Construction and Practice of Virtual Simulation Course System for Organic Chemistry Experiment Teaching

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Keywords: Organic Chemistry Experiment, Virtual Simulation, Teaching Reform, Case Study

Abstract: Organic Chemistry Experiment Teaching is the Basis of Students' Cognitive Experiment Operation. the Virtual Simulation Course System is One of Effective Methods to Improve the Experiment Teaching. the Specific Implementation Plan of the Virtual Simulation Course System is Discussed by Solving the Practical Problems of Organic Chemistry Experiment Teaching. Combining Organic Chemistry Experiment Teaching and Virtual Simulation Technology to Build a Comprehensive Experimental Platform for College Students is Conducive to Improving Their Experimental Operation Ability. This Paper Combines the Latest Development Direction of Virtual Simulation Topics, Points out the Necessity and Feasibility of the Application of Organic Chemistry Experiment Teaching Reform, and Gives Examples of Virtual Simulation Project System.

1. Introduction

With the Rapid Development of Virtual Simulation Technology in Different Research Fields, the Virtual Simulation Course System Emerges At the Right Moment and Develops Rapidly in the Field of Education, Giving Ideal Teaching Methods to College Teachers and Constructing a New Teaching Method -- Virtual Simulation Teaching Method^[1,2]. in Particular, the Organic Chemistry Experiment Teaching Tends to Be More and More Information-Based. the Organic Chemistry Experiment Teaching Method Constructs a Virtual Experimental Environment by Using the Internet of Things Technology, by Using the Simulation of Organic Chemistry Experiments to Carry out the Idea Design, Experimental Operation and Results Verification^[3].

2. Application Status of Virtual Simulation Teaching

At Present, the Teaching of Organic Chemistry Experiment At Home and Abroad Has Been Gradually Applied in Virtual Simulation Teaching. Virtual Simulation Teaching Can Form a Relatively Systematic Teaching Structure through Behavioral Awareness and Background Software. Europe and the United States Are the First to Conduct Research on the Virtual Simulation Classroom System. through Its Strong Application of Internet of Things Software Foundation, It Has Developed Virtual Simulation Software Systems Such as Quest and Envision to Be Applied in the Teaching Curriculum ^[6]. At the Same Time, the Virtual Simulation Classroom System is Also Used in Academic Research and Experimental Education. the Main Goal is to Apply the Virtual Simulation Classroom System to Student Experimental Education. in China, Various Educational Research Institutions Have Used Virtual Simulation Classroom System to Construct Scenes to Explore Classroom System in the Field of Education.

2.1 The Necessity of Citing Virtual Simulation Teaching

(1) In the reform of the classroom system of various universities, it is a necessary practical issue to promote the development of information system in the teaching system. The teaching of organic chemistry experiment requires a large amount of experimental equipment and pharmaceutical reagents, which will become a very heavy financial burden for ordinary colleges and universities. Therefore, reducing the cost and reducing the economic burden of the school in the construction of

organic chemistry laboratories is the only way for the development of information technology in colleges and universities.

(2) Students are more difficult to understand the specific operation process of the organic chemistry experiment course. Most of the content learning is completed by consulting experimental data, and the process is lack of immediacy and visualization ^[8]. There are few courses in organic chemistry experiments, and the consolidation and improvement of theoretical knowledge framework and experimental operation skills cannot achieve comprehensive guarantee. In the development of the virtual simulation course training program, the organic chemistry experiment planning is carried out to ensure that the experimental courses can reach the corresponding practical operation and theoretical study time, and the design of the experimental operation class is reasonable.

2.2 The Feasibility of Citing Virtual Simulation Teaching

(1) With the development trend of organic chemistry experiment teaching in China, the virtual simulation course has a wide range of feasibility, constructing a complete organic chemistry experiment teaching and integrating with the virtual simulation course system to achieve complementary teaching purposes^[7]. The virtual simulation course has the following advantages: it can ensure sufficient pre-class preparation, reduce the consumption of medicines, increase the content of extra-curricular experiments and so on.

(2) It is necessary to Fully and effectively use the resources of the school to conduct experiments, so as to avoid unnecessary experimental risks and to obtain the most effective classroom system effect. The pharmaceutical reagents used in organic chemistry experiments in various universities, especially in organic synthesis experiments have certain toxicity or corrosiveness. Some colleges and universities have neglected the environmental pollution of organic chemical reagents when constructing organic chemistry laboratories. Therefore, the construction of the virtual simulation course system helps to reduce environmental pollution and reduce experimental costs^[9].

3. Construction and Advantages of the Virtual Simulation Course System

In the specific implementation process of the virtual simulation classroom system, through the actual teaching situation of the organic chemistry experiment course, a series of specific virtual simulation course plans are developed. Through the case construction, the research design plan determines the best virtual simulation course system through the investigation and analysis of the organic chemistry experiment, establishes the specific experimental teaching virtual simulation classroom plan, and applies it in the teaching process.

1) Experimental preparation and improvement of experimental teaching effect: Using the virtual simulation course system, college students can prepare the course before the organic chemistry experiment, clarify the specific experimental operation process, pay attention to the sudden problems of the experimental system operation, and use the teaching software to prepare assessment system performs the scoring. Students who pass the assessment can enter the organic chemistry laboratory to complete the experimental course content, which replaces the traditional experimental preparation and improves the experimental teaching effect. Students need to use the virtual simulation platform to carry out three-dimensional operation on the use of experimental instruments and drugs. At the same time, there needs a comprehensive pre-class explanation in the virtual simulation course actual operation, matters needing attention and emergency processing and other measures. Teachers should combine the characteristics of the virtual simulation course to improve the experimental effect of organic chemistry teaching.

2) Experimental process, increase the fun of the classroom system: When completing the organic chemistry laboratory process, the specific organic chemistry experiment operation course needs to carry out the corresponding virtual simulation experiment according to the experimental characteristics of the students. In addition to the organic chemistry laboratory, college students can also complete part of the experiment process through the virtual simulation course, so as to improve

students' comprehensive experiment technology and teachers' ability to design synthetic experiment scheme, and help students to correctly choose instruments, install devices and reasonably design experimental methods. The organic experiment virtual simulation course jointly constructed by organic chemistry experiment teaching and virtual simulation classroom technology enables students to reach the immersive experimental operation effect and improve the interactive learning in the classroom. It can fully stimulate students' hobbies in organic chemistry experiments and open up the impulse to explore the mysteries of organic chemistry.

3) Experimental assessment, Diversification improvement of the classroom system: the traditional organic chemistry experiment is limited by the conditions of the experimental drug reagents and the operating site. It can only be used for the written test, but can not reach the goal of the experimental course. Virtual simulation software can now be used to simulate the real-life scenarios of organic chemistry labs, conduct comprehensive experimental assessments, and improve students' operational capabilities. The use of the virtual simulation classroom system can more intuitively demonstrate the diversification of the laboratory and avoid the experimental effects affected by insufficient experimental conditions. It need to put an end to the students' usual oral and graphical explanations of the experimental operation, eliminate the experimental operation conditions that students can not understand, and improve the objective conditions of organic chemistry experiment teaching.

Through the above specific experimental content and operation teaching construction, the best system construction scheme of virtual simulation teaching in the experimental course is explored.

4. Virtual Simulation Course Examples Are Introduced in Organic Chemistry Experiment Teaching

To comprehensively develop the practical operation ability and innovative experimental spirit of college students, improve the content of organic chemistry experiment teaching, and further improve the curriculum system, it is necessary to fully research and develop the latest teaching system and introduce it under the conditions of relatively inadequate organic chemistry experiment teaching. This course is developed by conducting courses on the preparation of organic synthetic raw materials and the separation of compounds between liquid and solid phases. Taking the preparation of cinnamic acid as an example, a virtual simulation class was introduced.

4.1 Preparation of Cinnamic Acid in Virtual Simulation Course

By the specific preparation method of designing cinnamic acid. The reaction of adding an aromatic aldehyde and a fatty acid anhydride (α -H) under the co-heating conditions of benzaldehyde, acetic anhydride and potassium carbonate to obtain an α , β -unsaturated acid is called a Perkin reaction ^[10]. Experimental procedure: The benzaldehyde and acetic anhydride were uniformly mixed, and then added with anhydrous potassium carbonate in a three-necked flask, the side port was a thermometer and a plug, and the middle port was a condenser. After heating for 1 hour, it should be cooled and kept at a constant temperature (within the temperature range of 50-170 oC). The sodium carbonate was dissolved in water and neutralized. The mixture was heated, boiled, transferred to a flask, and acidified with concentrated hydrochloric acid. The cinnamic acid was crystallized, recrystallized with water, and dried at 100 ° C to obtain a sample.

5. Problems in the Virtual Simulation Course Experiment

At present, in the actual application of virtual simulation classroom system, its teaching method has shown many advantages, but there are also some undeniable disadvantages. For example, compared with the actual operation of organic chemistry, the virtual simulation classroom can not completely replace the experimental operation process. At the same time, it is necessary to do a good job of software preparation before the virtual simulation course. Pre-class counseling, operation explanations and precautions must be explained in detail. The virtual simulation course should be strictly required to ensure the accuracy of each experimental operation, to ensure that each student can be trained, to ensure that each step is accurate. Therefore, we should give full play to the advantages of the virtual simulation course system. In the simulation class, we should give back feedback in a timely manner, accumulate experience, and let the simulation training really play its role.

6. Conclusion

This study combines virtual simulation technology and organic chemistry experiment teaching together to realize the integrated development of experimental teaching, which can effectively improve teaching classroom equipment, improve the quality of teaching content, and reduce experimental equipment and chemicals consumption. Especially in the application of experimental consumables, it can greatly save the investment of organic chemistry experiment funds in various colleges and universities, overcome the time and space constraints of building laboratory, and promote the organic chemistry experiment teaching classroom content and the experimental operation skills of students significantly.

Acknowledgement

China University of Petroleum Shengli Institute teaching experimental technology reform project, project number: JS 201704.

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