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Research on the "Fun Ideological and Political Education via Analogical Perspectives" Teaching Strategy: A Case Study of Computer Organization Principles

Yani Hou*, Chao Chen, Wenzhong Zhu

Sichuan University of Science and Engineering, Yibin 644000, China

* Corresponding author

Abstract

Curriculum-based political education aims to integrate ideological and political education elements into the teaching process of professional courses, ensuring the dissemination of knowledge while conveying values and fulfilling the fundamental task of cultivating students' moral character. Taking the course of Computer Organization Principles as an example, this paper based on a summary of the current status of curriculum-based political education, proposes a teaching strategy of " Fun Ideological and Political Education via Analogical Perspectives " with the help of the popular "multi-perspective evaluation" at this stage. By comparing different perspectives of electronic components, it integrates scientific cognition and value perception with interest, cultivates students' active exploration ability, improves teaching quality, provides reference for other computer-related courses in curriculum-based political education, and promotes the high-quality development of curriculum-based political education in university courses.

Keywords

Curriculum-based political education, Computer Organization Principles, Analogical perspectives, Funny.

1. Introduction

In May 2020, China's Ministry of Education issued the "Guiding Outline for the Construction of Curriculum-based Political Education in Higher Education Institutions", marking the beginning of the in-depth promotion of curriculum-based political education construction across universities nationwide. It aims to integrate ideological and political education organically into various courses, enabling students to acquire professional knowledge and skills while forming a scientific worldview, outlook on life, and values, thereby comprehensively enhancing their overall quality and sense of social responsibility. This has also become a key measure for comprehensively improving the quality of talent cultivation, constructing a full-staff, full-process, and all-round education system in universities in the new era, and systematically implementing the fundamental task of cultivating students' moral character and fostering talent [1].

Curriculum-based political education emphasizes the integration of ideological and political education elements into the teaching process of professional courses, ensuring the dissemination of knowledge while conveying value concepts, and achieving the dual educational goals of knowledge impartation and value guidance. Knowledge impartation focuses on the teaching and learning of scientific and cultural knowledge, emphasizing the cognition and exploration of the objective world; while value guidance focuses on cultivating individual moral quality, humanistic literacy, and mental health, shaping their outlook on life, values, and the world. However, in specific teaching practice, knowledge impartation and value

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guidance often present a certain "incompatibility". How to achieve the organic integration and deep alignment of the two is a pressing issue that needs to be addressed in curriculum-based ideological and political education. Inspired by popular short videos today, this paper proposes a " Fun Ideological and Political Education via Analogical Perspectives " teaching strategy based on the course of Computer Organization Principles, to strengthen the deep integration of professional knowledge and ideological and political elements with funny.

2. Current Implementation of Curriculum-based Political Education in Computer Organization Principles

Computer Organization Principles serves as a core course in computer-related majors, which elaborates on the basic components of computers, such as CPU, memory, input/output devices, and their connection methods and working principles. It also explains the execution process of computer instructions, data storage and processing methods, etc. Through learning, students can gain a deep understanding of the hardware structure and functions of computers, establish a comprehensive system thinking from low-level hardware to high-level software, understand the interaction and relationship between software and hardware, stimulate innovative thinking and creativity, and lay a solid foundation for subsequent learning of more advanced computer technologies and applications.

With the vigorous implementation and promotion of curriculum-based political education integrated into courses, some teachers and scholars have conducted in-depth research and practice in the concepts, methods, and specific implementations of curriculum-based political education integrated into courses. Jia Huizhen et al. [2] combined their exploratory experiences in the teaching practice of curriculum-based political education integrated into the "Computer Organization Principles" course, elaborating on the teaching plan from the perspective of the necessity of curriculum-based political education in computer-related courses and the implementation process of such education. Gao Shan et al. [3] took the "Computer Organization Principles" course as an example to explore the basic construction plan for the reform of curriculum-based political education integrated into courses. Yue Bin et al. [4] addressed the problems existing in the teaching of the "Computer Organization Principles and Design" course, benchmarked against the requirements of "golden courses", and explored how to introduce ideological and political elements into the course teaching process based on the "two properties and one degree" standard. Yang Xinyu et al. [5] constructed a three-tiered curriculum-based political education system for the Computer Organization Principles course, combining online and offline learning, and integrating classroom and extracurricular activities, based on a blended teaching model. Wu Hao et al. [6] integrated the reform model of the Computer Organization Principles course under the Outcome-Based Education (OBE) concept into the curriculum-based political education elements of the course, focusing on student cultivation outcomes and the application of knowledge. Based on the characteristics of the course and teaching methods, summarize the research system of ideological and political education in the course as shown in Figure 1.

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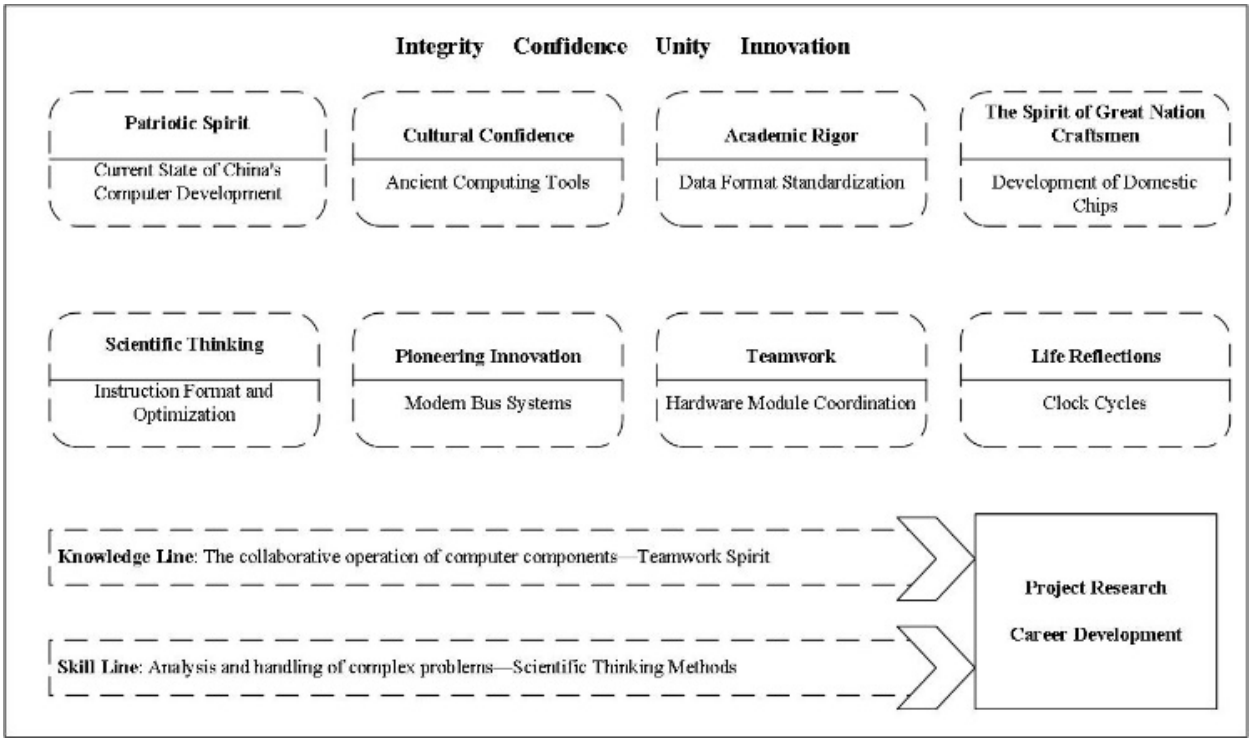

Figure 1. The overall framework of the ideological and political system based on the principles of computer organization

3. The "Fun Ideological and Political Education via Analogical Perspectives" Strategy

Based on the actual implementation of curriculum-based political education in courses, some teachers have different understandings of the essence of curriculum-based political education in courses, and are unable to explore and integrate ideological and political elements. This leads to mechanical application, deliberate preaching, and even directly listing the key points of curriculum-based political education, forcing students to memorize mechanically. Curriculum-based political education is carried out merely to fulfill the task, resulting in a significant reduction in the effectiveness of curriculum-based political education in courses, while professional knowledge is not effectively imparted to students. Therefore, how to leverage the current environment, use vivid and interesting descriptions to stimulate students' enthusiasm, rely on life experiences to highlight ideological and political elements, reveal the significance of knowledge, and inspire students' thinking, is the most challenging issue for most professional course teachers in the process of carrying out curriculum-based political education.

In the current wave of digital education, the narrative style of short videos provides new inspiration for ideological and political education in courses. By drawing on the techniques of multi perspective analysis of classic works in popular short videos, the Computer Organization Principles course can construct a "personification of electronic components" teaching mode, allowing students to immerse themselves in the process of data flow and system collaboration as hardware roles such as CPU, memory, and bus. For example, the instruction execution process can be interpreted as "imperial palace memorial approval", where the CPU transforms into a diligent emperor, caching becomes a confidential secretary, and the bus is a relay for transmitting messages. In this process, ideological and political elements such as responsibility and teamwork are naturally infused, making abstract computer architecture principles vivid and perceptible.

The core of this teaching strategy lies in using information technology to achieve resonance between knowledge transmission and value guidance. By creating innovative forms such as

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"Chip Diary" micro videos and setting up "Hardware Moments" discussion forums, not only can students' interest in learning be stimulated, but they can also be guided to understand life lessons from the "work philosophy" of electronic components. When students understand hardware features such as the silent dedication of cooling fans and the rigorous punctuality of clock generators, ideological and political points such as craftsmanship and rule awareness are quietly implanted in their minds, ultimately achieving the teaching goal of integrating education with fun and refining morality with technology.. The mapping table of ideological and political elements is shown in table 1

Table 1. Mapping Table of Ideological and Political Elements

Hardware components	Personification trait	Mapping point of ideological and political education	Typical teaching cases
Clock Generator	A rigorous time manager	Rule awareness and system engineering concept	Without my rhythm, the entire band would be in chaos
Hard Disk	Historian	Cultural Inheritance and Information Ethics	Permanent Storage vs Privacy Protection Debate Competition
Cooling Fan	The guardian who silently pays	Dedication and supporting role value	Extension of thermodynamic laws to team energy conservation

4. Case Study: Registers Analogy in CPU

Taking the CPU chapter mentioned above as an example, we introduce an analogical perspective into classroom teaching and reflect on the ideological and political elements through interaction. First, we start with “What do you know about CPU “to share our initial discussion of CPU with students. Then, we take perspective "If you were a CPU, what equipment you would need to maintain your central role?" Through the guidance of textbooks, we deepen students' understanding of the internal components of the CPU. Students see themselves as CPUs and express that "as the 'brain', I have to process hundreds of millions of requests every day, but without the temporary memory of my memory brothers, I can't even last for one second Next, we set up a deep dive topic " Experience an instruction cycle from the Program Counter’s (PC) perspective ". Ask students to put themselves into an instruction cycle, observe the working process of themselves and other registers from the perspective of the program counter, completing the journey of an instruction cycle. Finally, we summarize relevant knowledge points and communicate with students about their insights from this perspective, thus highlighting the ideological and political elements and achieving the clever integration of professional knowledge and ideological and political education.

In the " Computer Organization Principles (6th Edition)" edited by Bai Zhongying [7], the program counter (PC) is described as follows: "To ensure the continuous execution of the program, the CPU must possess certain means to determine the address of the next instruction. The program counter serves this purpose. Before the program starts executing, its starting address, that is, the address of the instruction memory unit where the first instruction of the program is located, must be loaded into the PC. Therefore, the content of the PC is the address of the first instruction fetched from the instruction memory. When executing instructions, the CPU automatically modifies the content of the PC so that it always maintains the address of the next instruction to be executed. Since most instructions are executed sequentially, the modification process is usually simply adding 1 to the PC. However, when encountering a branch instruction, the content of the PC must be obtained from the address field in the instruction register. Therefore, the structure of the program counter should have both register

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and counting functions." This definition outlines the role and operating principle of the program counter, but it is relatively abstract and prone to confusion with address registers and instruction registers.

Here, we use an analogical perspective to explain the working principle of the program counter: "When you start an instruction cycle from the perspective of the Program Counter, it's like waking up before the alarm goes off, taking a break amidst the hustle and bustle, and having to watch your boss's face." The corresponding knowledge points and ideological and political points in this perspective are shown in Table 2.

Table 2. Corresponding knowledge points and ideological and political points from the perspective of Program Counter

Program counter perspective	Knowledge points	Ideological and political points	Ideological qualities
Hello everyone, I am the Program Counter, or PC for short—a monotonous assembly-line worker in the CPU.	Program Counter definition	Screw spirit	Professional dedication and work ethic
When I joined the company, my boss told me the operating rules were designed by a scientist named von Neumann. My job is simple: pass instruction addresses to the Address Register, increment the count, and hold the next instruction's address.	Von Neumann architecture principles. PC operation workflow	Normative awareness in engineering ethic	Scientific spirit of rule compliance
Over time, I met my supervisor—the Timing Generator—and my coworkers, the Address Register and Instruction Register	Primary registers connected to PC	Systems engineering thinking	Clear division of labor and interdependence, collectivism in teamwork
Confidently, I began a new cycle, only to panic when I realized I had no starting instruction address. After re-reading the rules, I learned I must fetch the first address one clock cycle earlier than my supervisor.	Fetch initial instruction address (Pre-execution). CPU master control logic	Preparedness ensures success	Foresight and planning awareness

Table 2. Continue

Program counter perspective	Knowledge points	Ideological and political points	Ideological qualities
When the Timing Generator's first pulse arrived, I swiftly sent the address to the Address Register. Finally, I could relax—just incrementing my counter and waiting for the next cycle.	Timing Generator characteristics per instruction cycle. Address Register position	Craftsmanship spirit	Patience in repetitive work, perseverance and steadfast quality
Drowsily, I lost track of time… until the Instruction Register knocked on my door with a new address. The moment I saw JMP, I jolted awake and began another round of work.	The difference between branch instructions and sequential instructions	Evolving with the times	Breaking path dependence, adaptive and innovative thinking

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PC's workflow perfectly illustrates the dialectical relationship of "upholding principles while embracing innovation"—adhering to architectural rules (program sequence) while promptly adapting to changes (jump instructions). This embodies the life wisdom of "balancing principle and flexibility" that contemporary youth need. The above methods cleverly combine the content of the CPU before and after sections, which is full of fun. Similarly, By observing from the perspective of registers, students can more vividly understand their working characteristics of "short-term storage and fast response" - just like the key opportunities in life that need to be grasped in real time, fleeting but far-reaching. When data flows between registers, students will find that each register has its irreplaceable mission: instruction registers focus on "current tasks", program counters plan "future paths", and status registers constantly "reflect and adjust". This operating mechanism is like the art of time management in personal growth: it requires efficient handling of immediate affairs, forward-looking planning of development direction, and continuous self-reflection and optimization.

5. Reform of Teaching Effectiveness Evaluation Methods

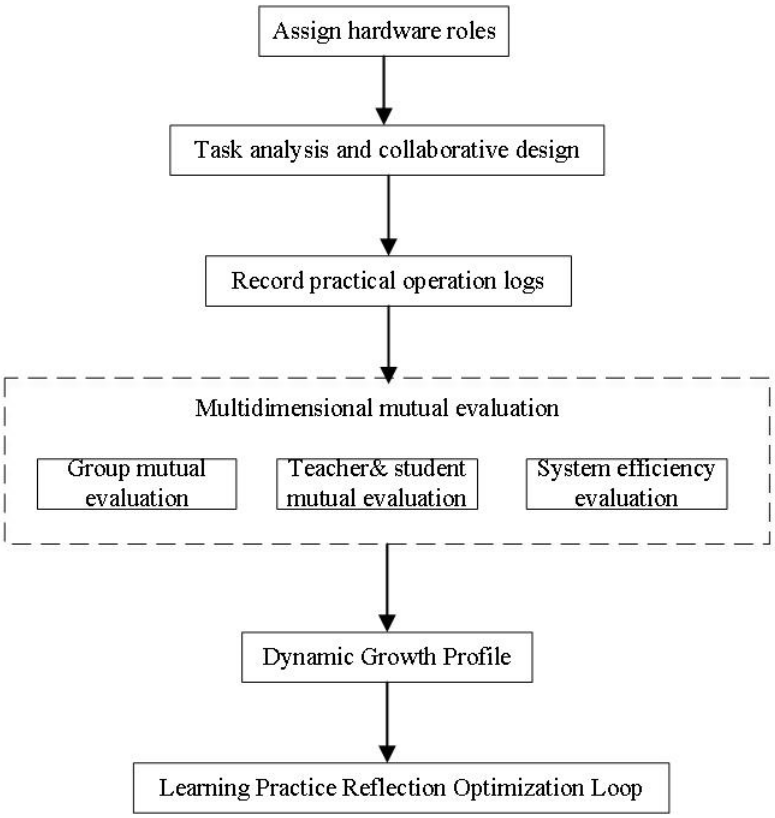

Figure 2. Evaluation process flowchart

Inside a computer, every component is a key participant in the operation of the system. Taking the CPU as an example, as the "brain", it reads instructions from memory, coordinates the work of various components through the controller, the arithmetic unit executes calculations, and then writes the results back to memory or output devices. This process is like teamwork, where each component performs its own duties and works closely together, reflecting the spirit of collectivism and responsibility. The course assessment and evaluation mechanism needs to echo this concept, breaking the traditional single score evaluation and shifting towards a process oriented, multi-dimensional dynamic evaluation. Teachers can design "instruction execution simulation" tasks, where students are grouped to play different components and collaborate to complete computational tasks. The assessment focuses on the accuracy of component functions (professional ability), collaborative efficiency (teamwork), and anomaly

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handling (innovative thinking). The evaluation process flowchart is shown in Figure 2. Students first receive "hardware role allocation" and enter the "task analysis and collaborative design" stage. They record their individual contributions through the "practical operation log" and finally conduct "multidimensional mutual evaluation", including group mutual evaluation, teacher evaluation, and system generated efficiency analysis report. The evaluation results are fed back to the "Dynamic Growth Archive", forming a closed loop of "learning practice reflection optimization", emphasizing the cultivation of craftsmanship spirit and systematic thinking in technical learning, while infiltrating the concepts of cooperation and integrity in socialist core values through teamwork.

Through research on the mastery of knowledge by computer science students in the 2022 and 2023 classes using this method, most students expressed a strong interest in this approach. While mastering basic knowledge and building a complete machine concept, they also transferred their knowledge to other fields, formed cooperative groups, clarified their own responsibilities, and played their own role in project application and competition cooperation.

6. Conclusion

Curriculum-based political education integrated into the curriculum serves as the primary approach and medium for fulfilling the fundamental task of fostering students' moral character. By fully utilizing modern information technology, drawing analogies to electronic components, and shifting perspectives, integrating ideological and political education into the course on computer organization principles not only enriches the teaching content and enhances teaching effectiveness but also effectively guides students to consider the ethics, morality, and social responsibility behind technology, cultivating their awareness of technological ethics and social responsibility. This achieves the dual goals of imparting knowledge and guiding values, laying a solid foundation for cultivating information technology talents with both moral integrity and professional competence.

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