Research on Teaching Reform of Computer Course Based on Computational Thinking

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Abstract. With the rapid development of computer science and technology, especially the development of various numerical algorithms and intelligent algorithms, the calculation and algorithm have been promoted to the philosophical category, and the practical application of computer science has gradually generated. Through the introduction of computational thinking, the development of domestic computational thinking, the combination of university computer education and computer application, this paper studies and expounds the application of computational thinking in university computer curriculum.

Introduction

The concept of computational thinking is the natural product of the development of computer science. The first use of this concept is the United States Carnegie Mellon University Professor Jeannette n. wing. In her view, computational thinking is the use of the basic concepts of computer science to solve problems, design systems and understand human behavior; calculate the most fundamental content of thinking, that is, its essence is abstract and automated.

Computational thinking is an inherent part of human scientific thinking activities. Human beings in the process of understanding the world, the transformation of the world has shown three basic characteristics of thinking: experimental and verification characterized by empirical thinking (to physical science as the representative), to reason and deduction is characterized by logical thinking (to mathematics Representative), computational thinking characterized by design and construction (represented by computer science). With the development of computer technology and its wide application, it further enhances the meaning and function of computing thinking.

The concept of computational thinking not only reflects the new understanding of the important role of computing and computer science in the current society, but also reflects the most essential features and core methods of computer science. Is a generalization and refinement of three different areas of computer science (theory, design, implementation).

Basic Knowledge of Computational Thinking

Computational thinking from the basic level of computing and computer science to explore some of the core concepts and content, which in the current rapid development of computer technology today is particularly important. For a science, if you want to maintain the guidance and guidance for the technology, and will not be kidnapped by technology and lose direction, then the conceptual and theoretical innovation is necessary. In our extensive application of computer to solve the problem, and enjoy the computer science to human society brought about by the progress and convenience, but also often need to return to the new, and constantly concerned about the original purpose of computer science and development direction, and computing thinking is such a The product of rational thinking.
The research on the connotation of computational thinking in China mainly includes the following contents: Professor Guo Fengxi analyzes the connotation of computational thinking from the angle of engineering, based on the thinking of Professor Zhou Yizhen for the public, according to the theory, technology and engineering of computer science and technology Tools, computing tools, computing services, computing services and computing applications, elaborated the computational thinking of engineering thinking, and put forward the calculation of computing, computing, computing, computing, computing, computing, computing, computing, The hierarchical structure of thinking. As shown in Figure 1.

![Figure 1. Hierarchical structure of computational thinking.](image)

Compared with the different forms of thinking, such as artistic thinking, religious thinking and emotional thinking, scientific thinking refers to the form of thinking when human beings engage in scientific activities. Compared with other thinking, the biggest feature of scientific thinking is that its expression system must have the following characteristics: First, we must be able to accurately express the content of thinking, so that others can understand the content of your thinking; Second, must be able to The process of thinking a reasonable description, so that others do not have to repeat your thinking process can believe your thinking results; Third, we must be able to have a public foundation for the basis of thinking, so that others can have a common discussion of the starting point. In this sense, thinking and its carrier is closely linked, thinking the most common carrier is language or text. Even in the scientific development today, we still can not directly read people's thinking, but through its expression to indirectly understand the content of thinking. Therefore, careful expression of the expression vector and expression form of thinking is the important content of thinking science, and what kind of expression is really related to whether it can correctly and effectively express thinking, scientific thinking of the category must include the expression of thinking.

With the current understanding, in the scientific thinking of the pedigree, the real system and improve the expression system of thinking mode only three, namely, empirical thinking, logical thinking and computing thinking. Which is the latest thinking of thinking and finishing thinking mode? Although in the history of human thought development, often see the shadow of computing thinking, while thinking some important content is also studied in different periods, but strictly speaking, only in the last 10 years, the thinking of thinking really get attention And attention. Unlike empirical thinking and logical thinking, computational thinking focuses on the part of human thinking about feasibility, constructability, and evaluability. When a primitive man faces a stone to prepare a processing tool, his mind is neither a physical understanding of the properties of the stone itself nor a logical reasoning of the use of the tool. What he thinks is real processing. The details of the operation of the tool are how to complete the process from stone to tool step by step, the order between these steps, the standard of completion of each step, and the alternative measures after a step failure, that is, the modern sense of operability and Verifiable. Primitive people to these thinking
gradually mapped to the specific processing engineering, must be the first engineering thinking, after the engineering practice. This kind of thinking contains the core of calculating the core of thinking, although to the extent that the original human thinking is still low and simple. But computational thinking does exist in the natural thinking of mankind, which is the inherent and innate component of human thought. No computer before, there is a calculation of the budding and performance, but after a computer, the problem of thinking was really concerned about, by the rapid development of modern human beings must master the basic thinking ability.

But we do not underestimate the scientific activities of other modes of thinking, such as analogy, association and inspiration. And even we think that these thinking are an important source of human innovation, history, many major inventions, are made with the help of these ideas. However, these thinking has a major problem is not resolved, is how to correctly express the thinking of the conclusion, so that other people do not repeat your thinking process and believe your conclusions. In fact, our research on analogy, association and inspiration is not enough. The application of these ideas, even with new conclusions, still requires empirical thinking, logical thinking or computational thinking of the framework of the conclusions, at least the current human can only do so.

**The Relationship between Computer Education and Computational Thinking**

Concerned about thinking and thinking science education, not just for the human behavior of their own curiosity, more importantly, the progress of thinking, whether it is its content and form, will bring great social progress. People who are armed with scientific thinking will have a new understanding of our world and will have the strong desire and the ability to transform the world. Thinking of innovation, on the one hand makes the behavior of social individuals more effective and rational. On the other hand makes the whole society become more harmonious and powerful. Scientific way of thinking, so that people can easily communicate the results of thinking, so that the accumulation and transfer of knowledge more and more quick and convenient. The evolution of mankind from the set of individuals into the collective of society, the progress and development of thought plays a vital role in it. Education has made it possible to achieve this goal by educating the knowledge created by a few elites to each individual, thereby becoming a co-owned wealth of social groups, through the universalization of education in all groups, the divergence of the population and the Good thinking into a common cognitive and consistent direction of thinking orientation, the formation of human understanding of the world and transform the world of thinking together, and thus produce a huge transformation of the world's social productive forces. Education transforms the world by transforming people, which is the foundation and charm of education. Education is a bridge of modern people into modern people. Scientific thinking is not inherited, so education is the eternal theme of human social development.

As the computer gradually becomes a tool that everyone can’t leave at all, the information processing has been done with various things, whether natural, artificial, economic, or social, and digitized to become objects of computer processing. Become the basic means of daily work and life, so the thinking of thinking must be the same as the empirical thinking and logical thinking, as a modern citizen must master the basic mode of thinking. At the same time, as the activities of people and society increasingly rely on computers and various communication devices, these large amounts of data have forced us to look at individual rights and privacy, social structures and behaviors from a new perspective, as well as national economic security and Political stability, in this sense, the calculation of thinking education has not only the problem of personal ability to enhance, but also affect the country's development strategy and security of a serious and urgent event. Some experts at home and abroad keen to capture the impact of the global trend of the future, put forward to strengthen the thinking of thinking research and education recommendations.

**Literature Review Method**

The main two parts of this project include "thinking and mixed learning model design" and "theoretical practice" mainly use this method. Using a variety of channels to obtain the literature, and
the material finishing, analysis and summary, with reference to domestic and foreign scholars of the research results, a clear study of the theme and direction to determine the appropriate research ideas and methods.

**The Method of Observation**

The observation method is a method used by the researcher to directly observe and study the object according to the purpose, outline or observation table, sensory and auxiliary tools, so as to obtain the information, often used in educational research. The research object is basically a certain ability of independent learning, through the observation of their external learning behavior, combined with their learning situation to analyze the characteristics of the object, learning process and effect.

**Questionnaire Survey Method**

Questionnaires are a means of investigating material indirectly in written form. It is a highly effective method of data collection and is the main research method used in this study. Mainly to understand the characteristics of learners. In this study, the first-year students in the university were selected as the survey subjects, and the questionnaires were distributed in batches. After the analysis of the survey results and statistical finishing, the study provides a considerable value information.

**Action Research Method**

The method of action research is one of the commonly used research methods in the field of education and teaching. It means that there are planned and step-by-step problems in the teaching practice. The teachers and researchers work together to study the action to solve the practical problems. A scientific research method. Through the analysis of the process of problem solving in the process of teaching and learning, the author makes an objective evaluation of the learner's learning process to understand the learners'

**Summary**

Big data and cloud computing era is to bring a revolution to human society, a huge data resources so that all areas began a quantitative process, regardless of academia, business or government, all areas will start this process. This will pave the way for a wider application of computers and play a more important role. It is the call of the revolution in the field of teaching to reflect the cultivation of computer-based curriculum reform. The preparation of appropriate teaching materials, so that students can understand the new features of the Internet age and the new characteristics of the new computer science model, in order to promote the calculation of thinking teaching to provide a strong technical support.

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