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Research on the Teaching Reform of Computer Network Course Integrating Ideological and Political Elements in BOPPPS Teaching Mode

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Abstract

In response to the low enthusiasm of students in traditional classrooms, the reluctance of most students to participate in active interaction with teachers, and the single and low innovation of teachers' teaching methods, this article proposes a computer network course teaching method that adopts BOPPPS teaching mode and integrates ideological and political elements. Through teaching practice, it has been found that this teaching model has improved students' enthusiasm for participating in the classroom, promoted strong learning motivation, and provided clearer learning objectives.

Keywords

Teaching reform; BOPPPS; ideological and political elements; computer network course.

1. Introduction

The computer network course is one of the fundamental courses for computer related majors, and it is also an important knowledge and skills that need to be mastered for computer research and work [1]. However, there are many problems in traditional computer network teaching, such as the inability to flexibly adjust course content to actual situations, teachers' teaching methods being single and following the old mode of teaching, students' weak hands-on ability, and lack of practical operation links. With the development of the Internet era constantly promoting the reform and innovation of education models, and the fierce competition for employment among college graduates, cultivating students with strong engineering practice and innovation abilities has become a daunting task. This study aims to reform and innovate computer network courses from various aspects such as educational concepts, teaching methods, and practical teaching management, with the aim of cultivating high-level talents in computer network technology with strong engineering practice and innovation abilities [2].

Computer networking is a fundamental course in the field of data science and big data technology, with strong theoretical value and practicality. When teaching in a multimedia classroom, the teacher's solo performance and rote learning methods cannot arouse students' interest in learning, let alone stimulate their independent thinking ability. This to some extent neglects the cultivation of students' self-learning and independent thinking abilities. Therefore, this study adopts the BOPPPS teaching model and integrates ideological and political elements into the classroom teaching method to stimulate students' active participation in the classroom, improve their love for this course, and thus enhance their initiative and enthusiasm for active thinking. This teaching method not only cultivates students' ideological and moral qualities and sense of social responsibility, but also enriches their extracurricular life and enhances the relationship between teachers and students. On the other hand, it provides a new approach for innovative teaching of computer network courses in applied undergraduate universities [3].

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2. BOPPPS Teaching Model Integrating Ideological and Political Elements

This study conducts an in-depth analysis of the connotation of ideological and political education in the teaching of "Computer Networks", and explores a curriculum ideological and political education teaching plan based on the B0PPPS teaching mode. It guides students' learning from shallow to deep, allowing them to have more ways and methods to invest more energy in learning the "Computer Networks" course, and urging them to develop self-learning habits, which is conducive to improving students' innovation ability [4]. The adoption of BOPPPS teaching mode in the course of "Computer Networks" reflects the modern teaching philosophy of "people-oriented, student-centered, and teacher led", which helps to improve students' enthusiasm for participating in the classroom, strengthen their sense of participation, optimize the classroom teaching process, and greatly expand their network thinking ability. The integration of ideological and political education into computer network teaching aims to cultivate students' sense of social responsibility, innovation ability, and teamwork spirit, enabling them to become outstanding talents with comprehensive development [5].

2.1. BOPPPS Teaching Mode

The BOPPPS teaching model was proposed by Canadian educational institutions in the 1970s. This model advocates for education goals as the guide, student-centered, and mainly uses teaching practice as the main approach to improve teachers' teaching skills and effectiveness through centralized reinforcement training [6,7]. At present, many domestic universities have begun to introduce the "BOPPPS" teaching model in actual teaching. This model, combined with actual teaching, can help teachers change the teaching process, identify teaching blind spots, and improve and enhance teaching effectiveness as a tool.

The BOPPPS model is a new teaching approach that is goal oriented and student-centered. It mainly includes the following six teaching modules, and the word "BOPPPS" is composed of the first letters of the English names of each module: the BOPPPS model includes Bridge-in, Objective, Pre-Assessment, Participant Learning, Post-Assessment, and Summary. Through this orderly teaching method, students can have a more comprehensive grasp of knowledge, and teachers can guide students' learning more effectively. The core of the BOPPPS model is twofold: firstly, it emphasizes students' all-round participatory learning rather than just listening to lectures; The second is to obtain timely feedback from students and adjust subsequent teaching plans in a timely manner in order to achieve teaching goals smoothly [8,9].

Based on the training objectives of data science and big data technology professionals and the characteristics of this course, the BOPPPS teaching mode is adopted in the computer network course to guide students to actively participate in learning, improve learning effectiveness and literacy. By combining explanation with practical exercises, case teaching, random answering, group discussions, and other methods, students can master the basic concepts of computer networks and the basic principles of data communication, as well as the architecture and protocols of computer networks and practical training projects. In addition, students are required to have a deep understanding and comprehension of computer network design and integration, network software and hardware, local area network interconnection, Internet network applications, and network security. Through the study of this course, students can improve their ability to analyze and solve problems, as well as their ability for sustainable development. This study developed and constructed the concept of "BOPPPS teaching mode integrating ideological and political elements" in the development and construction of computer network courses through the following process, as shown in Fig. 1.

2.2. Ideological and Political Elements

At present, universities are paying more and more attention to ideological and political education in their courses. However, some professional course teachers often lack awareness

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and cognition of integrating ideological and political elements into the classroom, and cannot skillfully integrate professional courses with ideological and political content. This cognition lacks emphasis on students' political and ideological education. In computer network courses, by integrating ideological and political elements through the BOPPPS teaching model, students can comprehensively apply professional knowledge to solve problems under the premise of ideological and political education, thereby improving their comprehensive abilities. The integration of ideological and political elements into the BOPPPS teaching model can guide students to think deeply about problems, stimulate their enthusiasm and enthusiasm for learning, and thereby improve teaching satisfaction. At the same time, through the study of professional knowledge, cultivate students' sense of social responsibility, innovation ability, and teamwork spirit [10,11,12].

This course focuses on "cultivating professional system abilities" and implements the educational philosophy of "learning centered". The teaching direction is mainly focused on ability development, aiming to enable students to comprehensively understand principles and technologies, master computer network architecture and protocols, and develop skills in computer network planning, design, management, and maintenance, laying a solid foundation for future work in computer network related fields.

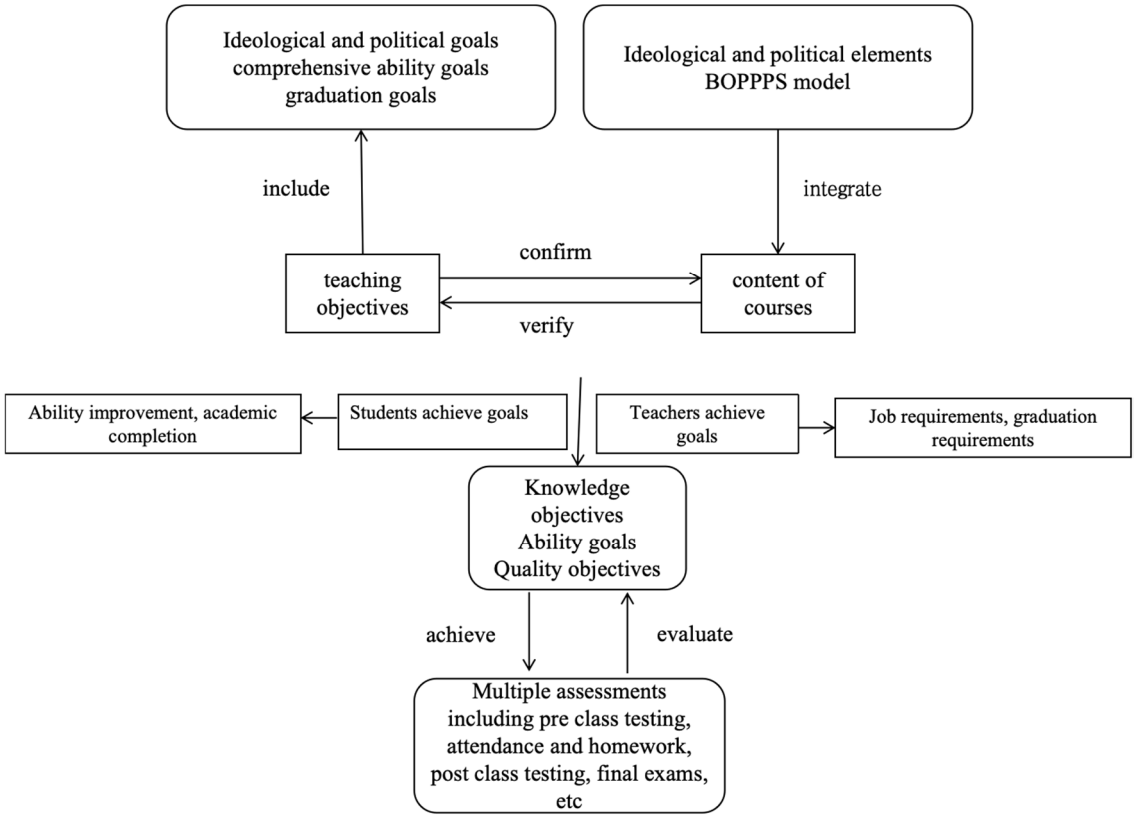

Figure 1. Flow Chart of BOPPPS Teaching Mode Integrating Ideological and Political Elements

From the above flowchart, it can be seen that the formulation of teaching objectives should take into account graduation goals and comprehensive ability goals. At the same time, the teaching objectives of the course should comprehensively consider social needs and employment requirements. By integrating the BOPPPS teaching philosophy with course ideological and political education, corresponding course ideological and political objectives can be sorted out according to the characteristics of the course. Then, when determining the teaching content through course objectives, the "BOPPPS+Ideological and Political Education" teaching philosophy should be organically integrated into all aspects of the teaching content. The final

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determination of teaching effectiveness is measured by students' pre class tests, post class tests, attendance, homework, final exams, etc. The evaluation of teaching effectiveness is used to provide feedback on teaching objectives and achieve dynamic adjustment of teaching objectives.

3. Design of Computer Network Teaching Structure in BOPPPS Mode

In order to change the traditional classroom teaching style of cramming, where students passively learn and the course content is designed to be single and low in innovation, it is difficult to mobilize students' learning enthusiasm, which is not conducive to the cultivation of students' innovative thinking. Therefore, in response to the problems in computer network teaching, the BOPPPS teaching model is introduced to integrate ideological and political elements into the teaching philosophy. Based on the course objectives, teaching content and activities are designed in reverse, emphasizing the cultivation of students' practical and problem-solving abilities, and improving their thinking and innovation abilities in teaching. In the process of teaching practice, this course intends to address the key issues that this project aims to solve from several aspects, including "Bridge-in", "Objective", "Pre-Assessment", "participatory learning", "Post-Assessment", and "summary" (Table 1).

①Bridge-in: The course content is integrated into ideological and political education. We combine network security, social news, and the impact of information technology development on society with classroom knowledge, guiding students to link professional knowledge with ideological and political theory, attracting students' attention, and stimulating their classroom enthusiasm.

②Objective: The purpose of this stage is to demonstrate to students the objectives of this lesson, including knowledge, ability, and quality goals, in order to facilitate students' mastery of the key and difficult points of the learning content. It is required that the proficiency level of knowledge mastery must be clear and measurable.

③Pre-Assessment: The purpose of this stage is to master students' training abilities, and the differences in knowledge background and learning abilities between students cannot be ignored. If the teaching content far exceeds the students' existing knowledge range, it is easy to make them feel frustrated and lose interest in learning; If the knowledge taught is already very clear to the students, it will also make them feel bored.

④Participatory learning: This stage aims to cultivate students' ability to learn actively and adopt a student-centered teaching philosophy. Common forms of participatory learning organization include group discussions, role-playing, hands-on calculation, thematic discussions, case analysis, etc.

⑤Post-Assessment: This stage is an important step in determining whether students have achieved their expected goals. Timely evaluate the teaching effectiveness by testing students' mastery of knowledge through in class exercises after class or during the teaching process. Based on the evaluation results, students can timely understand their level of knowledge mastery, and teachers can reflect and adjust their teaching design to make it easier to achieve teaching goals.

⑥Summary: This stage mainly involves summarizing the knowledge points of a lesson, clarifying the knowledge framework, and introducing the content of the next lesson. In the process of summarizing, the teacher mainly plays a guiding role, allowing students to summarize the knowledge points and important content of this lesson and evaluate their own learning effectiveness.

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4. Taking the chapter on "Computer Network Architecture and Protocol" as an example, design a BOPPPS implementation plan for the ideological and political content of OSI/RM and TCP/IP network architecture

①Bridge in: Firstly, using the case of Huawei's founder in the field of 5G communication, this article illustrates the importance of standards and specifications in the development and application of computer networks, demonstrating the significant progress of China from a passive receiver to a rule maker in the field of communication networks. This allows students to have a deeper and more comprehensive understanding of their profession, increase their sense of identification with the profession, and inspire their patriotism and mission to serve the country through science and technology.

②Objective: Based on this chapter, summarize two common network architectures: OSI/RM and TCP/IP. Simultaneously clarify the learning focus and difficulties.

Knowledge objective: Master the hierarchical division and functions of OSI/RM model, and master the hierarchical division and functions of TCP/IP model;

Ability objective: To be able to summarize two common network architectures, OSI/RM and TCP/IP;

Quality objective: To cultivate students' self-learning ability, as well as their ability to analyze and solve problems.

③Pre-assessment: Online question: 1) What network performance indicators do we pay attention to when using the internet in our daily lives? 2) Why can computers from different regions and systems communicate without barriers?

Teaching methods and means: The teacher distributes the questions to each study group, and through discussions between groups, representatives are sent to share on stage to receive a reward of 2 points for learning comprehension.

④Participatory Learning:

Task 1: Learn the performance indicators of the network: speed, bandwidth, throughput, latency, latency bandwidth product, round-trip time, network utilization

Task 2: Learn computer network architecture: OSI/RM model, TCP/IP model

Task 3: Understand new network technologies: Internet of Things, cloud computing SDN、5G

⑤Post-assessment: Summarize the hierarchical division and functions of OSI model and TCP/IP model based on classroom lectures, and describe the relationship between the two models.

Teaching methods and means: discussion and summary.

⑥Summary: Basic network performance indicators and their meanings; OSI model structure and layer functions; TCP/IP model structure and layer functions.

5. Summary

In the computer network teaching practice of undergraduate students, the BOPPPS teaching mode is used to integrate the ideological and political education of the course, use the Internet, multimedia and other modern scientific and technological means, and use the online and offline teaching mode to provide online learning resources and communication platforms, broaden the students' vision, and enhance the interactivity and enthusiasm of learning. In the process of computer network teaching, case materials are first used to introduce problems, which then arouse students' interest, and then course knowledge is explained, fully exerting students' subjectivity and promoting teaching interaction. Through project-based teaching, practical

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teaching and other methods, students can experience the importance of ideological and political education in solving network security issues, technological innovation and other practical activities, and stimulate their innovative consciousness and sense of social responsibility.

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References

[1] Zhang Yi, Wang Juan, Zhu Yaling Research on the Design of Blended Online and Offline Teaching Mode for Computer Network Courses [J]. Computer Knowledge and Technology, 2023, 19 (36): 178-180.

[2] Jiang Wenjuan, Lu Na Exploration of Mixed Teaching Mode for Computer Network Courses Based on Chaoxing Learning Platform [J]. Computer Knowledge and Technology, 2023, 19 (26): 129-131.

[3] Wang Yingmei Research on the Application of Blended Online and Offline Teaching Mode in the Course of "Computer Network" [J]. Technology and Innovation, 2022, (17):179-181.

[4] Xu Haixia, Mao Hongxia, Zhang Jinguo, etc Exploration of the Teaching Mode of Big Data Technology Professional Courses Integrating Course Ideology and Politics [J]. Scientific Consulting (Educational Research), 2023, (11):160-162.

[5] Sun Zhigang, Yin Qing, Zhu Liangming, etc Application research of CBL combined flipped classroom teaching mode integrating ideological and political courses in clinical teaching of thoracic surgery [J]. Health Vocational Education, 2023, 41 (12): 99-101.

[6] Yuhang, Anqi, Jinli, etc The Application of BOPPPS Teaching Mode Integrated Course Ideology and Politics in Undergraduate Internal Medicine Internship [J]. Medical Education Research and Practice, 2024, 32 (03): 349-354. DOI: 10.13555/j.cnki.cm.e. 2024, 03.019.

[7] Tian Yongmin Analysis of Teaching Mode of Computer Network Security Technology Based on Course Ideology and Politics [J]. Computer Knowledge and Technology, 2021,17 (33): 214-215.

[8] Qu Kaiyang, Gong Siliang Practice of BOPPPS and the Integrated Teaching Mode of Split Classroom [J]. Fujian Computer, 2024, 40 (06): 106-110.

[9] Sui Lili, Zhao Dan, Sun Chiyu, etc Application of BOPPPS based integrated teaching mode in natural medicinal chemistry [J]. Journal of Shenyang Medical College, 2024, 26 (05): 537-541.

[10] Han Haixiao Research on the Application of Blended Teaching Mode in Flipped Classroom Based on OBE: Taking "Computer Network" Course as an Example [J]. Modern Information Technology, 2022,6 (23): 183-186+190.

[11] Zhang Xiaoqiang, Yang Ligang, Jin Hui Practice and Reflection on Innovative Teaching Mode of Integrating Ideological and Political Elements in the Introduction to Chinese Food Culture [J]. Education and Teaching Forum, 2019, (21): 220-221.

[12] Chen Jiali, Ji Tongguang, Zhang Zhongmei Exploration of the Teaching Mode of the Course "Fundamentals of Big Data Applications" in the Integration of Ideological and Political Construction in Curriculum [J]. Zhizhi, 2024, (34): 37-40.