

## Classroom teaching reform based on the cultivation of computer majors' innovative ability

Gong Fanghai

School of Information Engineering, Guangzhou Huashang Vocational, College, Guangzhou, 511300, China

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**Abstract:** With the continuous advancement of educational reform, the teaching of basic computer courses in colleges has established the core task of cultivating students' computational thinking ability. Computer application is an indispensable element of future social development, and computer application courses have become a hot reform topic of university education courses in my country. The problems of independent innovation learning are analyzed, and the strategy of cultivating students' independent innovation learning ability in the teaching of computer basic courses is proposed, which has positive significance for realizing the goal of talent training. Based on this understanding, this paper studies the cultivation of computing thinking ability in the teaching of computer basic courses in Universities in China, in order to provide reference for people who pay attention to this topic. According to the author's teaching experience and the characteristics of the computer course, this paper points out that the computer course needs innovative learning; This paper analyzes the disadvantages of the existing classroom teaching to the cultivation of innovative talents; This paper puts forward some ideas on how to reform college classroom teaching and make the classroom the birthplace of students' innovative thinking, innovative consciousness and innovative ability.

### 1. Introduction

In computer education, to cultivate excellent talents, we must strengthen the reform of teaching philosophy and teaching mode [1]. The subject of innovation is talent, the source of innovation is knowledge, and knowledge comes from learning. Therefore, the competition among countries in the world is, in the final analysis, the competition of education and the competition of cultivating innovative talents [2]. After entering the university, students must first study the course "University Computer Fundamentals". The establishment of this course not only enables students to master basic computer knowledge and technology, but also enables students to use computational thinking to solve practical problems [3]. "Insist on cultivating high-quality skilled talents with strong practical ability and good professional ethics who meet the needs of the first line of production, construction, management and service. A tool course that combines knowledge and skills, in which skills, that is, operability, are dominant; theoretical knowledge is the basis of skills, and skills are the purpose of theoretical knowledge [4].

Classroom is the main place where teachers guide students to learn and impart knowledge [5]. There are great problems in traditional computer education. The most prominent problem is that the dominant position of classroom students is ignored, and the development of students' independent innovation ability is limited. In this way, the computer students can only be conservative, do not understand innovation, and do not learn. Such talents have low comprehensive quality, low social adaptability, insufficient working ability, and little room for development [6]. As far as computer major is concerned, mathematics teaching should aim at training talents of computer major, and determine the teaching content, teaching method and teaching mode according to the knowledge and skill needs of computer major and the industry. This paper will analyze how to make the classroom become the birthplace of students' innovative thinking, innovative consciousness and innovative ability for computer courses. Therefore, relevant personnel should also strengthen the research on the cultivation of computational thinking ability in the teaching of basic computer courses, so as to better promote the development of higher education [7].

## 2. Teaching reform strategy of computer basic course for cultivating independent learning ability

### 2.1. Innovative teaching methods with students as the main body

Cultivating students' independent innovation learning ability is inseparable from the innovation of teaching methods. Teachers should be able to innovate teaching methods with students as the main body, highlight the status of students as the main body of learning, and achieve the improvement of teaching effects [8]. According to the syllabus, teachers should first complete the induction of knowledge units, and then sort out the computational thinking involved in the knowledge units, and change the teaching idea of "instilling knowledge" in the past. When teaching the teaching content, it is necessary to describe the achievable and visible thinking from the perspective of knowledge-based thinking, so as to guide students to form computational thinking. In order to achieve this goal, teachers need to do a good job in teaching content design and guide students to complete the analysis of abstract problems, so as to master the principles of calculation and form a solution to the problem [9]. The student-centered teaching methods mainly include task driven method, role-playing method, group discussion method, etc. This paper focuses on the application of task driven teaching method through cases [10].

Interest is the driving force for learning, which enables students to take the initiative to learn from the heart, give full play to their subjective initiative, use what they have learned, acquire knowledge through hard work, and creatively complete their learning tasks. Modern computer technology integrates language and images through optical signals, acoustic signals, and electrical signals, comprehensively stimulates students' different senses, gives them a strong visual and auditory impact, and enables them to know knowledge from different angles, thus improving students' interest in learning. College computer education should take students as the main body in teaching, and teachers only play the role of assistance and guidance. Students can use their own thinking and imagination to operate computers to complete the tasks in the classroom, thereby cultivating students to discover and solve problems independently. Ability. In terms of skills, the mastery of basic skills has a significant impact on later skill learning. Being able to grasp the vertical and horizontal connections between knowledge, draw parallels, and gain intuition and inspiration is an important method for innovative thinking.

### 2.2. Build a visual teaching model

Establish a visual teaching model as shown in the figure Visual programming tools are used to visualize the execution process of each algorithm, and corresponding software such as power point is used to organize these visual algorithm modules to form a multimedia teaching software, which is convenient for teachers to teach. As shown in Figure 1.

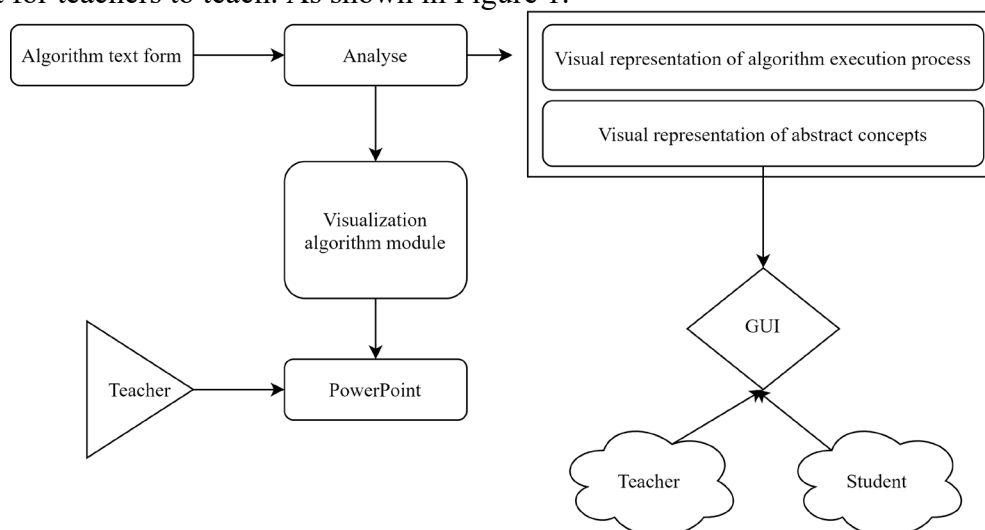


Figure 1 Visual teaching model

In user interface design, a consistent appearance can create a harmonious beauty in the application. If the interface lacks consistency, it will make the application look chaotic and disorganized, which will reduce people's interest in using the application. Here, taking the form control as an example, we will briefly talk about how to design the interface. From the aesthetic point of view, neat, simple and clear design is preferable. An easy mistake to make in interface design is trying to use the interface to mimic real-world objects, which is unnecessary and has no real meaning to the user. It's best to design an interface that does both functionally and feels clean and comfortable for the user. Therefore, the reasonable selection and arrangement of the controls in the form is an important basis for forming a beautiful and practical user interface. Like drawing on paper, interface design is nothing more than combining colors, text, controls, etc. on the computer screen.

As an important basic course of computer basic teaching, "College Computer Basic" is an important course related to whether students can correctly understand computing thinking, so teachers should organize teaching targeted to ensure that the teaching method of computing thinking can be scientifically introduced into the course teaching. On this basis, we can try to use the gradual change mode and small class pilot to carry out teaching. First of all, in order to realize the natural introduction of computational thinking, teachers should introduce computational thinking by organizing seminars, regularly communicating and arranging special topics, so as to ensure that the knowledge points that can reflect computational thinking in basic courses can be reasonably arranged, and absorb various experiences through various communication channels. Furthermore, by carrying out the pilot work in small classes, the influence of computational thinking in curriculum teaching can be gradually improved, and then the popularization of scientific teaching experience can be realized.

### 3. Teaching reform of computer algorithm design

#### 3.1. The importance of computer algorithms

Algorithm is a very important concept in computer science. It indicates the process of problem processing and solution, and is an accurate and complete description of the solution to a given problem. In fact, we have corresponding algorithms for everything we do. For example, the operating instructions of the TV set are the algorithm of using the TV set; The schematic diagram of the installation steps of the aircraft model is the algorithm for making the aircraft model. It is very complicated to give the algorithm to the computer for execution. The biggest obstacle is the poor communication between human beings and the language barrier between human and computer. In order to cooperate better, people need to express the algorithm correctly, clearly and concisely. Natural languages (Chinese, English, etc.), flow charts, programming languages, etc. can all be used to describe the algorithm. Briefly describe the general steps of giving the algorithm to the computer for execution. People usually use natural language, flow chart and programming language to describe algorithms.

From the geometric meaning of definite integral, it can be known that the value of  $\int_a^b f(x)dx$  is equal to the area of a trapezoid with curved edges surrounded by  $x = a, x = b, y = f(x)$ . Take  $[a, b]$  as the dividing point  $a = x_0 < x_1 < x_2 < \dots < x_{n-1} < x_n = b$ , divide  $[a, b]$  into  $n$  cells  $[x_{i-1}, x_i] (i = 1, 2, \dots, n)$ , and mark  $\Delta x_i = x_i - x_{i-1} (i = 1, 2, \dots, n)$  as the interval length. Make a small rectangle on each cell. If the lengths of the small rectangles are equal, and the functions of the right end point, the left end point and the middle point of the interval are respectively taken as high, the approximate area of the stepped graph can be expressed as:

$$\int_a^b f(x)dx \approx \frac{b-a}{n} \sum_{i=1}^n f\left[a + \frac{i}{n}(b-a)\right] \quad (1)$$

$$\int_a^b f(x)dx \approx \frac{b-a}{n} \sum_{i=0}^{n-1} f\left[a + \frac{i}{n}(b-a)\right] \quad (2)$$

$$\int_a^b f(x)dx \approx \frac{b-a}{n} \sum_{i=1}^n f\left[a + \frac{2i-1}{2n}(b-a)\right] \quad (3)$$

Run the program, when the input, the output is the input, and the output is 0.33335. . . . Different evaluation methods and precisions of are shown in the following table:

Table 1 Accuracy of different algorithms

N	10	30	60	100	1000
Left rectangle method	0.345	0.36684	0.545821	0.34566855	0.3345645
Right rectangle method	0.248	0.48842	0.212454	0.233544	0.333455
keystoning	0.356	0.41554	0.2123	0.33355	0.35545

That is to say, if a program developer wants to implement a function, as long as the program developer calls the methods in the public class, he does not need to know how these methods are written, just use it. Therefore, with the development of the times, the programming language has gradually become easier, and the reusability of the program is getting higher and higher.

### 3.2. Teaching Reform of Computer Design

Innovative design of computer basic course content is an effective measure to enhance students' interest in learning computer and promote students' independent and creative learning. Only the course content is novel, fashionable and practical, can the teaching effect and students' learning effect be guaranteed. Therefore, it is necessary to innovatively design the content of computer basic courses. With the upsurge of computer, all colleges and universities have started to offer software engineering majors. In order to enable more talents to learn computer programming and engage in software development, Soft Drop Engineering is a professional course in the Department of Computer Science and Technology. Through the study of this course, students can master the basic concepts, basic principles, practical development methods and technologies of software engineering.

In order to strengthen the cultivation of students' computational thinking ability in computer basic experimental courses, teachers should also complete a comprehensive experimental design to ensure that the experimental content is interesting and practical, so as to provide students with more space for thinking and innovation. Specifically, when designing the experimental content, in addition to requiring students to complete basic experimental questions, teachers should also design comprehensive questions to provide more learning opportunities for students with spare capacity. It is necessary to open up practical training education resources and practical training education content, and to be able to fully develop computer course training teaching resources with students as the main body and teachers as the leading. In this kind of teaching, teachers can provide students with practical training content and set practical training tasks. Its logical necessary conditions mainly include the following aspects: (1) arouse students' learning intention and arouse students' learning needs; (2) Students agree on learning objectives and teaching objectives; (3) Planning the learning field and providing necessary course resources; (4) Adopt a way that is easy for students to understand and can best mobilize students' initiative. Put forward new ideas and solve new problems. Bruner once emphasized that "only through the efforts to solve problems or discover problems can people learn the real method of discovery. The more this kind of practice accumulates, the more he should be able to summarize what he has learned into the way of solving and exploring problems. Mastering this way of generalization is effective for him to solve all kinds of problems. The process of work-driven learning reflects this law.

#### 4. Conclusions

In the Internet age, computational thinking ability has become an indispensable ability for people to live and work. Therefore, in the teaching of basic computer courses in universities, the cultivation of this ability should also be strengthened so that students can better adapt to the development needs of the times. In short, in computer teaching, teachers should give full play to the advantages of computer technology, pay attention to cultivating students' interest, stimulate their subjective initiative, make reasonable use of the computer knowledge they have learned, and find and solve problems by themselves, so that students can use their hands to operate. Experience the joy of innovation and self-learning firsthand. Many computer teachers feel that visualization software is difficult to obtain, their own development cycle is too long, and their technical requirements are also high. As a computer educator, we should promote the improvement of students' autonomous learning ability through a variety of ways. Only in this way can we ensure that the education effect of computer basic courses can be steadily improved, and can we truly cultivate excellent talents through educational practice activities to meet the needs of students' learning development. Therefore, it is believed that the research on the cultivation of computing thinking ability in the teaching of basic computer courses in universities can bring enlightenment to the development of related work.

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