Research and Practice on the Model of Innovation and Entrepreneurship Education Under the Perspective of New Engineering—Take Binzhou College as an Example

Wang Mengmeng

Binzhou University, Shandong, China

In order to adapt to the rapid development of new engineering and the national “13th Five-Year Plan” and the goal of talent cultivation in local applied universities, Binzhou College takes the innovation entrepreneurship ability and practical ability and quality as the core of education, and carries out the education mode from the actual demand. The reform put forward the “four in one” education model, including the four dimensions of target guarantee, teaching methods, training practice and ability. Local application-oriented universities need to make full use of the current educational development opportunities, establish an innovative and entrepreneurial talent training model that is in line with the development characteristics of the school, and strive to improve the quality of personnel training.

Keywords: innovation and entrepreneurship education, local applied universities, new engineering, talent training model reform, computer science and technology major, educational practice

Introduction

At present, the role of science and technology in economic and social development is increasingly obvious. It is generally believed that whoever has mastered the latest technology will take the lead in the fierce global competition. Innovation is a key driver of science and technology and economic development. Therefore, the cultivation of innovative and entrepreneurial talents in higher education institutions has been responded to by major countries (Wang, 2018). The traditional mode of engineering education, which attaches great importance to theory but not practice, knowledge but ability, has been out of step with the development of modern science and technology and the social demand. The phenomenon of “over-education” has become more and more obvious (Fan, 2018). In this context, China has proposed a new engineering concept based on new ideas, new features, new knowledge, new models, new opportunities, and new talents from the national strategic level, with a view to gaining competition advantage in technological innovation (Gao, 2017).

The core of the implementation of “New Engineering” is innovation and entrepreneurship education, and the effective development of innovation and entrepreneurship education directly determines the success or failure of
the “new engineering” strategy. The development of innovation and entrepreneurship education in China is not mature enough to meet the needs of China’s innovative talent construction. Local applied universities are the main body of engineering talents in China at present, but the lack of innovation and entrepreneurship education not only affects the development of the school’s characteristics, but also hinders the implementation of the “new engineering” strategy and the development of local economy and society. In view of the lack of understanding of innovative entrepreneurship education in local applied colleges and universities, the existing educational evaluation mechanism is not suitable for innovative entrepreneurship education, and innovative entrepreneurship education is separated from traditional education, etc. (General Office of the State Council, 2015). This paper studies the training mode of innovative entrepreneurial talents from the perspective of new engineering.

**Innovation and Entrepreneurship Training Objectives Under the New Engineering Background**

In the context of new engineering, the cultivation of innovative entrepreneurial talents includes the cultivation of elite quality and ability, innovation ability, engineering practice ability, and international competitiveness. Therefore, it is not a complete innovation education to carry on the general education with the pure quality training as the core and the elite education with the entrepreneur training as the core. The goal of the innovative entrepreneurship education is to train the students’ practical ability and the innovation ability (Wang, 2015).

Binzhou University, as a provincial applied university with aeronautical characteristics, has always been active in teaching reform in the same kind of colleges and universities, and its Information Engineering College is an important department for the cultivation of applied talents. The reform and exploration of innovative entrepreneurship education have been deeply studied, and a set of educational system with innovative entrepreneurial characteristics has been formed, which attaches importance to the general education of students and the basic education of subjects, on the basis of which the professional education and innovative entrepreneurship education are carried out. According to the needs of the construction of computer science and technology major and the development of the school, three directions of mobile interconnection, software engineering, and general specialty are set up, which generally form the training goal of computer science and technology undergraduate students with the characteristics of “new engineering subject”.

**Practice of Training Mode of Innovation and Entrepreneurship in Applied Universities Under the Background of New Engineering**

According to the training target of new engineering subjects and innovative enterprisers, the college carries on the reform of the training mode. Its train of thought is as shown in Figure 1. Starting from the engineering certification standard, the school training goal, and the professional training goal, the college innovates the education mode. In order to cultivate engineering talents with high innovation consciousness and practical ability, a “four-in-one” talent training model is constructed, as shown in Figure 2. In the process, according to the requirements of training new engineering subjects and innovative entrepreneurial talents, three modules of curriculum knowledge, innovative entrepreneurship education and quality development, and concentrated practice are constructed.
Course Knowledge Module

The module includes general education courses, subject basic courses, and professional education courses. Through the introduction of enterprise case, innovation and entrepreneurship mechanism and other reform
In addition to traditional courses, the general education curriculum increases the curriculum of social inquiry and critical thinking, science and technology, innovation and entrepreneurship, and strengthens the cultivation of innovation awareness and entrepreneurial ability; the basic courses of the discipline include courses in mathematics and programming; professional education courses. Including model, digital, data structure, computer network, computer composition principle, database, software engineering and program development technology, network security and other courses, and appropriate adjustment according to different professional directions, strengthen student interest training and improve learning efficiency.

**Innovation and Entrepreneurship Education and Quality Development Module**

The innovation and entrepreneurship module includes innovative entrepreneurship education curriculum and innovation entrepreneurship training. The education curriculum is generally for college students’ career planning, college students’ innovation, and entrepreneurship guidance, etc. It guides and motivates college students’ innovation consciousness and innovation and entrepreneurship practice; the training follows the enterprise cooperation model and according to industry needs to carry out innovation and entrepreneurship training such as “Andriod” and “Java web” enterprise development. The enterprise engineers use the actual cases and situational teaching of the enterprise to improve the quality and competitiveness of students’ innovation and entrepreneurship.

**Centralized Practice Module**

Concentrated practice is an effective means to improve the ability of innovation and entrepreneurship. It emphasizes the ability to independently discover and solve problems. Students are the mainstay, advocate independent learning, think independently, and improve their ability as the fundamental goal. The model can be divided into four levels, as shown in Figure 4. The basic layer is mainly based on curriculum experiments, aiming at stimulating students’ interest in professional learning and mastering professional knowledge. The professional
level is mainly based on various topics and subject competitions, and expands students’ ability of innovation and practice through on-campus or off-campus practice. Professional knowledge learning improves students’ self-learning ability; engineering training and graduation practice mainly rely on student-led comprehensive training to cultivate professional skills application and comprehensive quality; targeted practice and entrepreneurial incubation are oriented towards strong sense of innovation and outstanding entrepreneurial ability. Students with relatively mature business plans carry out innovation and entrepreneurship practice training, which requires the joint care of schools, enterprises and society, and jointly guarantees the smooth implementation of innovation and entrepreneurship practices.

![Practice training hierarchy.](image)

**Teaching Methods for Cultivating Innovative Entrepreneurship Under the Background of New Engineering**

Introducing innovation and entrepreneurship education in engineering education is the connotation of the new engineering and the development direction of the new engineering education. Innovation and entrepreneurship education is an important way to cultivate students’ awareness of innovation and entrepreneurship. The American Engineering and Technology Certification Board regards the development of innovation and entrepreneurial thinking, skills, and knowledge as an important measure in engineering education. In this context, according to the actual situation of our school, the heuristic teaching, discussion and participatory teaching methods were introduced into the classroom, and achieved good results.

**Heuristic Teaching Method**

Use real-life cases to stimulate students’ interest in learning, help students organize their knowledge, and inspire students’ divergent thinking on the application of theoretical knowledge in practice. Computer theory is abstract, and the learning of various algorithms, protocols, or standards is relatively isolated. How do you use these problems when encountering problems or requirements? This is a lack of our students, which is why some students with good exams have poor development and design skills. The use of heuristic teaching exercises in the
practice of theoretical knowledge is conducive to improving students’ theoretical application and practical ability.

**Discussion-Based Teaching Methods**

In view of the problems encountered in the classroom theoretical study and technical practice, the discussion within the group and between groups will be carried out to enhance students’ ability of communication and collaboration, enhance students’ thinking ability, and stimulate students’ innovative ability. Teachers can answer questions online and discuss regularly in class so as to solve the problems of students in time and solve the problems that come back from practice. Guide students to discover problems and think about them, strengthen the application of CMOOC, online courses, and various teaching software in the teaching process, and improve the convenience of students’ independent learning. Enhance students’ learning interest and self-confidence through discussion-based teaching, and improve students’ learning ability.

**Participatory Teaching Methods**

Computer major learning, the experience process is very important, so each student is required to fully participate in classroom experiments, project development, and group project discussions. Exercise the ability to design and development of typical computer software, hardware systems and to use computers to serve other disciplines. Enhance the process experience, deepen understanding and application of knowledge, and strengthen the ability of students to write project documentations, research papers, and scientific papers, project communication and defense.

**Guarantee Mechanism for the Cultivation of Innovation and Entrepreneurship Ability**

**Under the Background of New Engineering**

**Deepening the Mechanism of Collaborative Education**

In recent years, college-enterprise cooperation, collaborative education model had a more profound impact on local talent training application-oriented colleges and universities. The Department of Higher Education of the Ministry of Education has launched more than 20,000 collaborative education projects, most of which are in application-oriented colleges and universities. The faculty and practice environment with innovative and entrepreneurial ability is a key problem that local colleges and universities cannot solve in a short period of time. The company has experienced engineers and enterprise cases. In-depth cooperation with enterprises can make up for the shortcomings of colleges and universities. Colleges and enterprises play their respective advantages. It has greatly promoted the professional integration, professional practice ability and innovation and entrepreneurship ability of new engineering. Taking our hospital as an example, computer science and technology, communication engineering and other majors have established a full coverage of school-enterprise cooperation. The Ministry of Education has signed more than a dozen projects, and the students’ practical ability training has been significantly strengthened. Further deepening the college-enterprise cooperation and collaborative education mode is an important guarantee for the cultivation of innovation and entrepreneurship ability of local applied universities.

**Establishing the Academic Status of Innovation and Entrepreneurship Education**

At present, the local application-oriented college teaching model is still based on traditional indoctrination
education and repetitive training, and the quality of talent training is difficult to improve, only in the form of employment guidance to carry out innovative entrepreneurship education. Teachers and students do not pay enough attention; the educational effect is not obvious. There is a lack of systematic and mature theoretical research and results guidance in local colleges and universities, thus establishing the subject position of the innovation and entrepreneurship education, strengthening the research of relevant theories and practice, and improving the integration of the innovation and entrepreneurship education and the professional education, will help to improve the training quality of the innovative and entrepreneurial talents.

Establishing a Sound Evaluation Mechanism

A reasonable evaluation mechanism can guide the development of education in the right direction. In view of the current lack of students’ active feedback and reflection ability, and the insufficient attention of teachers to innovation and entrepreneurship, the evaluation mechanism for teachers and students to adapt to the professional innovation and entrepreneurship ability is established. Conducive to improving students’ ability to innovate and start a business. Taking Computer Science and Technology as an example, in the course of class assessment, practice-oriented, including problem-solving, theoretical analysis, algorithm design, software and hardware testing, document finishing, and other aspects of the staged assessment system. In the aspect of extracurricular examination, the credit of practice and innovation should be increased within the total 175 credits, and students should be encouraged to carry out innovative entrepreneurial activities, including competitions in various disciplines; the evaluation of teachers should be guided by practice and evaluation of achievements, and teachers’ ability assessment should be emphasized.

Conclusion

Today, with the rapid development of new engineering, innovation and entrepreneurship education is more urgent. The purpose of in-depth promotion of innovation and entrepreneurship education in local application-oriented universities is not to cultivate all students into entrepreneurs, but to promote students’ learning knowledge and cultivate students’ innovative consciousness through practical means, and improve the comprehensive ability of students’ development. Therefore, the innovation and entrepreneurship education model needs to be combined with the local society, the school environment, and the professional characteristics. Only in this way can the innovation and entrepreneurship education be implemented and the quality of personnel training can be improved.

References