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Exploration on the Ideological and Political Education of "Circuit Foundation" Course under the Background of New Engineering

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Abstract: *In order to meet the needs of moral education in the new curriculum of science and engineering, this paper discusses the exploration and practice of moral education in the course of Circuit Foundation as an example. On the surface of practical activities, the introduction of moral education in this course can not only stimulate students' learning initiative and innovative thinking ability, but also stimulate students' learning potential and interest in the course, in order to improve students' sense of mission and responsibility, realize the close combination of students' ability building and values, and correctly guide students' value orientation.*

Keywords: *New Engineering; Circuit Foundation; Course Exploration*

1. Introduction

On May 28, 2020, the Ministry of Education issued The Guiding Outline of Curriculum, Political and Ideological Infrastructure Projects of Colleges and Universities, which pointed out that promoting the ideological and political construction of the curriculum is a strategic measure to implement the educational policies and guidelines and an important provision for cultivating the quality of talents in an all-round way. Colleges and universities should scientifically design the curriculum scheme and ideological teaching system, and should have the comprehensive ability to cultivate students. The course of Circuit Foundation should attach importance to the moral cultivation, humanistic quality, innovation consciousness, legal consciousness, national security awareness and thinking ability of college students, strengthen their ideals and beliefs, cultivate their patriotism, broaden their knowledge and vision, and shape their fighting spirit and practical ability.

2. Educational objects and course characteristics

Automation technology, electronic computer and circuit are the core technical courses of various science and engineering majors such as electrical major, instrument and equipment major and communication major. We should take professional knowledge as the carrier, create circuit entity models based on the electromagnetic induction characteristics of various circuit electronic devices, and apply various circuit theories and statistical analysis methods to carry out reliability design of various functional circuits and meet the engineering application requirements. The basic theory of this course is serious and detailed, with strong logic, and the application background of engineering projects is universal. It can build a highway bridge between science and technology education and engineering education. It not only has the general characteristics of public courses, but also has a strong professional background and theory. The content of its education contains a large number of conceptual elements.[1] According to the deep exploration and innovative teaching methods, the rational use of this ideological and political element can not only stimulate students' enthusiasm for learning, but also improve the learning effect. The close combination of Marxist Leninist viewpoints and scientific thinking education can also enable students to correctly deal with problems, think about problems and solve problems.

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3. The teaching practice strategy of ideological and political curriculum

3.1. Integrating the important construction achievements of the country and strengthening the students' national feelings

For example, when learning the three-phase circuit, we should integrate the three-phase power generation, radiant heating of power engineering, power factor and other knowledge points. We can briefly introduce the Three Gorges project, solar energy and wind power generator, smart grid and other national important projects and new energy development technologies to the students, indicating that China's power supply system was extremely backward in the early days of the founding of new China (in 1949, China's power generation was 4.3 billion kilowatts, and the average power consumption was less than 8 kilowatts) to the technical strength of the power network with the leading technology at the current stage. Students can be informed that the power generation capacity has increased to 1600 independent power supply and distribution systems in border areas and islands. We can highlight the service and support ability and combat ability of the Chinese army, stimulate students' interest in learning, improve national self-confidence, and shape the spirit of struggle, in order to inspire students' patriotism and the important task of serving the country with science and technology.[2]

3.2. Leading philosophical thinking and improving cognitive ability

When creating a circuit solid model, the electromagnetic characteristics of specific circuit parts are very complex. Referring to the concept of grasping the main contradiction in Chairman Mao's theory of contradiction, on the premise of conforming to the lumped assumption, the more common circuit electronic devices can be represented by lumped electronic devices with single electromagnetic characteristics. When analyzing the dynamic circuit transient response, the circuit transient response will cause impact and damage to the circuit machinery and equipment, but it can be used for automobile ignition, aircraft carrier electromagnetic transmission, etc. This is in line with the materialist dialectics in Marxist Leninist philosophy. The similarity between the phenomenon of circuit resonance and the phenomenon of mechanical resonance conforms to the philosophical theory that things have universal connections. The method of dividing the whole into parts and defeating each other in the law of overlap is also more in line with Chairman Mao's military thinking.

3.3. Advocating morality and shaping correct values

This course includes a lot of practical philosophy theories, which is helpful for students to shape correct values. The creation of circuit model is a process of abstracting specific components into circuit components, and it is carried out under the general assumption of convergence, which is related to the concept of "grasping the main contradiction" in Marxism. The process of sorting out hypotheses is a process of "grasping the main contradiction". Here, when students think and work independently, they should grasp the key points and concentrate on dealing with the main contradictions. This can be further expanded. In 2017, in the report of the 19th National Congress of the Communist Party of China, General Secretary Xi stressed that socialism with Chinese characteristics has entered a new era, and the important contradictions in our society have long been transformed into contradictions between the people's growing needs for a better life and the unbalanced and insufficient development trend. The long-term development goal of college students should also be to do everything for the people's better life. Kirchhoff's law is the most critical and basic basis for circuit analysis. This basic law was deduced by Kirchhoff from two basic laws of nature - the law of energy conservation and the law of charge conservation when he was 23 years old and still in college.[3] The university period is the key link in the cultivation of life values and values. By using the examples obtained by Kirchhoff's law to carry out value education for students, clearly put forward how to spend valuable college life, discuss with students, and establish how to shape correct values, so that students cherish college life and learn more meaningful and valuable things in the Limited four years. In the part of power factor, the concepts and internal relations of power factor, reactive power, active power and power factor are given. This power factor reflects the proportion of power factor in active power. In the exploration of 51 system thought factors in the fourth issue of Electric Power by Zhang Yong, Chen Dixiang and Hong Huajie, the power factor can effectively use the power factor and reduce the reactive power consumption. Similarly, in daily life, only by doing more practical things can we achieve twice the result with half the effort.

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3.4. Exploring the process of basic circuit theory and shaping the spirit of innovation

After finishing the teaching of branch current method, the most basic circuit statistical analysis method, first of all, what should be done if the topological structure of the circuit network is complicated and the number of equations is too many to be solved? We should correctly guide the students to find the redundant independent variables of bypass current flow, and find a group of completely independent variables (mesh current flow or working voltage of connection point) to list the equations, and then generate more efficient mesh method and node method. When analyzing the full response of the first-order dynamic circuit, the general method is to enumerate the differential equations of the type circuit according to the professional knowledge of summation. However, after analyzing the way of solution, it is found that the response can be written only by specifying the initial value, stable value of the circuit, which leads to one of the key methods of dynamic circuit analysis - three element method. Students do not need to give examples and obtain complicated linear differential equations, and the analysis process is greatly simplified.

3.5. Encouraging participation in innovation practice and cultivate independent innovation ability

The classroom teaching experiment of circuit foundation requires students to make scientific and reasonable experimental plans, strictly implement safety operation procedures, record test data, and carefully analyze deviations. At the same time, attention should be paid to the safety of electricity use, and students should be cultivated with rigorous and meticulous scientific spirit and innovative spirit of seeking truth and pragmatism and pursuing excellence. We should encourage students to dare to explore the truth and the unknown, and let students deeply understand the value of the highest realm according to practical activities. We should encourage students to sign up for new innovative practice projects for college students according to the key requirements of the state and the army, and actively carry out disciplines such as electronic product design, intelligent driverless vehicles, and intelligent robots for walking mechanisms, so that we can closely link theoretical knowledge with engineering application, and shape better engineering literacy. At the same time, we will shape the will of students to climb the peak of high-tech and further innovate the practice level. Meanwhile, it reflects the students' Altruism and teamwork spirit (for example, each circuit component has different volt ampere characteristics, but the generation of a complete circuit will also be limited by the network topology), honesty and friendliness, and the moral cultivation of following academic ethics, not derailing, and not following selfless dedication in combination with the actual course content. For example, although capacitors and inductors consume electricity, they are indispensable in applications such as data signal filters Johnson's awareness of the rule of law and engineering moral education (such as monitoring and safety accidents by using the professional knowledge of the circuit).

3.6. Use philosophical thinking to analyse problems and improve the level of understanding

In the view of "grasping the principal contradiction", some commonly used circuit components are expressed by a centralized unit with a single electromagnetic property, and can also satisfy the aggregate assumption. Through the analysis of the dynamic line transient reaction, it can be found that although the transient reaction can bring some impact and damage to the line equipment, it can be used in vehicle ignition, the electromagnetic ejection of aircraft carrier and carrier-borne aircraft. The similarities between the circuit resonance phenomenon and the mechanical resonance phenomenon are consistent with the universal relationship of everything.

3.7. Discuss the formation of circuit principle and the cultivation of scientific thinking

After teaching the most basic circuit analysis method of branch current method, the teacher first asked: if the circuit topology structure is complex, many equations, how to solve it? Next, we introduce the students into the redundancy of the branch current, and on this basis, we find a complete set of independent variables (grid current, node voltage), and summarize it into an efficient grid method and node method. In the analysis of the overall response of the first-order dynamic circuit, is generally according to the knowledge of mathematics, physics, enumerate and find the differential equations of the circuit, but after its analysis, will find that as long as there is the initial value, steady state value, time constant these three factors, can immediately write the corresponding reaction, which can get a new dynamic circuit analysis method —— ternary method.

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3.8. Encourage students to participate in innovative practice and cultivate creative thinking

Experimental teaching requires students to make experimental plans scientifically, to strictly abide by the operating procedures, and to record the test data truthfully, and to analyze the errors carefully, and to pay attention to safe electricity use, to adopt a scientific attitude, to seek truth from facts, and to strive for perfection. Through the exploration and exploration of the unknown, the students truly realize the true meaning of "practice gives true knowledge". Actively guide college students to participate in the competitions of electronic design, intelligent unmanned vehicles, obstacle-crossing robots and other fields, and combine the theory learned with engineering practice, to cultivate an excellent engineer. Through the competition, cultivate students who are not afraid of hardship, not afraid of hardship, and have the courage to climb the peak of science and technology spirit quality, so that students can constantly improve their creative skills in practice. Based on this, combined with the specific teaching content, to cultivate students' collective consciousness and team spirit. For example, although the voltage and voltage characteristics of each circuit are different, a complete set of lines should be formed according to the topology and integrity of the network. For example, we should abide by academic ethics, do not cheat, do not copy, do not sign at will, and do not make any personal contributions. For example, capacitance, induction, etc., although it will not lose electricity, but also need to filter the signal.[2], for example, cannot use the existing line knowledge for illegal activities such as stealing electricity and making electric shock.

4. Conclusion

Han Yu, a famous litterateur in the Tang Dynasty, said: "I am a teacher, so I preach and accept my work to dispel my doubts." At one stage, in the process of education, we only paid attention to "teaching", but could not guarantee "preaching" and "dispelling doubts". The ideological education of students in the study pays attention to the value concept of knowledge imparting and ability cultivation, which is beneficial to the students to shape the correct "three views" and the inevitable choice to complete the training of talents. Taking the basic course of circuit as an example, this paper introduces the concrete measures and methods of ideological education in detail. The survey results show that ideological education in class can significantly stimulate students' enthusiasm for learning, improve the satisfaction rate of classroom teaching, and reasonably stimulate scientific thinking and innovative spirit. Students' recognition of the curriculum is also significantly improved, which has achieved better teaching results.

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