

Study on Education System of Students' Humanity Health in Background of New Engineering Education

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Abstract—Traditional engineering education pays attention to technical training, but it is easy to neglect humanistic care and cause health hazards. In the context of today's technological revolution, industrial change, new economy, and a new starting point for new engineering, it is necessary to strengthen health and safety education so that students can acquire both engineering knowledge and specialized knowledge and skills to discern and prevent occupational hazards. Based on the relevant factors of engineering career, this article constructs a combination of theory and practice, has a technical innovation and comprehensive teaching evaluation characteristics of the engineering occupational health education system, to achieve the cultivation of students from the perspective of humanistic care.

Index Terms—engineering education, humanistic concern, occupational health, innovation teaching

I. INTRODUCTION

With the deepening of the industrialization process in the world, the new engineering education background has been proposed. From the point of view of the industrial reform trend, or from the perspective of new economic development needs, a large number of emerging engineering talents are needed to support. At present, there are numerous engineering employees, and the health and safety hazards of engineering professionals are also getting more and more attention. Therefore, occupational health has become a topic of universal concern in the world. Today, the idea of humanistic care is valued in various professional fields, but the discussion in the education field is still limited to the curriculum or a report, seldom involves the teaching system, emerging teaching technology areas. Health education is an important content of quality education. Only systematic health education can better guide people to concern about the quality of life and physical health. Human health and safety are not only technical issues, but also issues at the cognitive level. It is not a question of which course, but also a task of training the system. Therefore, engineering students need to understand the relevant occupational hazards in order to avoid being harmed. Therefore, we should actively encourage wide-caliber basic education so that occupational health awareness and professional

knowledge can be organically integrated in the process of teaching, and change the traditional teaching philosophy of "relying only technology and not paying attention to the spirit" so as to protect ourselves and others from harm.

II. CONCEPT OF "NEW ENGINEERING"

In recent years, a large number of emerging industries have emerged from the scientific and technological revolution and the adjustment of China's economic structure and industrial upgrading. As a post-developing country, these new industries are an effective way for China to realize overtaking in cornering and surpass the developed countries in terms of technical level and economic development. At present, China's manufacturing industry is out of touch with the actual needs of enterprises, industrial education is not sufficiently integrated, engineering education practices are weak, and the basic capacity building of schools and training institutions lags behind. Therefore, the background of technological revolution, industrial change, new economy and new demand a new conceptual word emerged - the New Engineering Section [1].

The concept of "New Engineering" was put forward at the Fudan University's strategy seminar on the development of comprehensive university engineering education. More than 30 colleges and universities, including Peking University and Nanjing University, attended the conference. Afterwards, the Ministry of Education issued the "Notice of the Higher Education Department of the Ministry of Education Concerning the Launch of New Engineering Studies and Practices." It is hoped that colleges and universities around the country will carry out research and practice activities for new engineering disciplines, thereby deepening the reform of engineering education and advancing the construction and development of new engineering disciplines [2]. The main research contents of the new engineering section are summarized as "five new" (see Fig. 1), namely, the new concept of engineering education, the new structure of subject specialty, the new model of talent cultivation, the new quality of education and teaching, and the new system of classification development [3].

Under the background of the new engineering human health education as which is one of the focuses of the engineering education reform, it is not only a teaching

reform, but also a full cycle and a multi-directional reform of the talent training system, which is the innovative practice of the new concept of talent training. Starting from the integrity of engineering education, new ideas, new models, new technologies and other core elements are embedded; it improves the development of students' comprehensive quality and reforms the knowledge system about the traditional design basic course, as well as the capacity requirements and teaching methods, in order to adapt the new technical requirements about the course and lay solid foundation for students' future development.

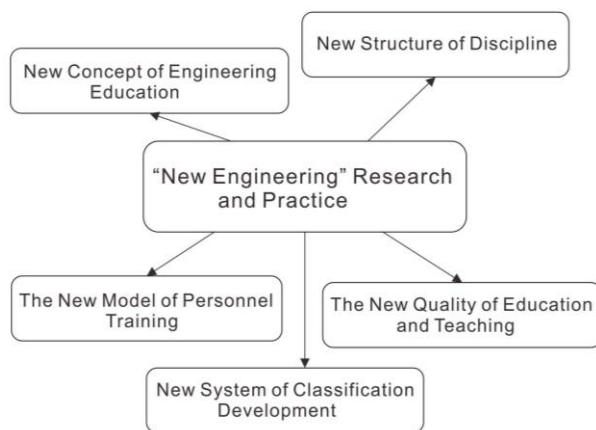


Figure 1. New engineering research and practice contents.

III. KNOWLEDGE SYSTEM OF MECHANICAL ENGINEERING DISCIPLINE

The main contents of mechanical engineering subject teaching include basic knowledge of mechanics, mechanics, power electronics technology, computer application technology, information processing technology, and modern design methods. It trains modern engineers and has the basic ability to design, test, and use electromechanical products; it has research and development capabilities for new types of electromechanical products and technologies; masters the basic theory and skills of computer-aided design, testing, and manufacturing; and has the basic capabilities of technical and economic analysis and production organization and management of electromechanical products[4]. At present, the course system of China's mechanical engineering discipline is almost perfect in all aspects, but it lacks the integration of knowledge related to occupational health.

The integration of new engineering talent training, occupational health and safety knowledge can not only further improve the curriculum system, apply to practical work and life, and transform the results of practice into an ideological skill, but also can resist various unexpected hazards [5]. Everyone has the occupational health and safety knowledge and skills is one of the teaching objectives of the mechanical engineering discipline curriculum system. The mechanical engineering subject curriculum system is also an important guarantee for occupational health and safety knowledge and skills.

IV. UNDERSTANDING OF OCCUPATIONAL HEALTH IN MECHANICAL ENGINEERING

Health means that a person is in perfect condition in all aspects such as body, spirit and society. The World Health Organization puts forward that "health is not only a body without diseases, but also has mental health, social adaptability and good morals". The development of mechanical engineering disciplines focuses on technicality, fosters implementation issues related to engineering design and manufacturing, and lacks awareness of health and safety awareness among employees.

Foreign safety education not only pays attention to basic education and practice, but also pays attention to occupational health and safety knowledge education. After the analysis of examples, U.S. schools pay special attention to students' participation in actual combat exercises such as tornado exercises, fire safety exercises, and gun shooting exercises. In actual combat exercises, they emphasize human health as the center. Through exercises, they can understand and identify places better for security, importance, and then increasing safety awareness. Ontario, Canada, pays attention to the coverage of an all-inclusive course. The "Occupational Health and Safety" course is included in the compulsory course of the school's teaching system. After passing the examination, it can enter colleges, community colleges, and private vocational schools. At the same time, through perfect discipline construction, in the institutions of higher learning to set up degrees and professional methods to promote occupational health and safety education and training [6]-[8].

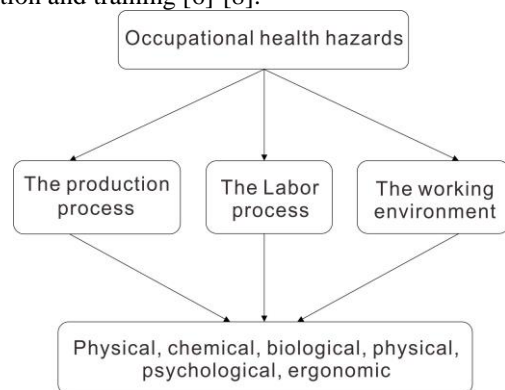


Figure 2. Classification of engineering occupational health.

Occupational health is to study and prevent people's health problems caused by work. Occupational health hazards in engineering can be divided into three categories. The first is occupational hazards related to the production process; the second is occupational hazards related to the labor process; the third is occupational environment-related occupations Sexual hazards. Among them, environmental factors can be divided into physical, chemical, and biological; human factors can be divided into physical, psychological, and ergonomic [9] (see Fig. 2). These hazards are often not obvious, not direct, and will only be exposed if they accumulate to a certain degree, causing occupational diseases. Therefore, it is

necessary to have health awareness and prevent occupational diseases in advance. (Fig. 2)

V. THE CONSTRUCTION OF OCCUPATIONAL SAFETY KNOWLEDGE SYSTEM IN ENGINEERING

Changing the traditional education model in the context of the new engineering education shifts from pure engineering education to centering on people's health, emphasizing the importance of attaching importance to the "human factor in engineering education" education philosophy. Studying the system structure of teaching resources for "Engineering Occupational Health", the basic course pays attention to the instillation of engineering occupational health concept, the professional class pays attention to the teaching of engineering occupational health knowledge and skills, increases the design practice link, constructs the engineering cognitive public virtual space, and reforms the teaching evaluation system[10], [11]. It forms a teaching system combining theory with practice, popularization on the surface, improvement of key points, comprehensive innovation, and combining inside and outside classes. (Fig. 3)

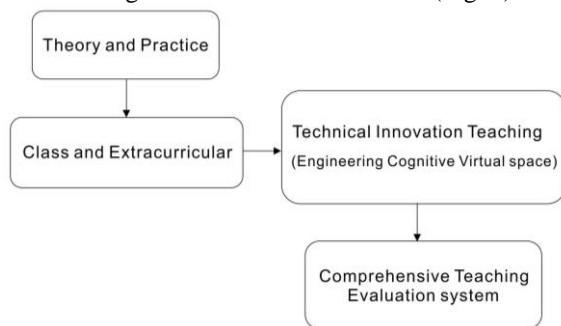


Figure 3. Construction of engineering occupational safety knowledge system.

The integration of occupational health and safety knowledge can not only further improve the curriculum system, but as a theory applied to practical work and life, the result of practice is transformed into an ideological skill, and the current employment environment is in need of skills to resist Various sudden harms; Students as a carrier of the curriculum system have been pursuing a more complete training system. (Fig. 4)

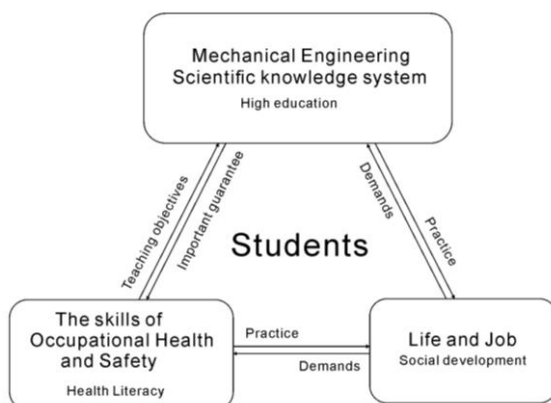


Figure 4. The relationship between the Knowledge system of Mechanical Engineering and the skills of Occupational Health and Safety.

VI. CONSTRUCTION OF KNOWLEDGE SYSTEM OF OCCUPATIONAL HEALTH

A. Foundation Course

The basic content of the basic course of study is occupational health and safety basic knowledge and professional knowledge, including ideological education and relevant laws and regulations, safety production knowledge, types of occupational diseases and protection, etc.; through the education of occupational health and safety policies and regulations, improve students' Safety awareness; Understand relevant safety production technical knowledge, improve humanities and technical literacy; Learn more about the source, classification and characteristics of occupational hazards, and master occupational hazard protection measures and control methods. Through the teaching methods of teamwork and teacher-student interaction, students' occupational health and safety awareness is deepened. Deeply implement the concept of "health first, safety first".

B. Training Course

The indispensable link in the process of engineering education is the engineering training (see Fig. 5). In addition to teaching knowledge in class, students are guided to experience and experience occupational health and safety, and experience the occupational environment. Incorporating the corresponding educational ideas into it can solve the problem of completing educational tasks with specialized courses and simultaneously radiating into multiple courses. The methods are to study the identification of customized safety warning signs; analyze of typical cases of occupational health and safety in engineering; and visit to practical teaching activities such as engineering bases. In the specific practical activities, while giving full play to the leading role of teachers, the emphasis is placed on highlighting the subjective status of student learning. Through the curriculum design and as part of the final grade assessment, students' enthusiasm and interactive learning will be mobilized to develop the ability to prevent, control, eliminate hidden dangers, and improve occupational health and safety. From the ideological level, students' degree of emphasis on occupational health and safety is improved so as to ensure that students can solve safety problems in engineering practice.



Figure 5. Students Practice Classroom activities.

C. Innovative Course Design

Based on the concept of “new engineering”, starting from the new concept of engineering education, the new structure of disciplines, and the new model of talent cultivation, the innovation curriculum design in the cultivation system is proposed, and the college engineering cognitive public virtual space is constructed [12]. Students learn basic knowledge, professional skills, engineering safety and other comprehensive knowledge through virtual spaces inside and outside class, and realize teacher-led and student-independent interaction and innovative curriculum design. Through virtual teaching mode, engineering education integrates teaching resources efficiently and allows students to have more in-depth, comprehensive and concrete knowledge of occupational health and safety, so as to better complete the teaching goals and stabilize and strengthen teaching effects.



Figure 6. The engineering cognitive public virtual space.

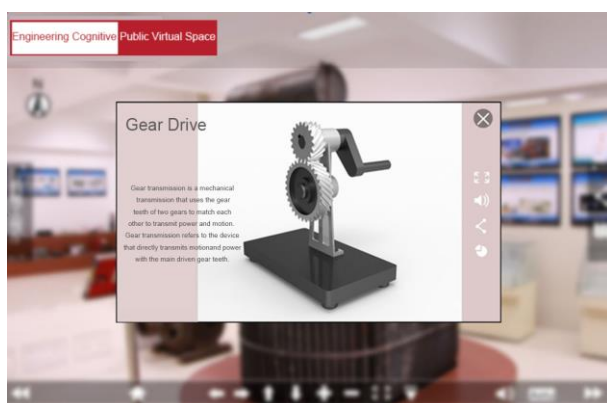


Figure 7. The engineering cognitive public virtual space.

Fig. 6 to Fig. 7 show that the engineering cognitive public virtual space operation interface. The engineering cognitive public virtual space is a full-scale and deep integration of science and technology and education modernization. Specifically, it integrates new technologies and concepts such as virtual reality technology and interaction design into the engineering teaching system. It also innovatively reforms teaching models, develops, integrates, and uses Teacher resources, student resources, and social resources, enrich teaching resources and teaching practices; through rich material, pictures, charts, photos, audio and video material carriers, more intuitive, visual description and interpretation of occupational health and safety-related knowledge,

improved students The mechanized memory and closed understanding of the teaching material knowledge mobilizes the students' enthusiasm and interest in learning, shifts passively accepted learning to active exploratory learning. The engineering cognitive public virtual space not only provides a new teaching perspective for engineering education, but also constructs better opportunities for students and promotes the simultaneous learning of theoretical knowledge and practical ability in a diverse, multi-level and open knowledge ocean.

D. Teaching Evaluation System

Scientific and rational teaching evaluation system as an important part of classroom teaching content is an effective means to improve teaching quality. Under the new engineering background, the original teaching evaluation system can no longer meet the requirements of education reform and development. It is urgent to establish a new teaching evaluation concept, change the single evaluation model based on engineering technology, and construct a multi-dimensional teaching evaluation system. In the "Engineering Occupational Health"-centered teaching model, students' initiative and creativity are emphasized, and the influence of engineering technology on people's health is judged. Comprehensive evaluation of theoretical teaching and practice links, expanding the range of evaluation subjects, reflecting the combination of self-evaluation, mutual evaluation, and teacher evaluation, and comprehensively applying quantitative and qualitative evaluations. Quantitative evaluation is performed through methods such as scores and number calculations for teachers and students in the classroom teaching process. The behavior and teaching effects are recorded and judged objectively. Qualitative evaluation is more concerned with the consistency between classroom teaching results and educational goals. The advantages are complementary between the two, which is different from the traditional teaching method that uses students' academic performance as the main criterion. Evaluation model, to build a fairer, objective and scientific teaching evaluation system, give full play to the role of education and guidance, and effectively improve the quality of teaching.

VII. CONCLUSION

The research breaks the traditional teaching thought pattern, integrates the humanistic care idea into the vocational education, put new models and technologies into the actual teaching system, and implement the relevant curriculum design. And forms the engineering education idea with health as the core. To achieve updated and higher quality education, from theory, practice to innovation, Students become a new type of talents who possess both special engineering knowledge and professional health from theory; practice to innovation. Through the research of this project, education teaching of engineering occupational health can reach the advanced level in China and become one of the characteristics of undergraduate teaching.

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