

Research on the Model of Higher Mathematics Experiment Teaching Based on Information Technology

Liu Yi

Department of Materials Science, Jingchu Institute of Technology, 448000, China

Keywords: Information Technology; Advanced Mathematics Experiment; Course Integration

Abstract: In the process of educational informationization and new curriculum reform, the integration of information technology and curriculum has always been a hot issue of concern, especially in the teaching of Higher Mathematics in universities. As an abstract subject, higher mathematics is difficult to understand. How to present some difficult and abstract theoretical knowledge through today's information technology is a question we need to think about. Using computer multimedia technology and computer-aided mathematics software to vividly explain and display the more abstract or complex content of higher mathematics courses, a mathematical experiment teaching mode based on information technology is proposed. This model is conducive to students to understand the difficult points in the classroom, can not only achieve the specific teaching objectives of colleges and universities, but also improve students' comprehensive ability from all aspects, but also help to promote teaching reform, build a new teaching model, and improve students' information literacy.

1. Introduction

In the 21st century, informationization has become a major trend of world economic and social development. Information technology with multimedia and network technology as its core has become a creative tool for expanding human capabilities. At the same time, information technology in the field of mathematics teaching has greatly changed people's way of thinking and behavior, making the current college mathematics teaching mode more and more diversified, open, personalized trend [1]. Under the new conditions, teachers must have higher theoretical level and educational technology ability of educational informationization, and use new teaching modes and methods to stimulate students' innovative spirit and practical ability, so as to improve the quality of teaching. In the process of reform, the education model is also developing into information and networking, which is of great significance to the reform of education work [2]. Therefore, it is difficult to satisfy the students' learning needs with the previous teaching mode. By applying information technology, teachers can not only implement higher mathematics teaching more efficiently, but also reduce the burden on students and teachers [3].

This paper attempts to make full use of computer multimedia technology and computer-assisted mathematics software to vividly explain and display the more abstract or complex content in higher mathematics courses, and proposes a mathematical experiment teaching mode based on information technology. The mathematics experiment is mainly to let the students experience by themselves, and ask students to summarize the rules by observation [4]. The research on the integration of information technology and mathematics curriculum makes the curriculum content break through the scope of traditional classroom teaching content, including not only textbooks, but also a variety of teaching resources based on information technology. This mathematical teaching mode is conducive to mobilizing the enthusiasm and initiative of students, paying attention to the infiltration of logical thinking into students and the cultivation of students' personality in the teaching process, so that each student's advantages and specialties can be brought into full play.

2. The Theoretical Basis of Integration of Information Technology and Higher Mathematics Course

Successful integration of information technology and higher mathematics means that information technology is no longer used as an auxiliary tool in Higher Mathematics education, paying more attention to the combination process of information technology in Higher Mathematics teaching, and creating a good learning environment for students. In this teaching environment, it can effectively realize resource sharing, information acquisition and situation creation. At the same time, it can make full use of teachers' guiding role and students' subjective initiative. Students can acquire higher mathematics related knowledge, cooperate with each other and have situational teaching mode in the learning environment [5]. In actual teaching, teachers can also put students in the main position and improve students' enthusiasm for higher mathematics learning. Integrate the mathematical modeling method into classroom teaching, introduce students to the use of mathematical software, take students as the main body, use mathematical methods to solve mathematical problems with mathematics, and learn mathematics in the process of mathematics [6]. It is to realize a teaching method characterized by "independence, inquiry and cooperation" that can play the leading role of teachers and fully reflect the status of students, so as to give full play to students' initiative, enthusiasm and creativity. The cultivation of innovative spirit and practical ability is truly implemented.

In the process of integration with information technology, higher mathematics teaching will follow the corresponding adjustment of higher mathematics theory knowledge, and then constructive learning theory. In the process of integrating advanced mathematics and information technology, the learning theory of higher mathematics should be taken as the foundation, and the relationship between higher mathematics communication theory and mathematical logic thinking should be actively explored [7]. Under the guidance of constructivist learning theory, the teaching mode of information-based education is student-centered. In the learning environment created by teachers and in cooperation and dialogue, learners give full play to their initiative and enthusiasm, construct the meaning of the knowledge they have learned and solve practical problems with what they have learned. This new educational concept redesigns and improves the traditional knowledge structure. It takes students as the core of teaching, makes students' subjective initiative fully play, fully reflects the main position of the classroom, and thus solves the problems of higher mathematics.

3. Constructing the Experimental Teaching Model of Integrating Higher Mathematics Course with Information Technology

In the context of information technology, combined with the teacher's dominance and the subjective initiative of students, the goal is to improve the overall quality of students, and to combine with the actual situation of students' knowledge. The logical way of thinking of students in learning is the core of the experimental teaching mode. According to the students' actual learning level of higher mathematics, the teaching content is adjusted from the scientific point of view, and the educational tasks are diversified. In the process of classroom teaching, teachers use multimedia to carry out situational teaching, and through the three-dimensional model of computer to describe the key knowledge theory in books, so that students have a deeper understanding of mathematics knowledge. In order to help students gradually form a scientific world outlook and methodology on the basis of mastering basic knowledge and skills, the pluralistic teaching objectives of mathematics are determined from the aspects of scientific knowledge and skills, scientific concepts, scientific methods, scientific attitudes and scientific spirit. On the premise of mastering some basic skills and knowledge, students can gradually form scientific methodology and world outlook, which is the integration of mathematics curriculum and information technology.

In the integration of information technology and higher mathematics curriculum, the guiding teaching mode is task-driven teaching method. Task-driven teaching method pays attention to the status of students in education in practical application, and completes the teaching task by assigning learning tasks to students. In the process of higher mathematics teaching, while retaining the original

classroom teaching links, we should increase the teaching links of mathematics experiment appropriately. At the same time, we can learn from foreign excellent computer software technology, constantly upgrade and update our network resources, which is more conducive to the growth and improvement of students. Students must have the autonomy to learn. Therefore, teachers must constantly guide and motivate students. Learning participation activities should be combined with relevant questions and tasks, and students' tasks should be used to stimulate students' motivation and interest in learning, so that students can learn problems with problems and tasks. The learning activities can be effectively integrated with the mathematics knowledge points. The students can also complete the learning interest and motivation in the actual learning, and the students have absolute initiative in the actual learning.

The teaching mode is a stable relationship between the elements of the teaching and learning environment and the structure of the activity process under the guidance of certain educational qualities, educational thoughts, teaching theories and learning theories, supported by a certain teaching environment and resources. In the process of integrating information technology with higher mathematics courses, teachers must combine the characteristics of higher mathematics teaching, so that students can understand higher mathematics disciplines and understand advanced mathematics learning modes. In addition, in the process of applying task-driven teaching method, teachers should decompose specific tasks according to the teaching theme and combining with the teaching content. At the same time, teachers should guide students to collaborate in groups and explore independently, analyze the problems, and find out the steps and methods to solve the problems. Each task contains the relevant knowledge and skills that students must master, and guides students to explore independently and collaborate in groups. To enable students to give full play to their initiative, initiative and creativity in mutual cooperation, actively participate in the learning process, to achieve active learning.

4. Realization of Experimental Teaching Model of Higher Mathematics

Colleges and universities should establish a comprehensive platform for online teaching, and should cover a number of contents, including teacher information and teaching blog, personal resources and teaching mailbox, schedule and curriculum list, as well as teaching information. In this system, teachers can edit and delete materials for their courses, students can hand in homework and other interactive operations between teachers and students, teachers can also compile questionnaires to understand students' evaluation in time. In the new teaching mode, teaching space is no longer limited to blackboard and platform. Normal classroom teaching cannot guarantee the quality of learning for all students. Students at different levels can choose appropriate course content as a supplement to classroom teaching according to their own situation. In order to ensure the quality of education, teachers should effectively combine information technology with traditional teaching modes, explore a higher level of teaching mode, and constantly improve the teaching content of higher mathematics, so that information technology plays a driving role in higher mathematics teaching.

The platform can be used to establish a library of higher mathematics teaching resources, and the teaching scenarios can be designed. For example, the application software of 3D technology can be used to produce experimental teaching software for higher mathematics, which is presented in the form of film, animation and sound. Teachers use multimedia technology to design situational teaching, use computers to simulate the real world, characterize quantitative relationships, depict spatial graphics, formulate formula theorems, and demonstrate mathematical experiments. Quality education attaches importance to knowledge and ability, and no longer emphasizes the memory of knowledge. The learning time and progress can be mastered by themselves. Mathematics experiment teaching mode of information technology, as a new teaching method, has changed from the traditional mode of explaining knowledge structure by teachers alone to the common learning mode of teachers and students supported by information technology. At the same time, it is also conducive to collaborative learning and research learning. For example, when solving matrix, differential equation and series, the computer can be used for research learning.

In classroom teaching, we adopt the model of mathematics experiment teaching based on information technology. At the same time, we also attach great importance to students' autonomous learning after class. Because the network teaching platform can share resources, it can design after-class learning tasks to cultivate students' mathematical experiment ability. The application of mathematics experimental teaching model in higher mathematics education can not only provide more vitality for boring higher mathematics education, but also show students the integrity of mathematics curriculum. Students' online self-learning reflects personalized self-management, which can stimulate students' initiative and provide feedback for teachers' teaching. The teacher also helps students improve themselves by evaluating and summarizing the completion of student homework. It can be seen that cooperative learning is an inevitable requirement of the teaching mode centered on "study". The various network environments provided by modern information technology can effectively carry out cooperative learning.

5. Conclusions

Practice has proved that if computer-centered information technology can be integrated with the curriculum of various disciplines, it can indeed have many valuable characteristics to optimize education and teaching process. The mathematical experiment teaching mode based on computer multimedia technology can absorb the essence of the traditional teaching mode and combine with the modern teaching mode, which can make the classroom teaching structure more diversified and personalized. The experimental teaching mode of higher mathematics based on information technology can effectively integrate the traditional teaching mode with the modern teaching mode, improve the teaching structure of higher mathematics, enable students to obtain better learning resources, and broaden the teaching means of teachers. It is a step-by-step process to optimize the teaching of higher mathematics by using information technology and to explore and practice a new teaching mode adapted to the development of the times. We will also carry out more exploration and practice in the future teaching work.

References

- [1] Fukawa-Connelly T P, Newton C. Analyzing the teaching of advanced mathematics courses via the enacted example space. *Educational Studies in Mathematics*, 2014, 87(3):323-349.
- [2] Dittrich A B. An Experiment in Teaching the History of Mathematics. *Mathematics Teacher*, 1973, 66(1):35-38.
- [3] Li, Fa Y. The Application of MATLAB Software on the College Network Teaching Platform of the Mathematics Experiment. *Applied Mechanics and Materials*, 2011, 55-57:1459-1463.
- [4] Song, Wang, Bingyi, et al. Experimental research on mathematics teaching of, in Chinese primary and. *Frontiers of Education in China*, 2008, 2(3):366-377.
- [5] Hu X F, Huang J. Research on Application of Network Education Technology in Mathematics Teaching of Higher Vocational Institutions. *Key Engineering Materials*, 2011, 480-481(11):410-414.
- [6] Wilson R J. An Experiment in the Teaching of a Modern MathematicsTM in Schools. *Mathematical Gazette*, 1965, 49(367):22-33.
- [7] Ikeda T. Evaluating student perceptions of the roles of mathematics in society following an experimental teaching program. *ZDM*, 2018, 50(1-2):259-271.