

Teaching Reform and Practice of the Course "Computer Organization Principles" in Universities under the Background of Curriculum Ideology and Politics ——Taking Semiconductor Storage Chips as an Example

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Abstract. In order to enhance the patriotism, national pride, and social responsibility of college students, and fully leverage the role of the main channel of the classroom education, ideological and political elements are integrated into the course "Computer Organization Principles". Taking the knowledge points of "semiconductor storage chips" in the course as an example, ideological and political practice and exploration are carried out on the course "Computer Organization Principles" of the Internet of Things Engineering major, achieving knowledge transmission, ability building. The organic integration of interest cultivation and value guidance, cultivating new generation with ideals, skills, and responsibilities.

Keywords: principles of computer composition; course ideological and political education; semiconductor storage chip

1. Introduction

The Guiding Outline for the Ideological and Political Construction of Course in Higher Education Institutions is an important outline issued by the Ministry of Education to further deepen the reform of higher education and teaching[1]. Against this background, new ideas for course and teaching reform have rapidly emerged in universities across the country. The course "Computer Organization Principles" is a core course in the field of Internet of Things engineering[2]. How to fully utilize the educational role of the course is an important issue in the teaching reform of the course "Computer Organization Principles". Since 2019, there have been many research results on the ideological and political construction of the course "Computer Organization Principles"[3]. However, most of them only design course ideological and political reform plans from one or several teaching links, without systematically designing teaching reform plans for the entire teaching process[4]. Moreover, there are problems such as a teaching philosophy that emphasizes teaching over educating people, a lack of expandability in teaching content, a single introduction of ideological and political elements, and outdated

course evaluation methods. This article takes the course "Computer Organization Principles" of the Internet of Things Engineering major in undergraduate universities as the research object, and designs a complete set of teaching reform plans under the background of ideological and political education[5].

2. Construction of the reform model of ideological and political education in course

In the context of ideological and political education in the course, the teaching team on the course "Computer Organization Principles" analyzed and explored the knowledge system of the course deeply, analyzed the profound connotation of ideological and political education in the course, and designed a teaching reform model led by ideological and political education in the course, centered on students, and aimed at stimulating students' learning interest[6]. This model reconstructs the course system through the design of ideological and political elements, with a student-centered approach and a focus on students' emotional growth during the learning process, in order to achieve the teaching goals of knowledge transmission, ability shaping, interest cultivation, and ideological guidance[7]. The teaching reform model of the course constructed in this article is shown in Figure 1.

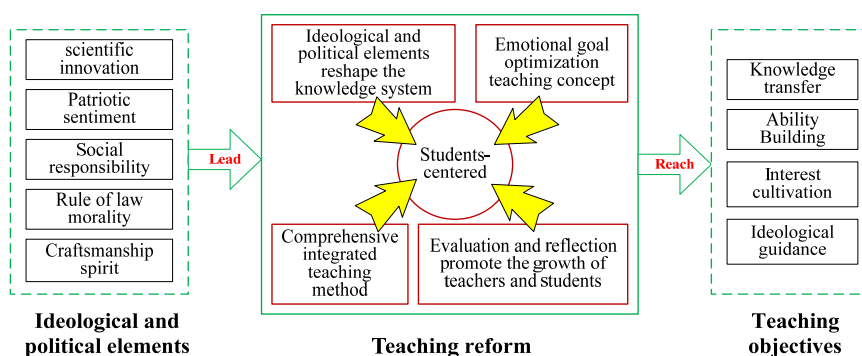


Fig. 1. Teaching Reform Model of the Course

3. Design of ideological and political elements in the course

The course "Computer Organization Principles" has a strong professionalism, mainly cultivating students' cognitive and design abilities in hardware computer systems, as well as their ability to consider and solve problems from the perspective of computer systems. The ideological and political construction of the course should focus on the professional knowledge points of the course, introduce valuable ideological and political elements, strengthen students' patriotism, teamwork, and craftsmanship spirit, enhance students' interest in learning professional knowledge, and promote the digestion and absorption of professional knowledge[8]. The main ideological and political elements of the course are shown in Table 1.

Table 1. Knowledge System and Ideological and Political Element Design of the Course

Knowledge points	Ideological and political elements	Goals of educating people
Introduction to Computer Systems	The current situation of Supercomputing in China.	Establish a sense of national pride and cultivate a spirit of patriotism.
Bus, bus structure, bus control	The importance of teamwork and adherence to engineering standards.	Cultivate students' teamwork and craftsmanship spirit.
Main memory, semiconductor storage chip, connection between memory and CPU	The current situation of Chinese storage chip enterprises.	Cultivate students' ability to take on responsibilities and keep up with the times.
Input output system	The development of I/O equipment in China.	Establish students' aspirations to serve their country.
Unsigned and signed numbers, fixed point representation of numbers, fixed point operations	The standards and powerful functions of computers.	Cultivate students' awareness of compliance with laws and regulations.
Machine instructions and addressing methods	The current situation of CPU design companies such as Longxin and Huawei in China.	Stimulate students' sense of mission to devote themselves to the domestic IT industry.
The structure and function of the CPU	The current situation of CPU manufacturers such as Shenwei and Longxin in China.	Cultivate students' patriotism spirit.
Function of control unit	The current status of CPU core software technology in China.	Stimulate students' enterprising awareness of striving for excellence.

4. Case implementation of course ideological and political education

Semiconductor memory chip is an important chapter of the course, including the basic structure of semiconductor memory chip, decoding drive mode, and Random-access memory. Based on the characteristics of this knowledge point, three teaching processes were designed: pre class, during class, and post class[9].

4.1 Pre class preparation

Teachers will release preview materials and requirements one week in advance, and students will review the materials to consider three questions: What are the global semiconductor chip manufacturers? What are the characteristics of semiconductor storage chips? What do they usually do in a computer? Students collect and organize information in groups, and give speeches in class. Teachers answer questions from each group based on their speeches, and record their classroom performance scores.

4.2 Implementation during class

Classroom teaching is the core link of learning knowledge points in the classroom, which is divided into five stages: course ideological and political education, course introduction, content refinement, classroom discussion, and classroom summary[10].

Course Ideology and Politics. Semiconductor storage chips are widely used in electronic devices, such as embedded devices, mobile phones, and automobiles. The teacher pointed to the first question: what are the main semiconductor chip manufacturers in the world? Check the students' preview. Through the students' answers, the teacher led to "the 20 fastest growing semiconductor chip companies in the world in 2022", of which 19 are from China, such as Suzhou Guoxin, Cambrian and other enterprises. The development of semiconductor chips in China has achieved astonishing results, establishing students' sense of national pride. At the same time, achieving results is not easy and requires the unremitting efforts and dedication of R&D personnel, in order to cultivate students' ability to take on the times and keep up with the times.

Leading In. By understanding the development status of semiconductor storage chips in China, we can learn about the structure of semiconductor storage chips, how they work, what are typical chips, and what do they usually do in a computer. With these questions, we will learn the content of this course together.

Content Refinement. Teachers use a combination of multimedia teaching and blackboard writing to provide precise lectures on important knowledge points. During the explanation process, they constantly ask and answer questions for students, and engage in teacher-student interaction.

(1) The Basic Structure of Semiconductor Storage Chips. The semiconductor storage chip includes a storage matrix, a decoding driver, and a reading and writing circuit inside; Externally connected to the CPU through address lines, chip selection lines, data lines, and read/write control lines. The storage chip capacity can be obtained through address lines and data lines. Teacher's question: The role and characteristics of address lines, data lines, and read/write control lines. For example, what is the purpose of the data lines? What are the characteristics of the data lines?

(2) Decoding and driving methods for semiconductor storage chips. There are two decoding and driving methods. One is the line selection method, where a single word selection line can select a storage unit, suitable for chips with small capacity; One method is to select a basic unit through the X and Y selection lines using the re method.

(3) Random-access memory (RAM). Random access memory is divided into static RAM and dynamic RAM. Static RAM is composed of bistable circuits, while dynamic RAM uses the principle of capacitor charging and discharging to store information. There are many differences. Teacher's question: The concepts of storage cycle and storage time.

Classroom Discussion. Organize student discussions on the differences between static RAM and dynamic RAM, leading to the role of random access memory in computers. Students actively discuss and speak in groups, while teachers summarize.

Classroom Summary. The teacher summarizes the knowledge points of this lesson, emphasizes what needs to be mastered and what needs to be understood, assigns exercises, and publishes preview materials and requirements for the next lesson.

4.3 Review after class

Students complete exercises and review the content taught in class by reviewing materials. The teacher answers the questions that students encounter during their review.

5. The effect and reflection of course ideological and political education

Taking the content of "Semiconductor Storage Chips" as an example, ideological and political elements were integrated into the course "Computer Organization Principles" in the Internet of Things Engineering major[11]. Through communication with the school supervision team teachers and students, it was found that this course achieved good teaching results. In the process of ideological and political education in the course, students actively think and speak, and their thinking is very active. Students have developed a strong interest in the course. During the intensive teaching process of the course, teaching methods such as guidance, questioning, discussion, and interaction are used to actively stimulate students' learning enthusiasm, allowing them to actively participate in the course and achieve better teaching results. Teachers also need to collect and read materials more widely, acquire cutting-edge technology knowledge related to the Internet of Things engineering profession, and achieve the effect of moistening things silently.

6. Conclusion

On the basis of summarizing the current situation of ideological and political construction in the course "Computer Organization Principles", this article conducts ideological and political practice and exploration on the course "Computer Organization Principles" in the field of Internet of Things engineering from four aspects: construction of teaching reform mode, design of course ideological and political elements, implementation of course ideological and political cases, and effectiveness and reflection of course ideological and political education. It achieves an organic integration of knowledge imparting, ability shaping, interest cultivation, and value guidance, Reached the fundamental goal of cultivating virtue and talent.

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