

The Construction of a National First-Class Major in "Communication Engineering" Based on "Student-Centred"

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Abstract: The Communication Engineering major at Xi'an University of Science and Technology is a national first-class professional training center. Based on the OBE and the "student-centred" concept, this platform aims to reform the professional training plan, curriculum teaching system, teaching content, teaching methods in response to existing teaching problems. By combining the collaborative education model of industry education integration, innovative talents are cultivated.

1. Introduction

With the rapid development of China's economy, improving national competitiveness and independent innovation capabilities of enterprises have become key factors for China to enhance international competition. Among them, innovative talents are the top priority in meeting and participating in international challenges. In the current national situation, the key to cultivating innovative talents lies in education, especially higher education, which has a significant impact on them. The Communication Engineering major of Xi'an University of Science and Technology is based on a national first-class professional training center as a platform, with a "student centered" approach and the OBE concept. Through teaching reform, it has established the training goal of systematically mastering basic engineering knowledge and communication theory, and being able to engage in scientific research, engineering design, equipment manufacturing, operation and maintenance, and technical management in the fields of information communication and emergency communication.^[1]

Therefore, starting from the characteristics of the communication engineering major and under the educational concept of "student-centered", a comprehensive reform and construction will be carried out on the training plan, teaching system, teaching content, teaching methods and methods, assessment methods, practical links, and teacher teaching level of the communication engineering major, with the goal of improving teaching quality and cultivating innovative applied talents.

2. Main teaching problems to be solved

(1) Strengthen the teaching concept of "student-centered", reform teaching methods, construct a multi modal and three-dimensional teaching system for courses, and improve teaching quality.

The traditional offline classroom is centered around teachers, with teachers as the main body of the classroom and students as onlookers. Therefore, in the teaching process, the teaching concept of "student-centered" is constantly strengthened, and the teaching methods of teachers have changed from mainly teaching to exploring and guiding students to learn. The student-centered teaching philosophy stimulates students' enthusiasm for learning, allowing them to actively absorb new knowledge, independently choose and decide their own learning activities, cultivate students' comprehensive ability to analyze and solve complex problems using professional knowledge, and enhance their innovation ability.^[2]

(2) The talent cultivation system in response to the needs of new engineering talent cultivation.

Focusing on the advantages of geology and mineral resources in our school and the wide range characteristics of communication engineering, two professional directions have been established:

wireless communication and communication network. Based on the concept of OBE oriented output and continuous optimization, the 2020 version of the talent training plan has been formulated.

(3) The construction of an innovative teaching system.

Continuously introducing high-level talents, a high-level teaching team has been built led by renowned teachers with equal emphasis on teaching and research, and outstanding practical abilities. A two-level management mechanism has also been established for the communication engineering teaching guidance group and teaching team.

(4) The construction of innovative teaching platforms.

Starting from cultivating students' ability to solve complex engineering problems in the communication industry, and based on the school enterprise cooperation and collaborative education model, a number of innovation, entrepreneurship, and practice platforms have been constructed.^[3]

(5) The cultivation of students' innovative abilities.

By promoting a four-year continuous training model for software and hardware design abilities, encouraging teachers to guide students to participate in scientific research projects and subject competitions, the quality of students' employment and graduate enrollment have been steadily improve.

3. Methods for solving teaching problems

(1) A talent cultivation plan that conforms to the OBE concept, centered on cultivating students' theoretical and innovative practical abilities.

The plan is divided into three levels:

① The first level is a general education course and a professional course, reflecting humanistic qualities and professional abilities.

② The second level is a professional core course that adapts to the direction of new engineering majors, with a focus on the cultivation and application of theoretical and engineering abilities, especially the cultivation of information engineering abilities in the coal industry.

③ The third level aims to cultivate the engineering practical ability of OBE, with a focus on teaching scientific and technological activities and innovation and entrepreneurship courses related to the intelligent construction of coal mines.

(2) The collaborative education model of comprehensively promoting the integration of teaching and research, as well as the integration of industry and education.

On the one hand, excellent students are guided to participate in teacher research projects and engineering practices; On the other hand, by building a school enterprise cooperative internship and training base, carrying out industry education research integration projects, utilizing the human and technical resources of enterprises and companies, students are trained in various forms such as practical engineering project training, course design and subject competition guidance, and technical training.

(3) The reform of the curriculum system and educational teaching mode to adapt to the cultivation of innovative and entrepreneurial talents.

① The curriculum system has been revised in accordance with the requirements of new engineering concepts and engineering education certification, highlighting the combination of theory, engineering application, and innovation and entrepreneurship in the curriculum teaching concept. On the basis of the original professional courses, courses or lectures related to emergency communication have been added. The course design should be adjusted to include targeted content for comprehensive engineering application training and enrich the training format. Students should be actively encouraged and guided to participate in various levels and knowledge and skills competitions, as well as innovation and entrepreneurship practice activities, and provide financial support.

② The reform of educational and teaching models should be actively promoted among teachers, comprehensively introducing the concept of "student-centered" and OBE, explore teaching models

such as CDIO, SPOC, flipped classroom, MOOCs, and micro classes, and improving students' subjective initiative in learning.

(4) Talent training guarantee mechanism.

The high-level and part-time teachers should be introduced with engineering backgrounds to enhance teachers' academic and engineering abilities in various ways, and enhance students' learning and engineering abilities. Actively striving for funding from all parties to improve teaching and experimental equipment, and sufficient resources can be provided for engineering practice on and off campus. Teaching supervision should be strengthened at all levels and in all aspects to ensure the effectiveness of high-level teaching and learning.

4. Innovation points

(1) Starting from the needs of the development of advantageous disciplines at Xi'an University of Science and Technology, a training plan has been formulated with the goal of cultivating innovative communication talents with interdisciplinary integration capabilities

① On the basis of the school's positioning, it has been determined to base itself in the western region and face the whole country, establish a systematic grasp of engineering basic knowledge and communication theory, and be able to engage in scientific research, engineering design, equipment manufacturing, operation and maintenance, and technical management in the fields of information communication and emergency communication.

② We have offered general courses in advantageous disciplines such as Introduction to Mining and Introduction to Safety Engineering.

③ Elective courses featuring emergency communication and mine wireless communication have been offered.

④ Actively encouraging and guiding students to participate in research projects related to the teaching industry.

(2) A student centered, output oriented, and continuous improvement talent cultivation model that conforms to the OBE concept

After passing the engineering education professional certification in 2019, based on the student-centered concept and output oriented goals, the professional training objectives, graduation requirements, and curriculum system were sorted and optimized. By completing the revision of the 2020 version of the training plan, a process management, achievement evaluation, and continuous improvement mechanism are established that meets the requirements of the training objectives. Teachers are be organized to carry out teaching practices in teaching organization, teaching resource organization, and teaching achievement evaluation.

(3) Collaborative Education Model

A school enterprise cooperation and collaborative education mechanism has been established, actively encouraging teachers to conduct research on collaborative education models, carry out collaborative education teaching practices, and establish a collaborative education teaching platform.

5. Promotion and application effects

5.1. Promoting the reform of the curriculum system

This major passed the China Engineering Education Certification in 2019, and the curriculum system has been revised according to the new engineering concepts and the requirements of engineering education certification, highlighting the teaching concept of combining theory with engineering applications and innovation and entrepreneurship. On the basis of the original professional curriculum system, courses or lectures related to emergency communication and mine wireless communication have been added, adjusting course design to include comprehensive engineering application training content and enriching training formats.

5.2. Constructing a multi-modal and three-dimensional teaching system to improve teaching quality

Starting from the 2020 training plan, based on the social demand for innovative talents and the trend of electronic information science development, combined with engineering education certification, national first-class professional construction requirements, and the characteristics of communication engineering courses, a multi-modal three-dimensional teaching system is constructed.

5.3. Strengthening collaboration between industry, academia, and research to educate students

Teachers actively apply for collaborative education projects between industry and academia, carrying out school enterprise collaboration mechanisms, and building a four level practical platform for professional training, comprehensive training, innovation practice, and entrepreneurial practice. The ICT colleges and industry education integration practice bases with Huawei and ZTE have successively been established .We have established the 2018 Shaanxi Provincial College Students' Off campus Innovation and Entrepreneurship Practice Education Base with Xi'an Yipeide to provide a long-term practical platform for students to conduct in class experiments, course design, internships, subject competitions, and innovation and entrepreneurship practices.

6. Conclusions

This achievement is achieved by the communication engineering major actively carrying out comprehensive professional reforms in accordance with the requirements of the Ministry of Education, Shaanxi Province, and the development of higher education in the new era of the school. It constructs a talent training system that is student-centered, output oriented, continuous improvement, school enterprise cooperation, and collaborative education. Through teaching practice, the key indicators for the quality of education in the "Communication Engineering Major" have significantly improved.

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