

Research on the Integration of Innovation and Entrepreneurship Education and Higher Special Education Courses

——Taking the Network Engineering Course of the Technical College for the Deaf of Tianjin University of Technology as an Example

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Abstract. Under the background of "mass entrepreneurship and innovation", mass entrepreneurship and innovation education urgently need integration with professional education. This paper takes the Network Engineering course of the Technical College for the Deaf of Tianjin University of Technology as an example, analyzes the mass entrepreneurship education's research status, deeply studies the integration education of innovation and entrepreneurship education and the deaf network engineering professional course, and proposes the education path of "integration of expertise and innovation," it gives a new method for the organic combination of entrepreneurship and innovation education and professional education in China's higher special education.

Keywords: mass entrepreneurship and innovation education; special education; Professional courses; professional and creative integration

1. Introduction

In 2015, Premier Li Keqiang proposed "mass entrepreneurship and innovation" in the government work report. In 2018, the State Council issued the Opinions on Promoting the High-Quality Development of Innovation and Entrepreneurship and Creating an Upgraded "Mass Entrepreneurship." In recent years, although many universities have carried out mass entrepreneurship and innovation education and achieved some results, mass entrepreneurship and innovation education have not been carried out in higher special education schools^[1-3]. Most of them are realized by adopting mass entrepreneurship and innovation education courses and have not been combined with professional courses. It is difficult to deepen mass entrepreneurship and innovation education, especially in higher special education schools. Mass entrepreneurship and innovation education need to be organically integrated with professional education. Only mass entrepreneurship and innovation education integrated into professional education can have certain practical significance^[4-6].

The network engineering of the Technical College for the Deaf is a higher special education college for training hearing impaired talents. Network engineering is to train application-oriented senior professional and technical talents. They have a solid knowledge of computer networks and related fields. They have certain engineering management abilities and good comprehensive quality. They can be engaged in the design, development, deployment, operation, maintenance, and other work of computer network systems in scientific research institutions, enterprises, government departments, etc. This major meets the shortage of talents in the network field. Integrating innovative thinking and entrepreneurship into the teaching of network engineering courses will benefit students' employment and entrepreneurship in the future. The current teaching content cannot meet the actual needs, and the integration of mass entrepreneurship and innovation education is a mere formality. How to combine them substantively requires in-depth discussion and practice.

2. Status quo of entrepreneurship and innovation education in the Technical College for the Deaf of Tianjin University of Technology

2.1 Status quo of mass entrepreneurship and innovation education in network engineering

The Technical College for the Deaf of Tianjin University of Technology is one of the four engineering colleges for the Deaf in the world. It is known as Tsinghua for the Deaf. Deng Pufang, the former president of the China Disabled Persons' Federation, has inspected the Deaf Institute many times and praised it as a pearl of special education! The network engineering major of the college has been recruiting students since 2015. It is aimed at hard-of-hearing students across the country. Combining its learning and professional training characteristics, it has formed a training mode of "multi-module, phased and practice-oriented training mode." It is guided by the ideological and political construction of the curriculum, focused on the study of professional knowledge of the curriculum, and innovated and entrepreneurial practice training methods in a modular and phased manner. It is student-oriented and output-oriented to meet the various requirements specified in the National Standards for the Teaching Quality of Undergraduate Majors in Ordinary Colleges and Universities issued by the Ministry of Education.

The professional construction practice teaching resources are rich, with barrier-free science and technology research and development center, off-campus training base, collaborative education base, innovation demonstration laboratory, network engineering, generic cabling, and network security laboratory. We have established good cooperation with NTID of the United States, the National University Corporation Tsukuba University of Technology of Japan, and the Bauman Moscow State Technical University of Russia. We have achieved mutual recognition of credits for relevant courses with NTID of the United States. We have jointly built courses with Xipu Corporation and enriched resources with high-quality and improved course content to innovate course practice and training links.

2.2 Status quo of Mass Entrepreneurship and Innovation Education of Network Engineering Course

Network Engineering is an important core professional course for the network engineering major of the Technical College for the Deaf of Tianjin University of Science and Technology. It is a comprehensive course that combines theory, practicality, and innovation. Based on the OBE concept, the course establishes a closed-loop evaluation feedback mechanism (as shown in Figure 1) oriented by the curriculum training objectives and graduation requirements. From the perspective of teaching effect and cultivating students' innovation and entrepreneurship ability, the course infiltrates innovation and entrepreneurship thinking into all aspects of education and teaching and completes the cultivation of students' innovation spirit, entrepreneurship awareness, and innovation and entrepreneurship ability while improving teaching quality.

Up to now, this course has been offered in the network engineering major from Grade 15 to Grade 19, respectively. See Table 1 for details:

Table 1. List of network engineering courses

Opening time	Class	Number of students	Teaching situation	Innovation
2018-2019	Grade 15	18	Good	High
2019-2020	Grade 16	23	Good	High
2020-2021	Grade 17	22	Good	High
2021-2022	Grade 18	21	Good	High
2022-2023	Grade 19	19	Good	High

This course adopts a new teaching mode that combines online and offline teaching, virtual simulation technology, real equipment, and practice inside and outside the school to enhance students' practical ability and innovative engineering awareness. This course adheres to the talent

cultivation concept of "thick foundation, wide caliber, ability oriented and innovation-oriented." It cultivate

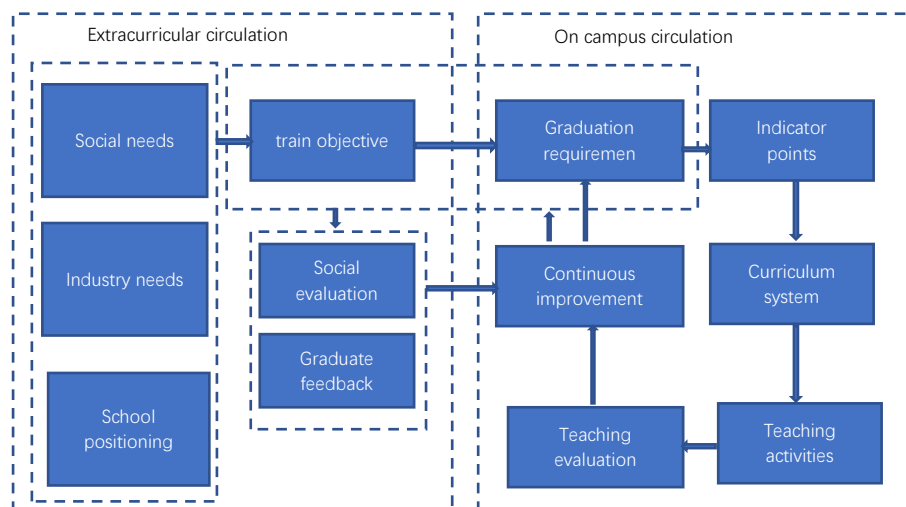


Fig. 1 Closed loop evaluation and feedback mechanism of teaching process quality

students to have substantial employment advantages in Tianjin and surrounding areas and a strong sense of innovation and entrepreneurship.

2.3 Achievement of the goal of mass entrepreneurship and innovation education in Network Engineering

This course aims to cultivate talents with essential qualities of innovation and entrepreneurship and pioneering personality, orient education to the future, develop practical skills, and promote the development of innovation and entrepreneurship education. In recent years, the school's professional teaching quality assurance system has been improved, teaching management has become more standardized, teaching and research level has been continuously improved, teaching quality has been comprehensively improved, and teaching achievements have been fruitful. The course leader and team members conducted continuous research and approved three education reform projects. The course leader guided the students to win the national gold medal of the seventh Internet + college student innovation and entrepreneurship competition, which realized the breakthrough of Tianjin University of technology in the main track of the Internet + competition of ordinary colleges and universities in Tianjin. The award of the competition marks the significant effect of the course leader in integrating innovation and entrepreneurship education into the professional course education for the deaf in Colleges and universities. At the same time, the course team members also won gold and silver in the Challenge Cup many times, won the first prize in Tianjin in the New Engineering College Students Competition, and made outstanding achievements in other innovation competitions. They published and employed two EI retrieval papers with students as the first authors, won one software copyright, and applied for one patent.

3. The integration path of mass entrepreneurship and innovation education and higher special education professional curriculum education

Based on the experience of mass entrepreneurship and innovation education of network engineering courses in the Technical College for the Deaf of Tianjin University of Technology, this paper proposes the following paths for the integration of mass entrepreneurship and innovation education and special education courses in colleges and universities:

3.1 Construct the teaching mode of "integration of specialty and innovation" and innovate the teaching method of mass entrepreneurship and innovation education

The curriculum adopts the task-driven model. The curriculum teaching team puts forward curriculum problems in combination with mass entrepreneurship and innovation education. After investigation, the task is determined. According to the task requirements, the student team members conduct detailed analysis and discussion through systematic review and research within the group. Finally, the results of the project tasks are obtained. Teachers give corresponding evaluation feedback based on the project submission results and presentation. The six-in-one teaching mode of "integration of specialty and innovation" has been constructed, which integrates question setting, research, analysis, conclusion, and evaluation. The concept of mass entrepreneurship and innovation education has been introduced into the professional curriculum education, and student-oriented mass entrepreneurship and innovation teaching modes have been created, which can fully develop the students' subjective initiative. It is no longer the traditional spoon-feeding teaching mode. Students have thought about it and participate in the curriculum teaching in the whole process.

3.2 Enrich the content of mass entrepreneurship and innovation courses and increase the proportion of practical courses integrating professional innovation

According to students' needs, professional knowledge, innovation, and entrepreneurship practice will be linked. Accordingly, entrepreneurship education and professional education will be integrated, and the theory and practice of innovation and entrepreneurship education in higher special education will be combined. Develop a multi-form and diversified innovation and entrepreneurship curriculum model. Establish a "government university enterprise" collaborative innovation and entrepreneurship practice education mechanism to promote the quality of innovation and entrepreneurship courses in higher special education.

3.3 Innovate teaching assessment methods to improve the learning effect of deaf students on entrepreneurship and innovation courses

Change the traditional theory-based teaching method, use the "Internet +" method, learn and innovate the foreword content, and improve the integration of theory and project practice through group cooperation; In terms of teaching assessment, we should attach importance to the process evaluation of students and the promotion of innovation and entrepreneurship ability and awareness; Through setting up project reports for assessment, the comprehensive quality of students in all aspects was comprehensively investigated.

3.4 Give play to the role of entrepreneurship and innovation mentors, and introduce the system of entrepreneurship and innovation mentors to ensure entrepreneurship and innovation activities

Improve the existing teachers' education and teaching ability through training, and improve the quality of teachers in the school curriculum construction team; By identifying the entrepreneurship and innovation guidance work of curriculum entrepreneurship and innovation tutors, mobilize the enthusiasm of professional teachers, introduce innovative projects through innovative courses, and actively participate in various innovation and entrepreneurship competitions; Actively introduce talents to ensure that front-line mass entrepreneurship and innovation teachers have a high level and rich practical experience.

3.5 Strengthen the cooperation between schools and enterprises and build an innovative community of industry, education, and research

Strengthen the deep cooperation with enterprises, promote the pace of collaborative education and talent cultivation of industry, education and research, diversify the construction of teaching

staff, build an experimental and practical teaching platform, jointly build a professional curriculum system integrating innovation and entrepreneurship, coordinate the cultivation of high skilled applied talents, use new technologies, new standards and new skills of enterprises, establish an off campus training base, and increase the proportion of practical courses. Realize the integration of production, teaching, and research by means of group learning and inquiry learning, explore the whole process of combining theoretical learning, hands-on practice, teaching, and research, and build a three-dimensional curriculum collaborative education model to build an innovative community of production, teaching, and research.

4. Summary

In a word, to achieve the organic integration of entrepreneurship and innovation education and professional courses of higher special education, we should integrate the teaching mode, teaching methods, course content, and other dimensions, constantly innovate the course teaching assessment, improve the role of entrepreneurship and innovation mentors, strengthen the deep integration of courses and enterprises, build an innovation community of industry and college, and provide necessary guarantee for talent training. In order to achieve the deep integration of mass entrepreneurship and innovation education and higher special education professional courses. It is a long-term and systematic project to cultivate a group of professionals with an innovative and entrepreneurial spirit who are hard of hearing in network engineering. It needs the guidance of the government, the support of people from all walks of life, and the persistent exploration and practice of special education teachers to contribute to the cause of special education in China.

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References

- [1] Lv Y, Chen Y, Sha Y, et al. How entrepreneurship education at universities influences entrepreneurial intention: mediating effect based on entrepreneurial competence[J]. *Frontiers in Psychology*, 2021, 12: 655868.
- [2] Mei W, Symaco L. University-wide entrepreneurship education in China's higher education institutions: issues and challenges[J]. *Studies in Higher Education*, 2022, 47(1): 177-193.
- [3] Dong X. Research on the integration of curriculum ideological and political education, innovation and entrepreneurship education into professional curriculum system in higher vocational colleges under the new engineering background[C]//MATEC Web of Conferences. EDP Sciences, 2022, 355.
- [4] Mok K H. The Role of Higher Education, Innovation, and Entrepreneurship in Bay Areas: Challenges and Opportunities[J]. *Higher Education, Innovation and Entrepreneurship from Comparative Perspectives*, 2022: 1-14.
- [5] Lv M, Zhang H, Georgescu P, et al. Improving education for innovation and entrepreneurship in Chinese technical universities: a quest for building a sustainable framework[J]. *Sustainability*, 2022, 14(2): 595.
- [6] Qian M. Innovation and Entrepreneurship Education and Specialized Education[C]// 2016 2nd International Conference on Economy, Management, Law and Education (EMLE 2016). Atlantis Press, 2016: 472-475.