

Research on Problem-driven Hybrid Learning Model Based on Computational Thinking

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Abstract. Cultivating computational thinking ability is the core content of the teaching process. Combining with the misunderstandings in the curriculum design of programming, this paper proposes a problem-driven hybrid learning model based on computational thinking. Firstly, through the analysis of the validity and feasibility of computational thinking in teaching, from knowledge, cognitive structure and learning. The three dimensions of the method construct the development model of computational thinking ability; then, through the students' learning needs, the learning effect is effectively optimized, and the students' computational thinking ability is promoted. Finally, the corresponding theory is effectively provided through the three-dimensional hybrid learning environment and resources. Enriched the relevant research results of this paper.

Introduction

As the fastest growing knowledge field, computer software technology develops its knowledge content rapidly, and new technology and new content often appear. On the other hand, computer technology has become an indispensable part of daily life and work. With the continuous development of cloud technology, Internet of Things technology and new computer technology, the task of writing programs becomes very complicated. It is envisaged to solve programming tasks through another task area. By understanding the problem and finding a solution to the problem, the meaning of it may be far greater than the tools that you can use to solve the problem yourself. In the teaching process, it is a hot issue in the field of education to teach students the basic process and ideas of computer analysis and problem solving, to cultivate students' thinking ability and to train students to solve problems.

Computational Thinking in the Perspective of Thinking

In 2006, Professor Zhou Yizhen[1] of Carnegie Mellon University in the United States defined computational thinking as a thinking activity using the basic concepts of computer science for problem solving, system design, and human behavior understanding. The essence of this is to master and apply computer science. The method solves the problem. Chen Guoliang [2] believes that computer is both a materialization tool for problem solving and a thinking tool for problem solving. Focus on the ability and the inability of the computer in the problem solving process, that is, computational; how to use the most efficient method to automate the solution, that is, automation and efficiency; how to deal with complex problems or design complex systems, namely abstraction, decomposition, algorithm design, etc. The value of computational thinking lies in the deep integration of “computer science” and “thinking science”. Computational thinking [3] is not only a kind of disciplinary thinking, but also a new cognitive means. Its universal applicability and new vision of cognition highlight the unique spirit of the era of big data. If we think from the perspective of data, all problems become data problems, data makes machines more intelligent, deep learning not only mines causal and logical relationships, but also mines association rules such as location, time, relationship, etc. The problem understands patterns and ways of thinking, which in turn expands the knowledge that can be used and creates new ways to solve problems.

Analysis of Computational Thinking and Problem Driven Blended Learning

The teaching method commonly used in the "problem-driven" teaching model. The "problem-driven" teaching model [4] is that learners, while acquiring knowledge, present problems to students and learn knowledge through problems. In the process of learning, students are eager to know the answers to the questions, and actively encourage students to find solutions to problems, which can stimulate students' potential and thinking, and further improve students' ability to learn; "problem-driven" teaching mode, teachers first It is necessary to create a learning situation so that students can fully integrate into it, and then transform the knowledge points into problem chains. According to the coherence of knowledge, the problems are gradually increased, and the layers are promoted, so that students can gradually study and develop learning knowledge. Until I find a way to solve this problem, it becomes a learning process of knowledge by solving problems. The problem-driven hybrid learning model based on computational thinking is to provide the problem for the students to learn. The teacher establishes the problem situation. The students can find the solution to the problem around the problem. In this process, the students can not only divergent thinking but also learn independently. The ability to explore will also be improved, thereby improving the overall quality of the learner.

Problem-driven Hybrid Learning Practice Based on Computational Thinking

The factors that influence students' learning are diverse and can be roughly divided into their own internal and external reasons. The analysis of learner characteristics, learning resources and learning environment is the study of constructing a problem-driven hybrid learning model based on computational thinking [5]. It can integrate various learning resources for learners to effectively learn and cultivate learners' thinking ability. It is the starting point and the foothold of building a hybrid learning model. Contemporary college students are mainly born after the 20th century, and can be expressed psychologically as a clear target of behavior, more utilitarian and independent; more individuality, more rebellious; poor sense of economic independence, weak psychological resistance; mentality More open, low self-control ability. The application of learning strategies is generally not high, or learners cannot clearly recognize the use of certain learning strategies in the learning process, which leads to the learners not being able to fully play the role of learning strategies and optimize their learning effects.

The Teaching Status and Problems of computer Language Courses

The computer language course offered by universities is an important computer technology foundation course. Depending on the student's major, the basic computer technology courses offered are slightly different, but mainly focus on "C language programming", "Visual Basic programming", "Visual C++ programming" and "Visual FoxPro programming". "Current courses, these courses play an important role in cultivating students' computational thinking and innovative ability as well as improving the overall quality of students. However, from the perspective of students, it is generally believed that computer language courses learned during colleges have no direct internal connection to future jobs. Students have incomplete knowledge of knowledge and unskilled skills; they face a large amount of program code during their studies. Lack of interest in complex grammar and a variety of algorithms, students passively learn data types, control structures, grammar rules and algorithms, theoretical content and practice learning are not well integrated, using computer tools to solve professional related problems The ability is very weak. From the perspective of specific teaching implementation, teachers' teaching methods, methods and teachers' teaching concepts are still relatively rigid, and a large part still adopts the traditional "to teach computer knowledge", and does not really go from "teaching students" "Knowledge" turns to "what methods and abilities to teach students" and how to ensure that the problem of "knowledge transfer" is changed from "knowledge transfer" to "knowledge-based thinking."

Constructing a Problem-driven Hybrid Learning Model Based on Computational Thinking

The teaching mode should aim at talent training, reasonable analysis, face the contradiction between "knowledge expansion" and "study compression" [6], and the contradiction between students, so that the program design class can be The curriculum reform can transform from a narrow single teaching to a capacity training. At the same time, it must eliminate the recognition that "information science and technology is only a high-tech tool" and build a new model to better realize the "computational thinking ability." Cultivating and cultivating innovative practical ability as the core talent training program. From the three dimensions of knowledge, cognitive structure and learning style, a model for promoting the development of learners' thinking ability is constructed [7], which reflects the characteristics of hierarchical, related, blending and dynamic development of thinking ability. The computational thinking ability is gradually accumulating to create soft areas. The three dimensions of knowledge, cognitive structure and learning process are closely related. The deeper the depth of development, the higher the heat of thinking ability training. In the process of thinking training, each of the cognitive learning activities will effectively promote the development of thinking skills to varying degrees. With the accumulation of knowledge, cognitive structure development, and thinking quality training in the learning process, from simple cognition to complex cognition, from passive learning to active construction, from factual knowledge to metacognitive knowledge, learner thinking The level of ability is gradually increasing, and the ability to calculate thinking is also gradually accumulating.

The Construction Of Theoretical Teaching Mode. In the teaching process, it is often necessary to introduce a teaching method based on constructivist theory and inquiry-based self-learning [8], which is what we call problem-driven teaching methods. The first step in the integration of computational thinking and problem-driven teaching methods is to design accurate teaching tasks. This teaching task should include the purpose of the teaching content and the knowledge points involved. If the theoretical teaching model is constructed, it can be more The knowledge points are introduced through a teaching task. Under the guidance of a teaching task, students can recognize the integration of multiple content, and enable students to actively ask questions, analyze problems, and finally identify the various knowledge involved. Point, under the guidance of the instructor, gradually solve the problem. Adopting such a theoretical teaching link can not make the boring classroom become gamified, making the knowledge of the course simple, clear, easy to learn, easy to understand and easy to operate. It can also stimulate students' interest in the course and enhance students' independent thinking. Analyze and solve problems to develop students' computational thinking.

Construction Of Practical Teaching Mode. Combining the theory with the practical content, breaking the traditional teaching mode, introducing the project case teaching mode in the practical teaching link, learning the theoretical knowledge system through the project case, and gradually expanding the students' thinking ability with the deepening of the project case. improve. When constructing a project case, it is necessary to have a clear experimental task, determine how the student's thinking mode should be cultivated in the practice session, continuously increase the intensity of the practice link and practice the time, guide the students to master the knowledge, expand the thinking and improve the student application through the project case. The cultivation of abilities. The most important part of this session is to carry out the design of experimental teaching content, through the verification test, gradually improve, let students change to innovative experimental content.

Advocating Algorithm Diversification. The main purpose of carrying out practical courses is to enable students to effectively solve theoretical problems with effective theoretical knowledge, to cultivate students' diverse thinking, to increase students' horizons and ideas, and to actively improve students' thinking thinking activities. In the process of learning, the program algorithms for solving problems are various, and different algorithms may have certain limitations. In this case, our teachers encourage students to think through different ways of divergent thinking. Through the comparative analysis of various methods, we can find the best algorithm. In this process, it is also the process of cultivating students' thinking ability, thus cultivating the diversity of students' computational thinking.

Research Summary, Reflection and Outlook

Research Summary. The study of students and the cultivation of their computational thinking are inseparable. Computational thinking has brought severe challenges to the reform of the teaching model of colleges and universities. Firstly, the thesis analyzes the theoretical connotation of computational thinking and integrates it into the curriculum of computer programming. By constructing a reasonable set of teaching problems, combined with students' inherent qualities, learning environment and problem situations, it constructs a hybrid of computational thinking ability training. The framework of the learning model [9], through the study of the learning model framework, combined with the analysis of students' learning effects, based on the computational thinking mixed learning model can enable students to take the initiative in the learning process, students from passive learning to active learning Through the transformation, the students can participate in the teaching process, and the level of thinking ability is gradually improved. The students have an accurate grasp of their learning goals and directions, not only improve their thinking and judgment ability, but also effectively improve the teaching effect. The benefit of students is that the benefits outweigh the disadvantages. The problem-driven hybrid learning model based on computational thinking [10] adapts to some individualized learning needs of learners to a certain extent, in line with the current educational and social development trends, and has obvious effects on achieving differentiated teaching. Driven by the problem of computational thinking mode, students can promote students' self-exploration, analysis and problem-solving characteristics. While learning the content of knowledge, their own abilities are also improved. The problems of teaching and learning have become simpler and adapted. The current teaching, which enables the sustainable development of teaching and learning resources, is an effective new learning model for adapting to the rapid development of contemporary society and unpredictable educational fields.

Research Reflection. The research on computational thinking is a hot topic in scholars at home and abroad. Many scholars pay more attention to the study of theory in the process of research. How to effectively integrate computational thinking into the teaching process, the research on students' true thinking ability is not yet It is very mature and needs further research through practice to verify the effectiveness of incorporating this way of thinking into teaching. In this paper, the content and research results of most scholars are used as the basic content and theoretical basis of the previous research. In the gradual development and research process of the teaching, the setting and expression of some links are not rigorous enough; The teaching mode is limited by the time of the class. Because the classroom time of the university is limited, the short time of the class is not enough for the design of complex problems. Then only the bold teaching reform is carried out, and the teaching time of the scores is processed centrally. It can provide sufficient time for the problem-driven teaching mode, so that better teaching results can be obtained. In the research process, research should be carried out for different subjects. The whole research of computational thinking is only carried out around the university's science and engineering majors. Universality, we must continue to promote research results in the future.

Research Outlook. A computer is just a universal learning tool. Cultivating students' computer thinking can not only help students understand the mechanism of computer programming, but also help students develop their innovative ability. With the continuous development of computational thinking and the continuous application of information technology in the field of education, the cultivation of computational thinking ability is still a hot topic in the field of education, especially computer education. How to integrate the thinking of computational thinking into the teaching process and cultivate students' ability to think and innovate to solve problems is the focus of research in the teaching process and the breakthrough point of reform for a long time. This study constructs a development model of computational thinking ability from the three dimensions of knowledge, cognitive structure and learning style, which can effectively improve the teaching effect.

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