

Research on the Teaching Reform of Engineering Ethics Course Based on the Concept of "Ideological and Political Courses"

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ABSTRACT

The impact of modern engineering on individuals, society and nature is becoming more and more intense, and the problem of engineering ethics is becoming increasingly prominent. So it is imperative to carry out engineering ethics education for engineering practitioners. Guided by the concept of "ideological and political courses", the teaching reform of engineering ethics course is carried out. By refining the knowledge system of engineering ethics course, and integrating the ideological and political elements with it, the sinicization and localization of engineering ethics education is realized. On this basis, the teaching system of engineering ethics course is reformed and innovated, and the "practical rationality" is highlighted. Adopting online teaching, flipped class, MOOCS and other advanced teaching methods, an innovative teaching mode of "engineering ethics +" under the guidance of "curriculum ideological and political +" can be created. The quality of engineering ethics teaching is improved through these teaching reform modes. Interdisciplinary engineering and technical talents with engineering ethics can be better cultivated.

Keywords: *engineering ethics, ideological and political courses, teaching reform, practical rationality, flipped class*

1. INTRODUCTION

Modern engineering has the characteristics of large-scale, comprehensive, complex and profound impact on society and nature, which puts forward higher requirements for engineering professionals [1]. On the one hand, engineering professionals are required to master solid professional theory and technology. On the other hand, professional ethics and engineering ethics quality become the important qualities that engineering professionals must possess.

The consciousness of engineering ethics is not innate, but is created through education and cultivation. However, engineering ethics education originated in the West, and the diversity of its ethical stand and value standards does not fully meet the needs of China's national conditions and the development of the times [2]. Engineering ethics education in line with national conditions needs to be carried out in China. Thus, the teaching reform research of the educational idea, teaching system and teaching content of engineering

ethics is imperative. The aim of engineering ethics education is to improve the moral standard of engineering professionals, enhance their ethical literacy, and cultivate their sense of social responsibility. Higher ideological and moral quality and correct values become the foundation of engineering ethics education. Integrating ideological and political education into engineering ethics education becomes the necessary way for engineering ethics education in China.

General Secretary Xi Jinping put forward the idea of "ideological and political courses" at the National Conference on ideological and political work in December 2016. The idea guides the research direction of engineering ethics education reform and clarifies the essence of engineering ethics education and its reform in China. The requirements of professional ethics education for students are actually included in the ideological and political theory education in colleges and universities [3]. The concrete of vocational ethics education for engineering students is engineering ethics education.

Therefore, under the guidance of the new concept of "ideological and political courses", this paper integrates the ideological and political education into the engineering ethics education, and explores the reform and innovation of graduate engineering ethics education teaching. It can broaden the research vision of ideological and political education, and enrich the value system of national theory in engineering ethics education. It is conducive to cultivate the compound engineering and technical talents with humanistic and scientific spirit, so as to meet the needs of the new normal development of economy in the new era.

2. THE RESEARCH OBJECTIVES OF TEACHING REFORM

On the basis of clarifying the education and teaching objectives of engineering ethics, this paper combs and condenses the theoretical system and knowledge system of engineering ethics. The fit of ideological and political education into engineering ethics is analyzed. In view of the concise knowledge system of engineering ethics, the appropriate ideological and political contents such as socialist core values should be correspondingly integrated. Finally, a vivid Chinese knowledge system of engineering ethics is formed.

This paper studies and explores the theory and practice of engineering ethics education reform for engineering postgraduates, and extends the innovative achievements to the teaching practice of other professional courses, so as to create an innovative mode of "engineering ethics +" under the guidance of "ideological and political courses +". So as to achieve the goal of promoting and implementing the comprehensive education project.

3. DESIGN AND IMPLEMENTATION OF TEACHING REFORM MODE

Engineering ethics originated in the West. It has to go through the process of Western learning spreading to the East like many disciplines. However, engineering ethics can't be completely copied as natural science because it involves ethical standpoint and values. To meet the needs of personnel training in the new era, it is necessary to integrate Chinese ethical thoughts on the premise of clarifying the theoretical system of engineering ethics. Engineering ethics education is highly consistent with "ideological and political courses" in the fundamental goal of "establishing morality and cultivating people". Therefore, the reform of engineering ethics teaching system should be carried out closely around the fit [4]. Taking the idea of "theoretical rationality" to "practical rationality" and "instrumental rationality" to "value rationality" as the principle of teaching reform. Designing the teaching reform scheme, and starting to adjust the teaching plan, teaching content, teaching

mode, assessment method and so on, so as to realize the reform and innovation of engineering ethics teaching.

3.1. Concise knowledge system of engineering ethics course

Based on the national planning textbook *engineering ethics* designated by the National Engineering Professional Graduate Education Steering Committee, the key points of engineering ethics course knowledge were combed and condensed. With the ethical essence of "value benefit justice responsibility" as the core, a relatively independent and complete theoretical knowledge system with logical structure was formed. Taking the theoretical knowledge system as the main line, design and improve the specific teaching content. This paper studied the ethical connotation of the relevant nodes in the knowledge system, and explores which ideological and political elements can be combined and integrated. The research foundation of this project was to refine the knowledge system of engineering ethics course.

3.2. The exploration and integration of ideological and political education with socialist core values as the core

According to the condensed knowledge system of engineering ethics, this paper explored the content of ideological and political education that can be combined with it, and studies the conjunction point and path of the integration of the two. The teaching content system of "ideological and political+" and "+ engineering ethics" was conceived, and the corresponding teaching means and methods were designed on this basis.

The content of ideological and political education should take the socialist core values and Chinese excellent traditional culture as the core, and the integration with knowledge points related to engineering ethics should be natural and fluent, reflecting the sinicization and localization of engineering ethics education. Pay attention to the combination of theory and practice and keep pace with the times. To complete the improvement and innovation of "ideological and political +" → "+ engineering ethics" → "engineering ethics guided by curriculum ideological and political".

3.3. The reform and innovation of the teaching system of engineering ethics course

On the basis of completing the knowledge system reform of the course "engineering ethics guided by ideological and political courses", this paper further studied the teaching objectives, teaching contents and corresponding teaching means and methods of new engineering ethics. Design, improve and implement the syllabus, teaching mode, teaching means, and evaluation of educational achievements, so as to complete the reform

and innovation of the teaching system of engineering ethics course.

3.3.1. Revision of syllabus

Aiming at the new knowledge system of engineering ethics, the teaching syllabus of engineering ethics was revised to adapt to the teaching objectives, teaching contents and teaching means.

3.3.2. The perfection of teaching content

Around the various knowledge points, combined with ideological and political courses to build and improve the corresponding teaching content.

3.3.3. Design and implementation of teaching means and methods

According to the teaching content of each part of engineering ethics, the corresponding teaching means and methods were designed and applied. Such as the combination of "online" and "offline", MOOCs, flipped class, group discussion, class debate, case teaching and so on. Use these methods according to the different courses, students' learning enthusiasm and participation can be improved, and the combination of theory and practice can be highlighted.

3.3.4. Construction of teaching resources

According to the syllabus and teaching content, writing teaching plan, making PowerPoint, editing video teaching materials, and arranging teaching guidance materials.

3.3.5. Case base construction

In order to establish the engineering ethics teaching case base, the corresponding cases according to different ethical themes were collected and processed, especially the cases in Chinese engineering practice.

3.3.6. Case base construction

The assessment method was to adopt the comprehensive examination and evaluation mode of class performance + course homework + course report. The course report should reflect the theme of "ideological and political courses", and the final course score = usual class score + homework score + course report score. At the end of the final course assessment, the assessment analysis report was formed.

3.4. An exploratory study on the integration of "engineering ethics +" and professional courses

Through the exploration and practice of engineering ethics teaching reform under the guidance of ideological and political courses, the education and teaching ideas of "ideological and political courses +" to "engineering ethics +" can be extended and expanded. This paper explored how to integrate the idea of engineering ethics with the socialist values as the core into the teaching of other professional courses. Running the ideological and political education through the whole process, fully integrating the idea of engineering ethics into the teaching of engineering education. To cultivate and strengthen the students' sense of social responsibility, and promote the comprehensive teaching reform of comprehensive education [5].

4. METHODS AND MATERIALS

4.1. Literature analysis

This paper adopted the method of literature analysis for the preliminary study. The method can solve the related research status of engineering ethics education, the theoretical system of engineering ethics, the ideological and political materials of socialist core values, the excellent traditional Chinese culture and the ways of classroom teaching. So as to provide a research basis for the project research and clear research direction.

4.2. "Online" + "offline" teaching method

By using the "online" + "offline" teaching method, the focus of teaching can be shifted down, most of the traditional classroom teaching content can be transferred to "online". Making use of the characteristics of rich network resources to realize students' autonomous learning under the "online" class. Teachers should give full play to the initiative and enthusiasm of students in class. Teachers carry out guided teaching to inspire key knowledge points, knowledge system, and logical evolution relationship and so on. The main content of teaching was changed into case teaching, group discussion, topic report, flipped class and so on, so as to promote the reform of classroom teaching.

4.3. Flipped class

Flipped class is a more generalized expression of "online" + "offline" teaching method. It mainly emphasizes that students are the main speakers in class, and the roles of teachers and students are exchanged. It can make learning more flexible and active, make students more involved, and improve the teaching effect of engineering ethics course. This is the reconstruction of the learning process, and it is also one of the objectives of

this project. We should further summarize and improve its practical application.

4.4. Case teaching method

In order to change the educational concept of engineering ethics education from "theoretical rationality" to "practical rationality", the course teaching must highlight the practical characteristics. For classroom teaching, case teaching is a very suitable teaching method to realize "practical rationality". The realization of the goals of engineering ethics education, such as the cultivation of engineering ethics consciousness, the promotion of moral sensitivity and the enhancement of ethical decision-making ability, needs the support of context.

Case teaching can help students analyse ethical problems and ethical dilemmas, and make ethical decisions in situations. Students can verify and adjust what they have learned combined with the analysis of teachers and classmates.

5. RESULTS ACHIEVED

5.1. Improve students' autonomy and enthusiasm in learning

Through flipped class and case teaching, students can learn autonomously. Flexible assessment methods can give full play to students' subjective initiative in learning.

5.2. Promote teachers to keep pace with the times and learn from each other

Due to the role transformation of teachers and students and students' autonomous learning, teachers must make full and solid lesson preparation in order to cope with the student-oriented teaching situation in class. So it is bound to promote teachers to keep pace with the times and learn from each other.

5.3. Promoting the implementation of "ideological and political courses"

In order to refine the knowledge system of engineering ethics with Chinese characteristics, ideological and political education contents such as socialist core values are integrated into the teaching of engineering ethics. The implementation of this project can further promote the implementation of "ideological and political courses".

6. CONCLUSION

6.1. The curriculum system of engineering ethics under the guidance of "ideological and political courses" was constructed

To form the curriculum content of engineering ethics with Chinese characteristics, the socialist core values and Chinese excellent traditional culture were integrated into the knowledge system of engineering ethics. Highlighting the fundamental goal of "Building Morality and cultivating talents" is not only a beneficial attempt of sinicization and localization of engineering ethics in theory and practice, but also a concrete practice of "ideological and political courses" education concept in graduate education.

6.2. A new teaching system in line with the characteristics of engineering ethics education was explored

To shift the focus of traditional class teaching content down and guide students to learn independently. The teaching mode and method of "online" + "offline", flipped class, case teaching and flexible assessment were adopted to stimulate students' initiative and enthusiasm in learning and improve teaching effect.

6.3. The educational idea of "engineering ethics + "was put forward

This paper combined the basic theory of engineering ethics with the teaching of other professional courses. When students study the relevant professional courses, they can cultivate the engineering ethics consciousness and enhance the sense of social responsibility. It is the further deepening and practice of the ideological connotation of "three-whole education".

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