Application of Virtual Simulation Technology in the Teaching of Mechanical Courses

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Abstract. The mechanical course is very practical and the content is abstract, and is a machine and institutions as the main research object of the course. To meet the needs of the complex machinery of the applied talents training, in this paper, the virtual reality technology is applied to the teaching of the theory and practice. The use of virtual simulation technology in teaching will help to design a vivid and guide students into the state of autonomous learning, which can help improve the ability of student to analyze and solve problems and innovation. It can improve the teaching effect and improve the teaching effect and quality.

Introduction

At present, China is in a critical period from a manufacturing power to a manufacturing power transformation, thus cultivating a large number of professional personnel needed to adapt to the mechanical manufacturing industry, the China mechanical engineering of higher education is not only a challenge, but also a rare opportunity. The progress of science and technology and the development of economy have made great changes in the structure of talent demand. The higher education in China has made the change with the social demand in time, which has appeared the multi style characteristic in the school level, the type, and vigorously develops the application type undergraduate course education. There are some practical and comprehensive professional basic courses and specialized courses in the undergraduate mechanical engineering, their theory is strong, and their content is abstract, only the teacher explained, text, formula and brain images, it is difficult for students of mechanical design and principle of a clear understanding. In order to meet the needs of the application of engineering and technical personnel training, it is necessary to carry out the reform and exploration of the traditional mechanical teaching based on theory teaching. The results of the current reform focus more on the adjustment of the teaching system and content, but this kind of curriculum is closely linked with the actual project, and has strong practicality. The students often lack the background of engineering application, which requires the combination of mechanical structure and practical knowledge in classroom teaching process to help students understand the mechanical structure of the principle and application in engineering. In this way, we can improve the teaching effect of mechanical courses.

Computer virtual reality technology is the use of virtual environment in computer technology and hardware equipment to achieve a certain perception of the way people can feel, it integrates the latest achievements of computer graphics technology, simulation technology, artificial intelligence technology, display technology, a 3D digital model by computer graphics, provide to the people through a new way of computer visualization and interaction of complex data [1]. The most important feature of virtual reality technology is that users can interact with the virtual environment in a natural way. It changes the mode that the human can only understand the environment indirectly, thus effectively expanding the cognitive means and fields of human. Virtual reality technology also provides people with an ideal teaching method. At present, it has been widely used in curriculum teaching, athletic training, virtual experiment and some other researches both at home and abroad [2]. Virtual reality technology is more and more applied and popularized because of its advantages of high efficiency, low cost, rich content, performance and security [3]. The application
of virtual reality technology in teaching of mechanical courses can make full use of the mechanical
design and simulation software to realize the analysis of comprehensive performance and
mechanical principle directly, fully improve students' understanding, and mobilize students' enthuiasm and initiative.

Organization of the Text

The Application of Virtual Reality Technology in Theory Teaching

The learning level of students is divided into two levels, the primary level from the basic knowledge,
principle and law, the knowledge is very abstract; senior level refers to the ability of knowledge
application, solving process through some case analysis and practical problems, the relationship
between the complexity knowledge to apply the knowledge to solve the problem. Mechanical
courses are very practical, the content is more boring, and the traditional teaching methods are often
very simple, resulting in little effect. Especially in explaining the composition of all kinds of mechanical components, structural features and working principle of content, in order to allow
students to understand the teaching materials in the assemble diagram and schematic diagram, often
need to spend a lot of time and effort to explain. The traditional teaching method is to make the
body move by the teacher's explanation, and some of the multimedia courseware is also in the level
of some animation, and the lack of interactivity. However, the organization is moving, how to make
the analysis of the movement in the classroom is to improve student interest in learning and master
the relevant knowledge of the key points. Virtual reality technology can be applied to all aspects of
the teaching of mechanical courses, from the analysis of the organization to the design, from
kinematics to dynamics, and from the common institutions to the combination of institutions and
mechanical systems, they are available through the virtual reality technology, allow students to
carefully observe the movement mechanism under various conditions, any problem is given to
allow students to think [4]. This can take full advantage of the attention of students, stimulate
students' interest in learning and innovation ability.

The Application of Virtual Reality Technology in Practice and Experiment Teaching

The traditional training and experimental teaching mode is that the students can finish the operation
contents of the teachers in the time stipulated by the teachers. This experiment did not pay attention
to students' interests and receiving ability, students lack interest in learning, passive learning,
mechanical operation, lack of independent thinking, the development of students' innovative
thinking and ability is limited, and the enthusiasm of the students to explore the obstacles. This kind
of teaching mode is difficult to train the technical talents with comprehensive thinking ability and
comprehensive problem solving ability. At the same time, the actual operation by the number and
variety of equipment and other restrictions, not everyone can participate in the actual operation, and
some tests cannot be completed in a timely manner, there is low efficiency, high cost and high risk
time. Teachers can be experimental on screen by use of virtual simulation software which is
intuitive and practical, students can complete the experiment on computer, which avoids the
separation of theory and experimental study of traditional teaching mode. Moreover, the students
can give full play to their creativity in the virtual simulation situation and stimulate student to think
actively, which greatly improves the students' interest in learning. The application of the virtual
simulation technology makes the teachers and students get rid of the restriction of the experimental
equipment and the field. In addition, the virtual simulation technology can greatly improve the
learning efficiency of students, can reduce the damage of the equipment and the consumption of
components, and can save resources to alleviate the tension of the laboratory.

The application in practice teaching. In the process of mechanical equipment construction and
maintenance, the time of disassembly and assembly determines the speed of maintenance work,
which directly affects the completion of maintenance tasks. In order to finish the maintenance task
quickly and well, it is necessary to master the disassembly and assembly of the assembly parts.
Over the years, the teaching of mechanical equipment construction and maintenance has been
carried out in accordance with the mode of training, the required equipment investment, teaching practice, teaching and training for a long time, the number of teachers. In addition, students have little opportunity for maintenance practice, so that the cycle has become very long. How to improve the maintenance skills of students in the short term has become a problem that puzzles the teaching institutions. Virtual reality technology is used to change the way of traditional teaching. It can realize a real-time and virtual reality virtual environment on the computer. Through the vivid visual and auditory effects, people can get the feeling of being immersed in the environment, implement the construction teaching of the equipment in a virtual way, simulate and decomposes, simulation adjustment and simulation examination and other teaching subjects. In the course of the operation, the student only need to view the analysis of virtual components, select the right tools, select the parts with the mouse, the data input box in the pop-up input torque data. Then, virtual disassembly operation can be completed.

In the process of NC machining training, the equipment system and models involved in teaching materials are diversified and extensive, and the system of experimental practice equipment cannot be matched, and not to adapt to the update and change of the model. Each practice consumes a large number of metal materials and tools, resulting in a huge waste. The use of real equipment to the initial contact with the students and students practice a great deal of equipment and personal safety hazards, especially the automatic tool operation and high-speed, high precision equipment operation is more so, and for the operation of multiple devices no more teachers investment, to ensure absolute safety operation. The introduction of computer virtual reality technology makes virtual processing a reality, virtual technology can imitate the real CNC machine tool processing process, realize the virtual machining, and can complete the traditional machine operation and processing teaching that cannot complete the task [5]. It makes the students like in the manufacturing site, not only can the equipment external information intuitively show students, they can even enter the internal equipment to observe, understand its internal working condition and operation principle.

The application in experiment teaching. The traditional experimental teaching mode is that the students can finish the operation contents in the time stipulated by the teachers. This kind of confirmatory experiment does not pay attention to students' interest and reception ability, there is no individualized teaching, student lack of interest in learning, the development of innovative thinking and innovative ability of students is restricted. Virtual experiment is a kind of experiment mode which is produced and developed by multimedia and virtual reality technology. It is based on the computer as the control center, uses the software technology to construct the logic structure model of the system, coordinates the related hardware equipment technology to form the virtual experiment system, and through the computer network Forming a virtual experimental system network. It is possible to make the students learn to do all kinds of experiments in the real environment by computer, and the learning and training effect is equivalent to or even better than that in the real environment [6]. It is the combination of computer technology, virtual reality technology and human-computer interaction technology. It is also an innovation in the application of information technology in education field. The virtual experiment is carried on through the virtual laboratory, to simulate the real experiment environment by using multimedia technology, group learning, collaborative learning and competition learning model of flexible application, which can stimulate the students' learning interest. In the virtual experiment, students can easily analyze different experimental results by changing the experimental parameters. It is helpful to cultivate students' scientific consciousness and innovative spirit.

Conclusions

Computer assisted instruction has become the development trend of modern education and information technology. With the rapid development of computer technology, virtual reality technology is a new science and technology. It has been applied and popularized more and more with the advantages of high efficiency, low cost, abundant content and effective performance. The application of virtual reality technology in teaching can help us to solve the drawbacks of the traditional teaching model. It changed the traditional teacher centered teaching model, instead of the
student centered autonomous inquiry learning. Through the virtual simulation, it can easily carry out repeated experiments on the mechanical courses involved in the basic principles, calculation methods and advanced technology complex system. It can improve the efficiency of learning related knowledge, and deepen the students' understanding of theoretical knowledge. The creativity and imagination of the participants can also be displayed and displayed on the simulation platform. Each the process of simulation model from the conception, construction to debug through, until the final results is a review, consolidate, improve and improve for the professional knowledge, mathematical knowledge and computer knowledge. Therefore, the use of virtual simulation technology in teaching to improve teaching quality and teaching efficiency will help to design a vivid and guide students into the state of autonomous learning, which can help improve the ability to analyze and solve problems and innovation.

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