Thinking and Practice of College Mathematics Computer Innovation Teaching

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Abstract. In the new era of mass entrepreneurship and innovation, the primary work of colleges and universities is to improve the awareness of innovation and improve the innovation ability. Mathematics is an important subject in the field of information technology in universities, which has positive significance for cultivating creative talents. Based on this, this paper analyzes and discusses the problems of computer aided teaching in college mathematics, and summarizes the measures of how to use computer to innovate mathematics teaching in college. It is hoped that the writing of this paper can provide some enlightenment and reference for the majority of educators, so as to further improve the application value of computer on the basis of strengthening the mathematics education in colleges and universities.

Keywords: university; mathematics teaching; computer; thinking; practice

1 Introduction

With the advent of the 21st century, China's computer technology has been rapid development, in the field of education has been widely used, especially in colleges and universities, computer technology because of its own excellent characteristics and popular university students and teachers, thus promoting the reform of traditional teaching methods. However, the current computer technology in our country is not perfect, it still needs to be the joint efforts of the whole society, so that it is integrated with the conventional teaching, so as to promote China's education reform and development[1].

2 The problem of computer-aided teaching in College Mathematics Education

(1) Software development technology needs to be strengthened

Computer-aided education is developed on the basis of applied software technology, indicating that with the progress of software technology, the application of computer-aided teaching is becoming more and more standardized. From the perspective of China's existing technology development, although it has been achieved to a certain extent, and has made a certain breakthrough. However, compared with the application of software development and hardware development, the computer construction of schools in China has backward characteristics, thus producing some unfair situations. In many countries, due to the relatively

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few construction of computer software in schools, the mode of computer-aided education has undergone some deviation, so it must be concerned by all aspects.

On the other hand, the development degree of computer software in many colleges and universities is relatively low, which shows the lack of computer-aided teaching mode, and the teaching content is not complete enough. The root cause lies in the failure of universities to achieve win-win results in hardware and software research and development, lack of in-depth teaching communication, lack of opportunities for cooperation and common development, lack of a perfect development system[2]. Different regions will make it difficult for universities to cooperate effectively, resulting in a considerable waste of resources in the process of software development. In general, such a situation will make students lose their interest in mathematics, thus affecting the overall quality of education and the change of education.

(2) Hardware design needs to be improved

In general, the development of software development and hardware design are complementary. If software development is the human thinking, then, hardware is the external performance of people. Without good hardware, the advantages of software technology cannot be fully exploited. In the construction of hardware facilities in colleges and universities, the development trend of network equipment is becoming more and more obvious. Although the construction is constantly enhanced, but the quality of its development is difficult to guarantee. First of all, from the perspective of technological development, the equipment level of different colleges and universities is very different. For example, 985,211 and other key universities, due to sufficient funds, state support, supporting facilities are relatively complete, to provide better teaching conditions for universities. In stark contrast, some ordinary universities do not have more funds. It may also be that the local authorities do not have enough support, leading to some hardware defects. In China, such an education mode is very common, but in the past few years, the school hardware equipment is unable to adapt to the new needs, thus restricting the development of computer-aided teaching.

3 The practical measures of mathematics and computer innovation teaching in colleges and universities

(1) Classification of computer software courses

First of all, the knowledge of computer software can be divided into the following categories: computer language, information system design and development, courseware development, network application, application software and database management.

Not all of these subjects are available due to limited teaching time. Detailed studies and overall planning can be conducted for each course, and all three courses can be selected and assigned in the first and second year. Secondly, each course has a large amount of computer knowledge. For example, the mathematics course focuses on algorithm design and language analysis and the design of learning programs. Information management students focus on the development and design of information systems and website creation, while applied statistics students focus on application software.

(2) Reform and innovation of teaching concepts

The computer courses offered by mathematics students are very useful, so it is necessary to emphasize the practicability of knowledge in teaching and pay attention to cultivating students' practical ability to use computers as a tool to solve practical problems. The teaching of theoretical subjects should follow the principle of "fine theory, emphasis on application". Indeed, the purpose of teaching computer skills in mathematics is to use computers as powerful tools to solve practical problems in the future, with the help of appropriate references[3].

The purpose of "fine theory and heavy application" is to use computers as a powerful tool to solve practical problems. Teachers can organize the theory and choose the part to be taught, while students can use the other part to study independently. The design of theoretical courses is mainly for application, so the choice of textbooks should be as simple as possible. When choosing textbooks, it is best to use practical textbooks or self-published materials[4].

"Fine theory, emphasis on application" requires teachers to prepare lessons more seriously and increase the proportion of practical teaching, so as to realize 'pay attention to theory and application' in practice.

(3) Use computer-based tools for group cooperative learning activities

With the rapid development of computer technology, teachers' educational ideas have also changed. In the mathematics education in colleges and universities, we should take the "people-oriented" educational concept as the core, respect the central position of students, and give full play to the central role of students. Cooperative learning is the starting point for solving problems through cooperation and an important way to cultivate the spirit of cooperation and creativity. The solution of mathematical problems is an important step to improve the students' mathematics learning level. Teachers should train their problem-solving ability pertinently and systematically. Through computer simulation, students can carry out a variety of "mathematical experiments" through the powerful computing ability of computers in a virtual environment[5]. At the same time, teachers can also provide more practical operations for students through computer technology, so as to enhance their hands-on ability.

(4) Promote the combination of mathematics teaching and computer-aided learning in colleges and universities

Applied computer technology to college mathematics teaching can effectively improve the teaching quality of college mathematics. At the same time, computer-aided teaching also has a strong application ability, which can effectively solve some difficult problems encountered by students in the classroom. However, in the use of computer technology, we must remember that the computer is only an auxiliary tool, and can not replace the teacher's teaching. Not all classes use computer assistance, because computer tools are easy to misunderstand people's thinking. According to the author's teaching practice for many years, we believe that using computer technology can effectively solve some key and difficult problems in college mathematics teaching.(1) computer tools transforming function concepts, properties and images from constant to variable functions; (2) using multimedia means of computers, such as continuity of functions, polynomial approximation of functions, geometric application of partial derivatives of functions, from static to dynamic graphics.(3) Through the teaching video, let the students understand the evolution from plane graphics to three-dimensional graphics, such as the geometric meaning of calculus, the basic concept of fixed integral and

the application of fixed integral. Teachers can flexibly use computers according to their own ability, which can not only shoulder the traditional teaching methods, but also enhance the interest of classroom teaching through the computer, so as to stimulate students' interest in learning[6].

(5) The teaching mode of developing majors

The goal of mathematics education is to cultivate students' understanding of mathematics, to cultivate their full use of mathematical knowledge, and to use computers to solve problems. Therefore, after establishing the mathematical model, an appropriate algorithm is extracted, because the students in the computer department are trained by special programs, so they will realize that this algorithm can be implemented by computer.

This course is divided into several steps: mathematical mode + computer + seminar. The organization of such mathematics education by "comprehensive training" is not only a simulation of students' scientific research work, but also provides an important supplement for the graduation project. In class, the teacher makes the multimedia courseware according to the teaching content, and extracts the relevant problems and algorithms[7].

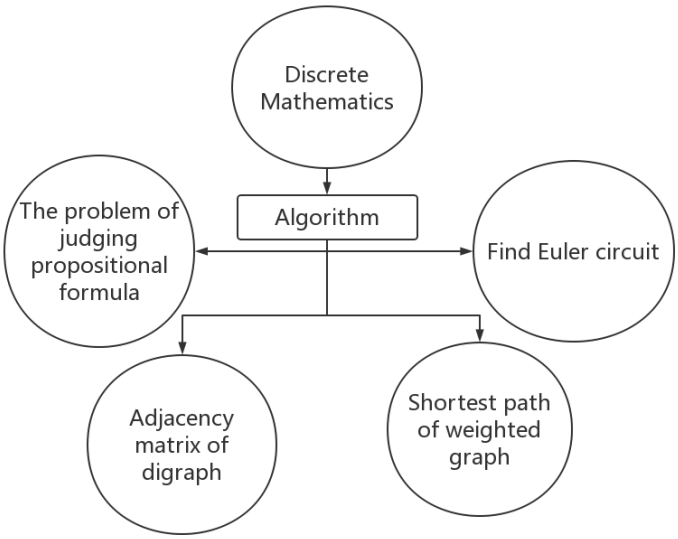

Figure 1 Discrete mathematics course algorithm

As shown in Figure 1, after guiding the students to learn the algorithms in the graph, let them combine "group learning" with "individual learning" to explore the solutions to the problem. Students went through the process of acquiring data, running algorithms (using software packages and programming), solving problems and checking, writing essays and printing, allowing them to apply mathematical knowledge, calculate by computers, and think and practice systematically[8]. At the same time, in the group study, students should think about how to cooperate, how to compromise, support and encourage each other when necessary, which is also a kind of exercise for organizational ability and scientific cooperation. If

necessary, discussions can be organized, and teachers organize students to explain and discuss their thesis, similar to thesis defense. The teacher assigned the usual grades to each group based on their ability to complete homework and the coping ability of each group.

In addition, in mathematics courses, students can use computer programs to conduct mathematics experiments to deepen their understanding and mastery of mathematics and stimulate their enthusiasm for exploration[9]. For example, in a class of probability statistics, students need to write C programs with random numbers to simulate random trials, such as coin toss and dice roll, to understand the basic principle of probability statistics —— the law of large numbers. In this course, we will teach the demonstration experiment of "Poisson distribution close, normal distribution approximation", so that students have a deeper understanding of Poisson theorem and central limit theorem. Through the experiment of "histogram and density", students can be made to understand the application of probability density and probability density curves in continuous random variables[10]. This test is presented as a "hypothesis test" to inform students about the two types of errors that can occur in the hypothesis test and the relationship between them.

(6) Create a good learning environment for computer knowledge

The style of study of the university mathematics department is better, but the atmosphere of learning computer skills is not very strong, and the ability to actively use computers to solve practical problems is not very strong. Different forms can be used to create a good learning environment for the computing ability of mathematics students. The author believes that with the help of Table 1, students' enthusiasm in learning computer knowledge can be improved[11].

Table 1 Methods to improve students' enthusiasm in learning computer knowledge

order number	method	content
1	Organize lectures on computer skills regularly or irregularly each semester	Experts and teachers are invited to introduce computer applications
2	Fully implement the tasks of the internal learning department of the Student Union	The department of Mathematics has set up a computer lovers association, which organizes student exchanges and teacher-student exchange seminars regularly or irregularly every semester
3	Build a garden for learning computer skills	Teachers and students are invited to introduce teaching methods and learning experiences as well as programming skills
4	Encourage and support the students to participate in the competition	Encourage and support students to actively participate in national, provincial and college computer skills competitions, and vigorously commend students and teachers who have achieved outstanding results
5	Organize regular competitions for various computer skills applications every year	It has organized the management information system development and design competition, office software knowledge competition, course development competition, website development competition, computer language programming competition, algorithm design competition, application software use competition and so on

4 Comparison of the practical effects of computer-aided teaching

Based on the relationship between circles and sine, it aims to provide an interactive learning environment through virtual simulation technology to help students understand the characteristics of circles more deeply, as well as the mathematical relationship between sinusoidal functions and circles. Characteristics such as the center of the circle, while observing the changes in the amplitude, period, and phase of the image of the sinusoidal function, this real-time feedback mechanism enables students to deeply understand mathematical concepts in practice and cultivate their interest in mathematics. [12]

In this study, we experimented with the use of virtual simulation technology to create an interactive classroom environment, mainly to verify the computer-aided effects and to study how students' attitudes towards mathematical problems during the use of the experiment affected them. The results show that there are obvious differences between the overall performance of the experimental class, the long-distance migration score of the post-test, the near-migration score of the post-test and the corresponding category score of the post-test and the corresponding category score of the control class, especially the difference of the long-distance migration score of the post-test is more prominent, which indicates that the mathematics teaching of virtual simulation can be used as an effective tool to help improve students' interest while combining traditional teaching methods. Students in both classes had a positive impact on their overall satisfaction with the use of computer-aided instruction[13]. According to the comparison of the school examination results of the experimental class and the control class, it is preliminarily judged that the standard deviation of the control class is better than that of the experimental class, as shown in Figure 2.

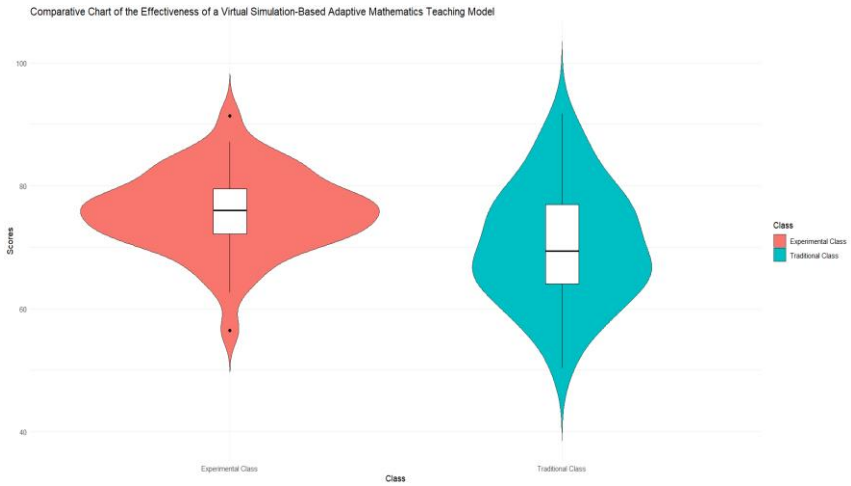

Figure 2: Comparison of the training effect of computer-aided mathematics teaching

5 Conclusion

Computer-based tools are widely used as learning support tools in modern university education. In university mathematics teaching, using computer tools can improve the effect of

classroom teaching, innovate the traditional teaching methods, and improve the interest of classroom teaching. It should be emphasized that computer-based tools do not replace teachers in the process of imparting knowledge. Teachers need to skillfully use computer-based tools to solve important and difficult problems, so that the traditional teaching methods can be fully combined with computer-based tools.

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