

Analysis on Construction of Engineering Ethics Course of Transportation Specialty

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ABSTRACT

The negative benefit of science and technology has become constantly prominent and the ethical issues of some heavy construction have been highlighted for the past few years, arousing an extensive discussion on engineering ethics issues in academic circles, which also promotes educators to reflect on the lacking situation of engineering ethics education in colleges and universities in our nation. For engineering majors, how to carry out the engineering ethics edit, and appropriately set up as well as construct the engineering ethics course with their professional characteristics is an urgent problem to be solved. This article takes the construction of engineering ethics course of transportation major in Zhejiang Ocean University as the object of study, through illustrating the development status and the exiting problems of the engineering ethics education, the article puts forward the ideas of engineering ethics course construction with the characteristics of transportation specialty, promoting the development of teaching theory and practice of engineering ethics course system of transportation specialty.

Keywords: *transportation major; course construction; engineering ethics; case analysis*

1. INTRODUCTION

The advance of manufacturing technique is bound to stimulate economic development. Driven by economic benefit, ethical conflicts between engineering decisions and practice are becoming constantly apparent, which suggests that the engineering ethics quality and social responsibility of technical personnel remain to be further improved. To better the case, it is essential to educate them about engineering ethics knowledge. Technical personnel should obey the moral bottom line as well as master the thinking and methods which help to deal with complex practical problems and relationships. From the perspective of ethics, they are required to cogitate, make decisions and manage problems. Furthermore, taking such thinking mode and behavior norms as their professional spirit, also abiding by professional ethics norms, which also leads educators of higher engineering colleges to thinking and exploring how to implement engineering ethics education in the process of engineering and technical personnel training.

Since the 1970s, the fundamental goal of Higher Engineering Education in Occidental countries is to foster the related rational spirit of engineers, which promotes the combination of theory and praxis in engineering education, forming a new interdisciplinary--engineering ethics [1]. The earliest engineering ethics standards can trace back to the ones adopted by the American Society of civil

engineers in 1914. After the 1980s, engineering ethics grew with a sharpened speed. The educational research of engineering ethics has been carried out in France, Canada, Britain et al in succession. In western developed countries, In the United States and Germany, a relatively complete frame of researcher work has taken shape which has a profound impact on the advance of engineering ethics in other countries [2]. Li, Jessica believed that the subject of education was supposed to be diversified, ranging from university professors, field engineers, engineering graduates, ethics scholars to instructional design experts. McMaster University of Canada had initiated the engineering and social project by employing teachers from interdisciplinary, technical and soft sciences, engineering and humanities to teach kernel courses together. Lafayette College emphasizes the cooperation of interdisciplinary teachers to present students with demonstration and guidance Science, technology is closely integrated with humanities, society, politics and ethics and complement each other [3]. Rabins and M.J. believed that the application of engineering cases is the future development direction of engineering ethics education [4]. Unger, S.H. selected nine engineering ethics issues compiled by IEEE Association [5]. Abate, Charles J. emphasized the essence of case teaching method in engineering ethics education [6]. Bucciarelli, L.L. believed that the teaching method of engineering ethics is mainly to discuss virtual or real cases under the framework of engineering ethics norms; while the deficiency lies in that it does not consider the

complexity of the scene environment; secondarily, it merely concentrates on the individual behavior level, involving the reform of the entire engineering education system and mechanism[7]. Alpay E et al think that in the teaching process, specific teaching case studies can be applied to grapple with the engineering ethics teaching problems caused by students' subjective, ambiguous and pioneering. Iophical understanding of engine case teaching, freshmen are responsible for submitting with ethical education activities related to their peers and disciplines. Through a brief introduction of engineering ethics, students prepare tasks based on the general framework of ethics and professional knowledge discussed. Eventually reporting by the club to provide information support for design tasks how to evaluate students on the course and task work experience. In order to prove the value of this method for teachers, and ultimately prove the value of students in their own learning experience [8].

There are relatively in-depth projects and research results on the professional ethics education for engineering students in China, but the scale and quantity of research are relatively inferior than foreign countries. In China National Knowledge Network (CNKI), the relevant literature data of "Engineering" and "Ethics" are basically increasing year by year on the whole. A growing number of colleges and universities have set up elective courses of "engineering ethics" for related majors. In 2007, Liu Chuansheng, Party Secretary of Beijing Normal University, conducted an extensive questionnaire survey in more than 20 colleges and universities in Beijing and Tianjin, covering undergraduate and graduate students of all grades in engineering. The survey found that engineering students faced moral confusion. Nowadays, it is a widespread phenomenon for engineering schools to instill moral theory knowledge, which results in students' weak moral choice ability as well as the tendency the utilitarianism is quite apparent [2]. Yang Yuhong etc. analyzed the engineering ethics of science and engineering college students through questionnaires. The results showed that the as a whole that cognition college students majoring in science and engineering have of engineering ethics of science and engineering students was deficient, their ethical judgment and moral sensitivity were weak, engineering ethics knowledge has certain subjective demand. To be more precise there were characteristics that female students were more sensitive than male students and graduate students were more sensitive than undergraduate students [9].

According to the above research status, it can be found that compared with the developed countries and regions which attach great importance to the research, education and promotion of engineering ethics, our country's awareness in the research and education of engineering ethics is not well prepared. This article takes the construction of engineering ethics course of transportation major in Zhejiang Ocean University as the research object, through illustrating development status and the exiting problems of the engineering ethics education, this article puts forward the construction ideas of engineering ethics course with the characteristics of transportation specialty, in order to promote the development of teaching theory and practice

of engineering ethics course system of transportation specialty.

2. THE NECESSITY OF THE CONSTRUCTION OF ENGINEERING ETHICS COURSE FOR TRANSPORTATION SPECIALTY

One of the foundations for engineering college students and graduates to become qualified engineers is to receive complete and systematic engineering ethics education. According to document No. 14 issued by the Academic Degrees Committee Office of the State Council in 2018, all colleges and universities with engineering professional degree postgraduate enrollment qualifications must include the engineering ethics course as a required course beginning from 2018.

Transportation is a multi-disciplinary and comprehensive discipline, which has a cross-disciplinary color with Zhejiang Ocean University majors such as navigation technology, marine engineering, traffic management, ship and ocean engineering, logistics management, oil & gas storage and transportation, port and waterway engineering, civil engineering. Its main fields cover the marine time waterway traffic safety and environmental, port and transportation facilities planning, design, construction, maintenance and management. Its main cultivation has to adapt to the modern traffic technology development and innovation consciousness and practical ability to apply social demands, capable of transportation science and implementation of technical research and project planning and management of new technology popularization and application work of application-oriented high-level engineering and engineering management talents. Therefore, in particular, it is vital to educate students on engineering ethics, so as to make transportation engineers and technicians avoid engineering ethics problems in engineering practice.

3. CONSTRUCTION OF ENGINEERING ETHICS COURSE

3.1. Construction of Course System Framework

The premise of developing course teaching is to construct a complete and feasible course system framework, which covers a wide range of contents, mainly including syllabus, teaching positioning, teaching content, teaching methods and evaluation system, among which the syllabus is the top priority. In the process of constructing the framework of course system, the construction of teaching syllabus with the characteristics of transportation specialty should be carried out first, and the engineering ethics course should be organically combined with characteristics of

transportation major. At present, there is no teaching syllabus of engineering ethics with the characteristics of transportation specialty. Therefore, we can learn from the syllabus of engineering ethics, and on this basis, the characteristics of transportation specialty are added, so as to form a teaching outline with the characteristics of transportation major.

Given significant differences in teaching methods between graduate students and undergraduate students. Undergraduate students are mainly teacher-led while in graduate teaching, teachers should play the role of guide, and students should be the leader of the class. Therefore, teaching engineering ethics for transportation major can apply case analysis method. The main content of its construction is to build case database, collect and sort out a large number of relevant cases, and make case courseware. In terms of teaching form, since there is no engineering ethics materials for transportation major, the general engineering ethics education course can be combined with the specialized courses of transportation engineering, traffic safety system engineering, water transportation planning and management. In the early stage of the course, we mainly explain the relevant theoretical knowledge of engineering ethics. On the basis of subsequent course, most of the class hours in the follow-up courses will be used to guide and organize students on the discussion and analysis of relevant engineering ethics cases, and in view of the current social hot pots, and other professional ancillaries.

3.2. Clear Course Orientation and Enrich the Teaching Content

The orientation of engineering ethics course of transportation major should be as a professional education course. Teachers should help students understand the universality and importance of professional ethical problems in transportation, improve transport professional ethical sensitivity, enhance the transportation professional conduct and enhance the transportation engineering practice of ethical judgment and willpower. Through the study and discussion in this course, which trains students of transportation to develop ethical consciousness-raising students' ethical sensitivity and judgment ability, to master the requirements of ethical norms in specific engineering fields, improve their decision-making ability of engineering ethics, and cultivate their ability to seek self-protection and practical wisdom in ethical dilemmas and ethical dilemmas.

Engineering ethics is a compulsory course for postgraduates majoring in transportation in our university. The teaching contents should cover the following parts: firstly, the basic concept of engineering ethics as well as the significance and objectives of engineering ethics education; the second part, the risks, safety responsibilities values, interests and justice existing in the engineering; third point, the ethical problems existing in transportation engineering events and professional ethics possessed by

engineers. Fourthly, analyzing and discussing relevant practical cases.

3.3. Application of Case Analysis in Course

Case teaching doesn't merely mean making an example, nor a simple judgment of right and wrong. It should take case analysis as the core, and each chapter should be supplemented by relevant cases as guidance. The whole case teaching should be adopted in the course to guide the students to be there, and urge the students to take the initiative to analyze, judge and make decisions under the simulated complex environment. The case selection of engineering ethics should be timely, professional and typical, which are the key factors to determine the quality of the course.

Because of the characteristics of the major transportation major can be based on classic cases supplemented by professional and technical engineering cases to carry out teaching. One of the most critical steps of case analysis is to establish a case base with the characteristics of transportation. In addition, for related engineering cases, teachers from different engineering practice backgrounds can be contacted to conduct full discussion and analysis, so as to express their own opinions, and finally integrate the process of case analysis.

4. CONCLUSION

Based on the analysis of the research status of engineering ethics education at overseas and domestic, combined with our professional transportation characteristics, this article expounds on the necessity of carrying out engineering ethics education, and finally discusses the transportation professional engineering ethics and constructive ideas of course system and teaching methods. With a view to improving the teaching of the course, improving students' ability of engineering ethics decision-making and cultivating students in the ethical dilemma and ethical dilemma to seek self-protection ability and practical wisdom.

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