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THE ROLE OF MULTIMEDIA TECHNOLOGY IN COLLEGE CHEMISTRY EXPERIMENTAL TEACHING

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Abstract: The upstream stage of the process of technological innovation is the research and development of science and technology, which is closely related to the theoretical development of science and technology disciplines. Disciplines are important symbols of the formation and development of the scientific and technological system, and there is a close relationship between the development of disciplines and technological innovation. The coordinated development between various disciplines, the continuous intersection, infiltration and integration between disciplines, and the promotion of major scientific discoveries and the emergence of emerging disciplines can provide sustained accumulation and foundation for enhancing China's scientific and technological innovation capabilities. At the same time, the demand for technological innovation in turn puts forward new requirements for the development of disciplines, thereby promoting the emergence of emerging disciplines and the further development of traditional disciplines. The breakthroughs in international industrial technological innovation today are closely related to the disciplinary development of related industries. Some industries in our country with weak technological innovation lack core technologies, which is related to the weak development of science and technology disciplines related to this industry. This article analyzes the main problems in current undergraduate chemistry experiment teaching and points out the advantages of multimedia technology in undergraduate chemistry experiment teaching. This article analyzes the position of multimedia technology in undergraduate chemistry experimental teaching and how to use the organic combination of multimedia technology and classroom explanation to improve teaching effectiveness. It is obvious that the traditional teaching mode can no longer meet the current teaching needs. With the continuous development and improvement of modern teaching technology, especially the widespread application of multimedia technology in teaching, effective ways and teaching technology platforms have been provided to solve this contradiction. The reasonable implementation of multimedia technology and innovative teaching methods in the teaching process of biochemistry courses, which integrate theory, practice, and application, plays an important demonstration role. This article explores the role of multimedia technology in biochemistry teaching, the necessity of integrating multimedia technology with traditional teaching methods, and the application of multimedia technology in practical teaching of biochemistry.
Keywords: Multimedia; Experimental teaching; Innovation; Reform

1 INTRODUCTION

The Ministry of Education pointed out in the "Several Opinions on Further Deepening Undergraduate Teaching Reform and Improving Teaching Quality" that efforts should be made to promote the reform of talent training models and mechanisms, and focus on cultivating students' innovative spirit and ability. To promote the reform and innovation of experimental content and modes, and cultivate students' practical and hands-on abilities, analytical and problem-solving skills. The traditional undergraduate experimental teaching content, methods, and means can no longer meet the needs of cultivating innovative talents. How to fully utilize the advantages of multimedia technology in undergraduate experimental teaching, promote the construction of multimedia teaching resources, and promote the reform and innovation of experimental teaching content, methods, and means has become a hot research topic [1-2].

The main problems currently existing in undergraduate chemistry experiment teaching are that it is an important link between theory and practice, and an important way to cultivate students' hands-on and innovative abilities. At present, most undergraduate experimental teaching still uses traditional experimental teaching modes, teaching concepts and methods, which cannot meet the needs of cultivating innovative talents. There are still some problems in experimental preparation, experimental conditions, and experimental effects [3-4].

Insufficient preparation of 2.1 experiments leads to passive experimental learning for students. Experimental preparation is the primary step in experimental teaching, and students use it to master the initial skills of experiments. Traditional experimental preview only allows students to obtain relevant experimental information from experimental textbooks and guidance books. The learning resources are limited, the amount of information is small, and the abstract understanding is not comprehensive. In experimental teaching, teachers spend most of their time on introducing experiments, explaining instrument usage, and other issues, leaving limited time for students to conduct independent experiments. Students can only "follow the prescription and grab medicine", and the low efficiency of passive experiments restricts their imagination and creativity.

With the development of science and technology, multimedia technology has been widely used in the field of education. In university chemistry experimental teaching, multimedia technology has injected new vitality into traditional experimental teaching with its intuitive, vivid and interactive characteristics. This article will explore the role of

multimedia technology in university chemistry experimental teaching from the following aspects.

2 THE EXPERIMENTAL PHENOMENON OF 2.2 IS NOT INTUITIVE

Some experimental phenomena occur quickly and the effects are not obvious, which affects the absorption of teaching content. The process cannot be fully displayed, and students cannot observe the details of the experiment with their naked eyes. Therefore, it is necessary to magnify the experimental process that has poor demonstration effects and is difficult to observe. At the same time, due to the large number of experimenters and limited experimental equipment, students are unable to clearly see the teacher's operation steps. Experiments are prone to failure or have unsatisfactory results, which affects the absorption of experimental teaching content.

The innovation needs of 2-3 students are not met, and most experiments are ready-made experiments in textbooks. Students do not have the right to choose independently, nor do they design different experiments based on different abilities and propose different goals. Not being able to meet students' demands for proactivity, let alone cultivate their innovative abilities.

3 THE ADVANTAGES OF MULTIMEDIA TECHNOLOGY IN CHEMICAL EXPERIMENT TEACHING

3.1 Using Multimedia Technology to Transform Abstraction into Imagery

Reforming experimental based teaching of concepts and laws to enhance students' understanding of concepts and laws. Concept teaching has always been a key and difficult point in teaching. Students often value the memorization of concepts and underestimate the correct understanding of concepts in the classroom learning process. Therefore, for concept teaching centered around experiments, teachers must correctly grasp the use of teaching aids, learning aids, and modern educational methods. In experiments, the organic combination of sound, image, projection, simulation experiments, and demonstration experiments is achieved to transform abstraction into imagery, enabling students to delve deeper into problems through observation and group discussions. Additionally, utilizing multimedia computers to create simulated courseware can enhance students' cognitive abilities. In teaching, there are often many scenes that are difficult for students to imagine or toxic experiments of certain reaction products that cannot be carried out. There are also some experiments that can be demonstrated but the reaction process cannot be seen. The credibility is low and students find it difficult to understand. At this point, realistic simulation courseware can be created using computers to help students overcome these cognitive barriers. For example, when demonstrating the electrolysis process, although the phenomena are obvious, the experimental phenomena are abstract and difficult for students to imagine. However, if we use a computer to draw the experimental device and use animation effects to demonstrate the migration of ions in the solution and the reactions that occur on the two electrodes during electrolysis [5], the entire experimental process will be completed through simulation methods. Students will have a thorough understanding, accurate mastery, deep impression, and firm memory.

3.2 Using Multimedia Methods to Enhance the Effectiveness of Demonstration Experiments

In experimental teaching, there are many experiments with low visibility that are difficult to achieve the expected goals. For example, using a video projector to enlarge the demonstration operation process and broadcasting the operation process to the computer screen in front of each student through a multimedia computer not only demonstrates the reality but also stimulates students' interest, observation, and enthusiasm, resulting in twice the result with half the effort.

Reform the teaching of group experiments to improve the efficiency of student group experiments. Traditional group experiments, where students follow the teacher's instructions once, invisibly stifle their creativity. Moreover, if students make operational mistakes, it can not only lead to experimental failures but also accidents, causing fear and affecting their interest in learning chemistry. Using multimedia technology and typical software materials to simulate the consequences of operational errors, allowing students to perform simulation operations in front of the computer to master correct operations and understand incorrect operations before conducting experiments, will greatly improve the effectiveness of student experiments.

Using multimedia to improve the effectiveness of demonstration experiments is an important trend in the development of educational technology. Here are a few strategies that can help teachers improve the effectiveness of demonstration experiments through multimedia:

3.2.1 Clear experimental demonstration

Use high-definition video or animation to show the experimental process, ensuring that students can clearly see each step and detail.

Add text descriptions and diagrams to the video or animation to help students better understand the principles and operations of the experiment.

3.2.2 Real-time experiment

Through real-time video transmission, students can watch the experimental process remotely and even participate in the experimental operation.

Use interactive software to allow students to simulate experimental operations in a virtual environment, increasing the

sense of participation and fun of the experiment.

3.2.3 Enhance the visualization of the experiment

Use multimedia technology to magnify the experimental phenomenon and make the details that are difficult to observe more obvious.

Use 3D modeling and animation effects to show the microscopic process or complex structure in the experiment, helping students understand concepts that are difficult to observe intuitively [6].

3.2.4 Slow-motion playback of the experimental process

Through slow-motion playback, students can carefully observe the key steps and changes in the experiment. Analyze and discuss the details in the slow-motion playback to deepen students' understanding of the experimental principles.

3.2.5 Real-time processing and display of experimental data

Use the data acquisition system to collect experimental data in real time and display the analysis results through multimedia means. Use visualization tools such as charts and curves to help students intuitively understand the changing trends of experimental data.

3.2.6 Emphasis on experimental safety and precautions

Add experimental safety tips and precautions to multimedia demonstrations to improve students' safety awareness. Through case analysis, show the consequences of improper experimental operation and enhance students' safety awareness.

3.2.7 Interactive Q&A and discussion

Use multimedia platforms to conduct real-time Q&A and discussion, so that students can ask questions and get instant feedback. Create scenario simulations to allow students to apply the knowledge they have learned and deepen their understanding in the process of solving problems.

3.2.8 Evaluation and reflection after the experiment

Through multimedia tools, let students review the experimental process, evaluate the experimental results, reflect and summarize. Use online questionnaires or discussion areas to collect students' feedback on experimental teaching and continuously optimize teaching methods and content.

Through the above strategies, multimedia technology can not only improve the effectiveness of demonstration experiments, but also enhance students' learning experience, promote knowledge understanding and skill mastery.

Using multimedia technology for experimental design teaching to cultivate students' creative spirit and ability. In the multimedia laboratory, students can explore the unknown world of chemistry by freely exploring and utilizing their talents. For example, the identification of substances is carried out through multimedia laboratories that provide students with the necessary reagents. Students design various methods to conduct experiments and make judgments. Computers can simulate and correctly judge various phenomena generated by various methods, and provide correct prompts, which is conducive to cultivating students' consolidation, application, and development of knowledge, and cultivating their creative spirit and ability.

4 THE POSITION OF MULTIMEDIA IN CHEMICAL EXPERIMENT TEACHING

The research on multimedia assisted teaching should first clarify that its position is to assist rather than replace other teaching methods and means without blind or analytical use of multimedia assisted teaching. We should adhere to the principle of irreplaceability and avoid formal pursuits as much as possible. All teaching problems that can be studied through experiments in chemistry teaching must not be separated from experiments, which can be solved through local amplification simulation or macroscopic display of micro changes through microcomputers. Because the function of experimental teaching cannot be replaced by any means, its manifestation lies in the exercise of students' thinking, operation, analysis, and observation abilities in experiments. The formation of emotions, willpower, perseverance, and other qualities in experiments can only be achieved through experiments. Therefore, the implementation of multimedia assisted teaching should not weaken experimental teaching, that is, adhere to the teaching principle based on experiments.

In addition, some schools have started to establish virtual experimental methods through the internet to better assist students in learning biochemistry experimental skills. The idea of a virtual laboratory is to provide videos of the operation process and standard steps for most commonly used experimental instruments in the laboratory; Upload the experimental lecture notes. Students can learn the preparation process of experimental reagents, standard operation of experimental instruments, and download and save them by clicking on the link [7]. Students can use virtual experiments as a platform to learn various skills and provide assistance in research-based learning and experimental design through this platform. Virtual experiments can enable students to master experiments beyond the requirements of lecture notes, and can save a lot of reagent and experimental instrument losses.

However, multimedia simulation experiment technology cannot replace real experiments. There is still a big gap between simulated experiments and real experiments. Many characteristics of experiments, such as the hardness of instruments, the smell of drugs, and the density of items, cannot be perceived by students through multimedia technology simulations. Students must obtain these characteristics through hands-on experiments. At the same time, some things such as experimental phenomena that do not match theory, their use together, and assembly sequence, etc.,

students must experience and master these experimental skills through actual experimental operations. Multimedia technology simulation experiments cannot improve students' practical operational abilities in any way. Students must also engage in necessary practical operations in order to master this skill and transform it into their own behavior.

5 CONCLUSION

With the continuous development of multimedia technology and the introduction of traditional teaching ideas and concepts in the classroom, it is inevitable that they will change accordingly. The optimal combination of chemical experiment teaching and multimedia technology is the primary issue for us to learn and utilize multimedia technology. Only by fully integrating multimedia technology with the characteristics of chemistry and experimental teaching, and cleverly utilizing them, can we optimize the classroom structure and effectively increase the density of teaching and expand the amount of information, greatly improving teaching efficiency. Therefore, we need to constantly explore and tap into the potential of multimedia teaching to play a greater role in teaching. The application of multimedia technology in university experimental teaching has solved some difficult problems in conventional teaching. This advanced teaching method has been recognized by most people. Transforming students from learning to being able to learn, from being required to learn to being required to learn, and promoting the comprehensive development of students' qualities. Only in this way can the superiority of multimedia assisted teaching be truly reflected, gradually moving from immaturity to maturity and achieving the best integration of multimedia and traditional experimental teaching [8]. By analyzing the actual application of multimedia technology in chemistry experimental teaching, it explores its positive impact on improving students' learning interest, optimizing teaching effects, and enhancing experimental safety, providing theoretical support and practical reference for the reform of university chemistry experimental teaching.

The application of multimedia technology in university chemistry experimental teaching has significant advantages and important roles. In order to give full play to the advantages of multimedia technology, teachers should constantly improve their information technology literacy and use multimedia technology reasonably to contribute to improving the quality of university chemistry experimental teaching. At the same time, this study also provides theoretical support and practical reference for the reform of university chemistry experimental teaching.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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