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How to Improve Computational Thinking Ability in the Course of Computer Fundamentals

Huadong Wang

School of Computer Science and Technology, Zhoukou Normal University, Zhoukou 466001, China

Abstract

At present, many colleges and universities have listed the course "Computer Basics" as a compulsory course. The purpose of teaching the "Computer Basics" course is to help students master certain knowledge, methods and application techniques of "Computer Basics", and at the same time assist them in solving problems within their own professional fields. This requires schools to strengthen the cultivation of students' computational thinking ability, that is, to cultivate students' ability to discover, analyze and solve problems. The current situation of the teaching of the "Computer Basics" course was analyzed, and effective strategies for strengthening the cultivation of students' computational thinking ability in the teaching of the "Computer Basics" course were explored for reference.

Keywords

"Computer Basics" course, Computational thinking ability, Cultivation strategy,Teaching resources.

1. Introduction

Computational thinking is one of the basic competencies of college students in the digital age and a necessary thinking ability for integrating into society. In 2006, Professor Zhou Yizhen proposed the definition of computational thinking, which refers to a series of thinking activities that use fundamental concepts of computer science to solve problems, design systems, and understand human behavior. The essence of computational thinking is abstraction and automation, reflecting the fundamental problem of computation, which is what can be effectively automated. Computational thinking is a way for humans to solve problems, it is human thinking, not machine thinking. Computational thinking embodies a type of thinking related to computation that people use to solve problems, manage daily life, communicate and interact with others. The new ideas and methods generated by computational thinking have led to changes in people's thinking patterns, which are reflected in various disciplines such as natural science and engineering, as well as socio-economic and technological fields. With the development of the times, computational thinking is no longer required by computer courses, but should be integrated into students' comprehensive qualities as a form of "thinking". At the cognitive level, students are required to have a clear understanding of the current situation in the field of computer science; The 'thinking level' requires students to integrate computational thinking into the process of solving natural/social problems; The 'spiritual level' requires students to internalize computational thinking as a literacy, inherit and promote it.

As an introductory course for teaching Computer Fundamentals in universities, the course mainly includes basic knowledge and technologies such as database basics, programming basics, information processing, and computer system platforms. Its core task is to improve students' computational thinking ability, lay a solid foundation for them to better learn and utilize computers and computer technology, and solve problems in their professional fields.

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Therefore, it is of great practical significance to study the cultivation of students' computational thinking ability in the teaching of "Computer Fundamentals" course.

2. The current teaching situation of the "Computer Basics" course

The content of traditional university computer foundation courses focuses on the basic knowledge and operational skills of computers, with many knowledge points, but the content is relatively loose and lacks systematic connections between various knowledge points. The teaching method of computer fundamentals still has the problem of "narrow tool theory", which leads to some students being trained to only know basic software operations and simple programming. Many college students have already been exposed to computer related knowledge during their middle school years, and some students have already mastered the basic operations of commonly used office software, which has caused them to lose interest in studying university computer courses. In order to address the above drawbacks and promote the comprehensive development of students, the teaching of computer fundamentals in universities has set a higher goal: it is necessary to enable students to enhance their computational thinking abilities.

At present, the teaching of the "Computer Basics" course shows characteristics such as randomness, marginalization, popularization and ubiquity. The reasons for this phenomenon mainly include two aspects:

Students' learning goals are not clear. Many students think that the "Computer Basics" course is very "easy" and that they can learn it well on their own even without a teacher. There is still a portion of students who believe that the "Computer Basics" course is only for computer science major students. As non-computer science major students, they think that whether they study it or not makes little difference to them.

Students lack the help and guidance of teachers. Some teachers have not accurately recognized the position of the "Computer Basics" course in education. They believe that as long as they teach students some practical skills, their academic performance can be improved quickly. They do not attach importance to the theoretical knowledge teaching of "Computer Basics" and have not realized that the cultivation of students' computational thinking ability in the teaching of "Computer Basics" is a long-term and gradual process. Over time, many students lose interest in learning the "Computer Basics" course, and teachers also lack guidance and teaching motivation. As a result, the teaching of the "Computer Basics" course gradually falls into a vicious circle.

3. Strategies to enhance the cultivation of students' computational thinking skills

3.1. Improve the theory of course teaching

In the information technology environment, computational thinking, as a guiding thinking method for analyzing and solving problems, should not be passively taught to students. Instead, through cooperation and communication among students and between students and teachers, as well as social activities, students should be enabled to understand the concept of computational thinking ability and build their own computational thinking in their minds. In the modern teaching of the "Computer Basics" course, teachers play the roles of assistants, facilitators and guides, guiding students to enhance their understanding and recognition of computational thinking ability through collaboration, motivation and other means. With the rapid development of intelligent search technology, Web2.0, knowledge construction systems, etc., more and more technologies and tools are being applied in modern course teaching. For instance, the "associationism" theory, as a learning theory in the digital age, emphasizes that

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people are not only contributors to complex knowledge but also benefit from it through "association". By enhancing students' "association" ability, it can lay a solid foundation for cultivating their computational thinking skills.

3.2. Formulate teaching content with analytical teaching

The teaching content of "Computer Basics" should provide convenience for the cultivation of students' thinking ability. When organizing and designing teaching content, teachers should sort out the knowledge units involved in computing thinking according to the teaching syllabus, formulate reasonable teaching objectives, guide students to problems, help students form the idea of analyzing and solving problems through automation and abstraction, guide students to actively think and discuss, and give students enough time to independently analyze the methods and to solve problems.

Firstly, the setting of teaching content should fully take into account the training objectives of basic computer teaching in universities and incorporate the latest technological application achievements in the field of computer science. Secondly, the three levels of computational thinking ability from low to high should also be taken into account: the ability to operate machines, the ability to process information, and the ability to solve problems. Finally, based on the school's educational level and professional characteristics, the content of the basic computer courses in universities was appropriately revised, and a series of courses reflecting differentiated and applied training models were formulated and implemented.

3.3. Developing interesting teaching content

When compiling teaching content, in order to stimulate students' interest in learning, teachers should pay attention to comprehensiveness and interest of the teaching content of the "Computer Basics" course, fully stimulate students' subjective initiative, so that they can participate in the teaching of the "er Basics" course more actively, and achieve the goal of cultivating students' computing thinking ability. The traditional "Computer Basics" course teaching content often overemphas the students' hands-on operation ability, while ignoring the combination of practicality and interest in course teaching, and neglecting the cultivation of students' computing thinking ability. Modern college students a strong desire for knowledge and curiosity, and have a wild imagination, teachers should be based on the characteristics of several students to improve the interest of the course teaching content design, the attraction of the course knowledge to students, and provide sufficient space for the cultivation of students' thinking ability.

3.4. Create a platform for sharing and open teaching resources

In recent years, the development of computer network technology is rapid. In addition to creating reading rooms, libraries and so on for students to acquire teaching, schools should also make use of computer technology and network technology to create a shared and open teaching resource platform to provide students with diverse and comprehensive teaching resources, and to provide the possibility teaching individualization. The construction of teaching resource platform has always been a difficult problem in the teaching of the course "Basic Computer". By creating an online learning center, students be provided with high-quality course platform and teaching resource sharing platform; students can obtain the knowledge they want to learn through the retrieval function of the teaching self-evaluation platform; when have problems, students can solve them by visiting shared resources or online consultation. At the same time, the shared and open teaching resource platform has created conditions for the cultivation of students' thinking ability and the realization of students' personalized development.

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3.5. improve the systematicness of teaching process

The modern computer foundation course has been listed as a required course in many colleges and universities, and the school will formulate corresponding courses and teaching contents according to its own characteristics. By strengthening the pertinence and systematicness of the teaching organization process, we can scientifically and systematically introduce basic computer knowledge, application technology and other technologies into daily teaching, and formulate targeted solutions to problems encountered in the teaching process, so as to improve students' ability to analyze and solve problems, which is conducive to the cultivation of students' Computational Thinking.

3.6. reform of course assessment and evaluation methods

We should better optimize the process of cultivating Computational Thinking Ability through multi perspective curriculum assessment and evaluation based on actual needs. It can expand the scope of the assessment content, not only limited to the final examination, but also include daily homework, unit tests, online learning and course papers into the comprehensive score assessment. In addition, the examination content can be refined according to the professional characteristics. For example, students are required to submit small papers on their experience in learning computational thinking; Students are required to use office software to produce long graduation thesis documents in combination with their professional knowledge; Students majoring in e-commerce are required to submit the works of planning and design concepts of e-commerce websites combining computer knowledge and professional knowledge.

4. Conclusion

In summary, the teaching goal of the "Computer Basics" course is to cultivate students' computational thinking skills, enabling them to learn independent thinking and autonomous learning. When encountering problems in the learning process, students should fully utilize their computational thinking to analyze, devise solutions, draw conclusions, and summarize experiences. Teachers engaged in the front line of "Computer Basics" course teaching should continuously improve their own quality level and computational thinking skills, and accumulate computational thinking resources and examples in the practical teaching process, laying a solid foundation for cultivating students' computational thinking skills.

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