

Construction and Practice of University Public Basic Computer Course

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Abstract

The rapid development of information technology has brought new challenges and opportunities to the basic teaching of computer in universities. In view of the problems existing in the current teaching of computer fundamentals, this paper puts forward a new curriculum system aimed at cultivating computational thinking, and probes into the implementation scheme of the curriculum system and new examination methods. Through a series of courses, we will strengthen the cultivation of students' computing thinking ability and new technology application ability.

Keywords

Basic computer teaching, Curriculum system, Computational thinking, Teaching reform.

1. Introduction

With the rapid development and wide application of new technologies such as big data, cloud computing, artificial intelligence, industrial and social changes driven by technological innovation are sweeping in. Computer education is directly related to the future scientific and technological competitiveness of the country. Basic computer teaching is an integral part of higher education in China. It plays an important role in the cultivation of students' comprehensive quality and innovation ability, and provides necessary guarantee for students' subsequent professional courses. With the development of computer technology, it is the basic quality that college students must have to skillfully use computer technology and means to solve the problems of their major. College computer basic teaching is a public basic course that provides computer knowledge, ability and quality education for all college students.[1] Its training objectives include: cognition and understanding of computing systems and methods, mastering the methods of applying computer technology to analyze and solve problems, the quality of correctly obtaining, evaluating and using information, and the ability of communication and continuous learning based on information technology. At present, there are still many problems in the system of basic computer courses. There are many kinds of professional disciplines in colleges and universities, and each specialty has different needs for computer knowledge. Therefore, how to establish a curriculum system that meets the needs of different majors and how to reflect the cultivation of computational thinking ability are urgent problems to be solved. The cultivation of computational thinking is a hot topic in computer teaching and research at home and abroad. Having computational thinking and being able to use computer technology and means to learn, work and solve professional problems is a necessary quality for senior talents.[2]

2. Problems in Basic Computer Teaching

The basic computer course is designed for undergraduates except computer majors in colleges and universities, aiming to cultivate college students' information literacy, computer application ability and computing thinking ability. However, there are many problems in the construction of the basic computer course system.

2.1. The teaching content needs to be updated

At present, the teaching content of the basic computer course only includes three aspects. The first aspect is the basic knowledge of computing. The main teaching contents are the composition and simple principle of computer system, the development and application of computer; The second aspect is operation skills. It mainly includes the application of Microsoft Office automation components, Windows operating system and Word, PowerPoint and Excel; The third aspect is computer hot technology. The rapid development of computer technology has promoted the updating of these hot technologies. The current hot technologies mainly include information security technology, Internet of Things technology, multimedia technology and cloud computing. In the past few decades, the basic computer course has been opened in various universities in China. With the vigorous development of computers, the content taught has only been innovated for the software version, and there has been no significant change in other aspects. How to realize the innovation of the teaching content of the basic computer course is an urgent problem to be solved in various colleges and universities.[3]

2.2. Teaching methods are very traditional

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2.3. Too single teaching form

The first is teaching at all levels. With the extensive development of information technology education in primary and secondary schools, students' basic computer operation ability has been improved. However, due to the influence of local economic level, educational conditions and other factors, freshmen's computer skills at school vary greatly. If a unified curriculum is adopted, students with good computer skills will be "hungry", feel too simple, lose interest in learning, and students with poor computer skills will be unable to keep up. The second is teaching without classification. Because the requirements for students' computer ability are different in each major, and the learning methods and thinking modes of students in each major are also different, the adoption of a unified curriculum cannot meet the personalized needs of each major for computer ability. In addition, the basic computer courses can not be well combined with the students' majors, which also reduces the students' interest in learning. Finally, it deviates from the social application demand. With the rapid development of the information industry, new concepts continue to emerge, such as Internet plus, big data, the Internet of Things, cloud computing, etc. However, these new technologies and new concepts have not been introduced into the teaching of basic computer courses, resulting in a disconnection between the teaching content of basic computer courses and social application needs.

3. The reconstruction of basic computer courses

Due to the large number of majors in universities, different majors need different computer knowledge and abilities. The setting of university computer basic curriculum system should be oriented to serving the needs of the major, providing differentiated courses for students of different majors to choose. The new curriculum system should attach importance to strengthening the cultivation of computing thinking.

3.1. Cultivation of Computational Thinking

Computational thinking refers to a series of thinking activities covering the breadth of computer science that use the basic concepts of computer science to solve problems, design systems and understand human behavior. Computational thinking ability is the basic mode of human thinking. College computer basic teaching is an important part of college general education, which undertakes the important mission of cultivating college students' computing thinking ability. Teachers should consciously infiltrate the training of computing thinking ability into all aspects of teaching content, teaching methods and teaching evaluation in teaching. The essence of computational thinking is abstract and automatic. When teaching, we should explain how to solve problems according to the basic method of computer with specific cases, and build corresponding algorithms and basic programs.

3.2. Setting and implementation of curriculum system

Take Shanghai Polytechnic University as an example, conduct extensive research in various colleges to understand the needs of various majors for basic computer courses; In the general education stage, there are 2 compulsory courses of university information technology, computer introduction and programming, with a total of 3 credits, including 1 credit for university information technology and 2 credits for computer introduction and programming. Because different majors have different needs for computer knowledge and ability, computer courses should be classified according to the characteristics of the majors. Different majors have different courses, and each college can choose its own courses according to its own professional requirements. The major categories are divided into science and liberal arts. Science and engineering is also divided into science A (including electricity, mathematics, etc.) and science B (including chemical engineering, machinery, etc.). The liberal arts are divided into three series: literature and history, foreign language and journalism, and art.

As an important part of general education, the basic computer course should not only simply expand students' knowledge in computer, but also show the way of thinking in computer science. Its purpose is to cultivate students' computing information literacy, thinking ability and ability to solve problems. The training of computational thinking can not be completed by setting up a course, it needs the support of a series of subsequent computer courses. The teaching of relevant courses implemented by our university is divided into three stages: the first stage is the compulsory university information technology, which mainly requires students to master basic computer knowledge, how to encode information, how computers work, and the operation of network foundation and Office software. The computer introduction course offered in the second stage, especially the programming language course offered for science and engineering and economic management, focuses on the training of computational thinking, integrates and updates the course content, guides students to improve their logical thinking and computational thinking ability step by step along the main line of analyzing problems, building models, determining data structures and algorithms, writing programs and running on the computer. In the third stage, professional elective courses are offered to infiltrate computer technology into all majors, integrate computing thinking with professional applications, and make the basic computer courses develop in a more diversified direction.

3.3. Reform of assessment methods

Due to the relatively simple content of the first stage of university information technology, many students have learned it in middle school, so the method of "testing instead of examination" is adopted. Students are mainly self-study. Teachers hang teaching requirements, courseware, learning difficulties, exercises and videos on the website of the curriculum center, and students enter the curriculum center to learn and do exercises. At the same time, put simulation questions on the website of the examination system, so that students can practice repeatedly, score automatically, and get familiar with the examination environment. An appointment is required for the exam. The exam is provided once a month, and each student is provided with three exam opportunities. Before the exam, teachers are arranged to provide guidance and answer questions. If you don't pass the first exam, you can study again, and then take the next exam to pass. At the end of each semester, the teacher reports the highest score of the students who pass the exam to the Academic Affairs Office. The students who pass the exam cannot take the exam next term. If the students have poor foundation and have difficulties in learning, they can register with the relevant teachers, and the teachers will open classes to help these students. In the second stage of program design training, mid-term and final exams accounted for 20% and 40% respectively, monthly quizzes accounted for 20%, and regular computer training accounted for 20%. All tests and training were computer tests, which were automatically judged by the computer.

Stimulate students' interest in learning by means of competition, and cultivate students' innovative consciousness, exploration spirit and problem solving ability. Shanghai polytechnic University organizes a school level computer application ability contest every year, selects excellent teams to participate in the Shanghai University Students' Computer Application Ability Contest and the China University Students' Computer Design Contest, and has won several national second and third prizes. The students are very enthusiastic and enthusiastic. They think, model, design algorithms and realize the selected topics, which is exactly the method of system design and problem solving in computational thinking. Students often discuss and argue about a problem repeatedly and consult a large number of materials, which greatly stimulate their interest and potential in learning computer knowledge and skills, improve their computing thinking ability, cultivate their innovation ability, team cooperation awareness and comprehensive practical ability to use information technology to solve practical problems, and help to create more comprehensive development, innovation, practicality inter-disciplinary talent.

4. Implementation effect

4.1. Students are more motivated to learn

The above curriculum system has been fully developed in Shanghai Second University of Technology, and each department can choose its own content according to its own professional needs. Many colleges and departments have chosen to offer basic computer courses in their freshman year, some in the first semester of their freshman year, and some in the second semester of their freshman year. The assessment system has also been constantly improved. Because of the use of computer tests, students feel pressure to study harder. The class attendance rate has reached more than 96%. They are more motivated to learn and pay more attention to computer operation. The basic computer course is a highly practical course, which can only be mastered through more computers and operations. Students are encouraged to use computers and think more through computer tests to improve their ability to analyze and solve problems and their ability to calculate thinking, so as to lay a good foundation for their subsequent courses. Of course, in the process of reform, there are still many aspects to be improved, such as the machine examination question bank needs to be expanded and updated.

4.2. Students' hands-on ability is enhanced

While strengthening students' understanding of important concepts and technologies, the teaching reform of college computer basic course system focuses on cultivating students' practical ability from aspects of guiding students to think, find and solve problems. Taking the basic computer course of university as an example, although the theoretical knowledge covers a wide range of contents and knowledge points, the theory accounts for 8 class hours and the practice for 24 class hours in the class hour distribution, which ensures the smooth implementation of practical teaching. In addition, the teaching method of case driven, project oriented, highlighting practice and focusing on practicality was explored in the process of practical teaching, which greatly improved the students' practical ability, innovation spirit and ability to comprehensively use knowledge. Through reasonable division of the proportion of theoretical knowledge and practical operation in the examination process, the students' practical operation performance in the final examination of this course has improved in the past two years.

5. Conclusion

The information society has higher and higher requirements for talent training. In various colleges and universities in China, the college computer basic course is the first computer course for students to learn, which plays a vital role in cultivating students' computing thinking and continuing to learn computer knowledge in the future. Faced with this development situation, colleges and universities need to use diversified teaching methods, take cultivating students as the main center, take cultivating students' creative thinking as the teaching goal, and build a perfect teaching system of computer basic courses in colleges and universities according to the development of computer technology and the teaching objectives and teaching contents set by the university. The construction of college computer basic course system and course construction needs to be refined and improved constantly in teaching practice, while gradually forming solid achievements. The continuous development of new technology is both an opportunity and a challenge to the development of basic computer teaching in colleges and universities. The improvement of the quality of basic computer teaching in colleges and universities is not only conducive to cultivating students' necessary computational thinking ability in the information society, but also conducive to enhancing students' integration and innovation ability. Colleges and universities should fully realize the importance of basic computer teaching in colleges and universities, and give strong support in class hour allocation, curriculum system construction, teaching resources and conditions allocation.

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