Construction and Management of Virtual Experiment System

Liu Xu Yong

Abstract Virtual experiment system can effectively improve the teaching effect, stimulate student interest and enhance the technology content in teaching as well. This paper introduces the concept and basic characteristics of virtual reality technology and makes an insight into its advantage and the mode of administration, with the emphasis on its application to the computer and economic management courses.

Keywords Traditional experiment • Virtual reality technology • Virtual experiment system

Being essential for students' competence for knowledge acquisition and problem-solving ability, teaching Practice plays a very important role in higher vocational education. But the traditional teaching modes greatly hinder the students' innovation ability and therefore have some negative effect on their learning. The application of virtual reality technology can effectively solve the problem.

1 Introduction to Virtual Reality Technology

With three dimensional graph production technology, the multi-sensing interactive technology as well as the display technology, and the devices as keyboard, mouse, sensory equipment, hard helmet and data glove, the virtual reality

L.X. Yong (✉)
Electronic Equipment and Information Management Office, Shaanxi Academy
of Governance, Xi'an, Shaanxi, China
e-mail: liuxuyong@126.com

(Virtual Reality, VR) enables participants to enter and communicate in the virtual environment, in which they can sense and act on the various virtual objects (Hu Xiao Jiang 2005).

The basic characteristics of virtual reality technology include:

1.1 *Multi-sensations*

Employing the observation, to listen attentively to, touching, the kinesthesia sensing and the response installment, users may obtain various sensations in the virtual environment, and adopts the corresponding actual response and operates alternately.

1.2 *Interaction*

With kinds of equipments, users can sense virtual environment objects through their body movement and language in the virtual reality system. Such man-machine interaction may come very close to natural interaction through each, the user relies on comes in the sensation and the operation.

1.3 *Immersion (Huang Ming ji 2005)*

Based on the human physiological characteristic of vision, hearing and the computer three dimensional vectograph, the virtual reality technology get subjects immersed into the virtual setting.

2 The Characteristics of Virtual Experiment System

2.1 *Support Cooperation*

The virtual experiment system provides more than one way to communicate between the users.

2.2 *Powerful Interaction*

The virtual experiment system has the formidable interactive ability, which provides a lifelike experiment environment to the user, the subjects and the users can interact with each other simply by dragging the mouse Real-time observation on the experiment phenomenon and the result is also allowed in the setting.

2.3 High Sharing Degree

The virtual experiment system breaks the traditional regional and time limit, and enables wide-range subscribers' visit. Meanwhile, the laboratory technician may carry on the experiment in any time.

3 The Advantage of Virtual Experiment Teaching

Based on the present experiment teaching situation and the virtual experiment system's characteristic, the virtual experiment teaching has the following superiority:

3.1 The Open Object

In the experiment teaching, learners may be divided into the curriculum learner, the curriculum participant and amateurs. Rests on the hypothesized pilot system operation; they can be divided into the laboratory technician, the teacher and the technical personnel. Different objects carries on the study and the exchange under the virtual experiment platform according to their status respectively.

3.2 Open Organization

Closely related to the network, the experiment resource and the experiment project, the virtual experiment is not confined to time and place, which guarantees the users freedom to choose. Along with the experiment teaching's development and the request, there are more demands for the cross region, interdisciplinary and simultaneous experiment. The virtual experiment enlarges the space for the experiment teaching's development.

3.3 Open Resources

Teaching resources open completely to the experimental subjects in the virtual experiment, which not only includes the empirical datum, the curriculum analysis and summary, but also involves the virtual experiment project alternative's development, designs and operates (Xu Hong and Liu Yu 2009)? The student experimental design may use the system software program module and the experiment item design template; Empirical datum's analysis and processing may carry on through

the data analysis and the processing tool bag; the consolidated knowledge may be done through teacher's instruction, student's exchange information and experiment breakdown and error analysis.

4 Improve the Quality of Virtual Experimental Teaching Methods

To ensure a quality of teaching improved, so that effective teaching virtual experiments carried out smoothly, we must do a good job of teaching the management of experimental work, mainly in the following points:

4.1 Development of Realistic Experimental Syllabus

The experiment program of instruction is the university tests the teaching management the laws and regulations, it is organized and implemented teaching, check the fundamental basis of its quality.

4.2 The Preparation of Guidance Materials Virtual Experiment Class

According to the experimental curriculum, content and present laboratory experiments used in the virtual environment, to prepare for the professional use of the experimental tutorial series, available to the experimental class teachers and students to participate in the experiment. Tutorial should include the construction of experimental equipment, operating essentials, experimental project purpose, principles, experimental procedures, experimental results.

4.3 According to the Experimental Requirements of Syllabus Development of Assessment and the Scoring Criteria

Laboratory experiments to measure teaching quality assessment is an important indicator, is to check the effect of teaching to promote student learning, improve teaching, improve the quality of teaching methods, is to test the students master the content of experimental an important basis for the situation. Rating standards of impartiality, scientific and rational will directly affect student learning initiative.

4.4 Accurate Records of Experimental Teaching Log (Yang Yuhong and Huang Jinshan 2006)

Experiment course the log is the actual record after Experiment, Is examines the experiment class entire process actual result the concrete management document.

5 Virtual Reality Technology Application

The application of virtual reality mainly focuses on the virtual laboratory, the virtual learning environment, virtual really teaches aspects virtual simulation campus, and virtual distance learning.

5.1 Virtual Reality in Application Economics and Management Curriculum

In economy teaching, problems like lack of practice but abundance in theory, disconnection between theory and practice, are common. Computer technology should be combined with the teaching media and the teaching method reform to construct a curriculum related Virtual pilot system, including the market marketing, the third party physical distribution, electronic commerce, the human resources development, the stock transaction, the finance, the finance, the traveling scene and so on. In this way, we can carry on the perfect development and the interactive operation. For example, the real estate marketing virtual system may formulate different user and make out different strategies to marketing. Through virtual experience, not only deepened to the theoretical knowledge understanding, moreover lets the laboratory technician realize the modern real estate marketing the interactive type, the experience type, the digitized marketing pattern. Moreover, the electronic commerce modeling system may establish the store, the bank, the commodity and so on corresponding model, the laboratory technician may simulate processes and so on commodity choice, payment, allocation. Moreover, the virtual reality technology mock tourism scenic spot, take real data and so on image, picture as a foundation, using the computer manufacture three dimensional image, depends upon the hard helmet type monitor or the three-dimensional eyeglasses, the data glove, the bodily spot tracking device and the special projected display equipment, "the depth" the information and the observation parallax produces the three dimensional three-dimensional synthesis results through the visual main center comprehensive object, and unifies the sense of hearing, the vision and the sense of touch realizes the scenic area in the virtual scene the geographical environment and the characteristic.

5.2   Virtual Reality Technologies in Computer Experiment's Application

The virtual experiment system includes the related test installation, the experimental subject, the teaching information resources and the laboratory environment, the virtual laboratory already may be the virtual conception laboratory, may also be the real laboratory reappearance. For example, to deepen WAN, the metropolitan area network concept understanding, it does not need to construct the real network, (Jiang Ping 2006). Moreover, in the computer assembling and the maintenance curriculum, the virtual machine software vmware foundation and the real computer same movement environment may be offered to ensure various experiment such as the processor, the memory, the graphic display device, the input-output device and so on, which may create a real-sense experiment without any influence to the computer (Li Wen Yu 2004).

The virtual reality technology may also experiment on the model devised by laboratory technician .the result and the effect is supposed to confirm the feasibility and the rationalization. For example, in the network experiment, risk and cost may get reduced through the virtual router, the switchboard, the server and the terminal carries on the network (Jiang Ping 2006)

6   The Virtual Reality Technology the Question Which Exists in the Application

With the economy and technology development, the virtual reality technology will increasingly widely used in education teaching. But the current of the virtual reality technology still has certain problem, mainly displays in:

6.1   The Hardware Environment Also Needs to Enhance

The virtual reality technology's related equipment universal existence use is not convenient, effect not good and so on situations, meets the requirements which with difficulty the virtual reality system needs, like central computer's processing speed has not been able to satisfy in the hypothesized world the huge timely data quantity processing need, based on the sense of smell, the sense of taste equipment did not have mature and the commercialization.

6.2 Virtual Reality's Effect Also Needs to Strengthen

Virtual reality's expression stresses in the geometry indicated that lacks the lifelike physics, the behavioral model, in the sensation, the visual synthesis aspect's research are many, but the sense of hearing, the sense of touch attention are few, its hypothesized effect also needs to further strengthen.

6.3 Realizes the Cost to Need to Reduce

The virtual reality system application's related equipment price is also quite expensive, and these equipment limitation is very big, needs to further develop its structure and the technique of manufacture, causes its dexterous and reduces the cost, can be more advantageous in the promotion applies.

6.4 Virtual Environment and a Real Environment of the Differences

Students learn in a virtual environment with existing in the environment in a real difference. If only consider interactive authenticity, so really operate machines is superior to any media teaching effect. Therefore, the virtual reality technology cannot completely replace the specific real operation; it can only to a certain extent instead of some experiments.

7 Conclusion

The real experiment environment is more advantageous than the Virtual experiment environment in deepening student's perceptual knowledge and beginning ability, therefore, not all experiments are suitable to Virtual ways (Zhu Min 2006). An experiment system should be comprehensive and the complete, which includes the true environment and the virtual environment. Only with the perfection of construction and the advance of experiment environment, can we improve the quality of experiment teaching greatly, promote the university's core competence, and fulfill the task to serve for the teaching, the scientific research, and hence have breakthrough in our science and technology innovation and our society's development and the progress.

References

Hu Xiao Jiang (2005) The virtual reality technology [M]. Machinery Industry Press, Beijing

Huang Ming ji (2005) Virtual numerical control technology and applications [M]. Chemical Industry Press, Beijing

Jiang Ping (2006) Virtual machine and its application in computer teaching [J]. Eng Inst Sichuan Univ 5:34–35

Li Wen Yu (2004) A web-based virtual laboratory environment [J]. Exp Technol Manag 21(3): 105–108

Xu Hong, Liu Yu (2009) Computer virtual experiment environment reform and practice [J]. Exp Technol Manag 2(2):90–92

Yang Yuhong, Huang Jinshan (2006) Reforming laboratory management system to improve teaching quality [J]. Northeast Agric Univ 4(1):77–78

Zhu Min (2006) Application of virtual experiment and teaching [D]. PhD thesis, East China Normal University