in-depth exploration and development. The practice center encourages and supports potential works and teams to cultivate higher quality innovation and entrepreneurship projects (Fan, Wang, & Fan, 2020; Ministry of Education, 2019).

3.3.3. Strengthening the Construction of Innovation and Entrepreneurship Practice Center, and Providing Strong Support for the Cultivation of College Students' Innovation and Entrepreneurship Ability

The innovation and entrepreneurship practice center should adhere to the goal of cultivating students' practical ability, academic research ability, and stimulating students' innovative potential. The purpose of the construction is to cultivate and improve students' innovation and entrepreneurship ability, and give full play to the role of innovation and entrepreneurship center in stimulating students' innovative thinking and entrepreneurial potential, and cultivating students' independent thinking and judgment ability (Xu & Yin, 2020).

The Innovation and entrepreneurship practice center should adhere to a fully open, cross-professional and cross-grade model, and encourage and guide students to use their spare time or winter and summer vacations to enter the center for practical operations according to the requirements of the relevant competitions and projects they are participating in and under the guidance of professional instructors. Make full use of the software and hardware facilities of the

Innovation and entrepreneurship practice center to create works, so that students can go out of the classroom and into the society, constantly inspire innovative thinking in the process of participating in innovation and entrepreneurship competitions, and accumulate practical knowledge and experience outside the classroom, so as to effectively improve students to develop the practical ability, form an atmosphere of mutual learning, unity and cooperation, and gradually cultivate and improve the ability of innovation and entrepreneurship.

4. Conclusion

Under the background of “New Engineering”, integrating innovation and entrepreneurship education into the whole process of talent training in colleges and universities, realizing the full integration of innovation and entrepreneurship education and professional education, and improving the ability of education to serve the development of the country has become a new theme for the development of higher education. There is the urgent requirement to implement the innovation-driven development strategy. At present, under the background of “mass entrepreneurship and innovation”, colleges and universities across the country have successively set off a wave of deepening the reform of innovation and entrepreneurship education. However, the construction of “New Engineering” and the reform of innovation and entrepreneurship education still have the defect of a low degree of integration, the reform of innovation and entrepreneurship education is difficult to implement, and the cultivation of students’ innovation and entrepreneurship education ability still needs to be further improved. To deepen the reform of innovation and entrepreneurship education, we still need to work hard on “innovation”, starting from innovative educational concepts, innovative curriculum systems and teaching methods, innovative practice models, etc., to fully reflect the new concept of “New Engineering” engineering education, the new structure of subject specialization, the new model of talent training and the new quality of education and to cultivate innovative professional talents, entrepreneurial top-notch talents and high-level comprehensive talents that meet the development needs of the times.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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