How to Use Computer Technology to Break Through the Difficulties in Higher Mathematics Teaching

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Abstract. Most students and even some mathematics teachers think that advanced mathematics is one of the most obscure courses in Basic courses in higher education. For students, it is difficult to understand advanced mathematics, especially the concepts of calculus, derivative and limit. By using computer technology to restore the simple iterative process of data without these methods, students can understand the principles of higher mathematics more intuitively.

Keywords: Computer Technology, Higher Mathematics Teaching, Difficulties, Break Through

1. Introduction
Although there are many articles and treatises on the integration of information technology and curriculum, the definition of the integration of information technology and mathematics curriculum, especially the integration of higher mathematics curriculum, has been lack of in-depth research. So far, there is no universally recognized authority in this respect.

The learning objects of higher mathematics courses in Colleges and universities have generally grown up. They have their own thoughts and behavior habits that have been cultivated in middle school[1]. It may not be new to information technology, or it may have higher information literacy, or it has bias. In addition, the college higher mathematics curriculum is broader and deeper than the junior and senior high school mathematics. With the limitation of specialty and class time, it is not enough for students to master and apply it flexibly in practice. Higher mathematics course is not only the basic course of University, but also the cradle of cultivating students' innovation ability. The idea of applying computer technology in the teaching of higher mathematics courses has attracted many people's attention and attracted a large number of people's interest. Whether it's for teachers facing difficult higher math, or for students facing difficult higher math, it's great news. Although the research in this area has not yet achieved breakthrough results, we believe that if there is a subject goal, efforts will always make progress[2]. The methods of to teach and to learn of "the teacher" is to realize a teaching and learning method with the characteristics of "independence, exploration and cooperation", which can give full play to the leading role of teachers and fully reflect the main position
of students. In order for students to do their best in their initiative, enthusiasm and creativity, change the traditional classroom teaching structure, and make the cultivation of students' innovative spirit and practical ability true It is being implemented.

In the information technology environment, the higher mathematics curriculum also requires the learners to be good at learning and mastering the ability of logical reasoning and thinking from the theoretical aspect, insight and research practical problems from the quantitative aspect, cultivate the learners' consciousness and interest of solving practical problems with mathematical principles and methods, and strive for the harmony between theory and practice[3]. How to create a real online learning environment for the learners, combined with the online learning support service system, and do our best to let college students learn and apply the knowledge of higher mathematics systematically comprehensively is an important topic. The author effectively uses the network education platform of a university to integrate information technology and higher mathematics curriculum, including teaching scenario design, cultivation of students' experimental ability, students' personalized learning, expansion of students' mathematical cultural knowledge, teaching evaluation and other aspects of practice.

2. Curriculum Design and Practice
Use the platform to build personal mathematics teaching resource database, use the computer-aided mathematics software, and design teaching scenarios [4]. For example, using 3D technology, "Authorware" and other application software to make courseware for classroom teaching can integrate sound, animation, film and television. For example, we can use "Geometric Sketchpad" to make teaching platform, and make software for solving a knowledge point in class, which is convenient to use, just like the teaching aids in the hands of teachers. Multimedia facilities have been teaching in colleges and universities for many years. At present, most of the teachers only use its most basic function and do not make further use of it. Therefore, the deep application of multimedia facilities and its combination with traditional teaching make higher mathematics education more interesting and intuitive.

It is a very old mathematical problem to find the root of equation [5]. Newton iterative method is an important content in the calculation method of finding the root of equation. One of the characteristics of modern mathematics education is the effective combination of mathematics and computer to cultivate student who is able to use mathematical knowledge learned to analyze and solve practical problems. Higher mathematics teaching software has sprung up, and the comparison and rational use of software are very helpful to improve teachers' teaching vision and students' learning ability. The national annual mathematical modeling competition gives them a chance to show their talents [6]. However, it is difficult for low-age students to establish a good connection between mathematics and computer. Most of them are still in the simple programming of computer course. Computer technology plays a role in the teaching of higher mathematics and has become a new classroom for students to acquire higher mathematics knowledge, let some students like mathematical programming, and paves the way for the establishment of higher mathematics teaching mode. The course teaching is based on the application of the mathematical experiment teaching mode of information technology.

3. Realization of Subject Teaching
To solve equation \( f(x) = 0 \), the computer is to linearize the non-linear function \( f(x) \) step by step, so that the non-linear equation \( f(x) = 0 \) is approximately transformed into a linear equation to solve. This algorithm is the embodiment of the idea of replacing curve with direct and non-linear with linear in mathematics.

3.1 Theoretical derivation and algorithm
Suppose: the function has continuous second-order derivative function on the interval \([a, b]\), where a,
b are two endpoints of the interval, and meet the following requirements:

If \( f(a) \cdot f(b) < 0, f'(x) \cdot f''(x) \neq 0 \) then

According to the second-order Taylor's theorem:

\[
f(x) = f(x_0) + f(x_0)(x-x_0) + \frac{f''(\xi)}{2!}(x-x_0)^2
\]

According to the linear approximation theorem:

\[
f(x_0) + f'(x_0)(x-x_0) = 0
\]

Then:

\[
x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}
\]

This process is repeated. Assuming that \( x_n \) is the approximate value of equation \( f(x) = 0 \) with \( X' \), the Newton iteration formula is obtained:

\[
x_n = x_{n-1} - \frac{f(x_{n-1})}{f'(x_{n-1})}
\]

Among:

\( n=0, 1, 2, \ldots \)

The derivation process of the algorithm includes a lot of theoretical knowledge of mathematical analysis, such as the existence theorem of the premise of root existence, the significance of derivative and second derivative, Taylor's theorem, etc. These relatively abstract knowledge combined with practical problems can make students realize the importance of theoretical knowledge and deepen their understanding of these knowledge.

During the lecture, with the dynamic demonstration of multimedia, students can understand the principle of Newton's iterative method more vividly. In the following, we will make a simple exposition of multimedia demonstration. Next, we give the specific algorithm of Newton iterative method:

The first step: input the initial approximate value \( x_0 \) of the root and the allowable error limit \( \epsilon \), set \( n \leftarrow 0 \),

The 2nd step: Calculation:

\[
x_{n+1} \leftarrow x_n - \frac{f(x_n)}{f'(x_n)}
\]

The 3rd step: If \( |x_{n+1} - x_n| \geq \epsilon \), then \( n \leftarrow n + 1 \), otherwise, output \( x_{n+1} \), END.

4. Summary

The mathematics experiment teaching mode based on information technology provides students with a good learning environment, so that students can mobilize their original knowledge and experience with a positive attitude, try to solve problems, assimilate new knowledge and construct a new cognitive structure, so that students can not only learn mathematics knowledge and theoretical system, but also learn the thinking methods of mathematics, improve their practical ability and strengthen the inductive method in mathematics learning Interaction between method and experimental method.
Mathematics experiment is a new scientific research method. The full use of network platform under modern education technology makes mathematics research method develop to the mode of computer technology and thinking, which provides a broad application prospect for the application of mathematics and mathematics experiment. The new teaching mode calls for high-quality teachers. Higher mathematics teachers in colleges and universities should use their own mathematical advantages to think more and study how to integrate computer technology into higher mathematics course teaching, to better guide students to gradually master the ways and methods of understanding things and discovering truth, and guide students to solve problems creatively. In the environment of education reform, which advocates quality education and cultivates innovative talents, the cultivation of students' learning achievement, learning attitude and information literacy greatly depends on Teachers' teaching means and teaching design. As educators, teachers of higher mathematics should always take teaching students' knowledge as their purpose, make creative use of the modern teaching facilities provided by colleges and universities, accumulate the knowledge difficulties and good teaching methods found in teaching, change the single classroom teaching form, and improve the teaching efficiency of higher mathematics through multiple channels.

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