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Exploration of Ideological and Political Education in Curriculum

-- Illustrated by the Case of "Operating System"

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Abstract: Ideological and Political Education in Curriculum is a new requirement to strengthen the ideological and political education in colleges and universities in the new era and is important for cultivating people with morality. In recent years, it has been gradually implemented in colleges and universities, but there are still some problems in practice especially in the specialized courses in engineering. A practical path of Ideological and Political Education in Curriculum for specialized courses is promoted in this paper and is then illustrated by the case of “Operating System”.

Keywords: Ideological and Political education in curriculum; Cultivating people with morality; Operating System.

1. Introduction

At the National Conference on Ideological and Political Work in Colleges and Universities held in 2016, President Xi emphasized that ideological and political education in colleges and universities is related to the fundamental issue of” for whom to train people, what kind of people to train, and how to cultivate people” [1]. At the same time, it is pointed out that each course should undertake certain responsibility, so that specialized courses and ideological and political theory courses can go hand in hand to form join forces. The construction of a new system of ideological and political education in colleges and universities by combining ideological and political courses and specialized courses is of great significance for achieving the fundamental task of cultivating people with morality. "Operating System" is one of the core courses for computer majors, and the research and exploration of curriculum ideology and politics is an important component of cultivating computer professionals who meet the requirements of the new era.

2. The Practical Path of Curriculum Ideology and Politics

On May 28, 2020, the Ministry of Education issued the "Guidelines for the Construction of Ideological and Political Education in Higher Education Courses", which clarified the objectives and content priorities of ideological and political education , and pointed out the direction for ideological and political education in curriculum in colleges and universities. Ideological and political education in curriculum is not curriculum+ideological and political education, nor is about ideological and political education for the sake of ideological and political education. Rather, it should organically integrates ideological and political elements into curriculum teaching to achieve a nourishing and silent educational effect. The practical path of ideological and political education in curriculumis as follows.

2.1. Clarify the Ideological and Political Elements

In the early stages of the construction of ideological and political education in curriculum, the basic principles of being a person and doing things, the requirements of the Core Socialist Values and the ideals and responsibilities of achieving national rejuvenation are hot topics, which are "ideological and political elements" obviously. Higher education is a professional education , which has its particularity. According to the outline, for specialized courses, exploring the ideological value and spiritual connotation contained in the knowledge system, cultivating scientific spirit, improving students' ability to understand, analyze, and solve problems correctly, and strengthening engineering ethics education, and cultivating students' spirit of striving for excellence as a great craftsman should all be an indispensable part of the ideological and political education in curriculum.

2.2. Reorganize the teaching content from the perspective of ideological and political education

Developing ideological and political education in curriculum is by no means a simple preaching of "transplanting" or "grafting" ideological and political elements, but rather reorganizing the teaching content and excavating ideological and political elements based on a deep understanding of ideological and political elements. The ideological and political elements are contained in the curriculum itself. On this basis, based on teaching needs, the teaching content should be optimized to improve the educational function of the curriculum and achieve the organic unity of professional education and ideological and political education in the courses. In the course of "Operating System", each major management function undergoes a process from scratch, from simple to complex, and conforms to the three laws of dialectics. During the process of explaining knowledge points, heuristic teaching is used to guide students to analyze and solve problems step by step , connect knowledge points, and finally summarize and prompt.

2.3. Identify appropriate breakthrough points

To achieve a nourishing and silent educational effect, appropriate breakthrough points that can integrate ideological and political elements and specialized contents organically.

Table 1 lists typical breakthrough points for different types of ideological and political elements in “Operating System”.

Table 1. Typical breakthrough points for different ideological and political elements

ideological and political element	Breakthroughs point
Inspiring Students' National Feelings and Mission Commitment to Serving the Country through science and technology	Cases before or after explaining knowledge points
cultivation of scientific spirit	in the process of explaining knowledge points
understanding of the development laws of things	Connecting and Summarizing the knowledge points
Striving for the spirit of craftsmanship	practice
enhancing national sense of pride and national self-confidence	Cases in the process of explaining knowledge points

2.4. Carry on the Ideological and Political Education in Curriculum throughout the entire teaching process

The Ideological and Political Education in Curriculum is not only conducted in classroom teaching, but also runs through the entire process of teaching, from the formulation of the syllabus, the organization of teaching content, students' pre-class preparation, to classroom teaching, to course assignments, and ultimately course evaluation.

3. Ideological and Political Cases in “Operating System”

"The Development and Status Quo of Operating Systems" is the first part of the introduction in “Operating System”. The main content is to introduce the development process and current status of operating systems from scratch.It contains the ideological and political element of "Inspiring Students' National Feelings and Mission Commitment to Serving the Country through science and technology ",“understanding of the development laws of things” and ”enhancing national sense of pride and national self-confidence”.

3.1. Case Design

In 2021, the National People's Congress and the National People's Congress listed "adhering to innovation driven development" as one of the main goals during the "14th Five Year Plan" period. Operating system, as the "soul" in the "lack of core and soul", is one of the key core technologies in the information industry, and its strategic position is very important. First, use Figure 1 as an introduction to the course, introducing the background, and inspire students' national feelings and mission commitment to serve the country through science and technology.

Then, combined with the course content, classroom teaching is divided into two stages:

In the first stage, explain the process of operating systems from scratch, from single channel batch processing systems to multi-channel batch processing systems, as well as time sharing systems and real-time systems. In this process, guide students to think about the causes and new problems caused by each system, and clearly present the laws of things' development.

Figure 1. Case for course import

In the second stage, with the development of VLSI and computer architecture, as well as the continuous expansion of application requirements, the development of operating systems has entered a rapid development stage of multiple modes. Based on the students' preview results, introduce of HarmnoyOS and the latest research achievements of Chinese scientific companies “ORIGIN PILOT” and "KYLINSOFT" to stimulate students' national pride, encouraging them to work hard and climb the peak forever.

3.2. Teaching process

3.2.1. Pre-class preview

There are two tasks for students before class. One is to familiarize with the knowledge in advance and understand the relationship between the content, so as to establish an overall framework after learning; The other is to learn about the development process of operating systems in China through searching materials by himself, which can improve the ability to search and analyze information, stimulate their thirst for knowledge, and lay a foundation for classroom discussion.

3.2.2. Case Import

"Lack of core and soul" is the pain of China's information industry. "Core" refers to chips, while "soul" refers to operating systems. In May 2019, Google announced restrictions on Huawei's use of its GMS ecosystem and Android system, as well as subsequent restrictions on Huawei's chip production, which would make Huawei's mobile phone business even worse. The introduction of the case, through which students will be able to recognize the pain points of China's information industry at present, can inspire their determination to shoulder historical missions, assume the responsibility of rejuvenation and contribute to the development of China's operating system through hard work. In order to learn this course well, it is first necessary to understand the development process of the operating system and grasp the development laws, so as to scientifically view the current technological situation and formulate development plans.

3.2.3. Stage 1: Operating System Development History

1). Classroom teaching

manual operation:

In the early days, computers were not equipped with an operating system. The usual mode of operation was for programmer to sign up for a block of time using the sign-up sheet on the wall, then come down to the machine room, insert his or her plug-board into the computer, and spend the next few hours to run the programmatic stage was characterized by the exclusive use of the entire computer and requiring the CPU to wait for manual operation. There were human-machine conflicts and conflicts between I/O devices and the CPU.

batch system:

In order to solve human-machine conflicts and conflicts between I/O devices and the CPU among jobs, batch system is generated. Under the control of a monitoring program, continuous processing of jobs is completed, but only one job is always stored in memory. During the process of a job, the CPU has to wait for a long time when I/O operations occurs, which reduces the system resource utilization and throughput.

Multiprogramming batch system:

In order to solve the problems of lower system resource utilization and throughput, multiprogramming was the most important technique, which partition memory into several pieces, with a different job in each partition. While one job was waiting for I/O to complete, another job could be using the CPU. If enough jobs could be held in memory at once, the CPU could be kept busy nearly 100 percent of the time. This improved CPU utilization (combined with example analysis here) and effectively increased system throughput, but the system did not have interactive capabilities.

Time sharing system and real time system:

Time-sharing systems solve the problem of human-computer interaction, in which each user has an online terminal and the CPU can be allocated in turn to each terminal that want service.In the field of high real-time performance and reliability, time sharing systems are far from sufficient. This requires the use of real-time systems, which can respond to external requests in a timely manner and complete the processing of specified events within a specified time. Real-time systems have high reliability, and use multiple fault tolerance mechanisms to ensure system security.

2) Summary

The development process of operating systems is the process of encountering and solving problems. It is "problems" that drive the development of new things. In the process of solving problems, there is a dialectical unity of two-point doctrine and focal-point one. When primary and secondary contradictions coexist, it is necessary to first resolve the primary contradiction and then consider the secondary contradiction; In the same way, we also encounter various problems in our lives and learning, which need us view things with a developmental perspective, analyze the problems we face, distinguish the main contradictions, and solving the problems is an opportunity for our progress.

3.2.4. Stage 2: Operating System Development Status

1) Classroom Discussion - The latest research progress in computer and operating systems in China.

Through the introduction of the latest computer and operating system in China, it is shown that although China has been lagging behind for a long time in the development of operating systems, under the leadership of the Party, we can achieve curve overtaking, leading the world in quantum computing, 5G communication, and other fields, thereby building students' national sense of pride and national self-confidence, consciously achieving the "four self-confidence", and participating in China's information construction work with full enthusiasm.

2) Classroom teaching

With the development of VLSI and computer architecture, as well as the continuous expansion of application requirements, the development of operating systems has entered a rapid development stage of multiple modes. In recent years, operating systems have developed in the direction of parallelism, networking, convenience, and convergence. Especially in the Internet era, the emergence of the Internet of Things and quantum computers has put forward higher requirements for operating systems. HarmonyOS will usher in the Internet of Things ecosystem. Following the "Nine Chapters" quantum computing prototype, a research team composed of Pan Jianwei, Zhu Xiaobo, Peng Chengzhi, and others recently successfully developed the 62 bit programmable superconducting quantum computing prototype "Zuchongzhi", and implemented a programmable two-dimensional quantum walk on this basis.

3) Summary

Although we started relatively late, thanks to the collaboration and courageous efforts of scientific researchers, we have begun to make significant strides forward and achieved remarkable achievements. This is the best era in which the country, including schools, provides strong support for young people's innovation and development. As long as the young strives bravely to climb the peak, we believe that in the near future, the "stuck neck" technology will also be solved one by one. As President Xi Jinping said in his speech at Tsinghua University, let youth bloom in the relentless struggle, achieve a career in the practical work.

4. Conclusion and Reflection

The ideological and political education in curriculum simulate students' sense of national pride and professional identity and improve their enthusiasm for learning. Students have realized that curriculum learning is not only about learning professional knowledge points, they can also deeply experience the development laws of things through learning, and have some methods in hand to solve problems in daily life. However, there are also some problems. First of all, the ideological and political level of teacher is limited, which results in insufficient exploration of ideological and political elements in the curriculum; Secondly, the form is single, and it is mainly applied to traditional classrooms. If modern information technology is combined to carry out a "second classroom" or "third classroom", which are conducted in an all-round and multi-angle manner, the effect will be better. The ideological and political education in curriculum has a long way to go, continuously improving their own educational level, expanding the width and breadth of the classroom, and always carrying out ideological and political education throughout the entire process of education and teaching, so as to cultivate qualified builders and successors of the socialist for country.

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