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Research on the Construction Model of Virtual Simulation Experimental Teaching Ecosphere in Higher Education

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Abstract: *The experimental teaching content based on virtual reality technology is more and more widely used in the teaching process of higher education, and has achieved good teaching results. Firstly, this paper defines the basic characteristics of virtual simulation experiment teaching in higher education, and then combs the interest demands and roles of universities, enterprises and social resources in the construction of virtual simulation experiment teaching resources, the sharing of network resources and the reform of teaching mode. Finally, the paper puts forward a benign construction mode of virtual simulation experiment teaching ecosystem of higher education based on the sustainable development of "university + sharing platform + enterprise". The establishment of a benign and sustainable virtual simulation experiment teaching ecosystem is the guarantee for the effective development of virtual simulation experiment teaching, and promotes the integration of all advantageous resources and technologies to produce good social and economic benefits.*

Key words: *Higher education; Virtual simulation; Benign sustainability; Ecosphere*

Introduction

Virtual simulation is a way of thinking to simplify complex problems by using virtual means to simulate the occurrence and development of real events. The application of virtual simulation technology in the field of education can be traced back to the 1990s, when the characteristics of computer simulation technology limited its application in the field of higher education and teaching. In recent years, with the technology of virtual reality (VR) and augmented reality (AR) becoming more and more mature, the technology of Internet is developing rapidly, the number of virtual simulation experiment teaching content construction in the field of higher education is gradually increasing, and the application scope is also becoming more and more extensive. Through the application of virtual simulation experiment teaching project, the traditional teaching process can be carried out because of the high consumption and non-repetition of the project, which effectively improves the experimental teaching level of higher education stage.

Basic Characteristics of Virtual Simulation Experiment Teaching in Higher Education

The primary and basic feature of virtual simulation experiment teaching in higher education is its technical

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feature, that is, on the basis of meeting the requirements of teaching syllabus of related majors, using virtual reality, multimedia technology, human-computer interaction, network platform construction resource sharing and other technical means to achieve undergraduate experiment teaching. It must be through the reasonable use of technical means to complete the teaching resources, experimental environment and other real world elements of high simulation, to avoid the distortion in the process of virtual simulation experiment design is the key technical problem of its construction.

The biggest characteristic of virtual simulation experiment resource is its openness, which refers to the openness of resources. Through the construction of virtual simulation experiment network sharing platform, teaching resources can be opened. Users can choose any experimental items in the platform through the network to carry out experiments and conduct self-evaluation; the use of form is open, as long as users can carry out experiments in accordance with the experiment Under the condition of open, the experiment can be completed by any terminal device; the learning object is open, and anyone who is interested in the experiment can participate in the experiment process, and anyone except students and teachers can learn through virtual simulation experiment; the experiment process is open, and the experiment process of Virtual Simulation Laboratory is an open process, which will be based on different forms Different experimental results are obtained by different parameter settings, variable selection and experimental steps.

Development Process of Virtual Simulation Experiment Teaching and Demand Analysis

Construction of teaching resources of virtual simulation experiment

Virtual simulation experiment teaching resources are the basic unit of virtual simulation experiment teaching. The construction of high quality virtual simulation experiment teaching resources is the premise and guarantee for the smooth and efficient development of virtual simulation experiment teaching. At the present stage, the construction of virtual simulation experiment teaching resources is mainly initiated by the main demand side of the project, and the initial goal is to solve the problem of experiment teaching and improve the teaching level. The experiment teacher designs the experiment process, experiment parameter, experiment script and other works according to the actual teaching demand. After the preparatory work is done, the school will put forward the requirements for the production of experimental projects to complete the construction of virtual simulation experiment teaching resources through direct procurement or designated enterprise agent development.

Construction of teaching resource sharing platform for virtual simulation experiment

The essence of virtual simulation experiment teaching is the application of information technology, and the openness of teaching resources is its important feature. Therefore, the construction of a network platform for carrying out online virtual simulation experiment is inevitable for the development of virtual simulation experiment teaching. The construction of virtual simulation experiment teaching resource sharing platform has higher requirements for the management and maintenance of computer network and platform. Colleges and universities, as teaching units, pay more attention to the improvement of teaching resources and pay less

attention to the construction of sharing platform.

Elements of virtual simulation experiment teaching ecosystem

In the process of constructing virtual simulation experiment teaching system, there are teaching units, scientific research units and social enterprises participating in it. Each department in the system has its own advantages and disadvantages. The construction of virtual simulation experiment system can be completed only when all departments cooperate with each other and take what they need, which makes the formation of virtual simulation experiment teaching ecosystem possible.

Teaching unit

The main service object of virtual simulation experiment teaching system is teaching unit, which has the demand of using virtual simulation experiment teaching resources. The teaching unit is the starting point of the construction of most virtual simulation experiment resources. Because it grasps a large number of education resources, is familiar with the operation process of experiments, and is able to design scientific and reasonable experimental teaching projects that conform to the laws of education and teaching. However, the teaching unit is not familiar with the relevant technologies of the development of virtual simulation experiment teaching resources, so the teaching unit needs to complete the rest through other departments' related work.

Scientific research institutions

Due to the characteristics of open resources and learning objects of virtual simulation experiment teaching resources, many scientific research institutions also participate in the construction of virtual simulation experiment teaching system in varying degrees. Scientific research institutions participate in the construction of virtual simulation experiment teaching system through the introduction of new technology, patent transfer, personnel training and other ways.

Social Enterprise

The construction of virtual simulation experiment teaching system must be a long-term construction process, and social enterprise is an indispensable part of this construction process. As a profit-making unit, enterprises mainly need to seek their own interests through project construction in the process of virtual simulation experiment teaching construction. Enterprises can mainly achieve profit appeal, publicity appeal and ability improvement appeal through virtual simulation experiment construction.

Construct Virtual Simulation Experiment Teaching Ecosystem

Construction objectives

A. Advanced technology, comparative support, establishment of virtual simulation experiment teaching and

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experience environment.

Establish a teaching organization process that can integrate advanced technology virtual reality interaction technology, virtual simulation experiment teaching and experience environment, realize three-dimensional large screen interaction, share interaction with Internet platform, open experience of virtual simulation experiment hardware equipment and facilities, realize collaborative development of virtual simulation experiment teaching resources between universities and enterprises, and improve virtual simulation as soon as possible The real experiment teaching system can meet the teaching needs of related majors.

B. Innovate the mechanism, encourage the educational reform, and form a long-term development and operation mechanism.

According to the professional requirements, through the way of teaching process discussion, teaching process backtracking and teaching effect tracking, this paper explores the construction mode of virtual simulation experiment teaching system, establishes the virtual simulation project construction team, and establishes the selection mechanism of virtual simulation related enterprises. The advanced technology such as multi person cooperation and action capture are used to build the virtual simulation experiment teaching environment, promote the development of relevant teaching reform topics, deepen the cooperation between schools and enterprises, and form the long-term and sustainable research and development ability of the virtual simulation experiment system.

C. Highlight resource sharing and promote the construction of virtual simulation resources

In view of the development of virtual simulation experiment teaching resources for the key majors of the University, the advantage resources are concentrated to improve the project development level, and the reasonable construction projects are selected through the collection and selection mechanism of the college. In the process of construction, we should fully consider the resource sharing, pay attention to the content of development, and avoid the waste of repeated construction resources.

D. Long term mechanism, demonstration driven, deepening the new mode of school enterprise cooperation

Promote the application of new technology and novice in the field of practical teaching, study the characteristics and attributes of virtual simulation and virtual simulation teaching, explore multiple modes of school enterprise cooperation, deepen school enterprise cooperation by introducing resources, transferring patents, technology transfer, advertising in projects, etc., and build a platform for school enterprise cooperation and development.

Construction mechanism

A. Establish expert team mechanism

The expert team is responsible for the construction of virtual simulation system, overall planning, discipline coordination, development technology selection, network sharing platform support and other important tasks

of consulting services, so as to form a sustainable innovation construction.

Construction of expert database: the key teachers of key universities, relevant enterprises in the virtual simulation industry, industry associations, and experts in the academic field are used to set up the expert database to complete the relevant consultation work in the process of virtual simulation experiment teaching construction.

Expert selection mechanism: backbone teachers in Colleges and universities are mainly produced through voluntary declaration and centralized evaluation, focusing on the research level of teachers' teaching achievements in virtual simulation experiment projects; experts in related enterprises and industries mainly choose industry-renowned technical personnel, in principle, enterprise experts should be diversified to make the project construction process more scientific and standardized.

B. Enterprise selection mechanism

Guided by the actual supply-demand relationship between the school and the enterprise, we dig deep into the enterprise needs in the process of virtual simulation experiment teaching, select enterprises by echelon according to different needs, establish a two-way evaluation system elimination mechanism on a regular basis, establish the national construction standards in the field of education, and select construction projects. Enterprises can be selected according to the industry chain supplement mechanism and peer competition mechanism.

Industry chain replenishment mechanism: according to different nodes such as hardware support + software production + network support + industry application, units in the virtual simulation related industry chain carry out multi-level and multi angle research and analysis. Each node reserve company is no less than 20, and the project construction stage can be selected according to the opinions of the expert group.

Peer competition mechanism: the construction of virtual simulation experiment teaching resources can be generated through peer competition mechanism. Teachers have fully understood the technical means and implementation methods needed for resource construction and can select enterprises through bidding and inquiry to complete the preliminary demonstration task of the project.

C. Resource sharing mechanism

Realize the sharing of project development technology and project application. Set up a virtual simulation experiment sharing platform, classify it according to disciplines, majors and courses, select the same type of experimental projects through expert panel review, students' feedback and other ways, and implement the time limited open and paid use of experimental projects. Schools need to realize the mechanism of learning sharing and mutual recognition. In addition to the sharing of experimental projects, resource sharing also needs to realize the sharing of experimental technology, the diversification and flexibility of experimental virtual simulation experiment projects, and fully mobilize social resources to participate in the construction of virtual simulation experiment projects.

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D. Diversified school enterprise cooperation mechanism

To clarify the different needs of universities and enterprises in the construction of virtual simulation experiment teaching resources, fully mobilize social resources, deepen the cooperation between universities and enterprises, and accelerate the construction of virtual simulation projects. Enterprises' participation in the construction of virtual simulation projects is mainly divided into direct participation, technology investment, advertisement implantation, product sharing and other ways. According to the needs of different enterprises, universities should flexibly choose the mode of school enterprise cooperation through technology transfer, joint development, technology introduction into the second classroom, enterprise staff training and other ways to make the long-term and sustainable cooperation between schools and enterprises.

E. Evaluation mechanism of virtual simulation experiment resources

Establish the evaluation mechanism of virtual simulation resources, and establish the evaluation mechanism of virtual simulation experiment teaching resources through the utilization rate, sharing situation and feedback situation after the use of students. Realize the continuous investment of high-quality resources and high-quality projects, eliminate low-quality resources, and understand the current teaching needs to provide basis for the construction of resources. Through the evaluation mechanism of the project, the excellent development team can be effectively determined, and the evaluation of the project can be linked with the selection of the expert team. The main responsible personnel of the excellent development team can be selected as the expert team, and the team members with low quality of many development projects can not be selected as the expert team.

Conclusion

The construction of virtual simulation experiment teaching system is a long-term construction process. With the introduction of new technology and new means, the change of teaching needs will directly affect the construction and use of virtual simulation experiment teaching resources. Therefore, both the selection of teaching methods and the development of teaching are dynamic processes. With the continuous development and maturity of VR, AR, big data, cloud computing and Internet of things technology, virtual simulation experiment teaching will become the key development direction of undergraduate teaching field. In order to optimize the allocation of educational resources and fully mobilize social resources, the establishment of virtual simulation experimental teaching ecosystem will have a profound impact on education and teaching.

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