Application of Computer Simulation Technology in Practical Teaching of Bioengineering Specialty

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Abstract

With the development of information technology, computer simulation technology has gradually become a commonly used science and technology in people's lives. In recent years, in order to increase practical teaching in college teaching, computer simulation technology has entered the field of education. As a highly practical subject, bioengineering requires a lot of practical teaching for students, and computer simulation technology is a good auxiliary teaching tool. Computer simulation technology can help students to carry out a large number of practical operations in a short period of time. Teachers release tasks through the system, allowing students to solve problems in the process of experiments independently, and improve students' ability to analyze and solve problems.

Keywords-*Computer simulation technology; biology; bioengineering specialty; practical teaching*

1. INTRODUCTION

Bioengineering majors have high requirements on students' practical ability. Practical teaching can help students learn production skills and further understand the theoretical knowledge learned in the classroom. After practice, students can improve their ability to practice theory and practice and solve problems. Experiments in bioengineering majors are required courses for bioengineering majors. In the traditional experimental teaching, the teacher prepares the experimental materials, and then demonstrates to the students in the classroom, and the students repeat the experimental steps of the teacher. In this process, there is no independent thinking of students, and students are passively participating in learning. The use of traditional experimental teaching methods cannot mobilize the subjective initiative of students. Nowadays, in order to increase the practical learning of students, many colleges and universities will arrange students to enter the enterprise for internship. In the process of internship, students can understand the steps of enterprise production, but there are few opportunities for students to participate in practical operations. Modern enterprises are large-scale continuous operations, requiring continuous and stable production processes, so students can only watch and do not operate. . In order to enable students to combine theory with practice in practice, the teaching of bioengineering in colleges and universities should integrate industrial production into computer simulation and laboratory-scale production.

2. COMPUTER SIMULATION TECHNOLOGY

In recent years, with the rapid development of computer technology, information processing technology has been improved step by step, and simulation technology has also accelerated cooperation with other fields [1]. Computer technology is a discipline that integrates a variety of science and technology. Computer simulation technology realizes the simulation of real space through a computer system, allowing users to perform behavior operations corresponding to the real space in the simulation space, and obtain the same behavior as the real space. feedback. In the computer simulation system, users can observe things in the simulation space from multiple angles and perform experimental operations [2]. Nowadays, the scientific community will compare computer simulation technology and virtual reality technology. In fact, there is a big difference between the two. The use environment faced by computer simulation technology is the simulation of experiments, while virtual reality technology emphasizes the user's sensory experience, so computer simulation technology is generally used for the simulation of experiments or practices, while virtual reality technology is generally used for entertainment [3]. Simulation technology is becoming more and more common in people's lives, and now it is gradually entering the field of education. Many colleges and

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universities will use computer simulation technology to simulate real experiments. Low-cost, high-efficiency education, cultivating high-quality talents [4].Simulation experiment is a very important development direction in computer simulation technology. Modern simulation techniques separate the experimental framework from the simulation run control. The experimental framework is used to define conditions, including model parameters, input variables, observed variables, initial conditions, and output specifications. This distinction allows experiments to require different forms of output without having to re-modify the policy model or even re-run the simulation. The establishment of modern simulation methodology, computer simulation technology has new technologies such as simulation reusability, object-oriented method and application integration, simulation, modeling and experiment are unified, providing a convenient experimental environment for students and scientific research scholars.

There are generally three steps to build a computer simulation system. First, establish a mathematical model, consider the expression of observation data and the experience of experts, and use various means to analyze the computer to establish a unique mathematical model [5]. The second step is to program the data model, using advanced automatic programming software for interactive operations to realize the programmatic data model. The third step is to operate the simulation system. Before the actual simulation test, a detailed experimental plan is set up in advance, and the simulation model is run according to specific requirements to achieve the effect of the experiment [6].

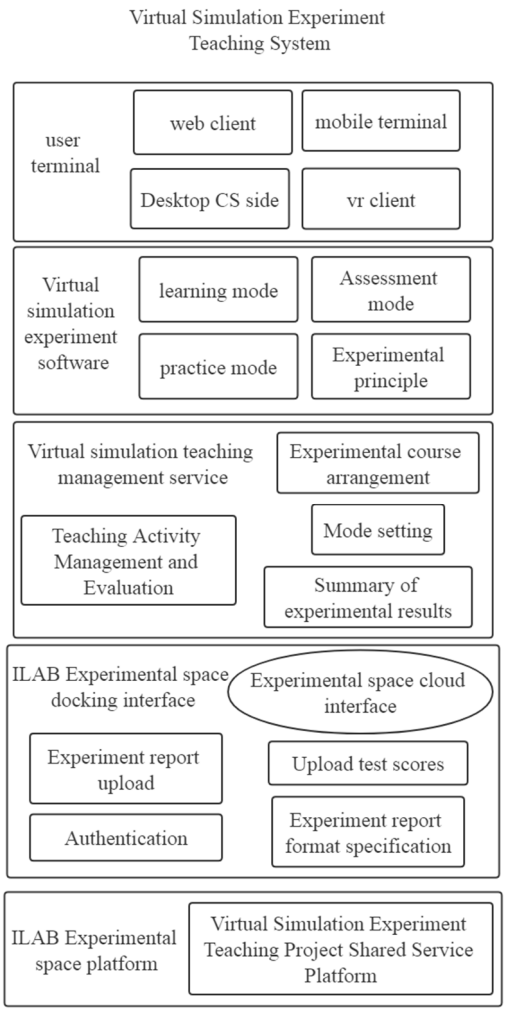

Figure 1. The process of making courseware in the simulation experiment system

3. IMPROVEMENT MEASURES FOR PRACTICAL TEACHING OF BIOENGINEERING SPECIALTY

In recent years, the application of computer simulation technology in operation skills training has gradually become popular. Enterprises use the computer simulation system to simulate the operation of machine tools and various accident state phenomena. It is not dangerous to continue the simulation in the computer simulation system, which saves money and shortens the practice of training, which has become an essential skill for many enterprise employees [7]. In order to meet the

needs of enterprises for talents, colleges and universities use practice simulation teaching similar to the on-site assessment of enterprises, so that students can understand the actual production process and equipment on campus, and repeatedly operate the production system of enterprises [8]. The simulation practice teaching platform can let students have an intuitive understanding of production, improve students' professional skills, promote students to combine practical production and theoretical knowledge, and stimulate students' interest in learning [9].

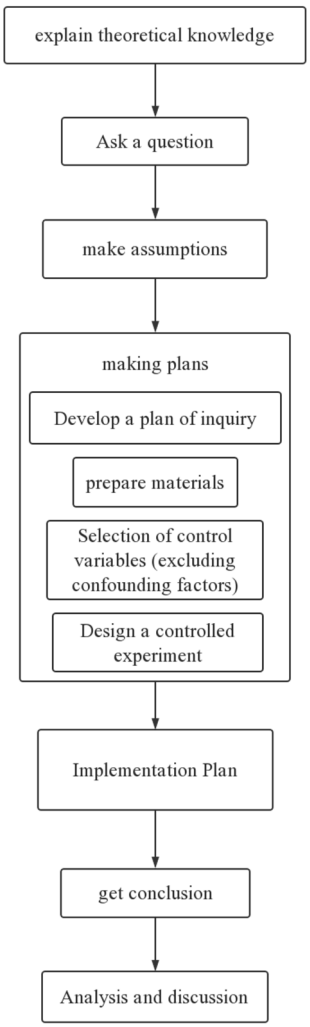

Figure 2. Bioengineering experimental steps

Colleges and universities should combine simulation teaching with experimental teaching in order to give full play to the advantages of the two teaching modes and avoid defects [10]. After the students are proficient in the simulation practice operation on the computer, the teacher can change the settings in the system and make human interference, so that the students can actively find the problem, take necessary measures according to the changes of the main parameters, and make the main parameters return to the normal range through operation. Inside, strengthen students' engineering awareness [11].

4. Organizational simulation experiment

When organizing a simulation experiment, you must first prepare the experimental materials. The experimental materials based on computer simulation technology include text, pictures, videos and 3D models [12]. Text, pictures and videos can be directly searched for the corresponding resources on the Internet, or teachers can create their own , but the design of the 3D model is more complicated.

There are two ways to get the 3D model. One is to download the 3D model from the 3D model website. Now there are many 3D models on the Internet, such as Modlar, TURBPSQUID, etc [13]. There are a lot of 3D model materials in these websites, and resources can be obtained as needed. The second method is to use 3D software to make 3D models by yourself. It is not always possible to find the required 3D model materials on the Internet, so you need to use 3D modeling software to model. The most popular 3D modeling software on the market today is 3Dmax. 3Dmax can model with polygons, patches and NURBS. Polygon modeling is to obtain models of any shape by editing the model mesh and subdividing modifiers [14]. The convenient location and orientation of the patch modeling determines the inner form of the patch. Mesh modeling can express smooth shapes with less detail, but is only suitable for the simplest polygon meshes. NURBS modeling surfaces are simple to construct and edit, their surfaces are determined by a series of curves and control points, and editing capabilities vary depending on the type of surface or curve used. Editing of NURBS modeling is more flexible. When constructing the experimental equipment modeling, you can choose the modeling method according to your needs [15].

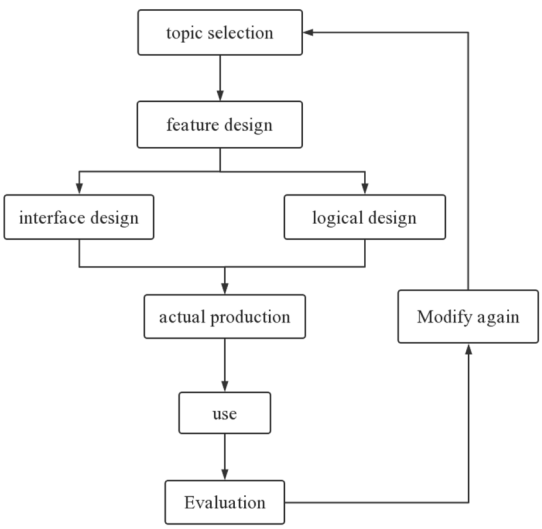

Figure 3. The process of making courseware in the simulation experiment system

The human-computer interaction design of the simulation experiment platform is the key point of the system construction. In order to meet the needs of different learners, the user interface should be pervasive, natural and intelligent. The operation of the system needs to be simple and close to the learner's daily study habits. The interface of the simulation experiment system in this paper mainly has three areas, namely the experiment name area, the experiment operation area and the experiment navigation area.

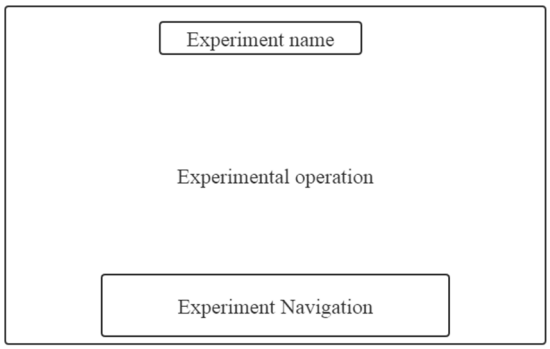

Figure 4. Interface Structure

The name of the experiment is clearly marked in the experiment name area, so that students can clarify the content and purpose of the experiment. The experimental operation area is the main part of the interface. In the experimental operation area, students operate the experimental equipment through the mouse and keyboard, including the installation, startup and use of the equipment, access to medicines and the effect of the experiment. In the experimental operation area, students can adjust the angle and zoom in and out of the screen as needed. Several hyperlinks are displayed in the experiment navigation area, and students can jump to the menu interface, experiment video, experiment principle, re-experiment and so on through hyperlinks.

5. Conclusion

The application of computer simulation technology to the experimental teaching of bioengineering can allow students to get better practical training, improve students' practical ability and professional application, and strengthen students' understanding of the current situation of serious shortage of practical teaching resources. Awareness of business production. This paper discusses how to conduct bioengineering experiments under the development of computer simulation technology, and introduces a simple simulation experiment system interface.

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