

# Research on the Cultivation of Project-Driven Engineering Innovation and Entrepreneurship Ability

Yilin Bei, Xiaorong Zhu\*, Bin Feng, Tailei Wang

*Information and Science and Technology Department, Taishan University, Tai'an, China*

*\*Corresponding author*

## ABSTRACT

In order to give play to the function of educating people in the revolutionary spirit, and to cultivate the core socialist values of college students with the revolutionary spirit, we must first make college students realize the recognition of the revolutionary spirit. For that end, we must build the revolutionary spirit recognition mechanism. Several factors must be considered in constructing the revolutionary spiritual identity mechanism for college students. Generally speaking, the revolutionary spiritual identity is divided into two levels — the individual and the social level. The individual mechanism formation is the internal of revolutionary spiritual identity, which mainly includes the mechanism of rational analysis, emotions, ideal and faith guidance, and social practice strengthening. The social mechanism formation is the external mechanism of revolutionary spiritual identity, which mainly includes the mechanisms of practice, enlightenment, guidance, reward and punishment.

**Keywords:** *Industry-education integration, Project-driven, Engineering innovation and entrepreneurship*

## 1. INTRODUCTION

At present, the world is in the period of transformation of the fourth industrial technology revolution. The traditional paradigm of the technological industry will be rapidly upgraded, transformed, and entered a new paradigm. Whether China can seize the opportunity to successfully upgrade industrial institutions, enhance technological competitiveness, and occupy the commanding heights of the value chain in the global market, the key is the improvement of innovation and entrepreneurship and the industrialization of engineering technology.

## 2. RESEARCH BACKGROUND AND EXISTING PROBLEMS

The global industrial revolution has entered a new paradigm, and education reform must also respond and enter a new paradigm in order to meet the needs of industrial upgrading for talents. The term paradigm has been wonderfully discussed by Thomas S. Kuhn, a famous American philosopher of science. "Paradigm shift" refers to a new development in a field, the original ideas, assumptions, rules, values, etc. are no longer suitable for new changes, thus forcing people to make fundamental changes in this field.

Dr. Wu Haoming, former director of the Center for Educational Leadership Research at the School of Education, The University of Hong Kong, proposed that paradigm shifts require changes in values and beliefs. To

achieve a paradigm shift, one cannot simply change the "external" practices, behaviors, and tools. On the contrary, the "internal" beliefs, values, and basic assumptions must be changed. If the values and beliefs have not changed, it will be difficult to complete the behavior change.

The cultivation of innovation and entrepreneurship in engineering background is a relatively weak and neglected problem in China's higher education for a long time. The key to whether a large number of engineering and technical talents with entrepreneurial ability can be cultivated is whether the talent training mechanism is scientific and reasonable. The "traditional engineering talent training method" can no longer meet the quantity and quality requirements of national industrial upgrading and new industry development. It is not conducive to the cultivation and emergence of innovative and entrepreneurial talents in the era of knowledge economy.

Closed door education has completely fallen behind. New paradigm brings new changes. New engineering and subsequent waves will bring each of us into a new era - the era of education integration.

In recent years, China's higher education has also gone out of campus under the guidance of national policies to conduct industry-university cooperation and coordinate education, but at present, school-enterprise cooperation is mainly used in vocational colleges and universities, and only at the level of skill improvement and employment. Most of the undergraduate colleges, as the main force of innovation and entrepreneurship, are in a state of "wait and see", "eyes are high and hands are low", and "fuzzy positioning". Due to capital, system, mechanism and other reasons, innovation and entrepreneurship education is difficult to be guaranteed, and there still exist the drawbacks

of "emphasis on theory, practice; performance, ability". In addition, because the current university evaluation system also tends to be based on basic theoretical research results, it is inevitable that the teaching team will be disconnected from the first-line needs of the national economy while completing the doctoralization. A large number of research talents are flooding application-oriented undergraduate colleges, resulting in a disconnection of knowledge structure and training objectives, and it is difficult to undertake the task of cultivating a large number of innovative and entrepreneurial talents that are urgently needed for the conversion of old and new kinetic energy. With the industrial upgrading, the change of global economic environment and the proposal of the strategy of building an innovative country in China, how to solve the problem of the lack of innovation and entrepreneurship ability training of China's scientific and technological talents has become an urgent task for China's higher education. It is of great theoretical and practical significance to conduct in-depth research and beneficial exploration on the training mechanism of "innovation and entrepreneurship" ability of engineering talents for improving the quality and level of training of engineering talents, promoting the reform and development of higher education, and formulating or improving relevant education policies and systems.

### **3. THE SIGNIFICANCE OF THE INTEGRATION OF INDUSTRY AND EDUCATION**

Enterprises are increasingly becoming the main body of knowledge production and technological development. Its relationship with universities is getting closer and closer, and it is a mutually beneficial relationship. More and more entrepreneurs realize that strengthening industry-university collaboration can not only directly translate university scientific research achievements, solve enterprise technical problems, but also through collaborative education and incubation Entrepreneurship and other ways to create opportunities for "acquisition of original shares". Technological enterprises are not only the driving force of the fourth industrial revolution, but also a base for engineering and technological innovation and entrepreneurship, and a "government-industry-university" collaborative training base for engineering innovation and entrepreneurship talents. It has been fully recognized from the national level that the construction of the "innovative and entrepreneurial" talent training mechanism can be completed not only by school education and school guarantees, but it must be combined with social education and self-education to achieve the desired effect.

Therefore, colleges and universities should carry out comprehensive and in-depth cooperation with relevant scientific and technological enterprises, and establish an organic consortium of "industry-university cooperation, project-driven, and achievement transformation". Using the

consortium as the link, the school and enterprise build a platform for interaction between students and entrepreneurs, establish a guidance mechanism for enterprise mentors to enter the school, improve the enterprise internship mechanism, incubate the entrepreneurial mechanism, and establish a venture capital system. Both the school and the enterprise should continue to improve the school-enterprise collaborative training mechanism, provide students with practical combat opportunities and business opportunities give full play to the collaborative training of the enterprise, and cultivate students' scientific research knowledge, innovative spirit and entrepreneurial ability.

### **4. PROJECT-DRIVEN ENGINEERING INNOVATION AND ENTREPRENEURSHIP TRAINING MODEL**

This solution aims at the problems existing in the cultivation of traditional engineering and current school-enterprise cooperation:

(1) Solve the problem of a single form of industry-university cooperation and insufficient depth of cooperation

We select enterprise project managers and senior engineers and even entrepreneurs to participate in the teaching of colleges and universities in the form of elective courses, lectures and practical training, and establish project-driven curriculum plans and outlines. Through careful design of practical training projects, we carry out comprehensive assessment of the corresponding technical direction of students and give reports in stages.

Based on the innovation laboratory, college teachers and enterprise teachers jointly organize students to participate in various professional skill competitions. Enterprises give more guidance and support to students in technology and projects, so that students can inspire innovation, broaden thinking, hone technology, and constantly accumulate and improve interest and self-confidence in professional learning through competitions.

Through the establishment of production-learning-research project studios, enterprises can introduce commercial projects into universities, and with the help of college teachers and students, carry out cooperative research and development of commercial projects. On the other hand, colleges and universities can fully train students' professional ability, team spirit, innovation awareness and entrepreneurial experience with the help of real projects.

With a certain amount of accumulation, schools and enterprises can jointly support potential students and teams, provide support for projects and funds, and encourage college students to jointly start businesses.

(2) Solve the problem of updating teaching content through in-depth industry-university cooperation

In this project, through in-depth industry-university cooperation, the practice teaching system structure will be changed, courses for the needs of first-line industries will be

added, practical links will be strengthened, and comprehensive capabilities that meet the needs of enterprise positions will be cultivated. We hire enterprise project managers and senior engineers to teach practical courses in universities, and also send students to enterprises for project internships.

Only by infiltrating the requirements of professional knowledge, technology and quality of the enterprise into all aspects of teaching, can we inspire the students' "innovation and entrepreneurship awareness" and cultivate the talents of "starting on the job" and "plug and play".

(3) Build a new talent training system by building a multi-level teaching system of "practice-competition-project-entrepreneurship".

Combined with the needs of industry (enterprise), formulate a practical teaching training program with professional skills improvement and engineering quality training as the core, and scientifically build a practical teaching system that highlights the characteristics of "innovative and entrepreneurial" talent training.

The University and enterprise cooperate to establish the university student incubator, support valuable student projects and teams, and encourage and support the entrepreneurship of university students. The incubator is designed for the college students who participate in the innovation project, which is divided into four steps: professional ability evaluation, project case development, real project practice and achievement incubation.

(4) Solve the problem of building a double-qualified teacher team through the measures of "going out + invite in" and "introduction + training"

This project adopted the methods of "going out + invite in" and "introducing + training" to solve the shortage of double-qualified teachers. By going out, students are sent to the enterprise to recognize, and the classroom is transplanted to the enterprise environment to experience. By inviting them, corporate teachers are invited to attend classes and lectures, so that students can enrich new knowledge and new technologies.

The professional teachers in the school can also quickly master the new technologies used by the company in the communication with the enterprise, and gradually apply them to practical teaching. Relying on school-enterprise cooperation, not only makes up for the lack of practical teaching, but also cultivates double-qualified teachers.

By sending teachers to work in enterprises, participating in enterprise project research and development and other measures, teachers' professional practice ability has been effectively improved.

(5) Innovate the industry-university-research cooperation model, and solve the transformation of scientific and technological achievements through "academic + engineering, research + development"

Colleges and universities rely on industry-university cooperation platforms to build "academic + engineering" scientific research teams. They use the large-scale scientific research equipment of universities and the intellectual

resources of expert teams to carry out scientific research with industrial engineers to serve the regional economy.

At the same time, under this model, college teachers' scientific research work will be closely combined with practice to achieve a "research + development" closed loop, thereby crossing the gap between science and engineering, reaching substantive cooperation and serving the needs of social and economic development.

## 5. CONCLUSION

Through the construction of project-driven engineering teaching system, we have effectively improved students' practical ability, innovative ability and ability to solve complex engineering problems, and effectively promoted the improvement of engineering talents training quality.

After the implementation of the teaching reform, the number and level of awards of the students' professional skills competition have been greatly improved, the high-end employment rate of students has continued to increase, the success rate of student entrepreneurship incubation has increased significantly, and the reform effect has been obvious.

Through the in-depth integration of both schools and enterprises, a win-win model of industry-education integration, coordinated development, and mutual benefit and win-win results has been achieved. The ability of universities to undertake horizontal scientific research projects and serve local economic development has significantly improved.

## ACKNOWLEDGEMENT

This research was financially supported by the "Teaching reform and research project of Taishan University" (No.201801), Research on Project-driven Engineering Innovation and Entrepreneurship under the Background of New and Old Kinetic Energy Conversion. In addition, this article was partially supported by the "Teaching reform and research project of Taishan University" (No. 201740 and No.201710).

## REFERENCES

- [1] Tan Fangyong, Zhang Zhen, Fang Ligang. Reform of the "Industry-Education Integration, Collaborative Education" Talent Training Model in Higher Vocational Colleges—Taking Suzhou Vocational University Computer Network Technology as an Example [J]. Journal of Suzhou Vocational University, 2019 (1): 65-68.

[2] Yang Lifang, Lu Weizhong. Deepening the integration of industry and education, the cooperation between schools and enterprises—the exploration and practice of mixed ownership secondary colleges [J]. *Science and Technology of Chinese Universities*, 2019 (Z1): 98-99.

[3] Li Jinyan. Research and Practice of "Industry-Education Integration and Collaborative Education" Applied Talent Cultivation [J]. *Education Modernization*, 2018 (34): 3-4.

[4] An Jing, Chen Chen, Cui Minri. Practical exploration of school-enterprise cooperation during the transition period of new undergraduate colleges and universities—Taking Guizhou Institute of Engineering Technology as an example [J]. *Vocational and Technical Education*. 2015 (11)

[5] Wang Jianliang, Ye Shengyan. Innovating the integration model of industry and education to promote the coordinated development of regional education [J]. *Chinese Vocational and Technical Education*. 2013 (28)