

Research on the Teaching Mode of Mechanical Design Course with Ideological and Political Education

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Abstract

This topic takes the course of "Mechanical Design" as an example, analyzes the key points of current ideological and political content and the quality objectives of talent training program, and selects three types of ideological and political education content that can be carried out in the course of "Mechanical Design", such as "Craftsman Spirit" and relevant knowledge points that can be cut into the ideological and political content in the specialized course, selects the "South-pointing Cart", "Little-assistant" and other appropriate ideological and political education cases and a variety of mixed teaching methods such as "Flipped Class", forms a set of teaching mode suitable for the course of "Mechanical Design" to carry out the ideological and political education. It can provide reference for the smooth and effective development of ideological and political education in other similar specialized courses, and improve the effect of students' ideological and political education, which is an effective supplement to the teaching of ideological and political class, and help to achieve the goal of ideological and political education of all staff.

Keywords

Ideological and political education; Specialized courses; Mechanical Design; The Teaching Mode.

1. The Background

1.1. Specialized Courses with Ideological and Political Education Is the Teaching Requirement of Specialized Courses [1, 2]

The key to strengthen and improve college students' ideological and political education is to keep pace with The Times and innovate constantly. It is a practical and worthy way to carry out ideological and political education in specialized courses. For the current vocational students, many people's learning purpose and motivation are not very clear and sufficient, which will bring about the slacking of professional learning inevitably. How can teachers ignore the existence of this situation and just teach their own professional knowledge? In fact, even if the teaching goes on like this, the learning effect is also very poor, so in this objective reality, it is very necessary for specialized teachers to carry out ideological and political philosophy to students.

1.2. The Teaching Mode of Specialized Courses with Ideological and Political Education Needs to Be Studied [3]

How to combine ideological and political education content with specialized courses effectively and apply it to teaching, so as to enable students to master professional skills and receive ideological and political education at the same time, and achieve the effect of both? It requires teachers to study carefully the characteristics of knowledge points that can be integrated with ideological and political education content in specialized courses, select and collect relevant

teaching cases and research effective teaching methods to carry out education and teaching for students.

Based on the above analysis, this topic takes the mechanical design courses as an example, analyse and select the knowledge points related to the core content of ideological and political education for college students and the appropriate case of ideological education and the teaching method, form a set of suitable for the mechanical design curriculum to carry out ideological education of the teaching mode. This can provide reference for the smooth and effective development of ideological and political education in other similar specialized courses, improve the effect of students' ideological and political education, and effectively supplement the ideological and political education class. The research of this project is also helpful to achieve the goal of ideological and political education of all staff.

2. Project Implementation

2.1. Analyze the Key Points of the Current Ideological and Political Content And the Quality Objectives of the Talent Training Program, and Select Three Types of Ideological and Political Education Contents That Can Be Carried Out in the Specialized Course of Machine Design, Such as "Craftsman Spirit"

However, it is our common aspiration of higher vocational education educators to train students to become builders of new China with professional ethics and correct outlook on life and values. Therefore, we choose the following three aspects of ideological and political knowledge as the scope of professional ideological and political knowledge by research: (1) "Craftsman Spirit". It is the embodiment of professional ethics, professional ability and professional quality, a professional value orientation and behavior of practitioners, and a professional characteristic that must be possessed by builders of new China. Cultivating engineering students with craftsman spirit is an indispensable requirement of the major itself. (2) The education of socialist core values. It is the most advanced in modern China and the most suitable for China's national conditions. It is also the study of the students as the successor of the socialist cause must be carried out. [4] (3) The study of the fine traditional virtues of the Chinese nation. Only by inheriting and learning the fine virtues of the Chinese nation, can students learn to be proud of their country, love their party and love their country.[5]

2.2. Analyze the Talent Training Knowledge and Ability Objectives of the Talent Training Program. According to the Determined Ideological and Political Content, Analyze and Select the 34 Knowledge Points of the Course of Mechanical Design That Can Be Combined with Ideological and Political Education, Such as "General Process of Mechanical Design" and "Prosthetic Limb Mechanism"

The knowledge points of specialized courses are oriented to professional skills, emphasizing the ability of calculation and analysis. Not every knowledge point can be extended to life philosophy and political thoughts, so it is necessary to organize the knowledge points of the courses. The course of Mechanical Design has various contents. At present, through the analysis of the characteristics and nature of the knowledge points of the specialized courses, we have determined 34 knowledge points that can extend the ideological and political education such as "Craftsman Spirit", "General Process of Mechanical Design" and "Prosthetic Limb Mechanism", etc.

2.3. Collect and Sort Out 34 Ideological and Political Education Cases Integrating with Professional Teaching, Such as "South-Pointing Cart", "Little-Assistant" and "the Cost of Lies" etc.

Choosing the right cases will make students resonate, so as to accept the content and views of ideological and political education, and then achieve the effect of their education. Therefore, this research team analyzes the psychology of current students, understands their hobbies and thoughts, and searches and sorts out cases accepted by students from a large number of ideological and political cases with different contents, so as to achieve the goal of this research. So far, we have identified 34 ideological and political cases including "South-pointing Cart", "Little-assistant", "the Cost of Lies" and "Double 11 Shopping Festival" based on 34 knowledge points, which are connected with the core socialist values, the fine traditional virtues of the Chinese nation and the "Craftsman Spirit". In addition, some of the cases were compiled into a book for the reference of other teachers in teaching and the improvement of this research group in the next step.

These cases contain some of the ideological and political knowledge points are different, some are interdependent. But what runs through all of them is one thing: they're easy to understand. The case selection is close to the lives and emotions of students, which is their familiar feelings of home and country, rather than the lofty and unreachable. Only in this way can students identify and accept the ideological and political content contained in the cases, so that the teaching can achieve the effect of ideological and political education.

2.4. Practiced and Applied the Ideological and Political Teaching Methods in Mechanical Design Course By A Variety of Mixed Teaching Modes Such as Flipped Classroom

The effect of teaching depends largely on whether the teaching method is appropriate. If ideological and political education can not be integrated into specialized courses, students will feel very strange in specialized courses, and may not achieve the expected educational effect.

2.4.1. A Variety of Teaching Modes Can Be Applied Flexibly According to the Characteristics of Majors and Ideological and Political Contents.[6]

Been trained by various teaching methods and classroom practice in and out of school, the teachers of this research group adopted various mixed teaching modes such as situational teaching method, participatory teaching method and flipped classroom according to the characteristics of ideological and political cases and professional knowledge points in the implementation of this project.

For example, in the practice activity of "Bearing Brand and Code", the research group changed the traditional way of classroom teaching and students' exercises after class, assigned preview tasks in advance, and students reported preview results in class, and carried out on-site compilation practice of bearing code in class. This teaching mode has played a variety of teaching effects. In terms of teaching form, it adopts the flipped classroom mode, changing teachers' teaching of knowledge into a mode in which students actively learn knowledge and teachers assist in answering questions. From the ideological and political point of view, it exercises students' self-discipline, oral expression ability, self-confidence and teamwork spirit. Moreover, it solves the problem that the ideological and political education brings about the lack of professional teaching hours. Thus it can be seen that the introduction of ideological and political science into specialized courses should be based on the characteristics of ideological and political cases and the characteristics of professional knowledge, and flexible use of a variety of teaching models to achieve the effect of "one lesson with many abilities".

The content of "Little-assistant" and "Gratitude" education runs through the whole teaching process of nearly a year. Students are allowed to practice and experience the meaning of these

ideological and political knowledge points by themselves in class and after class, so as to obtain good learning effects in professional learning.

2.4.2. Teaching Online and Offline Has Expanded the Time and Space for Ideological and Political Education in Specialized Courses

In the implementation process of this project, we not only carry out the ideological and political thinking for students in the online class, but also increase students' education time, improve students' education effect and expand the number of students receiving education through the video-on-demand form of Zhejiang University Curriculum Open Platform.

According to the above implementation contents, this research group organically integrated mechanical knowledge points and ideological and political elements for the course of Mechanical Design, and compiled a set of overall design scheme, part of which is shown in Figure 1 to Figure 4.

Combined with the ideological and political education of the course "Mechanical Design" overall design

1. Basic Information

Course Title: Machine Design	Course code: B01516 B01625
Department: Mechanical Engineering	Course type: Professional core course
Target: Mold Design and Manufacturing Major	Course credits: 3.5+2.5
Prerequisite Courses: Tolerance and Measurement Technology, Mechanical Drawing, Die Materials and Surface Treatment Technology	Course hours: 60+42
Follow-up Courses: Plastic Mold Design, Stamping die Mold Design, Die-casting Mold Design, 3D Printing Technology and Application, Mold CAM Technology, Mold Manufacturing Technology, Mechanical Equipment Maintenance and Management, etc.	

2. Course Orientation

2.1. Characteristics, Status and Effect of the Curriculum

This course is the core course of the major. On the basis of students' mastery of the expression knowledge of mechanical drawings, common engineering materials and heat treatment knowledge, tolerance related theoretical knowledge, drawing recognition and drawing skills, material identification and selection skills, this course aims to train students to use the theoretical knowledge and research methods of engineering mechanics. The ability to solve general mechanical problems in mold design and the basic skills to analyze, design and maintain simple mechanical devices. Its role is to learn mould CAM technology, plastic mold design, stamping mold, precision mold design, die-casting mold design, mechanism motion simulation and other courses and used in the practical work of mould processing and the related mechanical equipment foundation design for the future. At the same time through the combination of ideological and political education in specialized courses to train students with the corresponding professional ethics and correct outlook on life, values, to promote them to become a new China technician with ideal and faith.

Figure 1. Basic Information and Characteristics, Status and Effect of the Curriculum

2.2 Concept

2.2.1. Major

This course is a combination of Engineering Mechanics and Fundamentals of Mechanical Design, with rich contents, independent and related knowledge points in each part. According to the students' initial contact with the content of mechanical major, the goal of design teaching is to train the students to use the knowledge of engineering mechanics, the ability to solve the general mechanical problems in mold design and the basic skills of analysis, design and maintenance of simple mechanical devices. The overall idea of course design is to adopt project-based teaching and modular teaching, which is divided into 14 course tasks. By selecting the typical mechanical project tasks, from structure, movement, strength the tripartite face mechanism analysis and design calculation, relative to the implementation of the engineering mechanics knowledge and the related knowledge of mechanical design applications, thus causes the student to master the common institutions and the purpose of the application characteristics and design method of general parts.

The design of teaching activities of this course should reflect the orientation of working process and implement task-driven teaching.

The arrangement of the teaching items of this course should not only consider the cognitive law of students, but also realize the teaching purpose of letting students master the design idea and design process of mechanical transmission design through the study of this course. Therefore, the setting of each work item should be in sequence, and the difficulty of the task should be determined according to the actual level of students.

2.2.2. Ideological and political aspects:

To carry out ideological and political education in specialized courses, we should grasp the content and mode of education. In terms of content, ideological and political education knowledge points that can be integrated with professional content are adopted: socialist core values, "craftsman spirit" and excellent traditional culture of the Chinese nation. In the way of education should pay attention to the influence of students, can not be applied mechanically. The ideological and political education should be carried out in combination with professional knowledge and the characteristics of ideological education cases in order to achieve the complementary effect of professional and ideological and political education. The problem of reduced class hours after the introduction of ideological and political education in specialized courses can be solved by means of flipped classroom, online and offline mixed teaching, etc., and the effect of students' ideological and political education can be grasped by means of students' concentration in class, completion of homework, questionnaire on learning effect, etc.

Figure 2. Concept

4.Course content and teaching design

serial number	Teaching task (Hours)	Course content and teaching objectives		teaching design	learning effect
1	Course Guide(2)	Major	Content: 1.Basic concepts of mechanical design. Goal: 1.Master the concepts of machines, mechanisms, parts and components. 2.Understand the main content and tasks of this course. 3.Understand the process of mechanical design.	Case study: 1.Mechanical crank press analysis: through the function of the crank press, the role of each component, movement to explain the basic concepts of machinery, mechanism, parts and components in mechanical design. Teaching Methods: 1.The combination of multimedia courseware, theoretical analysis and students' classroom exercises.	1.The correct rate of students' classroom exercises and homework
		Ideological	Content: 1.Be patriotic and professional. 2.Professional attitude. Goal: 1.Cultivate the values of patriotism and work. 2.Establish a professional	Case study: 1.Mechanical history: The course introduces the oldest structures in China, such as the Shadouf and the South-pointing Cart, to arouse students' national pride, respect for human civilization and wisdom, and interest in learning the discipline of	1.Students' attention to teachers' explanation in class

Figure 3. Course content and teaching design (1)

			attitude of striving and innovation.	machinery. 2. Graduates' self-employment story: In the general process of teaching mechanical design, the case of successful graduates majoring in mold self-employment is introduced, which not only introduces professional knowledge but also encourages students: diligent study, active innovation, learning the major well and promising future. Teaching Methods: 1. Multimedia courseware combined with teacher's explanation.	
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Figure 4. Course content and teaching design (2)**3. The Results of the Project**

After nearly a year's implementation of the project, the research group has achieved the following results:

(1) This project has been applied in the Department of Mechanical Engineering and Rui'an College of Wenzhou Polytechnic. In mold design and manufacturing, mechanical design and manufacturing and other majors, total 14 classes with more than 600 students in offline courses "Mechanical Design", "Mechanical Engineering" and "Automobile Mechanical Basis" have been put into practice.

(2) This program is open to students all over the country in MOOC through the online course open platform of colleges and universities in Zhejiang Province. At present, the course has received more than 143,500 page views and more than 1,200 online trainees.

(3) The video of the mechanical design course "the Positioning and Fixed Design of the Parts on the Ladder shaft" lectured by Ms. Zheng Mosi, the principal of this project, was broadcast by Zhejiang News Network to the people all over the country. The video has received more than 340,000 hits and more than 6,000 thumb ups.

(4) Student evaluation. After the course, we consulted 87 students from three classes about the ideological and political effects of the course "Mechanical Design". The results are shown in Table 1. In addition, students' recognition and appreciation of teachers' work also tell us that teachers' example is the best way of ideological and political education.

Table 1. Student evaluation

Investigation Item	Statistical Result
Believe that the ideological and political education of "craftsman spirit" in the course of "Mechanical Design".	99%
Believe that ideological and political education is helpful for them to establish correct outlook on life and values	97%
Approve of the way to carry out ideological and political education in the course of Mechanical Design	95%

4. Conclusion

In the process of project implementation, we also found some deficiencies, such as to develop the specialized course with ideological and political education, specialized time is compressed. Students need to consolidate after class. Due to the lack of learning ability of some students, the effect of their major learning will be affected. Therefore, further research is needed to find a more effective teaching model to solve this problem.

In the United States, one of the most famous documents of the 1956 Education Act stated a view of education: education is to help a child to more successfully seek their own happiness in the future life. Some people say that education is to open a man's heart and help him to grow into what he really is. I think our exploration of the ideological and political teaching mode based on the "Mechanical Design" course is just for such education.

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