

Teaching Case Design Based on the Ideological and Political Course of Fundamental of Electronic Technology

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Abstract: Curriculum ideology and politics is an effective way to promote classroom teaching reform and improve teaching quality. The main goal is to cultivate high-quality talents with both ability and political integrity. Based on the current direction and the Kirchhoff's current law, for example, this paper deeply excavates the ideological and political elements contained in the teaching process, reconstructs the teaching content, and combines various teaching methods to integrate the ideological and political elements into the teaching content silently, so as to improve Students' enthusiasm and participation in learning can achieve the goal of college education and teaching of the trinity of knowledge imparting, ability training, and value shaping.

1. Introduction

In December 2016, General Secretary Xi Jinping emphasized at the National Conference on Ideological and Political Work in Colleges and Universities: "We must adhere to the central link of cultivating morality and cultivating people, carry out ideological and political work throughout the whole process of education and teaching, so as to achieve the whole process of educating people and all-round education. Efforts should be made to create a new situation for the development of my country's higher education. With the implementation and deepening of the spirit of the ideological and political work conferences in colleges and universities, the current curriculum thinking It is still a difficulty in the ideological and political construction of courses in the new era to realize the effect of political education and professional teaching. Building an effective course ideological and political teaching system is an urgent task of ideological and political work in colleges and universities.

2. The Ideological and Political Goals of Fundamental of Electronic Technology

Electronic Technology Foundation is an important professional basic course offered by Chengdu University of Information Technology for non-electrical majors. It is an organic combination of two basic courses of "circuit analysis" and "analog circuit". Circuit analysis is to simplify the actual circuit into a linear network-based resistance model for analysis. The purpose is to master the basic concepts, basic theorems, and common analysis methods of circuits. The object of analog circuit research is analog signals, and the core device of the circuit is the transistor (diode, triode, etc.), and the goal is to design, analyze and apply circuits (such as amplifier circuits). The teaching object of this course is freshmen, which is a critical period for the formation of three views and habit formation. Therefore, it is very necessary to implement course ideology and politics in the basic course of electronic technology. In the teaching process, the CDIO project teaching mode is combined to dig deep into them. The connotation of ideological and political elements contained in it (Figure 1) is to realize the coordinated development of students' knowledge, ability and quality, and has taken a solid first step towards realizing the grand goal of "cultivating morality and cultivating people" in the university.

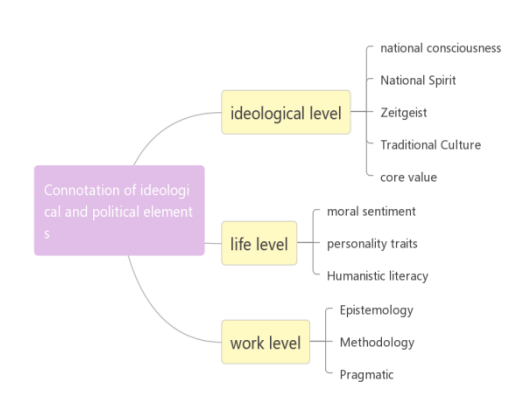


Fig.1 The Ideological and Political Elements

3. The Integration of Teaching Content and Ideological and Political Elements

Current direction and Kirchhoff's current law are the focus and difficulty of this course. It is stipulated that the movement direction of the positive charge is the actual direction of the current, but it is difficult to judge the actual direction of the current in the actual circuit, and the current reference direction needs to be specified. After specifying the reference direction, the actual direction of the current can be judged according to the positive and negative of the current. After specifying the reference direction, the functional formula of the current can be written. Kirchhoff's current law (KCL) elucidates the interrelationships between currents in a circuit and is the basis for computing complex circuits. Through the study of current direction and laws, students are guided to apply Kirchhoff's current law to analyze specific circuits. In the teaching process, focusing on the teaching knowledge points, dig deep into the ideological and political elements, guide students to enhance the awareness of "family and national feelings", enhance the concept of "connecting theory with practice", and cultivate students' engineering awareness and engineering application ability.

3.1 Cultivate the Spirit of Scientific Research and Social Responsibility

When teaching current knowledge points, he introduced the great physicist Tesla's selfless contribution story to society, that is, making alternating current and alternating current generator a free invention that has benefited all mankind so far. This kind of scientific research that is indifferent to fame and fortune and selfless dedication Spirit, lead students to establish a correct view of learning and values that serve the development of the country and society, cultivate students' sense of social mission and responsibility, inspire students' belief and enthusiasm for the scientific and technological revitalization of the country and the nation, and establish a sense of responsibility and mission to strengthen the country through science and technology. feel.

3.2 Cultivate Critical Thinking

When teaching the current direction, how to understand the relationship between the actual direction of the current and the reference direction is a difficult teaching point. The reference direction is the assumed direction when the actual direction of the current is not known, commonly known as "blindness". But this "blindness" will not affect the actual current direction of the circuit components. When the calculated current is positive, it means that the actual situation is the same as the hypothetical situation, and if it is a negative value, it means that the actual situation is opposite to the hypothetical one (Figure 2). Guide students to look at any problem dialectically, and cultivate students' multi-dimensional speculative thinking.

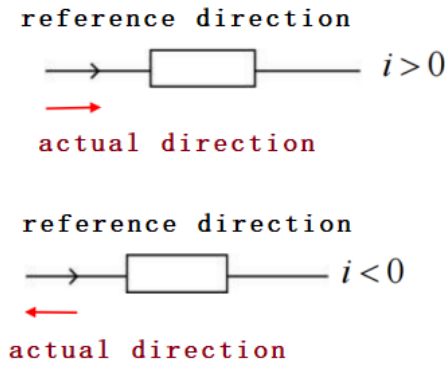


Fig.2 Current Direction

3.3 Enhance Legal Awareness and Sense of Responsibility

The KCL law studies the constraint relationship that multiple currents on a node should satisfy, that is: the sum of the currents flowing into any node at any time is equal to the sum of the currents flowing out of the node. Take Figure 3 as an example to list the KCL equation.

Node a: ① $I_1 + I_2 - I_4 = 0$ Node b: ② $-I_2 + I_3 - I_5 = 0$
 Node c: ③ $-I_1 - I_3 + I_6 = 0$ Node d: ④ $I_4 + I_5 - I_6 = 0$

[Question 1] In connection with the reality of life, what enlightenment can be drawn from the constraint relationship of the current law? Guide students to realize that things in life should be the same as laws, always abide by corresponding laws, regulations, rules and systems, establish scientific thinking that does not follow rules and cannot form a circle, and enhance students' legal awareness education. Legal weapons should be used to protect their legitimate rights and interests, instead of taking revenge on society and others in illegal and improper ways.

3.4 Cultivate Humanistic Feelings

[Question 2] When analyzing the circuit (Figure 3), is it necessary to list KCL equations for all nodes? From the equation ①+②+③+④=0, it shows that three of the four equations in the circuit are independent, so only three KCL equations need to be listed. For a circuit with N nodes, there are N-1 independent nodes, only need to list N-1 independent KCL equations. Therefore, when analyzing a specific circuit, it is not the more the better to list the KCL equations, and the students should be guided to follow the rules, do not “superfluous” in doing things, and cultivate students' humanistic feelings.

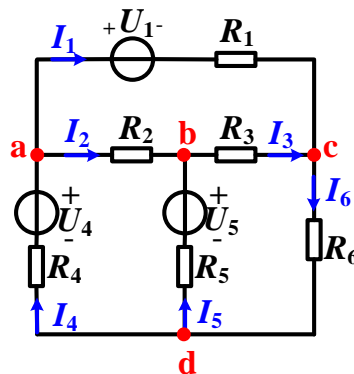


Fig.3 Circuit Diagram

3.5 Cultivate Scientific Thinking and Engineering Literacy

[Question 3] Taking node a as an example, the virtual simulation software Multisim is used to demonstrate whether the KCL theory is valid. Students observe the experimental phenomena,

analyze the experimental results under the guidance of the teacher (Figure 4), and substitute the experimental data into the theoretical equation①:

$$I_1 + I_2 - I_4 = 0 \Rightarrow -250\mu A + 375\mu A - 125\mu A = 0 \text{ ⑤}$$

The experimental data show that the algebraic sum of current at any node at any time is equal to zero. Guide students to establish the scientific thinking of “practice is the only criterion for testing truth”, and cultivate students' rigorous scientific attitude and engineering literacy.

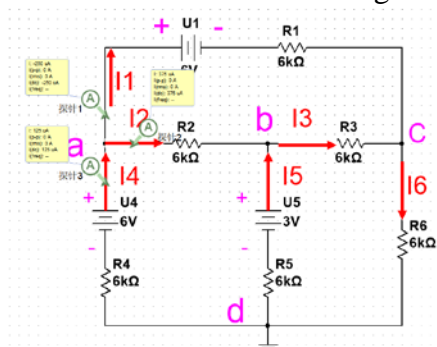


Fig.4 Kcl Simulation Analysis

3.6 Cultivate Team Spirit

[Question 4] Analyze the circuit in Figure 3. If the branch components are changed (the branch current remains unchanged), analyze whether the KCL law holds. It has been verified by experiments that the KCL law is only related to the branch current on the node, and has nothing to do with the properties of the branch components. As long as the branch current at the node remains unchanged, the KCL equation does not change. Introduce the importance of teamwork spirit and strengthen the education of family and country feelings: without a country, there is no home, and the individual should obey the whole.

4. Conclusion

This paper reconstructs the teaching content and teaching methods. In the construction of teaching content, “explain-demonstration-experience-exploration” should be used to construct teaching resources, and classroom teaching should be “combined with reality and reality”, emphasizing the integration of theory with practice, and attaching importance to the cultivation of students' abilities. In the middle-after-class, the multi-link focuses on the learning effect of students, and in the process, the teaching of knowledge and the cultivation of morality are organically integrated to achieve the effect. It can provide reference for other knowledge points to implement curriculum ideology and politics. Course ideology and politics is a long-term project, and the later research focuses on improving the student assessment system and teaching evaluation system.

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