The Curriculum System for Fire Protection Engineering Technology Based on OBE

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ABSTRACT

With the rapid development of Intelligent Fire Protection, the traditional personnel training system of fire protection engineering technology needs to be adjusted to be unified with Modern Fire Protection. OBE—Outcome-Based Education is a student-centered course system, which determines the training objectives and requirements for graduation and reverse design curriculum system according to the national social development needs and industrial development needs, etc. Achieve the expected achievements in the professional field and reach vocational education in fire protection engineering technology.\(^1\)

TRADITIONAL CURRICULUM SYSTEM OF FIRE PROTECTION ENGINEERING TECHNOLOGY

The traditional curriculum system of fire protection engineering technology mainly focuses on the theory and practice of fire engineering, and combines the training of humanistic quality and professional quality, as well as the cultivation of innovation ability and independent learning ability. However, in recent years, fire safety faces unprecedented new challenges because of traditional and non-traditional fire safety problems. Harbin storages fire, Tianjin 8 • 12 especially big fire and explosion with hazardous goods storages and other accidents caused the whole society to pay attention to fire safety. With the rapid development of big data, cloud computing and the Internet of things, how to use them to serve social fire safety construction has been highly valued by the national and local governments. Around the fire information construction, the government has issued various measures to accelerate the construction of "intelligent fire protection" in various forms, promote

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the in-depth integration of information and fire services, and realize the transformation from "traditional fire protection" to "modern fire protection". Accordingly, more and more highly skilled modern fire specialists are needed, which puts forward new requirements for the training of fire engineering technical professional.

PROFESSIONAL EDUCATION SYSTEM FOR FIRE PROTECTION ENGINEERING TECHNOLOGY BASED ON OBE

OBE (Outcome-Based Education), which was first proposed by Spady in 1981, is considered to be the right direction to pursue outstanding education. The Washington Accord fully accepts the concept of OBE that Guided by the learning output of students, education activities are all about ILOs (Intended Learning Outcomes), and China became a member of the Washington Accord in 2016. Apply OBE to higher vocational education, actively guide and promote the adjustment of education training objectives, graduation requirements, curriculum system, teaching demands, practical training, etc., and train high-quality technical personnel that meet the needs of social development. At the same time, with the rapid development of "modern fire" technology, it is urgent to cultivate "modern fire" professionals based on OBE.

Professional Education Goal for Fire Protection Engineering Technology

According to the development needs of the national society and education, the development of fire protection industry and career needs, professional orientation and development goals, student development and their parents' expectations, the target of professional training for fire protection engineering technology based on OBE is that training excellent professionals or certified fire engineers who have global vision, systems thinking, collaborative innovation ability, capable of rapidly changing challenges in the fire engineering field. They also possess interdisciplinary and cultural synergy ability and engineering innovation ability, able to adapt to the modern fire engineering technology development, then have the sense of social responsibility, to understand and abide by professional ethics, good humanities accomplishment, have team spirit, good communication skills and project management capability, with independent, lifelong learning habits and ability.

Education Training Plan Based on OBE

Based on OBE, reverse thinking is applied to design the education training plan for fire protection engineering technology (Figure 1). The curriculum system and practice system are set up via graduation requirements, knowledge structure requirements, ability requirements, quality education and other factors.
The education training plan is dynamically adjusted, and the "school-enterprise cooperation" mode is positively promoted. With teaching reform and innovation, such as "teachers guiding — students studying — class testing — problems resolved", developed students' potential abilities, and fully mobilized students' learning autonomy and enthusiasm, also cultivated their lifetime learning ability.

**CURRICULUM SYSTEM BASED ON OBE**

**Curriculum System Design**

Researched the results of domestic and foreign scholars on the curriculum system of fire protection engineering technology, and analyzed the talent demand for modern fire engineering technology, reversely designed the professional curriculum system of fire protection engineering technology together with enterprises and industry experts which based on OBE, surrounded education goal, and orientated graduation requirements. The curriculum system consists of mathematics and natural science courses and basic engineering courses that are orientated fire protection engineering technology, professional basic courses and professional courses, and humanities and social sciences courses, and engineering practice and graduation design (thesis). Among them, engineering practice and graduation design (thesis) account for at least 20% of total credits. Graduation design (thesis) topic selection combined with the practical engineering problems of this major to cultivate students' engineering consciousness, spirit of cooperation and ability to solve practical problems by comprehensively applying the knowledge they have learned. Enterprises and industry experts participate in the guidance and assessment of graduation design (thesis) in the whole process (Figure 2).
Mathematics and Natural Science Courses

Courses in mathematics and natural sciences that are appropriate to the education goal of this major include advanced mathematics, circuit and electronic technology, and the basis of university computer science, and so on. To master knowledge of mathematics and natural science, including basic concepts and analytical methods, to apply mathematics and natural science knowledge to the proper expression of complex fire protection engineering problems, to analyze and improve the solutions to complex fire engineering problems from the perspective of mathematics and natural science.

Engineering Basic Courses and Professional Basic Courses

Engineering basic courses and professional basic courses that meet the education goal of this major should reflect the cultivation of the abilities of mathematics and natural science in this major. Basic engineering courses include CAD engineering drawing, Building fire protection electrical engineering, Single chip microcomputer technology and application, Communication technology, Introduction to the Internet of things, etc. Professional basic courses include Building and structural foundation, Fire science and preliminary basic courses. Building and structural foundation courses should include building architecture, building structure, etc. Fire science mainly includes combustion science and its preliminary basic courses.
Professional Courses

Comply with the professional courses of this professional education goal should be able to reflect a fire protection system design and engineering practice ability, including the Principle of building fire protection design, Building smoke protection and exhaust system, Building fire protection water supply engineering, Automatic fire alarm system, Building information model (BIM) technology, the Intelligent fire protection system, Fire protection safety management, Fire engineering budget, and Fire safety assessment, and so on.

According to the expectation of practicing for graduates of fire protection engineering technology and the training target of "Double Certificates", students will obtain the national occupational qualification certificate of fire protection engineering before graduation, and they will be able to have the quality and ability of registered fire engineering engineers 5 years after graduation. The professional qualification standards are integrated into the professional curriculum, such as the Principle of building fire protection design, Building smoke protection and exhaust system, Building fire protection water supply engineering, Automatic fire alarm system and Fire protection safety management. Then students will have system design and engineering practice quality and ability that is a registered fire engineer should have. Meanwhile, "Intelligent fire protection" has become an important part of modern fire protection engineering. And some courses are added precisely for "intelligent fire protection", for example, Building information model (BIM) technology, and the intelligent fire protection system, etc. In section on the fire safety installations, completion acceptance, fire protection maintenance, fire risk assessment, fire safety management, etc., are the most jobs for fire protection engineering technical graduates. On the basis of extensive and in-depth investigation, some professional courses are set up after detailed analysis of the capacity requirements of these positions, for instance, fire protection engineering budget and fire safety assessment.

Humanities and Social Sciences Courses

Humanistic and social science courses cultivate students with good humanistic quality and high sense of social responsibility, understand and abide by professional ethics, so that students can take economic, environmental, legal and ethical factors into consideration when designing, inspecting and assessing fire engineering. General education courses enables students to understand the forward development trend on fire protection, pay attention to the new theories, methods and technologies derived from the fire protection major and other disciplines, have an international vision and global awareness, remain curious and enterprising, and can learn independently to adapt to professional or professional development.
CONCLUSIONS

Fire protection engineering technology involves a wide range of disciplines, complex content, theory and practice. At the same time, the content and quite part is in recent years, new technology, new equipment, new methods, urgently need to be able to complete the response the curriculum system of fire protection engineering technology professional education goal, to support their professional ability, social ability, able to solve the problem of complicated engineering, to have the future engineer qualification 30 capability requirements.

REFERENCES