

Research on the Inquiry-Based Teaching Mode of College Computer Basic Courses Based on Ideological-Political Education in Curriculum

Yue Liu, Lili Yu, Xiaoguang Su

*College of Information Science and Electronic Technology Jiamusi University, Jiamusi, 154007,
China
friend9023@sina.com*

Keywords: Ideological-Political Education in Curriculum, Fundamentals of College Computer, Inquiry, Teaching Mode

Abstract: How to use the course of Ideological-political education to cultivate excellent talents with family and country feelings is a research hotspot in today's society. This paper gives a new course system of university computer foundation based on ideological-political education in curriculum and an inquiry-based teaching mode based on ideological-political education in course with significant teaching effect, starting from the deep excavation of the correlation between programming language course and ideological-political education in curriculum.

1. Proposal and Development of Ideological-Political Education in Curriculum

Ideological-political education in curriculum is a comprehensive education concept to takes all kinds of courses and ideological and political theory courses in the same direction, forming a synergistic effect, and takes "fostering virtue through education" as the fundamental task of education.

In December 2016, General Secretary Xi Jinping pointed out at the National Conference on Ideological and Political Work in Colleges and Universities that "we should use classroom teaching as the main channel, ideological and political theory courses should adhere to strengthening in improvement, enhance the affinity and relevance of ideological and political education, meet the needs and expectations of students' growth and development, and all other courses should keep a good section of drains and plant a good responsibility field, so that all kinds of courses and ideological and political theory course in the same direction, forming a synergistic effect[1].

In 2020, the Ministry of Education issued the guiding outline for ideological and political construction of courses in Colleges and universities, which pointed out that professional course, are the basic carrier of Ideological and political construction of courses. For science and engineering professional courses, it is necessary to combine the education of Marxist positions and methods should be combined with the cultivation of scientific spirit in the teaching of the courses, so as to improve students' ability to correctly understand, analyze and solve problems[2].

This requires that in the process of teaching design and implementation, teachers should

condense the scientific spirit in line with their major, discipline and curriculum according to the nature of the discipline, curriculum content and students' professional characteristics, always led by the socialist core values, and organically integrate value shaping, knowledge transfer and ability cultivation to realize the nurturing value of the curriculum[3].

2. A New Course System of University Computer Foundation Based on Ideological-Political Education in Curriculum

In order to meet social environment demands, our school has made a new undergraduate training plan and objectives. We put forward a categorical and hierarchical reform of the teaching of basic university computer courses oriented to the ideology and politics of the curriculum. We aim to give consideration to education and capacity development. In our teaching process, we adhere to the "people-oriented" education concept, and constantly strengthen the idea of integration of the ideology and politics of the curriculum and teaching content. Besides, we also design practical teaching links to train innovative talents. New curriculum system of university computer foundation is shown in Figure 1 and each branch of the system integrates the idea of the ideology and politics of the curriculum.

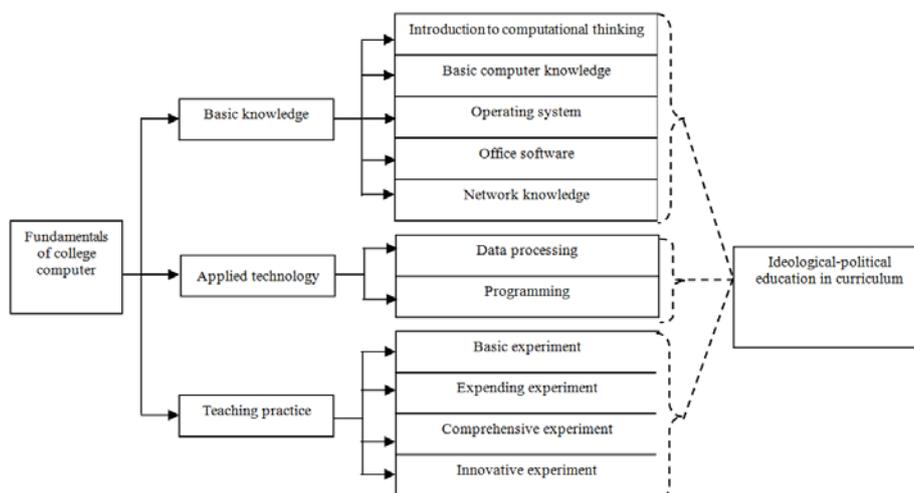


Figure 1: Schematic diagram of the new course system of university computer foundation

3. Inquiry-Based Teaching Based on the Ideology and Politics of the Curriculum

3.1 Inquiry-Based Teaching

Inquiry-based teaching is a way to create a situation similar to academic research in learning. It is used to guide students to independently discover problems, do experiment operations and investigation and research. The three objectives of inquiry-based teaching are to experience the process of inquiry, gain intellectual and emotional experience, and accumulate knowledge and methods. It also aims at our obtaining knowledge, skills, emotions, attitudes, methods, exploration spirit and developing our innovation abilities through object exploration, information collection and processing as well as expression and communication.

Inquiry-based teaching can be traced back to 1909 when American Dewey criticized the way that "students learn a great deal of scientific knowledge, concepts and principles through direct teaching of teachers" in American association for the advancement of science. He also proposed that what is more important is that we should learn research process or method of science. The National Research Council of the United States organized the compilation and publication of a monograph in

2000 to systematically and persuasively elaborate important issues of scientific inquiry teaching and learning and summarize five basic characteristics of inquiry-based teaching method. In China, education workers in colleges and universities are also actively exploring inquiry-based teaching methods in course teaching. For example, Liu Huijuan [4] applied it to the electrical engineering course and Ma Jianhua et al. [5] carried out teaching practice in probability theory. Zhang Wei [6] established the inquiry-based teaching mode in basic courses of computer application and Xie Heyu [7] et al. studied inquiry-based teaching strategies in computer course.

These researches and explorations have a positive impact on the teaching effect of computer programming courses. Inquiry-based teaching way can provide environment and conditions for students to practice and to enhance their understanding of procedures and algorithms. Besides, students can also experience the pleasure in that process, which will arouse their interest in the program design course, strengthen their inner drive for learning, get into the habit of active thinking, form their active learning attitude and develop their computational thinking ability.

3.2 Inquiry-Based Teaching Mode of College Computer Basic Course Based on the Ideology and Politics of the Curriculum

Computational thinking includes a series of methods, such as heuristic reasoning, separation of concerns, task decomposition, recursive thinking back, solution to abstract problems through simulation, parallel processing and eclectic thinking processing, etc. [8]. In the actual teaching, teachers should organically combine the ideology and politics of the curriculum with inquiry-based teaching mode, combine theories with practice, make abstract problems specific and simplify complex problems through setting scenario and giving vivid practical examples. Besides, they shall apply the idea and method of computational thinking in the whole teaching implementation process. Figure 2 shows the diagram of inquiry-based teaching mode based on the ideology and politics of the curriculum.

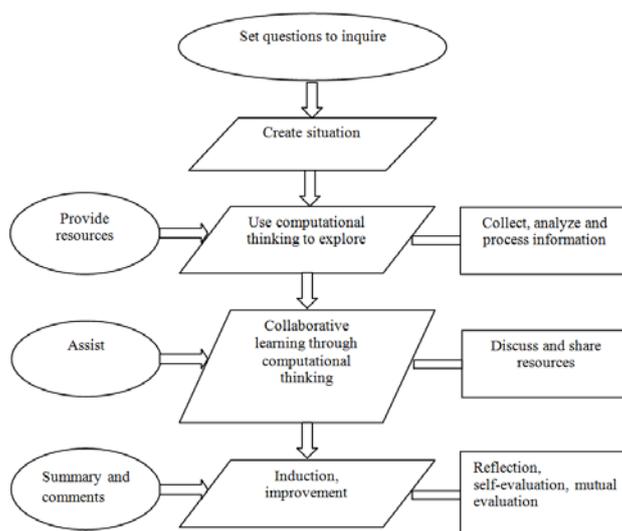


Figure 2: Inquiry-based teaching mode based on computational thinking

According to teaching contents, teachers should put forward problems based on the concept of the ideology and politics of the curriculum, set up situations, improve students' interest in learning, guide students to use recursive thinking of computational thinking to think or use the method of separation of concerns to simplify the complexity, extract and decompose problems and then carry out heuristic reasoning to solve problems. After students master this thinking method, teachers will inspire students to use the methods they have learned to independently explore and solve deeper

problems and apply computational thinking to consolidate and transfer knowledge through group discussion and collaborative communication [9].

Let's take the number of daffodils as an example to see the following application of inquiry-based teaching mode based on the ideology and politics of the curriculum.

(1) First, create a situation: there are many interesting numbers in life, such as 101, 111, 121, 131, 141...191, 1001, 1111, 1221 and so on. Ask students to observe and think "what are the characteristics and rules of these numbers? Then discuss and find out what numbers after 1221 are. This scenario setting can stimulate students' interest in inquiry learning, improve their concentration and make them take an active part in teaching actively.

(2) Display another math problem: $153=13+53+33$. What are the three digits that match this feature? Then, introduce the daffodil number problem. When students see questions raised by teachers, they should form a group of 4 or 5 people around the front, back, right and left to discuss the calculation methods. In the process of verification, students actually use the exhaustive method. In this exhaustive process, students will find themselves repeatedly testing whether the cubic sum of the digits of a three-digit number equals the number itself. Therefore, after knowing the thinking and method of the whole calculation, they can use the cyclic structure in the programming language to solve problems.

(3) Teachers and students explore the question together: In addition, there is an important problem in the process of solving this problem. The question is about how to separate the hundreds, tens and ones digits. There are several ways for teachers and students to explore problems together. Because students come into contact with the cycle for the first time in the coding process, students will draw the flow chart first. After that, the teacher will use the form of program filling to guide students to finally complete the program through the form of group collaboration or discussion.

(4) Consolidate the knowledge and deepen the application: Teachers also gives some ancient interesting questions about Chicken and Rabbit Cage and 100 money and 100 chicken and Pascal triangle so that students can further grasp the cycle and nested knowledge points. It also reflects the deep cultural accumulation of mathematics in China.

(5) Finally, the teachers give a summary and assign homework.

3.3 Inquiry-Based Teaching Effect and Experience

In the spring semester of 2021, I conducted a comparative experiment on the teaching reform of oral cavity and law in 2020 undergraduate teaching. It can be seen from Table 1 that the new teaching mode has received good teaching effect. In the teaching process, teaching contents can be drawn out through giving specific life examples, which can arouse students' curiosity and thus improve students' initiative and independent learning ability. The classified training in the experimental teaching links will also be done and students will hand in their homework in groups. Students will have a great sense of achievement in their graded learning and their ability of teamwork has been greatly improved. In terms of teaching effects, the unit test, comprehensive experimental homework and final examination show that students' operational skills have been greatly enhanced, their innovation ability has been improved and their computational thinking concept has been deepened.

A lot of problems of basic computer courses in university, especially in program design courses, can be thought by using computational thinking. Teaching modes, such as inquiry-based task and collaborative-driven tasks, will greatly stimulate students' interest in learning, enhance students' ability of independent analysis, problem solving and improve their learning efficiency and learning effect. Of course, it is a relatively difficult and long-term task to develop students' ability of computational thinking. At the same time, we should also cultivate students ability in other courses

in addition to basic computer courses so as to increase students' computational thinking depth and breadth [10], improve their ability to build computational thinking when they solve problems, exercise their computing power and lay a solid foundation for their creative thinking and innovation ability in their future study, work and study.

Table 1: Student Achievement Analysis Table

□Major	Teaching mode	Total number of students	Average score Excellent rates (%)	In-commission rate (%)	Moderate rate (%)	Pass rate (%)	Failure rate (%)
Oral cavity	New 60	79	10	36.67	16.66	36.67	0
Science of Law	Old 72	67.31	6.32	18.95	20.92	44.51	9.30

Acknowledgments

This research was supported by project on high school teaching reform of Heilongjiang Province (Grant NO. SJGY20200706), teaching research project of Jiamusi university (Grant NO. 2020JY1-03), teaching research project of Jiamusi university (Grant NO.2018JYXB-042) .

References

- [1] Xi Jinping stressed at the National Conference on Ideological and Political Work in Universities: Ideological and political work throughout the whole process of education and teaching to create a new situation in the development of higher education in China. *the people's daily*,2016-12-09(1)
- [2] Ministry of Education of the People's Republic of China. Notice of the Ministry of Education on the Issuance of the Guideline of Curriculum Civics Construction in Higher Education Institutions[EB/OL]. (2020-05-28).http://www.moe.gov.cn/srcsite/A08/s7056/202006/t20200603_462437.html.
- [3] Nie Xiaoying. Practical Study on the Blended Teaching Based on BOPPPS from the Perspective of Course-based Ideological and Political Education: Taking the Course of “Data Structure and Algorithm” as an Example. *The Science Education Article Collects*.100-102(2021)
- [4] Liu Huijuan, Zhang Wei, Zhang Yihuang. Inquiry Teaching Method and its Application in the Course of Electrical Machinery. *Journal of Electrical & Electronic Education* , 116-120(2008).
- [5] Ma Jianhua. The Practice of Inquiry Teaching Method in Probability. *Journal of Huaibei Normal University(Natural Science Edition)*,71-76(2008).
- [6] Zhang Wei. On the Construction of Inquiry-based Teaching Model in the Course of Computer Application Basis. *Study of Science and Engineering at RTVU*,11-12(2005)
- [7] Xie Heyu, Li Xiaolin. Research on Inquiry Teaching of Computer Course in Colleges and Universities. *China Adult Education*,157(2007).
- [8] Han Qiufeng, Kong Bo, Li Qi. Thought of introducing computational thinking based question inquiry teaching into university computer courses .*Computer Engineering & Science*, 186-190(2014).
- [9] Mou Qin. *The Pattern Research and Practice of Computer Basic Course Teaching and Learning Based on Computational Thinking*. SICHUAN Normal University, Chengdu (2012).
- [10] Kang Weiwei. *Analysis of Teaching Modes and Design of Teaching Cases for C Programming Based on Computational Thinking*. Chongqing Normal University, Chongqing (2015).