

Research on Resource Sharing Mechanism of Virtual Simulation Experiment Teaching of Economics and Management Specialty in Colleges and Universities*

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Abstract—To realize the effective opening and sharing of high-quality resources in the virtual simulation experiment teaching demonstration center and improve the utilization rate and use efficiency of education input are important issues that need to be solved in current education reform. The article aims at the problems such as low sharing level of virtual simulation experiment teaching resources of economy and management specialty in colleges and universities, lack of shared platform, redundant construction of shared resources, low-quality shared resources, unclear sharing construction and lack of motivation. With basic platform of cloud technology sharing network under mobile internet, this paper explores the establishment of an open sharing platform of teaching resource across the schools, the design of the resources sharing system of virtual professional simulation teaching of economy and management specialty, the development of open sharing access standards of experimental teaching resources and the establishment of a top-down, three-in-one experimental teaching resources construction.

Keywords—virtual simulation; experimental teaching; resource sharing

I. INTRODUCTION

By 2016, the Ministry of Education reviewed 900 national experimental teaching demonstration centers and 300 national virtual simulation experiment teaching centers. The next step is to build a high-quality virtual simulation experiment teaching resource sharing mechanism to achieve university resources sharing and complementary advantages.

The emergence of "Internet +" concept provides a broad space for the open sharing of teaching resources. The sharing of high-quality resources for experimental teaching in colleges and universities is becoming an important starting point for universities to give full play to the innovative characteristics of talent training models and to achieve complementary advantages and create multi-win effects. At present, many scholars, universities and institutions have actively explored and practiced in this

regard. In theoretical aspect, Li Ping et al. (2014) put forward the guiding ideology, working principles, organizational strength and supporting measures of open sharing in the "Opening and Sharing of Experimental Teaching Resources in Universities". Hu Jinhong et al. (2015) put forward the management system of the top-level, policy and application platform organization structure in the "Exploration of the Opening and Sharing Mechanism of Virtual Simulation Experiment Teaching Resources in Colleges and Universities". Liu Yafeng et al. (2016) proposed specific sharing strategy for the problem of low-level opening and sharing of virtual simulation teaching resources in the "Exploration of Opening and Sharing Strategy of Virtual Simulation Teaching Resources". Yu Min (2017) put forward the opening and sharing of teaching resources from the top-level system design, sharing standard formulation, operation and maintenance in the "Research on the Opening and Sharing Mechanism of Virtual Simulation Experiment Teaching Resources in Colleges and Universities". Zhang Ruilin (2017) put forward a shared management mechanism with government-led, enterprise-oriented, university-supported, and full-participation in the "Research on high-quality resource sharing management mechanism of experimental teaching center". Chang Rui (2018) analyzed the role, content and existing problems of opening and sharing of laboratory resources in the article "Research on the Opening and Sharing Mechanism of University Laboratory Resources under the 'Internet +' Form". In practice, some universities in Beijing, Chongqing university town, Shenyang north university park, Changzhou higher vocational park, etc., 29 national-level economic experiment teaching demonstration centers promote information sharing through the "joint association" mechanism. Guangzhou university city established regional college alliances, and carried out the coordination and sharing of experimental teaching resources among schools. They have achieved certain results. However, they are still in the initial stage and exploration stage. There are also many problems. [1]

*Fund Project: Education and Teaching Reform of Xi'an FanYi University (J18B18); Macroeconomics teaching team of Xi'an FanYi University (Z1405)

II. PROBLEMS IN THE SHARING OF VIRTUAL SIMULATION EXPERIMENT TEACHING RESOURCES IN COLLEGES AND UNIVERSITIES

A. *The Degree of Cross-school Resource Sharing Is Low*

On the one hand, the number of inter-school resource sharing is small. Whether it is the sharing of hardware resources or the sharing of software resources, in general, the number of participants is small, the benefits are narrow, and the scale is not formed. Compared with the total amount of university town resources, the amount of resources involved in sharing is extremely small. Compared with the total number of students in college towns, the number of participants in resource sharing is extremely small and does not form a scale [2]. On the other hand, the quality of inter-school resource sharing is not high. Due to the fierce competition among colleges and universities, the colleges and universities always guard against each other. Most of the inter-school sharing is the mass resources, not the core resources of the school. The truly valuable educational resources are "hidden". Certain key resources remain strictly confidential. The courses of the colleges open to the public are mostly training courses, special courses, and humanities. There are fewer excellent courses with key subjects and higher teaching levels.

B. *Virtual Simulation Experiment Teaching Resource Sharing Platform Is Missing*

Through the construction of the laboratory and the experimental teaching construction that have been vigorously promoted in recent years, all relevant colleges and universities have formed many unique experimental teaching resources. However, due to the lack of information sharing platform for experimental teaching resources, the information channels between the supply and demand sides are not smooth. The unique management of experimental teaching resources is idle and waste, while the demand side does not know where available resources are. It directly caused the low-level redundant construction of the experimental teaching resources and the problems of shortage, idleness and inefficiency.

C. *Repeated Construction and Low-quality of Virtual Simulation Experiment Teaching Resources*

In the absence of a unified opening and sharing access standard for experimental teaching resources, colleges and universities are not afraid of abusing in the construction of resources. They want to meet the needs of their own experimental teaching and the needs of the virtual simulation experimental teaching center, and strive to complete the virtual simulation experimental teaching system. It has led to the repeated construction of some resources, and there are also many situations in which the quality is not high and the application is inefficient. [3]

D. *The Main Body of Cross-school Resource Sharing Is Unclear and Lacks Motivation*

The sharing of experimental teaching resources across colleges and universities is a huge systematic project. The

range of construction is wide, the investment is large, and the results are strongly public. Due to the questions such as the relevant subject, dividing the responsibility, whether it is driven by the government, or whether the education service enterprise actively undertakes and builds the risk management based on the commercial purpose, the construction subject of the school, the experimental teacher, the education service enterprise, etc. is unknown. It lacks motivation. The subject is not unwilling to take the initiative to develop shared resources. The existing resources are not willing to take the initiative to participate in the sharing category.

III. CONSTRUCTION OF VIRTUAL RESOURCE SIMULATION EXPERIMENT TEACHING RESOURCE SHARING MECHANISM OF ECONOMICS AND MANAGEMENT SPECIALTY IN COLLEGES AND UNIVERSITIES

A. *Establishing a Cross-school Opening and Sharing Platform for Teaching Resources Based on the Internet*

The colleges and universities integrate experimental teaching resources with Internet information technology. Since these resources are not limited by the operating system and application platform, they can be compared to the e-commerce mode for online transactions. The type, size, difficulty and download frequency of teaching resources determine the actual value of each resource. When the user uploads the resource for approval, the points corresponding to the actual value will be awarded. The university user who realizes the sharing can exchange the corresponding value teaching resources with the points. Under the coordination of the sharing platform, the high-quality resources of each university are integrated into one platform. The points are obtained according to the quantity and quality of the resources provided, and the number of accounts is allocated. The resources are integrated and effectively connected, which is convenient for access, update and maintenance. [4] It gathers scattered experimental teaching resources on one platform. It will greatly reduce the repeated construction of resources, shorten the cycle of secondary development and reduce the development cost of virtual simulation teaching resources.

B. *To Design Cross-school Sharing System of Experimental Teaching Resources of Economics and Management Specialty*

The construction of the system relies on the two virtual simulation experiment demonstration centers of the international economics and trade specialty and financial management specialty of the Business College of Xi'an FanYi University. It builds the experimental teaching resource sharing system of economics and management specialty based on the cloud technology sharing network infrastructure platform under the mobile Internet. It covers: "cross-school experimental places and equipment sharing", "cross-school experimental course resource sharing", "cross-school experimental teacher resource sharing", and "cross-school experimental teaching supervision and sharing".

1) *Cross-school experimental sites and equipment sharing*: Cross-school experimental sites and equipment sharing can be divided into two ways: experimental site rental and experimental course sharing. The rent of the place is the experimental place and equipment provided by Xi'an FanYi University (providing equipment maintenance personnel when necessary). Some teachers and students who cannot have the experimental teaching course due to resource limitations can rent the resources to complete the teaching. For example, a training institution conducts training on ERP sandbox simulation experiments, financial transaction simulation, and accounting computerized simulation experiments with the laboratory of the university. Course sharing is an experimental teaching course opened and carried out by the university. The other party acknowledges the achievements of the students after completing the experimental course. [5]

2) *Cross-school experimental course resource sharing*: The cross-school experimental course resource sharing mainly includes: cross-school experimental teaching system, syllabus, teaching material resources, database and case resources, boutique experimental course resources, open class video resources, and so on. We should integrate the teaching lectures, experimental cases, experimental procedures, instrument instructions, and experimental analysis reports of all the experimental courses in each university in the region, and establish the experimental teaching system resource and its index directory in the SaaS application layer. The two virtual simulation experiment teaching centers of the Business College of Xi'an FanYi University have rich open-ended experimental teaching network resources, and build a unified networked intelligent experimental teaching and laboratory management information platform on the campus network (intranet) and the Internet (external network) to realize resource sharing. For example, teachers and students in other colleges and universities can obtain the corresponding experimental rights through the account password, which is completely independent of time and space. It can also repeat experiments or conduct group experiments and exchange experimental data through the Internet. In the later stage, we will further improve the ERP management system simulation experiments, financial simulation laboratories, cross-professional comprehensive practice teaching platform VBSE and other large-scale comprehensive cross-school training experimental teaching soft platform in accordance with the networked and shared standards of inter-school experimental teaching resources. A systematic and rich cross-school experimental software integration platform is convenient for teachers and students to use inside and outside the school.

3) *Cross-school experimental teacher resource sharing*: At present, there are ordinary theoretical teachers being experimental teachers in colleges and universities. The number of full-time experimental teachers is small, and the

number of high-level and professional experimental teachers is less. Therefore, the scarcity of experimental teacher resources is more obvious in experimental teaching. However, due to the special nature of teacher resources, they cannot communicate and share indefinitely. Under the condition that teachers do the work well, colleges and universities should appropriately promote the teacher sharing by means of part-time and inter-school exchanges. For example, the colleges and universities hire teachers with high theoretical level and strong practical ability in well-known universities in China and Xi'an as part-time teachers; the colleges and universities hire experts with strong practical ability in enterprises and institutions as student experimental instructors to improve the effect of experimental teaching; the colleges and universities send experimental teachers to higher institutions to conduct continuing education. And the teachers can work in departments, companies, and enterprises related to the management profession to improve the overall quality of the experimental teachers.

4) *Cross-school experimental teaching supervision sharing*: Cross-school teaching intelligent supervision sharing includes cross-school video live broadcast, recording and broadcasting system sharing, cross-school management information system sharing, cross-school risk monitoring, early warning system sharing, cross-school technical support center and cross-school portal website sharing.

C. To Develop Open and Shared Access Standards of Experimental Teaching Resources

Open and shared resources should be high-quality and high-level teaching resources. The high quality and high level are mainly reflected in the two aspects of discipline advantage and professional characteristics. Some college disciplines have a long history of development and deep accumulation, which can give play to their disciplinary advantages and build a group of high-quality teaching resources. Some colleges have disciplines that other universities do not open. These colleges can build a number of high-quality teaching resources with characteristics. [6] The opening and sharing of these resources will enhance students' enthusiasm for independent learning and active learning, improve teaching level and teaching quality, and play a good role in radiation demonstration. Therefore, it is necessary to establish standards for access to teaching resources. Only high-level and high-quality teaching resources can enter the open and shared platform.

D. Establishing a Top-down, Trinity Experimental Teaching Resource Construction Subject

As the top-level designers of educational planning arrangements, the Ministry of Education, the Provincial Department of Education, and the Municipal Education Bureau undertake the overall planning and layout of the virtual simulation laboratory of colleges and universities. The education department can make a reasonable allocation

of educational resources in the region to avoid duplication of construction. At the same time, it is also possible to coordinate resource allocation between universities in the early stage of the construction of experimental teaching platform to better promote the sharing of educational resources. Second, it is to establish a teaching alliance between universities in the region. College teaching alliances are usually composed of colleges and universities. The purpose is to stipulate the scope of cooperation among universities through contracts or related agreements, achieving resource sharing among universities. This includes the joint construction and maintenance of some experimental teaching platforms, and the joint purchase and use of experimental teaching equipment. Thereby, the platform construction cost can be reduced and the utilization rate of teaching resources can be improved. Third, the experimental centers within the university seek out the off-campus experimental platform worthy of cooperation based on their own developmental defects, making up for their own shortcomings. [7]

IV. CONCLUSION

The opening and sharing of virtual simulation teaching resources is an important part of the construction of virtual simulation experimental teaching center, and is also an important way and means for the integration and optimization of teaching resources. By constructing a virtual simulation experiment teaching resource sharing mechanism for colleges and universities, it is possible to integrate the advantages of university experimental teaching without increasing or decreasing the investment, and maximize the existing human, material, financial and intellectual functions. The improvement of informatization and intelligence level of experimental teaching, and the improvement of the quality of personnel training and comprehensive benefits play a role in promoting the reform of the teaching technology of experimental education in colleges and universities.

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