

“Course Education” into Professional Course of < Principles of Computer-Aided Design and Manufacturing >

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Abstract: To integrate ideological and political work into the whole process of education and teaching, thus achieving whole-course, all-round education by all staff, lecture of professional courses in colleges and universities must not only impart professional knowledge and skills to students, but also give course education when necessary. Based on the characteristics of mechanical engineering undergraduates and teachers, this paper analyzes the necessity of course education. Taking engineering certification and dual first-class construction as the background, it explores the path for course education in professional courses with “Principles of Computer-Aided Design and Manufacturing” as an example.

1. Introduction

Chinese leaders emphasized at the National Conference on Ideological and Political Work in Colleges and Universities: “In ideological and political work of colleges and universities, we must adhere to the key link of fostering character and civic virtue, and integrate ideological and political work into the entire education and teaching process” [1]. In view of the pain point that professional courses in the teaching practice of colleges and universities have always only concerned about knowledge instruction and ability training, making ideological and political courses the only responsible link for value guide, Chinese leaders emphasize that all courses should come with educational function, and all teachers should shoulder educational responsibility. Course education is not to turn courses into ideological and political courses, nor it is to add a new course, but to rely on a professional course as a carrier, implicitly or explicitly integrate ideological and political education into each link and every aspect of professional classroom teaching according to actual needs, thus achieving unity of curriculum knowledge instruction, ability development and value guide. In this way, public basic courses and natural science courses also have the function of educating people with culture. Course education is to spread educational function of ideological and political curriculum over a whole area from one point, thus forming a broad pattern of ideological and political education in which all courses educate people in colleges and universities. The unity of ideological guidance and knowledge instruction constitutes the curriculum goals of course education[2]. Based on the professional platform course “Principles of Computer-Aided Design and Manufacturing” of mechanical engineering majors, this paper explores how to unify ideological guidance and knowledge instruction in professional courses under the background of engineering certification and dual first-class construction[2-5].

2. Measures for giving course education in professional courses

2.1 Establishing the core role of course education teachers

Teachers are the implementers of curriculum reform. The ultimate goal of curriculum reform and

construction is teachers' education and teaching practice. What ideological and political education advocates is education by all staff. It requires ideological and political teachers to work together with professional teachers, promote and better shape the role of professional course teachers in ideological and political education. Teachers of professional courses must link traditional ideological and political education courses with professional courses to achieve in-line parallelism between professional courses and ideological and political theory courses, so that it is possible to educate people by “science + ideology & politics” and achieve all-round ideological and political education.

Teachers should change traditional teaching concepts and fully understand that professional courses must not only impart basic concepts, principles, models, representation methods, control and optimization techniques and knowledge of the discipline, but also assume ideological and political education roles. Taking mechanical engineering professional certification as an opportunity, teachers should follow curriculum goals of engineering certification design, take graduation requirements indicators as the starting point, fully combine the educational purpose of fostering character and civic virtue, deeply explore the historical resources of ideological and political education contained in the curriculum. Teachers of professional courses must fully explore the correct world outlook, outlook on life, values and professional emotions contained in the teaching contents in the teaching preparation stage. It is necessary to help students understand the history and development trends of science and technology, learn rigorous, truth-seeking, benevolent, innovative qualities of well-known scientists, so that the relevant ideological and political contents contained in professional courses are penetrated.

Teachers should fully integrate the elements of ideological and political education in the teaching of professional courses and broaden the educational connotations of ideological and political education in professional courses. Teachers of professional courses should fully tap the ideological and political education resources contained in the professional courses, take the outstanding results obtained in the development of world science and technology as a starting point, formulate corresponding ideological and political education goals based on curriculum characteristics, and slowly infiltrate Marxist theoretical thoughts in students' minds in various teaching links, instill positive energy, explore and enrich multiple ways and methods of course education through classrooms and courses, and strengthen the important role of course education in ideological and political education. Teachers should adopt innovative ideological and political education methods and means, consciously and purposefully adopt a variety of different educational modes, better help students grow into talents, broaden the ways and methods of educating people, improve the actual results of ideological and political education, thus highlighting teaching effect of practical teaching.

Professional teachers should give full play to professional enthusiasm, initiative in action, creative thinking, closely combine professional curriculum and professional characteristics to guide students to positive and correct ideological values, teach students how to behave and how to do things, and pay attention to cultivate students' independent thinking ability, innovation, entrepreneurship and creativity, high-quality cultural literacy, humanities and scientific research spirit, teamwork spirit, smooth communication and exchange skills. It is necessary to integrate the ideological and political courses taught by ideological and political teachers with professional teacher-led course education, and establish a three-in-one ideological and political education curriculum system consisting of ideological and political theory courses, comprehensive literacy courses and professional education courses. The core elements of ideological and political education should be combined with professional courses. Each teacher must shoulder the heavy responsibility of ideological and political education, and explore the construction of broad ideological and political education curriculum system by all employees and all courses.

Professional teachers should constantly innovate teaching concepts, ideas, methods and approaches for course education. It is necessary to give full play to the role of classroom teaching as the main platform, take into account the cultivation of socialist core values while promoting knowledge instruction and ability training. Therefore, how to cultivate students' political emotions and inspire students' pure hearts through the various teaching links with professional courses as a

carrier, so that professional courses run in parallel with ideological and political courses is a focused issue worthy of professional course teachers' thinking [6-7].

2.2 Teaching strategies for course education

Take the professional course “Principles of Computer-Aided Design and Manufacturing” as an example. This course is a professional platform course for mechanical engineering majors, which takes a relatively important position in the curriculum system. Its training objectives are as follows: let students master the basic concepts and skills of computer-aided design and manufacturing, use the basic concepts of computer-aided design and manufacturing to analyze complex engineering problems and prove its rationality, and give solutions to complex mechanical systems. At the same time, students are required to master the use of some common computer-aided design and manufacturing tool software. Regarding how to reflect the integration of ideological and political courses and course education in the course of “Principles of Computer-aided Design and Manufacturing”, we can proceed from the following three teaching models.

2.2.1 Design ideological and political education scenarios for each lesson based on the characteristics of the course “principles of computer-aided design and manufacturing”

According to the characteristics of this course, teachers of the course should carefully design the ideological and political teaching scenario for each lesson. First of all, in the course preparation, teachers should fully explore the penetration points for moral education in this lesson. For instance: in the ideological and political education scenario designed for the first lesson: How is the mechanical CAD / CAM system formed? In the long process of development, who have made significant contributions, how did they overcome difficulties and continue, eventually becoming scientists, etc. Using a variety of teaching methods such as heuristics, seminars, process-oriented, task-driven approaches, teachers should combine hybrid teaching mode, give instruction, enlighten, guide and train students to find these related contents by themselves before class. There is no need to be restricted in teaching form, but discussion can be organized online or in class while paying attention to that class discussion time must be well controlled. While designing scenarios to guide students, teachers can cultivate students' rigorous scientific attitude, pragmatic style of academic research and perseverance in research through the explanation of specific examples.

2.2.2 Five-minute design for course education

To achieve the desired teaching effect in course education, we must both strengthen explicit education and deepen invisible education. The five-minute teaching method is proposed here for course education. That is, in the ninety-minute professional classroom teaching, five minutes are allocated for ideological and political education. The content of ideological and political education in each lesson differs. The content and scenario of ideological and political education should be designed based on the knowledge content of professional courses. The two complement each other and support each other. For instance, when teaching the content of trees and binary trees, a tree is a finite set of n ($n \geq 0$) nodes. When $n = 0$, it is referred to as an empty tree; any non-empty tree meets the following conditions:

- (1) There is only one specific node, known as root;
- (2) When $n > 1$, the other nodes except the root node are divided into m ($m > 0$) disjoint finite sets T_1, T_2, \dots, T_m . Where, each set is a tree known as subtree of this root node.

According to the characteristics of tree structure, teachers can extend it to the concept of family and genealogy, discuss development process of genealogy with students, encourage students to learn traditional culture, dialectically inherit traditional culture, take its essence and remove its dregs. At the same time, students should be educated to love their country and their home. For the control of the discussion form and time, let the students make a statement first, and the teacher gives a guiding and concluding speech. The timing of the discussion is very important. It is best to start asking questions in each lesson when the students are tired, loose in a poor state. On the one hand, it makes students focus attention again, so that the brain starts to operate and the mental state gradually eases. Moreover, ideological and political content is very interesting, not as boring as

professional knowledge. It can relieve students' highly nervous brains, ease their mood, adjust the classroom atmosphere, and facilitate communication between teachers and students. Of course, it is possible to play some ideological and political short films related to professional knowledge on the multimedia, such as “Great Country Craftsman”, “Great Country Treasure” and “Great Country Strategy”, etc. In this way, the spirits of craftsmanship, Chinese spirit, innovation and entrepreneurship, dedication, teamwork, humanistic spirit, etc. are promoted to inspire patriotism and strengthen cultural self-confidence.

2.2.3 Use advanced teaching methods to highlight the effectiveness of scientific practice

In the practice teaching link, advanced inquiry-based teaching method should be combined with task-driven teaching method. Teachers arrange design topics and contents so that students actively explore through reading, observation, thinking, discussion, etc., to design, develop and complete tasks by themselves. From this, students can better grasp the corresponding theories and knowledge, and better complete the internalization of professional knowledge, thus cultivating good teamwork and professional ethics, as well as sense of social responsibility of serving the country with techniques.

2.3 Effect evaluation standards for ideological and political education

To implement course education in professional courses, teachers must innovate teaching methods, actively integrate ideological and political education contents into classroom teaching, achieve the unity of science and value, knowledge and ideology, so that course teaching goals are extended from single professional goals to professional goals coexistent with ideological and political goals. When curriculum teaching goals change, the curriculum evaluation criteria should also change. Not only involving professional knowledge and professional ability of the course, but it should also pay attention to contents related to student value guide to achieve comprehensive and integrated evaluation of the course teaching effect. The evaluation of course teaching effect should comprehensively evaluate students' professional goals and effects of ideological and political goals. For example, professional teaching goals account for 70%, while course education goals account for 30%. The main bodies of the evaluation should cover students, teachers, supervisors and enterprises. Student evaluation is mainly to evaluate whether they have mastered the learning contents, whether they can flexibly apply what they have learned to solve practical problems, and whether ideological and political contents can help establish correct world outlook, outlook on life and values. Teacher evaluation is mainly to evaluate whether they completely implement teaching programs and achieve the purpose, whether students have mastered the teaching content to solve practical problems, whether students' value orientation, personal accomplishment, spiritual style and behaviour standards are improved. Supervisor evaluation is mainly to evaluate students' learning atmosphere and value guide in course education. Enterprise evaluation is mainly to evaluate students' professional ability and professional literacy.

2.4 Diversified collaboration to build an ideological and political education system under the leadership of the party committee

First, under the concept of course education, a pluralistic system of co-governance rights under the leadership of the party committee should be established. In course education, we need to integrate various resources to achieve the goal of whole-course, all-round education by all staff. As a multi-subject in the course education work, teachers of professional course have various demands and rights appeal for education. Therefore, it is necessary to construct a multi-subject participation model. Second, under the concept of course education, a system of multiple co-governance in ideological and political education under the leadership of the party committee should be established. The school's party committee should comprehensively lead and deploy ideological education work, while the administrative, educational and academic departments actively cooperate consciously to achieve echo effect in diverse subjects of different departments, parties inside and outside the school and extracurricular and extracurricular parties, thereby effectively integrating various resources. In particular, it is necessary to give play to the education role of professional

course teachers in the front line of education and teaching, so that collaborative education is possible by professional course teachers and ideological and political workers.

3. Conclusion

Course education in professional classrooms represents a new way of ideological and political education in the new era. Based on the characteristics of the course “Principles of Computer-aided Design and Manufacturing”, this paper proposes the measures for implementing course education from the various aspects of course teachers, course content, teaching method and effect evaluation, in an effort to achieve the unity of professional knowledge transmission and ideological and political education in the course of teaching, so that educational function of the course can be realized amid interpretation of professional knowledge.

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