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Exploration of Safety Engineering Talents Cultivation under New Engineering Education

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ABSTRACT

Combining with the new requirements of the Ministry of Education for the construction of "New Engineering Education", it is proposed that dynamic innovation is the correct choice for professional education, the docking of production and education is the only way to train the practical talents. The integration of internationalization is the development direction of engineering education. Combining the exploration and practice of the transformation development of the safety engineering profession, pointed out that based on economic development, which must construct a new model of cooperative education, build a new platform for education of creation and innovation, introduce a new strategy for classroom education, and present new initiatives for international talent training. It is pointed out that must be guided by the market and cultivate professional and applicable talents in the industry.[1]

INTRODUCTION

On February 18, 2017, the Ministry of Education held a seminar on the development of advanced engineering education at Fudan University, and reached the "Fudan Consensus about New Engineering Education Discipline" [1]. On April 8, 2017, the Ministry of Education held a seminar on the construction of new engineering education at Tianjin University and formed the construction action line of "New Engineering Education" ("Tianda Action") [2]. "Fudan Consensus" and "Tianda Action" put forward new requirements and new ideas for higher

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engineering education. How to adapt to the new environment and new situation are new challenge and new test for higher education, especially engineering education.

Wuhan University of Science and Technology is a high-level and co-constructing university by Province and the MOST and was selected by "Basic Infrastructure Construction Project for Universities in the Midwest". The safety engineering major is one of the specialties of our school with outstanding engineering features and obvious application functions [3]. Taking the safety engineering major as a pilot for cultivating applied talents, it has carried out some useful explorations on the professional construction of engineering education and has gained some experiences which can be useful for reference.

THOUGHTS ON TALENT TRAINING UNDER NEW ENGINEERING EDUCATION

Dynamic Innovation is the Right Choice for Professional Education

In the context of the country's implementation of innovation-driven development and the "Made in China 2025" strategy, new technologies and industries are constantly emerging, and new demands and expectations of the talent market are constantly changing. These require adjust the direction of specialty, renew the teaching content, optimize the training plan in talent cultivation process, and break through four years of consistent training programs [4]. The "New Engineering Education" is a number of emerging engineering majors that set and develop new economics and new industries such as artificial intelligence and cloud computing. It also includes upgrading and transformation of traditional engineering major [5]. The main contents of the "New Engineering Education" research are mainly embodied in "Five New", namely the new engineering education idea, new specialty structure, new talent training model, new education and teaching quality, and new classification development system. It is necessary to integrate the industry's ability requirements for talents into all aspects of personnel training, to introduce new developments of industry and technology, and new requirements for professionals in the teaching process. To rely on industry industries, develop industry courses, write industry textbooks, introduce industry teachers, and open up "last learning place". The safety engineering major of Wuhan University of Science and Technology is based on the goal of talent training, dynamically setting up curriculum modules, and arranging the proportion of modules scientifically, so that the curriculum is set up with "Three Coordination" including the coordination of common cognition courses and specialized courses, the coordination of theory courses and practical courses, and Coordination with compulsory courses and industry courses.

The Docking of Production and Education is the only Way for the Training Practical Talents

"Fudan Consensus about New Engineering Education Discipline" clearly states that colleges and universities should actively meet the needs of economic and social development and corporate technological innovation, deepen integration of production and education, cooperation between school and enterprise, and cooperative education, and cultivate applied, technical and skilled talents who have strong industrial background knowledge and engineering practice, and satisfied the development of industry in China [1].

Wuhan University of Science and Technology insists on deepening education and teaching reform, comprehensively promotes the reform of the talent training model and the reform of the credit system, and strives to build first-rate undergraduate education and high-level graduate education in China. In 2017, the university was recognized by the Ministry of Education as a national "demonstration university of deepening innovation and entrepreneurship education reform", and was recognized as the first "provincial double innovation demonstration base" by the Government of Hubei Provincial. Safety Engineering major has made some positive explorations in the transition development and the connection between production and teaching. The first is cooperation with many companies, such as Baowu Group and Evergrande Group, and established "Management school of Hengda" and "Institute of Iron and Steel Science and Technology of Handan Iron and Steel Co., Ltd." in the university. Talent training and research development are carried out between the university and enterprises. The second is the implementation of the "one person and one enterprise action plan". The long-term, stable docking and collaboration relationship between the university and enterprise have been established and maintained. The third is the formation of a "double-instruction" team with "double-introduction and dualism" and resource sharing through scientific and technological special agents, doctoral service teams, and part-time teachers in the industry.

Connecting International is the Development Direction of Engineering Education

By carrying out engineering education professional certification, the quality of engineering education in China can be improved, and engineering education can be adapted to the needs of the government, industry, and society. In addition, being in line with international standards is also the development direction of China's engineering education. At present, China's professional certification standards mainly require input, process, output, and continuous improvement [6].

The Safety Science and Engineering Innovation Teaching Team of Wuhan University of Science and Technology have conducted a number of teaching research projects in the professional teaching process, such as "Study on training model of safety engineering talents adapted to the development of industrial

structures", "Research and practice on the cultivation of compound innovative talents based on compatibility of professional certifications and professional qualification standards" and "Study on the construction of the new model in the cultivation of safety science and engineering professionals under new engineering education" and other research projects have made positive progress. Through the introduction of engineering education philosophy, students' practical ability and design ability have been significantly improved. They have achieved outstanding results in national, provincial and ministerial-level competitions such as National Safety Science and Engineering Undergraduate Practice and Innovative Works Competition. The graduates' engineering capability and adaptability have also been unanimously approved by the employers.

EXPLORATION AND PRACTICE OF TRANSFORMATION AND DEVELOPMENT OF SAFETY ENGINEERING

Based on Economic Development, Building a New Model of Synergistic Education

The school-running orientation of the Wuhan University of Science and Technology's is to build application-oriented universities with distinctive characteristics, obvious advantage, and strong regional economic and social development capabilities. The safety engineering major is one of the specialty advantage specialties created during the "13th Five-Year Plan" period of our school, and it is one of the professional forces that cannot be acquired in the process of industrial development. Therefore, the university optimized its cooperative education organization model, relied on the advantages of disciplines such as first-class disciplines in safety science and engineering, and key disciplines in Hubei Province, and broke through institutional mechanisms through the establishment of an interdisciplinary academic research center for industrial safety in Hubei Province. It provides organizational guarantees for cross-school, departmental, interdisciplinary, and interdisciplinary training for new engineering talents. Bring together with industry departments, research institutes, and enterprises' superior resources to improve the collaborative education mode of integrating science with education, industry-university integration, and school-enterprise cooperation, and build a shared, collaborative education platform for education, training, and combined with research and development.

Highlighting Practical Teaching and Constructing a Training System for Innovation and Entrepreneurship Education

In order to adapt to the modern industrial production requirements, talent cultivation requires superb practical skills and a solid theoretical knowledge. The university actively builds an elite teaching team. The elite teaching team members

are not only composed of school teachers, but also hire outside school safety experts to provide practical guidance to students so that they can combine theory with practice. With a high standard of teaching staff and an integrated education model, the university will surely produce more elite talents that meet the needs of the company.

Construct an innovative teaching and training system and intensify innovation and practice education. Construct a three-dimensional practical teaching system which is "One Subject, Two Flanks". One subject is a "skills + comprehensive + design" specialty experiment, two flanks are front by "science and technology innovation project + open laboratory" training, and the back end of "graduate comprehensive internship + graduation thesis (design)" is consolidated. Regularly organize high-quality social innovation and practice activities to expand students' social practice capabilities. The creation of the engineering "two abilities" training base has enriched students' engineering experience, improved graduation project thesis project selection and strengthened graduates' scientific and technological research and development capabilities.

Keeping up with Market Demands and Introducing New Strategies for Educating People in the Classroom

With the further development of the economy, it will enter the era of Industry 4.0 by 2025, which is the economic era of completely automatic and completely informational[4]. Colleges and universities should cultivate professional talents suitable for the industry, they must adjust the direction of the profession, update the content of the curriculum, to achieve the correspondence between the knowledge structure and the industrial structure, and market demand and training program dynamic.

The safety engineering majors achieve “three prominent” when formulating talent training programs, that is, highlighting practice characteristics (increase the proportion of time in practice teaching), highlighting engineering characteristics (focusing on engineering technology courses), and highlighting courses characteristics (opening specific courses). Facing the actual needs of the project, it integrates innovation achievements of the industry, sets up a curriculum system for mobility, and achieves “four reflections” in the setting of professional courses, which embodies practicality, skills, technology, and application. In the teaching reform process, the safety engineering major focuses on the "five introductions" of classroom teaching. The first is the introduction of the frontier knowledge, targeting industry advanced technology, integrating engineering innovation achievements, updating of teaching content timely, and building a "traditional theory + industry dynamics" of teaching content system. The second is the introduction of engineering cases, promoting "learning based on problems and cases", encouraging students to explore problems and providing students with more room for thinking. The third is the introduction of research topics, insisting on the integration of teaching with

production practice and social reality, and focusing on cultivating students' knowledge application capabilities. The fourth is the introduction of comprehensive operations. In order to improve the students' design skills and sense of innovation, to introduce engineering design into the professional courses, such as "safety assessment", "Fire and explosion safety technology" and other professional courses. The fifth is the introduction of front-line information, the launch of the “Entry into the classroom by engineers, students entering the workshop” (“Double Entry”) activities, inviting business experts to enter the classroom, and to serve as part of the lectures, bringing the most direct information on the production frontline to the students. Students enter the company, learn advanced technology and corporate culture, and cultivate students' professionalism and professionalism.

Facing International Engineering Education Reform, Proposes New Measures for International Talents

Based on the forefront of international engineering education reform and development, the new trend and new strategy of engineering education in developed countries will be determined, and based on the pursuit of facing the future and leading the world, to propose the quality standards for the training of new engineering talents. At the same time, to cultivate students with a global perspective, we must understand the internationalization of the profession and integrate it with the international professional qualification certification standards. The safety engineering major through the comparative analysis of professional certification standards such as the NEBOSH International General Certificate (IGC), the US Certified Safety Professional (CSP), the US Certified Industrial Hygienist (CIH) and the Chinese Certified Safety Engineer, Certified Safety Evaluation Engineer, etc, to revise the training plan, and extract five professional courses such as "Social Public Security" and "International Project Safety Management", and these courses can cultivate students' international view, upgrade their professional qualities, and expand their employment.

CONCLUTIONS

The transition and development have no suspense, and university-enterprise integration is imperative. We must be bold in practice, dare to innovate, combine production with education, and educate people in a coordinated manner, and establish a teaching chain from theoretical study and hands-on practice to inquiry learning. We must convince the government, influence the enterprise, and clear the obstacles during the operations of engineering education; we should be dare to reform, explore in depth and establish a long-term mechanism for institutionalized, new-type personnel training. To cultivate practical, useful, applicable, and easy-to-use safety engineering professionals must be relying on the industry with dynamic, diversified, market-oriented.

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REFERENCES

1. Ministry of Education of the People's Republic of China. Fudan Consensus about New Engineering Education Discipline[EB/OL]. (2017-02-18) [2017-02-23]. http://www.moe.gov.cn/s78/A08/moe_745/201702/t20170223_297122.html.
2. Ministry of Education of the People's Republic of China. The Construction Action Line of "New Engineering Education" ("Tianda Action")[EB/OL]. (2017--04-08)[2017-04-12].http://www.moe.edu.cn/s78/A08/moe_745/201704/t20170412_302427.html.
3. Hongjie Zhang, Xiaodong Xiang, Wangsheng Chen. 2011. "Safety Engineering Teaching Methods Reform and Innovation Talents Training," Journal of Safety Science and Technology, 7(6): 172-175.
4. Aihua Wu, Yongfeng Hou, Qiubo Yang, Jie Hao. 2017. "Accelerating Development and Construction of Emerging Engineering, Taking Initiative to Adapt to and Lead the New Economy," Research on Higher Engineering Education, 1: 1-8.
5. Denghua Zhong. 2017. "Connotations and Actions for Establishing the Emerging Engineering Education," Research on Higher Engineering Education, 3: 1-6.
6. Xiaohong Wang. 2017. "Research on the Certification of Higher Engineering Education in China," Textile and Apparel Education, 1: 6-9.