Exploration on the Reform of Ideological and Political Education in Engineering Mechanics

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Abstract. In the new era of education background, the party and the state put forward the ideological and political education concept of curriculum. Curriculum ideological and political education is to integrate ideological and political education into all aspects of professional course teaching, so as to achieve moral education and cultivate talents. Ideological and political education has become an important aspect of teaching reform in colleges and universities. Based on the background of the current ideological and political construction of the course, this paper expounds the teaching reform methods of the ideological and political course of the engineering mechanics course from the aspects of the formulation of the ideological and political objectives of the course, the reform path of the ideological and political education of the course and the construction of typical cases.

Keywords: engineering mechanics · curriculum ideological and political · teaching reform · case

1 Introduction

It is an important task to implement the ideological and political work of the national conference on ideological and political work in colleges and universities. It is also the objective requirement of cultivating socialist successors with all-round development of morality, intelligence, physique, beauty and labor. It is also the fundamental way to realize Jinping Xi's socialist thought with Chinese characteristics in the new era. Curriculum ideological and political education is a new educational concept put forward by the party and the state under the background of new era education. It has become an important content of professional curriculum construction to integrate the ideological and political curriculum into the theoretical knowledge teaching and professional skills training of professional curriculum system. The guiding outline of ideological and political construction in colleges and universities issued by the ministry of education clearly stipulates that engineering professional courses should pay attention to strengthening students' engineering ethics education, cultivating students' great country craftsman spirit of striving for perfection, and stimulating students' home feelings and mission of serving the country through science and technology.

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Mechanics and mechanics are two compulsory courses of mechanics major. The course covers a wide range of subjects, such as transportation, machinery, aviation, energy, security and so on. The coverage of ideological and political quality education in college students will be greatly improved [1]. At the same time, engineering mechanics course itself has the characteristics of abstract theory, many formulas, rigorous logic and large amount of calculation. Many students feel that it is difficult and their learning initiative is poor. Therefore, integrating ideological and political elements into the teaching content can increase the interest of the classroom and improve the learning enthusiasm of students.

In the process of ideological and political construction of engineering mechanics course, our school adheres to the principle of combining ideological and political education, professional education and practical education. Through the establishment of curriculum ideological and political objectives, the path of curriculum ideological and political reform, and the design of typical teaching cases, the craftsman spirit and home feelings of students are shaped.

2 The Establishment of Ideological and Political Objectives in Engineering Mechanics Course

The formulation of the ideological and political objectives of the course should be combined with the characteristics of the course content and the cultivation of students' needs. As a professional course teacher, we need to deeply understand the knowledge system of the course, dig out the ideological and political education elements contained in it, find the breakthrough point of ideological and political education in the course teaching, realize the integration of knowledge teaching and ideological and political education, guide students to firm their ideals and beliefs, enhance cultural confidence and patriotic feelings [2]. Engineering mechanics course mainly teaches introduction, statics, mechanics of materials and so on. Table 1 shows the integration points and objectives of Ideological and political education in teaching contents.

Table 1. Ideological and political integration points and objectives of teaching content course

Chapter	Knowledge points	Integration of ideological and political elements	Ideological and political goals
1. Introduction to engineering mechanics	1. Engineering mechanics is closely related to engineering 2. Main content and analysis model of engineering mechanics 3. Analysis method of engineering mechanics	1. The application field of engineering mechanics and its wide range 2. Typical mechanical phenomena in nature 3. Famous success and failure cases in the history of mechanics	1. Patriotism, national pride, honest and trustworthy socialist core values 2.Strengthen students' cultural identity

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Chapter	Knowledge points	Integration of ideological and political elements	Ideological and political goals
2. Statics	1. Statics 2. Simplification of force system 3. Statics balance	1. Binding and binding force 2. Static equilibrium equation and its application	Rigorous scientific attitude and working style of striving for perfection
3. Basic deformation and combined deformation	1. Axial tension compression deformation, torsion deformation, bending deformation and shear deformation 2. Calculation of internal force by section method 3. Stress, deformation, strength and stiffness analysis	1. Calculate the internal force according to the positive and negative agreement of internal force and section method 2. Calculate the strength and stiffness according to the dangerous points and dangerous sections	1. Scientific standard, rigorous and pragmatic scientific spirit 2. Social responsibility and safety awareness
4. Stress state and strength theory	1. Stress state 2. Strength condition under general stress state	1. Types of stress state 2. Relativity of strength failure and check	1.The law of unity of opposites 2. Social responsibility and safety awareness
5.Stability of compression bar	1. The basic concept of strut stability 2. Critical load 3. Stability check	1. Judge the type of pressure bar 2. Check and design the stability according to the type of compression bar	1. The beauty of nature and structure 2. Social responsibility and safety awareness
6. Experimental teaching	Experiments of tension and compression, torsion, bending, etc.	1. Cooperation of team members 2. The difference between theory and experiment	Team spirit, perseverance and pragmatic attitude

3 Reform Path of Ideological and Political Education in Engineering Mechanics Course

Each course has its own characteristics and knowledge system. On the basis of in-depth understanding of the characteristics and knowledge system of the course, taking some knowledge points of the course as a breakthrough, excavating the ideological and political elements of the course and integrating into the classroom teaching is an effective way to

carry out the ideological and political construction of the curriculum. The reform path of ideological and political education in engineering mechanics course is as follows.

3.1 Effective Connection Between Knowledge Points of Engineering Mechanics and Ideological and Political Education

The ideological and political elements of the course are integrated into some knowledge points of each chapter to create lively teaching scenes, achieve the effect of moistening things and soundless, and make the knowledge objectives and ideological and political objectives naturally integrate. The effective teaching elements of ideological and political education are explored in the process of ideological and political education. For example, in the introduction part, an example is given of Zhaozhou Bridge in ancient China. The arch structure is adopted in Zhaozhou Bridge, which not only makes use of the pressure resistance characteristics of stone, but also eliminates the tensile stress on the arch axis section, which makes the bridge more stable, reduces the weight and increases the flood discharge capacity. Through the effective connection between the knowledge points of engineering mechanics course and ideological and political education, we can guide students to develop rigorous and pragmatic work attitude, cultivate their sense of social responsibility and safety, and stimulate their patriotic feelings [3].

3.2 Changes in Teaching Methods and Means

In terms of teaching methods, we should establish a student-centered teaching concept and adopt heuristic and project task driven teaching to cultivate students' independent thinking ability and the ability to solve complex engineering problems with mechanical knowledge. For example, when explaining the strength calculation of tension and compression bar, list the example of crane, let students first carry out mechanical modeling, then carry out static balance analysis and calculation, and finally calculate the maximum lifting weight of crane. Guide students to think further, is there any surplus in the strength of the inclined rod and horizontal beam of the crane? Let students think about which methods should be adopted to redesign the members, and the required methods should reflect the economy on the premise of ensuring the safety of the crane.

In terms of teaching means, online teaching platform can be introduced on the basis of multimedia and blackboard writing, such as learning pass, rain class, etc. Using the information teaching means, teachers can check attendance and ask questions at any time in the classroom, grasp the students' understanding of knowledge points in time, and obtain the students' learning situation in time, so as to improve the teaching strategy and ensure the teaching effect. In addition, the introduction of online teaching platform in engineering mechanics course can also enable students to understand and experience the penetration of the internet in the field of education[4, 5], so as to educate students to cherish the current happy life, study hard and aspire to serve the motherland.

3.3 Evaluation System of Ideological and Political Teaching

The key point of curriculum assessment is to stimulate students' autonomous learning ability, encourage their personality development, cultivate their innovative spirit and

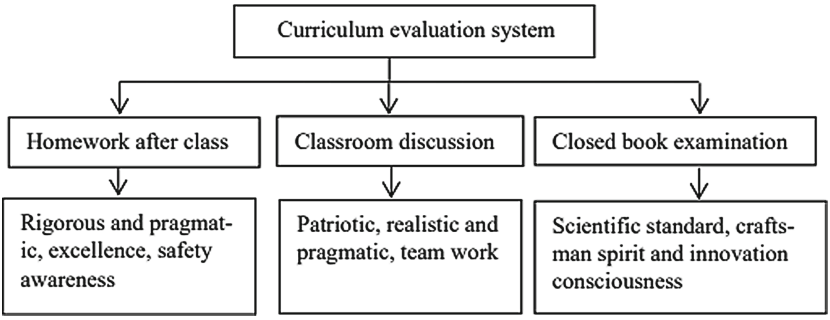

Fig. 1. Curriculum evaluation system

practical ability, and highlight their dominant position. The main purpose of the course assessment of engineering mechanics is to examine the students' understanding of the course objectives (knowledge objectives, ideological and political objectives), and the important content is to check the students' mastery of the teaching contents. The examination results are composed of homework, class discussion and closed book examination, as shown in Fig. 1.

4 Typical Case Construction of Ideological and Political Courses

An important aspect of curriculum ideological and political construction is the construction of typical cases. Through the construction of typical cases, strengthen the systematic and scientific design process of ideological and political courses. At present, there are 10 typical cases of engineering mechanics in our university. For example, when teaching the application of truss, the truss girder bridge, the application of mechanics in bridge construction, and world famous bridges are usually introduced. The form of "one bridge, one story" can be adopted to arouse students' thinking. This paper introduces the story of Yisheng Mao's construction and explosion of Qiantang River Bridge, the position of Qiantang River Bridge in the history of Chinese bridges, and the story of Yisheng Mao's determination to master the bridge construction technology since childhood, which greatly inspires the students and stimulates their patriotic enthusiasm and ideal and faith; When introducing bridges such as Nanjing Yangtze River Bridge and Wuhan Yangtze River Bridge, the paper talks about the history of bridge construction in China and how engineers innovate and overcome difficulties. They have built one bridge after another. Patriotism, craftsmanship, system confidence, social responsibility and safety consciousness are integrated into it. Many experts in the construction of the bridge in Macao and Hong Kong, including those who have worked hard to build a bridge in Macao, are confident in building the bridge. Bridge experts led the team to overcome difficulties, accurate engineering survey, improve bridge deck performance, innovate bridge pile design, ensure the 120 year service life of Hong Kong Zhuhai Macao Bridge, and contribute to the communication among Hong Kong, Macao and Zhuhai. So as to encourage students to have a solid professional knowledge and skills, and better serve the patriotic enthusiasm of the motherland construction.

5 Conclusions

The ideological and political construction of professional courses is an important supplement to the ideological and political courses in Colleges and universities. Taking engineering mechanics course as an example, this paper explores the ideological and political elements of the course, establishes the ideological and political objectives, and explores the path of Ideological and political reform. Through the ideological and political teaching reform of engineering mechanics course, students' patriotism, responsibility and safety consciousness are enhanced. In the future, the ideological and political education of the course will be integrated into all aspects of curriculum teaching.

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