

Education and Teaching Reform of Ordinary Differential Equations Based on Multimedia Technology

Caixia Fu

Xi'an International University, Xi'an, Shannxi, China

m18834199126@163.com

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Abstract: Nowadays, with the rapid progress of social economy, the electronic information technology is constantly changing and developing, which makes the teaching methods gradually enriched. The development of multimedia technology enables education and teaching to get out of the limitations of the classroom, realize the teaching methods of distance education, and change students' learning methods and teachers' teaching modes. This is also an important reason for the reform and exploration of the micro-course teaching mode of distance education based on computer technology in this paper. Taking the research and practice of network courseware development of ordinary differential equation course as an example, this paper expounds the necessity, development process, main modules and characteristics of network courseware development of ordinary differential equation in detail. Firstly, from the perspective of numerical simulation technology assisting college physics teaching, according to cognitive learning theory, constructivist theory, psychological theory and related theories of college physics teaching theory, this paper expounds the application of these theoretical foundations in numerical simulation technology assisting college physics teaching, and puts forward my own views. The above is also the innovation of this paper.

1. Introduction

Ordinary differential equation course is the core basic course for majors of mathematics and applied mathematics and information and computational science, which is not only the continuation of mathematical analysis, but also the foundation of functional analysis and partial differential equations [1]. For a long time, due to the limitation of class hours, the teaching process emphasizes more the strictness of theory, desalinates the practicality of the course, and lacks the cultivation of students' practical ability and application ability, so that many students do not know how to better apply the learned knowledge in practice [2]. The emergence of micro curriculum teaching mode enables the further integration and development of computer technology and curriculum teaching. The construction of excellent courses is an important part of the teaching quality and teaching reform project in Colleges and universities [3]. The purpose of excellent course construction is to improve the scientificity of teaching content and curriculum system, encourage the use of excellent teaching materials, advocate the reform of teaching methods and the application of modern educational technology, improve the quality of practical teaching, mobilize students' initiative and

enthusiasm in learning to the maximum extent, and cultivate students' scientific exploration spirit and innovative ability [4].

The advent of the information age not only changes people's way of life and production, but also changes people's way of thinking and learning, and leads to education becoming more and more networked, virtualized, internationalized and personalized. Challenges are also once-in-a-lifetime opportunities for development [5]. Vigorously promoting education informatization has become the trend and trend of world education development [6]. Many problems in many modern disciplines such as astronomy, biology, cybernetics, physics, fluid mechanics and so on can be analyzed and handled by ordinary differential equations. Therefore, ordinary differential equations are an applied mathematical discipline, which is closely related to other disciplines and is one of the most important disciplines in the field of modern science [7]. Aiming at the problems and shortcomings in the teaching process of ordinary differential equations, this paper puts forward some suggestions on the reform of teaching mode of ordinary differential equations based on inheriting the advantages of traditional teaching, using modern educational technology and combining with classroom teaching experience. The teaching practice shows that the engineering of teaching knowledge is the key point of teaching theory to teaching practice.

2. The Development Process of Ordinary Differential Equation Network Courseware

2.1 Design Thinking

In the process of courseware development, the ordinary differential equation network courseware mainly considers the following design ideas. First of all, enhance the intuition of ordinary differential equation teaching content and solve the problem that students' lack of perceptual knowledge affects the learning effect in the teaching process. Stay In the current society, although there are abundant online teaching resources, there are few resources that can adapt to education and teaching, and the educational content is relatively old-fashioned. At the same time, the video production of distance education is not fine enough, and the teaching content is mostly the reproduction of teaching materials. Moreover, the intensive part and key part of the course are just the reproduction of the scene of teachers' face-to-face teaching, which is not innovative, The most important problem is that the main content of teaching is not based on the specific learning object, so it is difficult to teach students according to their aptitude, resulting in the unsatisfactory effect of Distance Education [8].

Students can study in Jining according to their own interests, and find their interesting knowledge in time by using the search function in micro-courses. Teachers can use account management in micro-courses to grasp students' actual learning situation in time, give targeted guidance to students' doubts, help students expand their learning content, and conduct teacher-student exchanges in the interactive feedback system of micro-courses, which will help students learn knowledge [9]. When arranging teaching content, the teaching links such as lectures, discussions, assignments, experiments, and practice should be considered as a whole, and modern educational technology and teaching methods should be fully utilized to form a three-dimensional teaching content system; Construct professional course textbooks, teaching reference books, study guides, and experimental textbooks, strengthen the supporting construction of computer-aided teaching software, multimedia software, electronic teaching plans, and teaching resource libraries; carry out web-based courseware construction to further optimize teaching resources and sharing; pay attention to the research on the reform of teaching content and curriculum system in famous foreign universities, and at the same time introduce excellent foreign teaching materials [10]. Provide students with rich network resources and powerful interactive tools, and build a convenient communication platform for preview, review and autonomous learning.

2.2 Instructional Design

Design and determination of teaching objectives The teaching content, teaching process and teaching effect of network courseware are mainly determined by the teaching objectives. Using multimedia technology to teach is a new feature of mathematics teaching methods. The rapid development of computers has provided hardware conditions for the reform of mathematics teaching mode. Students can use the platform of computer software to learn to verify, apply and discover mathematical laws, and know how to apply the mathematical knowledge they have learned to solve various problems in real life. Students' ability to observe, use their brains, and innovate, improve students' creative thinking, and cultivate students' comprehensive quality. Students can use mobile computers to study anytime and anywhere. The main content of learning is the professional knowledge that students need to focus on. Although the video is short, it has strong pertinence and will not make students feel boring about learning.

Micro course teaching can divide a completed course or knowledge point into several small knowledge points, so as to teach students according to their aptitude. Finally, the teaching mode of micro-course itself has strong practicality, operability and practicability. However, with the development of modern science and technology, more complex scientific issues have emerged, such as: the interaction laws of species in life sciences, the quantitative and precise description of economic and financial fluctuation laws, the development of aerospace technology, and interstellar Exploration and other issues have enriched the theory and teaching content of differential equations. The design of online classroom module mainly displays the ordinary differential equation classroom content vividly to students through various media forms such as text, animation and video; The design of the model example module is to create a real situation for students and interpret the application of abstract theoretical knowledge in reality; Each module and knowledge points are linked and jump through hyperlinks to facilitate students' autonomous learning. In terms of applicability, the network courseware of ordinary differential equations is suitable for teachers as a useful supplement to classroom teaching, and can also be used for learners' autonomous learning. According to the teaching characteristics and syllabus of the course of ordinary differential equations, the structural framework of the network courseware of ordinary differential equations is proposed (Figure 1).

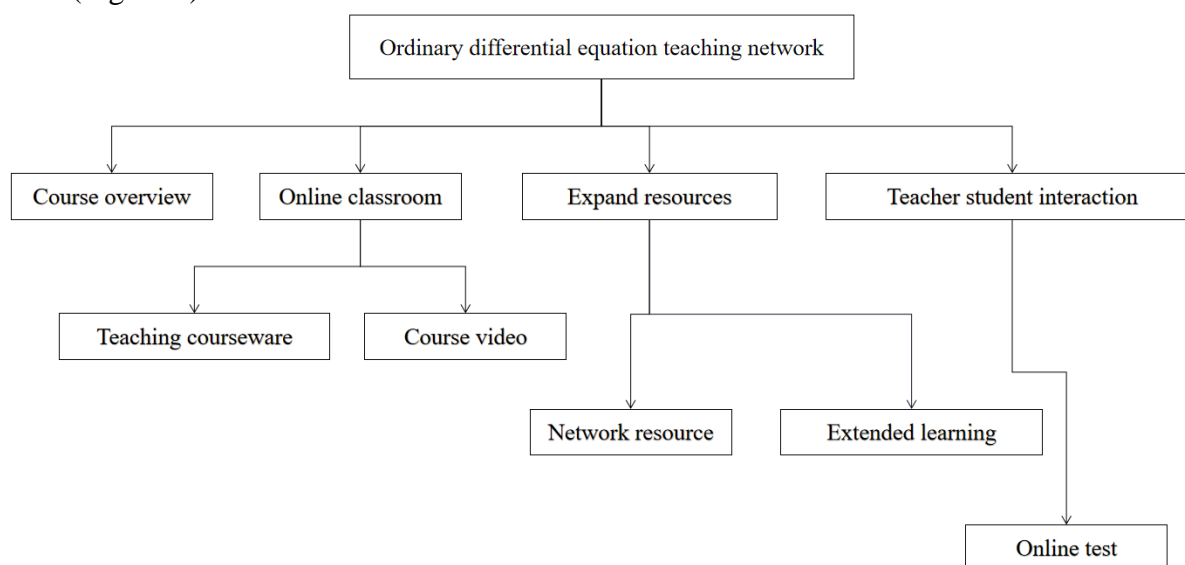


Fig.1 The Structural Framework Design of Courseware

3. Strengthen the Reform of Teaching Methods and Teaching Methods, and Make Full Use of Modern Educational Technology

3.1 Application of Network Assisted Instruction Platform

The biggest advantage of multimedia is its rich graphics, images, animation, video, audio and network functions. On the one hand, it can effectively stimulate learners' senses, stimulate their learning interest and improve their learning enthusiasm. On the other hand, it can provide rich information resources for learners and increase the amount of information imparted. Designing a network-assisted teaching platform with rich information resources, making a user-friendly course webpage, using the network platform to carry out online question and answering, providing teaching suggestions and a certain number of references, and providing students with learning guidance and self-testing, these are helpful for encouraging students to learn actively and actively. Thinking, broadening horizons and improving students' self-learning ability can play a very good role. At present, the peripheral environment of computer basic education in Colleges and universities has undergone great changes. First, the ability to use computers has become an important symbol to measure the quality and ability of today's college students. Second, all majors have more specific and strict requirements for college students' computer application ability. Third, the requirements of employers for college graduates' computer ability have increased.

How to effectively cultivate college students' ability to apply computers has become one of the important topics of basic computer education for non-computer majors in colleges and universities. Using the scientific computing function of the computer can avoid a lot of tedious and advanced mathematical calculations and derivation, and the calculation results can be displayed intuitively through images, allowing students to use computers to solve physical problems by themselves, so that students can change from watching to participating, and from passive acceptance. Become active research, thereby enhancing their interest in learning and cultivating their active spirit of exploration and innovation. In teaching, we should use computer numerical simulation to solve some complex and abstract physical problems, cultivate students' awareness and ability to use computer to solve scientific problems, and make computer not only a tool to assist teachers' teaching, but also a necessary tool for students' learning. This should be a foothold for the introduction of computer numerical simulation into teaching. Therefore, we should use multimedia appropriately and selectively according to the needs of the course content, so that multimedia teaching and traditional teaching methods complement each other. The basic and core part of Apache, which implements the basic functions of Apache as an HTTP server and extends the module, as shown in Figure 2.

3.2 Reform of Teaching Methods

Seminar teaching means that teachers guide students to participate in the teaching process in an organized and purposeful manner according to the content of the lectures, inspire students to have a clear idea of the problem, and continue to explore and research on their own according to this clear idea. , discuss problems, and solve problems. In traditional teaching, teachers only focus on imparting knowledge, and students only memorize them by rote, while ignoring the cultivation of students' research ability and application ability. In our teaching, we must avoid this kind of indoctrination. It is necessary to conduct in-depth research on students' learning methods and processes, clarify the characteristics of students' learning, and adhere to heuristic teaching according to the teaching content and teaching objectives, and guide students to ask questions, research questions, and then solve problems. Only in this way can we not only develop students' intelligence and improve students' ability to solve problems, but also improve teachers' teaching quality and

better complete teaching objectives. Ordinary differential equation is a subject which is most closely related to practical application. The application of its knowledge is everywhere, especially with other disciplines or fields. Many principles and laws in physics, chemistry, biology, engineering, aerospace, medicine, economy and finance can be described as appropriate ordinary differential equations by changing the initial conditions and relevant parameters, students can make exploratory research on physical problems, which is conducive to stimulate students' learning enthusiasm and cultivate students' innovative ability.

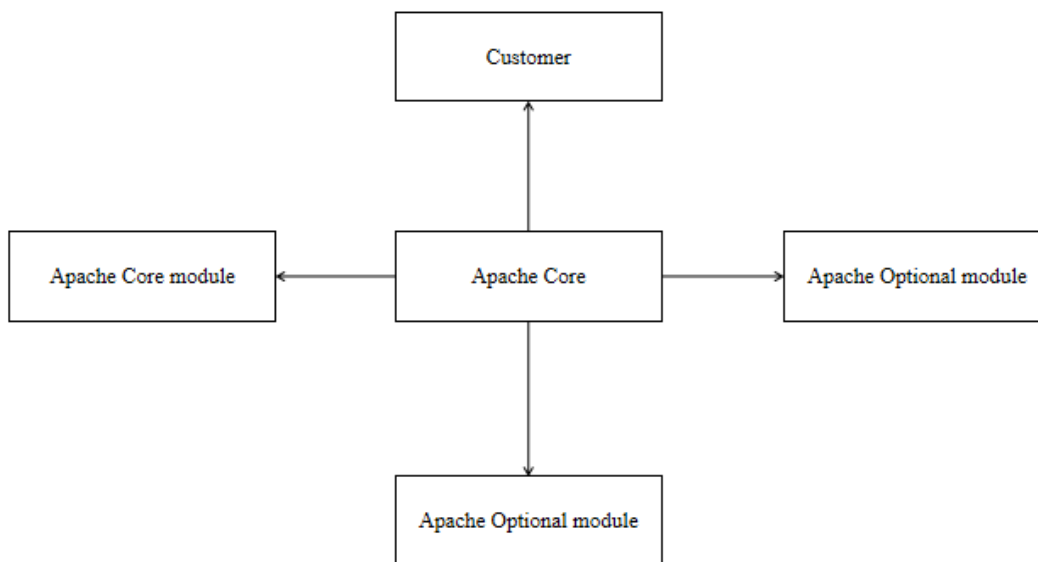


Fig.2 Apache Core Relationship

At present, the network courseware of ordinary differential equations runs well. The courseware navigation is clear, each page is displayed independently and linked to each other, and the hyperlinks between each page are accurate. After entering the page, users can quickly find the required content according to navigation. In the process of multimedia material processing, materials such as pictures, animation videos and the like are minimized without losing the effect, so that the running speed of the webpage is fast and the running process is smooth, and the user can browse the webpage at the fastest speed. After a year of teaching practice of ODE network courseware, I am confident that this courseware can be used as a self-learning tool for college students. Teachers will continue to improve and enrich the content of the courseware, so that it can be used in the teaching of ordinary differential equations in the contemporary information society environment.

4. Conclusions

With the development of the times, teaching methods should be constantly innovated in order to adapt to the updating and development of teaching contents. Only in this way can students' enthusiasm and initiative in learning ordinary differential equations be improved, their innovative ability and ability to solve practical problems be improved, and higher-quality talents be cultivated for the country. Micro curriculum teaching can solve the disadvantages existing in the traditional teaching methods, and further broaden the scope of students' knowledge. In other words, micro curriculum teaching is the improvement of teaching methods, which can enable students to learn anytime and anywhere, which is in line with the development needs of modern society. Through

carrying out teaching research, we should constantly sum up experience and innovate. Through curriculum construction, a series of high-quality courses with abundant resources will be built, which will provide practical guarantee for training high-quality talents. Therefore, as the “promoter” of students' knowledge, teachers should have extensive knowledge structure, the ability to respond flexibly, and the ability to accumulate scientific research and practice, constantly enrich and improve themselves, update their knowledge structure, establish the awareness of lifelong learning, and set an example of being willing to learn and daring to explore. In teaching, we should fully consider the feasibility of the problem and the acceptability of students, and analyze which problems the numerical simulation technology is suitable for. In the selection of calculation methods, the students' mathematical knowledge reserve level should be fully considered.

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