

Construction of Three-dimension Integration Mode of Education of Engineering Characteristic Mechanical Design Course

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Abstract: It is worth studying and discussing how to comprehensively implement the fundamental task of curriculum education, and cultivate people by taking curriculum as the carrier, and integrating curriculum ideology and politics to realize value shaping, knowledge imparting, and ability cultivation. Based on the engineering training of Dongguan City University, this paper discusses the construction of ideological and political content of mechanical design courses with engineering characteristics of independent colleges. The course is based on the application value of ancient culture in science and technology, dynamic development of mechanical industry, natural characteristics, engineering application orientation, etc., to achieve the educational goal of the ideological and political thinking of the mechanical design course.

Keywords: Curriculum ideology and politics; Engineering characteristics; Mechanical design; Three-dimension integration; Ancient technology

Fund Project:

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In 2020, the Guidelines for Ideological and Political Construction of Curriculum in Colleges and Universities put forward that "to carry out the fundamental task of cultivating virtues and cultivating people, we must integrate value building, knowledge imparting and ability cultivation into one, which cannot be separated^[1]. In 2021, the Ministry of Education presided over the ideological and political teaching ability training of national college teachers, Wu Yan^[2]. The Director General pointed out in his special report on Policy interpretation of ideological and political construction of college curriculum that science and technology majors should be integrated into the curriculum with aspects of "scientific thinking, scientific ethics, engineering ethics and artisans of great powers", and professional education courses should reflect the breadth, depth and temperature of expansion, combined with the outline and the spirit of the conference. In the teaching, we should integrate new materials in line with ideological and political elements to infect students' moral feelings, open students' spiritual world and stimulate students' rational interest, so as to help students understand the ideological and political education knowledge from a broader perspective of knowledge and shape their own moral world^[3]. The design of professional courses cannot be separated from the transfer of knowledge, the cultivation of ability and the shaping of spirit^[4]. It is an arduous challenge for science and technology courses to fully excavate ideological and political elements and value connotation in the curriculum, so as to integrate political education into the curriculum naturally and promote the collaborative education of various courses^[5]. Making full use of ideological and political elements to assist the construction of professional courses is the issue to be discussed in this paper.

1. Dongguan City University Mechanical design course ideological and political three-dimensional fusion mode

The integration of engineering vision, engineering application, ideological and political elements value guidance cultivates students to have the ability of innovative design, acquire the basic knowledge of mechanical design, and realize the guidance of socialist core values.

In view of students' weak professional foundation and lack of sensitive innovation consciousness, they are ambitious, impetuous, lack of gratitude and sense of responsibility, and enterprises need talents with professional ability and sense of responsibility. The ideological and political course concept of this course is: project guidance throughout the course teaching, enterprise embedded teaching concept, national culture confidence and feelings of home and country, social responsibility and craftsman spirit. The ideological and political elements are integrated into the curriculum in online and offline forms.

The solution is:

In terms of engineering vision, ideological and political courses, basic courses, network resources, experimental courses, enterprise special courses, course design courses to shape the engineering vision.

In the aspect of engineering application, the application projects guide the implementation of innovation training, engineering training through discipline competition, innovation thought inside and outside the traditional course.

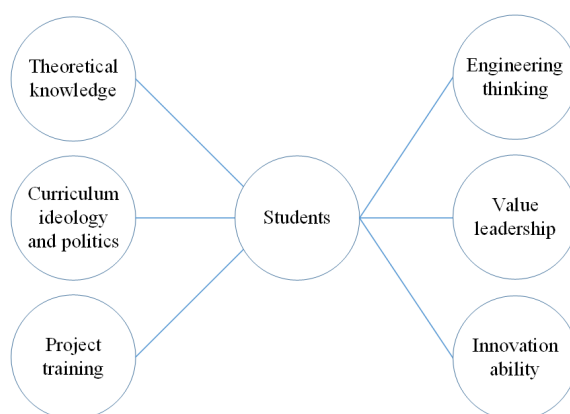


Figure 1 three-dimension integration mode of Mechanical design course

2. Examples of course design

This course focuses on the study of transmission parts. Combined with the nature of the course, the cognitive link of laboratory transmission parts is designed and carried out in the second week of the course.

The task of experimental cognition: observe the characteristics of each transmission, pay attention to observe the differences and similarities.

Assessment: Draw mind maps of screw connection, key connection, gear drive, belt drive, worm gear and worm drive, coupling and bearing, respectively.

Requirements: Mind map must at least have a physical map, name, can be appropriate to add features or applications.

Form: In groups.

Ideological and political education goal: to cultivate the spirit of teamwork, cultivate students' overall view, local view, guide students to observe the structure of the transmission parts, different types of transmission parts, different structures, different applications, enlighten students that existence is valuable, with students' core values. At the same time to lay the foundation for the later course learning.

3. Ideological and political education effect of mechanical design course

What do students learn from the first class introduction? What to learn? How to learn, stimulate the motivation of students to learn. In the process of theoretical learning, we take theoretical teaching as the main line, integrate project design, and strengthen students' design ability. In various subject competitions, students also achieved good results.

From the course assessment results, the failure rate of students decreased significantly, and the course evaluation showed a positive trend. The course ideology and politics serve the course content and stimulate students' intrinsic learning motivation. The course design has been positively evaluated by students and the school. The mechanical design course of the team teachers has been recommended as the demonstration course of ideological and political science of the City Institute, and has become the demonstration course of ideological and political science of the undergraduate course of Guangdong Province, and has been recognized as the first-class undergraduate course of Guangdong Province. From the perspective of longer time, taking the undergraduate graduates major-

ing in mechanical engineering as an example, the proportion of graduates engaged in mechanical engineering and similar industries has increased significantly in the past two years, which to some extent has achieved the cultivation of applied talents for the society.

Curriculum education is a long-term project, requiring many years of experience to see obvious results. We will continue to track the effect of education.

4. Conclusion

The course combines engineering perspective, engineering application, ideological and political elements value guidance to cultivate students' ability of innovative design, acquire basic knowledge of mechanical design, and realize the guidance of socialist core values. To a certain extent, the three-dimension curriculum construction realizes the value shaping, knowledge imparting and ability cultivation of students, builds up the confidence of Chinese culture, cultivates students' sense of social responsibility and feelings of home and country. Future engineering education is innovative engineering education. This model has achieved good results in the City Institute, and can be promoted in engineering courses to some extent. We are willing to discuss with our domestic counterparts to jointly promote the continuous improvement of ideological and political construction of mechanical design courses.

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