

Discussion on the Curriculum Organization and Teaching Method for Curriculum Ideological and Political Education

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Abstract: Curriculum ideological and political education is the main melody of contemporary higher education. It is necessary to explore the methods of education and teaching reform from the aspects of curriculum organization, evaluation mechanism, teaching methods and so on. Taking the core course "power system analysis" of electrical engineering and its automation specialty as an example, this paper analyses the orientation and shortcomings of the course, introduces the construction of ideological and political elements of the course, discusses the course evaluation and improvement mechanism, and puts forward the "3P" teaching method of ideological and political education. The content of this paper has strong operability and universality, and can be used as a teaching reference for similar courses.

Keywords: Curriculum Ideological and Political Education, Curriculum Organization, Evaluation Mechanism, Teaching Method

1. Introduction

"Building morality and cultivating people" is not only the fundamental task of higher education, but also the fundamental task of building a powerful educational country in China. The proposal of the educational concept of this new era makes the teaching reform of "curriculum ideological and political education" enter the public vision, and constantly promote the reform and transformation of educational concepts and methods of various courses in colleges and universities ^[1].

In 2017, the Ministry of Education of China issued the implementation outline of the quality improvement project of ideological and political work in colleges and universities, which identified the key goal of higher education teaching reform in the next few years as "curriculum ideological and political work" ^[2]. We must treat ideological and political education in the context of the great changes that have not occurred in the world in a century and the overall development of the cause of the party and the state, and from the perspective of upholding and developing socialism with Chinese characteristics, building a modern socialist power and realizing the great rejuvenation of the Chinese nation.

In 2019, Shanghai launched "college curriculum ideological and political guidance plan", and University of Shanghai for Science and Technology was selected as the "Shanghai college curriculum ideological and political overall reform pilot college". The "power system analysis" course of electrical engineering and its automation, as one of the "highquality reform pilot courses", participated in the construction of the course ideological and political pilot college. At the same time, as the core professional course of this major, "power system analysis" is the core supporting course for the training objectives and graduation requirements of this major in engineering education certification. According to this opportunity, the curriculum teaching team carried out the design and practice of curriculum ideological and political education and engineering education from the aspects of curriculum positioning, content design and teaching mode, and preliminarily realized the organic integration of curriculum ideological and political construction and engineering education certification ^[3].

2. Curriculum Orientation and Deficiency Analysis

2.1. Curriculum Orientation

"Power system analysis" is the core course of electrical engineering and its automation, with strong professionalism and wide audience. The latest training plan of this major mainly supports the graduation requirements of "Mastering professional knowledge of electrical engineering" and "being able to apply electrical and power engineering management principles and economic decision-making methods in a multidisciplinary environment". From the support of the course to the graduation requirements, it can be seen that this course has strong professionalism to solve complex engineering problems in the field of electrical engineering. At the same time, it is required to have interdisciplinary exchange and learning, as well as certain engineering economy and management ability.

On the other hand, the power industry that the professional power system direction relies on is a special industry. While undertaking the enterprise attribute and responsible for its own profits and losses, the power industry also plays an important role in ensuring social stability and development needs, which is related to the national economy and the people's livelihood^[4]. By the end of 2018, China's State Grid had assets of 3.87 trillion, turnover of 2.56 trillion and net profit of 78 billion RMB, ranking fifth among the world's top 500. At the same time, power system is by far the largest and most complex manmade system in human society. It is deeply integrated and intersected with many disciplines such as control discipline, automation discipline, machinery discipline and environmental discipline. It is an excellent carrier for curriculum ideological and political education.

2.2. Deficiency Analysis

Before carrying out the curriculum reform, the curriculum teaching team analyzed that this course mainly has the following deficiencies.

Firstly, in terms of teaching philosophy^[5], there is a lack of understanding of engineering education and curriculum thought and politics. In the past, the teaching concept is still taught by teachers. Students can master relevant professional knowledge through learning and test the teaching effect through problem-solving. For the consideration of simplifying the calculation requirements, exercises are usually aimed at the specific problems of small-scale systems, which is difficult to support the requirements of the course for cultivating students' ability to solve professional complex engineering problems. On the other hand, professional courses involve less ideological and political teaching, there is a misunderstanding that ideological and political education is the teaching content of ideological and political courses, and the integration of ideological and political elements and professional courses is more difficult.

Secondly, in the teaching content, there is a lack of complex engineering problems and curriculum ideological and political elements. The original teaching plan follows the teaching path from component to system to carry out teaching activities. For the problems at the system level, it is often to analyze a specific problem after simplifying or solidifying certain external conditions, which is far from the complex engineering problems under the condition of multiple factors and conditions in the actual engineering environment. On the other hand, the ideological and political elements of the curriculum in the teaching content mainly depend on the subjective grasp of the teachers, which is lack of pertinence and standardization.

Thirdly, there is a lack of top-down requirements and norms in teaching organization. The curriculum syllabus is a normative guiding document for carrying out curriculum teaching activities, standardizing and guiding the content and organization form of curriculum teaching. In other words, the syllabus standardizes the time node and content of teachers, as well as the breadth and depth of teaching. It is an essential part of the teaching organization to write the support of the courses required by engineering education to the graduation requirements and the integration of various teaching modules and ideological and political elements into the syllabus.

Fourthly, in terms of quality monitoring, there is a lack of quantitative evaluation and continuous improvement mechanism. In the past, the teaching process was mostly "open-loop", and the end of course assessment often means the end of the whole teaching activities. The final score of students is divided into pass and fail by 60 points^[6]. However, there is no quantitative evaluation on the achievement of each teaching module and the whole curriculum. The improvement measures of teachers in the second year's teaching activities are lack of pertinence and are mainly based on subjective experience.

3. Curriculum Design

3.1. Syllabus

In order to standardize the teaching requirements for engineering education and ideological and political education ^[7], the curriculum syllabus ^[8] has been revised. The main contents of the preparation are shown in Table 1.

Table 1: Content of the Syllabus.

| Title | Content |
|---|---|
| Basic Information | course introduction, course ideological and political design, teaching methods, etc. |
| Support for Graduation Requirement Index Points | specific items and contents of courses supporting graduation requirements |
| Course Objectives | course objectives and supporting relationship with graduation requirement index points |
| Content of Courses | content of each module, teaching method, teaching effect and the supporting relationship to the curriculum objectives |
| Teaching Materials and Learning Resources | course website, course materials, teaching conditions, etc. |
| Teaching Process Arrangement | teaching content and corresponding class schedule |

The improvements made in the new syllabus are mainly reflected in the following aspects. Firstly, in the basic information part of the course, the design idea of the ideological and political elements of the course is clarified; Secondly, it defines the supporting relationship between the curriculum and the index points of professional graduation requirements; Thirdly, it subdivides the curriculum objectives and their supporting relationship to the graduation requirements; Fourthly, it defines the supporting relationship of each teaching module to the curriculum objectives, the ideological and political elements involved and the expected teaching effect; Fifthly, it defines the proportion of the scores of each teaching module in the final evaluation, so as to provide a basis for the quantitative calculation of the degree of curriculum teaching achievement.

Taking the "power system analysis" course as an example, this course sets three course objectives to support the graduation requirements 1.3 and 11.2 in the professional training plan, and these three course objectives are supported by the teaching contents of the five modules of the course to form the supporting relationship between the course and the training plan.

3.2. Ideological and Political Elements

Curriculum ideological and political education is not to take ideological and political courses in professional courses, but to organically integrate ideological and political elements in professional courses in combination with professional knowledge and industry background, so as to enlighten students' thoughts, stimulate students' feelings and open students' wisdom. Professional teachers should establish the educational concept of "all staff education, all-round education and whole process education", and change the educational concept of "teaching" and "education" ^[9, 10]. Therefore, the selection and integration of Ideological and political elements into the design of curriculum teaching content is very important. After careful research and repeated consideration by the course teaching team, the ideological and political elements of the course with "patriotism", "dialectical thinking", "social responsibility" and "inspirational figures" as the main line are finally determined, which are combined with the course teaching content and integrated into the whole teaching process.

3.2.1. Patriotism

From 1.849 million kilowatts at the beginning of the founding of new China to about 2 billion kilowatts of installed capacity at the end of 2019, China's power industry has experienced earthshaking development. At present, China's power generation and installed capacity rank first in the world. In this process, tens of millions of electric power workers worked extremely hard, created countless Chinese miracles and great projects, and wrote a magnificent patriotic chapter.

The development of power industry is closely related to social and economic development. It is not only the basic guarantee of social and economic development, but also a barometer of economic development. The development history of power industry in new China for more than 70 years is an

epitome of China's social development. Its achievements are remarkable and its process is admirable^[11]. Students of electric power should not forget the hardships of their predecessors and the difficulties of their achievements, and turn these into a sense of patriotism for the great motherland.

3.2.2. Dialectical Thinking

Throughout the development history of the power industry for more than 100 years, its development process is not smooth. Many projects are born with disputes and are tested on the basis of practice. These historical events provide good materials for cultivating the dialectical thinking ability of engineering graduates.

At the end of the 19th century, the "DC group" represented by Edison and the "AC group" represented by Tesla debated whether the power system used DC or AC transmission at that time, which was known as the "dispute between AC and DC". In this process, what practices contrary to scientific ethics^[12] have taken place? Why did AC win the final victory? Why has DC become the focus of research again today? The answer to these questions is not simply right or wrong, but the speculation in the process of social and scientific and technological development. It is a vivid textbook for the cultivation of Engineering dialectical thinking.

3.2.3. Social Responsibility

The electric power industry is different from the general commodity manufacturing industry. The safety, reliability and economic supply of electric energy are related to economic development and even social security. Therefore, power workers not only bear the production responsibility, but also bear the social responsibility.

Since the beginning of the 21st century, many blackouts have occurred worldwide, affecting hundreds of millions of people and hundreds of billions of economic losses. According to the overall planning and construction of the state, the State Grid of China has adopted the world's leading technology to ensure the safe and reliable power supply of the world's largest power grid, and there has never been a largescale power outage. At the same time, as one of the only two countries in the world with all the land from the cold zone to the tropics, and the only country in the world with all the terrain and landform, China comprehensively solved the problem of electricity consumption for the population without electricity in 2015, reflecting the social responsibility and responsibility of power grid enterprises.

All of the above rely on professional knowledge, but higher than professional knowledge. Only a lofty sense of social responsibility can better transform professional knowledge into social needs at a critical moment^[13]. Therefore, the social responsibility education of electric power students runs through the whole teaching process of the course.

3.2.4. Inspirational Figures

In the decades of struggle of China's power industry, many outstanding figures have emerged, who have devoted their lives to China's power industry. Among them, there are academicians of the two academies, who fill the gap in the theory, method and technology of China's power system; Among them are engineers who break the monopoly of foreign technology and realize Chinese creation; Among them, there are countless ordinary front-line employees who have forged the great wall of China's electric power with their youth and sweat.

In the development history of China's power industry for more than 140 years, China's power workers have overcome the difficult working environment, overcome countless technical barriers, from weak to strong, from "made in China" to "created in China", and even become the locomotive leading the development of power technology in the world. These characters are role models of the times^[14], models to learn from, and vivid teaching materials.

3.3. Integration with Engineering Education

In view of the above problems in the whole process of course teaching activities, sort out the supporting relationship between each teaching content module of the course and the graduation requirements in engineering education certification, as well as the integration theme of Ideological and political elements^[15]. The fusion relationship between the three is shown in Figure 1, where abbreviations are shown in Table 2.

Specifically, the teaching content of "power system analysis" course is mainly divided into five modules: "overview of power system", "mathematical model of power system components", "power flow

calculation", "active power and frequency control" and "reactive power and voltage control".

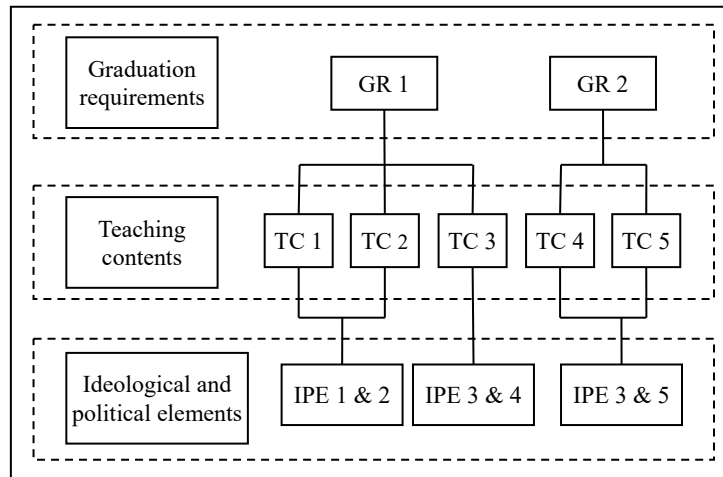


Figure 1: Integration relationship between engineering education and ideological and political elements of "power system analysis" course

Table 2: Abbreviations & Contents for the figure.

| Title | Abbreviations & Contents |
|------------------------------------|--|
| Graduation Requirements | GR 1: master the professional knowledge of electrical engineering GR 2: be able to apply electrical and power engineering management principles and economic decision-making methods in a multidisciplinary environment |
| Teaching Contents | TC 1: overview of power system TC 2: mathematical model of power system components TC 3: power flow calculation TC 4: active power and frequency control TC 5: reactive power and voltage control |
| Ideological and Political Elements | IPE 1: patriotism IPE 2: professionalism IPE 3: dialectical thinking IPE 4: inspirational figures IPE 5: social responsibility |

Modules 1~3 mainly teach the industry development background of power system, the mathematical model of basic components, and power flow calculation as the basis of power system static analysis. These modules can effectively support the graduation requirement of "master the professional knowledge of electrical engineering". At the same time, the power industry of new China has experienced more than 70 years of arduous development, and many outstanding figures have emerged. They have overcome the difficult working environment, overcome countless technical barriers, become strong from weak, from "made in China" to "created in China", and even become the locomotive leading the development of power technology in the world. Their character and spirit are vivid cases of Ideological and political education in the curriculum. In the power flow calculation module, how to select the appropriate mathematical algorithm according to the needs of the engineering scene and balance the relationship between model accuracy and calculation efficiency can inspire students' dialectical thinking ability.

Modules 4~5 comprehensively analyze the impact of active and reactive power on system operation frequency and voltage in power system. It is necessary to comprehensively consider system, management, economy and other factors to support the graduation requirement of "be able to apply electrical and power engineering management principles and economic decision-making methods in a multidisciplinary environment". At the same time, this part is also the concrete embodiment of dialectical thinking in engineering problems, such as whole and part, coupling and decoupling, optimal and suboptimal. Power accidents such as system frequency instability and voltage instability caused by improper active or reactive power control are also vivid cases to cultivate the graduates' awareness of social responsibility.

4. "3P" Teaching Method

In my practice of carrying out ideological and political education and teaching in the curriculum, the methods adopted are summarized as the following general forms, namely "push out, pull back and put it up" ("3P" teaching method).

The so-called "push out" refers to embodying the value concept to be transmitted into a specific social phenomenon or objective subject based on the curriculum knowledge points. The purpose is to fully stimulate students' thinking, rational, objective and systematic thinking ability from the perspective of "onlookers", which is an indispensable ability in the process of students from mediocrity to excellence.

The so-called "pull back" refers to the thinking of the above-mentioned social phenomena or objective subjects, connecting their own life experience or interests through a certain intermediate carrier, arousing students' resonance and arousing empathy and personal sense. Through this process, we can solve the problem of "what does it matter to me" in order to stimulate students' emotional resonance.

The so-called "put it up" refers to raising the value concept you want to transmit to the height of "improving cognition" based on the materialized phenomenon and the homogenized personal sense. At this stage, although the "big truth" is talked about, due to the foreshadowing of the practical phenomena in the first two stages and the resonance of personal emotions, it can better stimulate students' sense of identity and acceptability. At this time, the transmission of values should be "resounding and enlightening", and the core socialist values should be firmly injected into the soul and blood of students.

5. Continuous Improvement Mechanism

In order to realize the continuous improvement of the curriculum, which takes into account the dual requirements of ideological and political education and engineering education, a mechanism and system for continuous improvement of the curriculum are constructed with "year" and "session (four years)" as the time scale, as Figure 2.

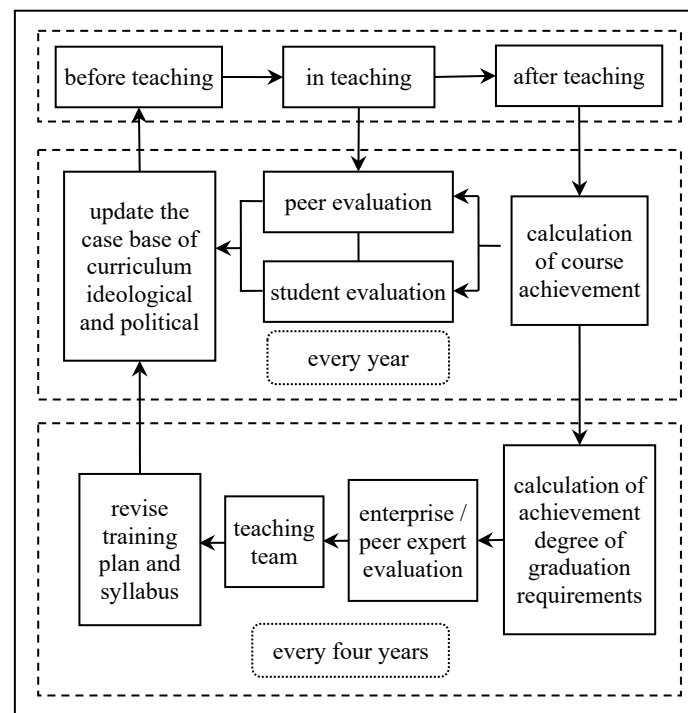


Figure 2: "Double cycle" curriculum improvement system.

After completing the course teaching task every year, the teacher calculates the degree of course achievement, updates the course Ideological and political case base in combination with the feedback of "peer evaluation" and "student evaluation" received, as well as the current political news in the past year, so as to form a "small closed loop" of course improvement. In this closed loop, in principle, the teaching objectives and teaching contents of the course will not be greatly changed.

After a student graduates, the calculation results of the degree of achievement of the course will be

further used to calculate the degree of achievement of the graduation requirements of the student. After the evaluation of enterprises and peer experts (off campus), the teaching team will revise the professional training plan and curriculum outline based on the evaluation results of all aspects, forming a "big closed loop" of professional and curriculum improvement. In this closed loop, the curriculum outline will revise the supporting relationship and weight of graduation requirements according to the requirements of the professional training plan, and revise the curriculum teaching objectives, teaching contents, assessment methods, etc. accordingly.

6. Conclusions

Curriculum ideology and politics is the theme of undergraduate engineering degree education in colleges and universities in China. Taking the "power system analysis" course of University of Shanghai for Science and Technology as an example, this paper introduces the current situation of course construction from the aspects of course positioning, course design, teaching methods and improvement mechanism, in order to provide reference for the construction of similar courses.

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