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EXPLORATION OF INNOVATIVE TEACHING IN JUNIOR HIGH SCHOOL CHEMISTRY EXPERIMENTS UNDER INFORMATION TECHNOLOGY

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Abstract: Under the background of the new curriculum reform, junior high school chemistry experimental teaching is facing new opportunities and challenges. In order to enhance the effectiveness of chemistry experiment teaching, this article deeply explores the significance, existing problems, and innovative strategies of innovation in junior high school chemistry experiment teaching, and analyzes and reflects on the practical effects of specific experimental activities in the second compulsory course of the People's Education Press. Through innovative experimental teaching, not only has it stimulated students' interest in learning, but it has also cultivated their experimental skills and scientific literacy, providing new ideas and methods for middle school chemistry experimental teaching. This article combines the requirements of the new curriculum reform for junior high school chemistry experimental teaching, elaborates on the principles followed in the production of multimedia courseware, and discusses the methods of innovative teaching in junior high school chemistry experiments under information technology.
Keywords: Information technology; Junior high school; Chemical experiments; Innovative teaching

1 INTRODUCTION

With the rapid development of information technology, its application in the field of education is becoming more and more extensive. This paper takes junior high school chemistry experiment teaching as the research object and explores the strategies and methods of innovative teaching of junior high school chemistry experiments under the information technology environment. First, the application status and advantages of information technology in junior high school chemistry experiment teaching are analyzed; secondly, the important role of virtual simulation experiments in improving experimental teaching effects, cultivating students' practical ability and innovative thinking is discussed; then, the implementation strategies of innovative teaching of junior high school chemistry experiments are proposed from the aspects of experimental equipment improvement, teaching method innovation, and teacher information technology literacy improvement; finally, combined with actual cases, the specific application and effect of innovative teaching of junior high school chemistry experiments under the information technology environment are discussed.

Chemistry is a natural science based on experiments. Under the background of innovation and entrepreneurship education, it is required that talent cultivation should keep up with the pace of the times, meet the requirements of the times for talents, and enable students to master cutting-edge knowledge and new technologies in the learning process, so that they can have better development after graduation [1]. The purpose of chemical experiment teaching is not only to verify principles and enable students to understand and master existing textbook knowledge, but more importantly, to cultivate students' scientific literacy, stimulate their interest in loving and learning science, and develop their innovative and practical abilities. With the widespread and effective application of information technology in various industries, the informatization of primary and secondary education has also experienced rapid development. The education reform implemented in our country has laid a solid foundation for the popularization of educational informatization and provided a good platform for the transformation of teaching activities. Therefore, the processing and application of information technology teaching resources is a necessary ability for modern teachers, and using information technology to assist teaching is an effective way for middle schools to improve the quality of education and teaching.

1.1 Principles Followed in the Production of Multimedia Courseware

The production of multimedia courseware should follow the following principles to ensure its effectiveness, practicality and educational value:

1.1.1 Auxiliary principle

Multimedia courseware should be used as an auxiliary tool for teaching activities, rather than replacing all teaching activities of teachers. Courseware should assist teachers in imparting knowledge and help students understand and absorb information.

1.1.2 Targeted principle

Courseware production should be designed according to specific teaching objectives, content and student characteristics, solve key and difficult problems in teaching, and should not blindly pursue flashy effects [2-3].

1.1.3 Educational principle

The design and use of courseware should be aimed at improving teaching quality, helping students to master knowledge, skills and thinking methods, and promoting the improvement of students' overall quality.

1.1.4 Interactive principle

Courseware should provide interactive functions, encourage students to participate and think, enhance the fun and interactivity of learning, and avoid one-way information transmission.

1.1.5 Clarity principle

The text, images, sounds and animation elements of the courseware should be clear and easy to understand, avoid too much redundant information, so as not to distract students.

Scientific principle: The information in the courseware should be accurate, scientific and logical, and should not contain wrong knowledge points.

1.1.6 Principle of practicality

Courseware should be easy to operate and use, and the interface design should be simple and clear to ensure that teachers and students can use it easily [4].

1.1.7 Principle of integration

Courseware should integrate multiple media elements, such as text, images, sound and video, to enrich teaching methods and improve teaching effectiveness.

1.1.8 Principle of innovation

Courseware production should be constantly innovative, combining the latest technology and educational concepts to improve the attractiveness and effectiveness of teaching.

1.1.9 Principle of efficiency

Courseware production should consider cost-effectiveness, should not be over-invested, but should seek cost-effective solutions.

Following these principles can help create multimedia courseware that has both educational value and is suitable for actual teaching needs.

(1) Multimedia courseware is a tool that highlights teaching priorities and breaks through teaching difficulties. Generally, what can be achieved through experiments, ordinary media (such as models, wall charts), etc. does not need to be displayed using multimedia courseware. We should handle the relationship between using multimedia courseware for teaching and traditional media teaching. Chalk and blackboard are still the main teaching tools for teachers, and we should make multimedia courseware the finishing touch of classroom teaching.

(2) Ordinary chemistry experiments that can be demonstrated in class must not be replaced by videos or animations. Experiments are the most direct and vivid medium that cannot be replaced by any other media. They can cultivate students' observation ability, hands-on ability, analytical ability, and teamwork ability. Chemistry teachers cannot give up experiments and use computer simulations instead.

(3) Multimedia courseware should be suitable for everyone to use, without conflicts caused by different teaching ideas and classroom structures. We should create courseware that can help us break through key and difficult points rather than complete courseware. Only in this way can courseware have strong vitality and be promoted [5-8].

(4) The courseware should have good interactivity. When making courseware, avoid weaving the entire classroom teaching content, teaching procedures, etc. into it. During class, just press the mouse, although it saves a lot of effort, the interactivity is too low; It is still an 'indoctrination style' and the teaching effect is not good. Especially for students' self-study exercise based courseware, it should have good interactivity and feedback functions.

2 METHODS OF INNOVATIVE TEACHING IN JUNIOR HIGH SCHOOL CHEMISTRY EXPERIMENTS UNDER INFORMATION TECHNOLOGY

2.1 Using Multimedia Assisted Teaching to Help Students Clarify the Teaching Objectives of Laboratory Courses

Teaching objectives are the guide for teaching activities and also the basis for learning evaluation. It is extremely important for students to clarify the specific requirements of the theoretical knowledge, observation, and operation parts of the experiment before the experiment, in order to reduce the blindness and arbitrariness of students' experimental activities and improve the quality of experimental teaching [9]. Therefore, using multimedia assisted teaching methods and making teaching objectives into courseware before the experiment can help students clarify the purpose, principles, methods, and processes of the experiment, understand the structure, performance, and precautions of the equipment used.

2.2 Utilize Information Technology Teaching Resources to Improve the Visibility of Experimental Phenomena and Stimulate Students' Interest in Learning Chemistry

Chemical concepts and principles are mostly abstract. The microstructure of matter is neither visible nor tangible, and the essence of chemical reactions is the process of molecules breaking down into atoms, which then recombine into new

molecules. Therefore, relying solely on the teacher's language and written description makes it difficult for students to understand. Using computer software to create courseware for animated simulation, vividly depicting the microscopic motion characteristics of molecules, atoms, and ions, turning abstraction into intuition, allowing students to directly understand the microscopic world, making it easier for them to understand the essence of chemical changes and the principles of chemical reactions. Chemical demonstration experiments are demonstrations by teachers in the classroom, and the phenomena demonstrated directly affect the teaching effect, such as the dissolution of solids, diffusion of molecules, and gas overflow. The visibility is small, and sometimes it is difficult for students in the front row to see the changes, making it a waste of time to conduct another experiment. If these demonstration experiments are presented through multimedia to show the experimental phenomena, using methods such as zooming in, slow down, freezing, and replaying to help students observe, students can clearly see the generation and overflow of gas, color changes, and precipitation. This enhances visibility and dynamism, turns abstract content into intuitive phenomena, and allows students to see clearly, thereby enhancing the demonstration effect. At the same time, it enlivens the classroom teaching atmosphere and stimulates students' interest in learning chemistry [10]. This novel method can stimulate students' senses, attract their attention, and help cultivate their observation ability.

2.3 Using CAl Courseware to Simulate Experiments and Cultivate Students' Innovative Consciousness

The traditional teaching method of chemistry experiments is that the teacher designs the experiment and the students "follow the recipe and grab the medicine", which suppresses their initiative and enthusiasm. CAI can be used to simulate, analyze, and process the experiment in advance, allowing students to find the best plan for the experiment and then implement it. Some students, out of curiosity, like to mix experimental drugs arbitrarily or change reaction conditions arbitrarily to observe changes. Teachers may also intervene due to safety considerations. Although this is not conducive to cultivating students' spirit of exploration and innovation, it is truly helpless. The development of CIA courseware can create different experimental conditions based on different reactions, allowing students to fully utilize their talents in the "laboratory" of computers for design, exploration, and experimentation [11]. Human computer exchange can display different experimental processes and results, allowing students to draw different conclusions, thus creating a broader and more autonomous exploration space for students, and cultivating their hands-on and innovative abilities.

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2.4 Using Modern Information Technology to Simulate Demonstrations, Reproduce Experiments, Overcome Experimental Difficulties, and Improve Learning Efficiency

2.4.1 Simulation demonstration, breaking through experimental difficulties

Some chemical reaction experiments are difficult to complete or implement according to conventional demonstrations due to various limitations, but good results can be achieved through computer simulation demonstrations. (1) Simulate experiments on toxic and harmful substances to reduce pollution. The toxicity of carbon monoxide cannot be perceived by students. In this case, a 3D animation can be designed with the help of a computer - a white mouse dies from poisoning, informing students to be cautious of gas poisoning in daily life. (2) Simulate erroneous operations and enhance security awareness. What are the consequences of mistakenly pouring water into concentrated HySO4 during the dilution of concentrated HySO ice? This cannot be demonstrated through experiments, but it can be solved through animation simulation and accompanying sound.

4.4.2 Reproduce experiments to improve learning outcomes

Chemical experiments are an important part of the middle school entrance examination review. If conventional methods are used for review, it is difficult for teachers to draw all the instruments and devices involved in the experiments that are required to be mastered in the outline, nor can they demonstrate the experiments that have been demonstrated again. If computer simulation is used to reproduce the implementation of devices, experimental processes, and phenomena, it not only increases classroom capacity, but also facilitates comparison, deepening understanding and memory, achieving the goal of reviewing the past and learning new things.

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3 CONCLUSION

In short, using multimedia as a modern teaching tool to assist experiments is beneficial for teachers to play a leading role in guiding, inspiring, questioning, and summarizing experimental teaching, and to achieve experimental teaching goals and improve experimental teaching efficiency. On the other hand, it can concretize, visualize, and experiment abstract phenomena and concepts. It has been proven that multimedia assisted teaching in electronic education has brought vitality to chemistry experimental teaching. It creates scenarios through images, animations, videos, sounds, and other methods, stimulates interest, highlights key points, breaks through difficulties, transforms stillness into movement, develops students' thinking, cultivates their abilities, breaks the traditional single experimental teaching mode, ensures the synchronization of students' visual thinking and abstract thinking, and greatly improves the quality of classroom experimental teaching.

Reforming and innovating chemistry experimental teaching plays an important role in strengthening students' theoretical foundation in inorganic chemistry, enhancing their experimental operation ability, innovation ability, and application ability. Under the concept of innovation and entrepreneurship education, inorganic chemistry laboratory teachers in universities should keep up with the times and update their teaching content. They should continuously enrich and innovate their teaching methods based on the comprehensive development needs of students. At the same time, they should improve and perfect the assessment system, conduct pre evaluation of students from multiple perspectives, and enhance the quality of cultivating composite talents in universities.

The deep integration of information technology and junior high school chemistry experimental teaching is conducive to improving the teaching quality and students' learning effect. The application of information technology makes chemical experiments more intuitive and vivid, which helps to break through teaching difficulties and stimulate students' interest in learning and desire to explore. As an innovative experimental teaching method, virtual simulation experiments show obvious advantages in solving the difficulties and problems in traditional experimental teaching. It can not only make up for the shortcomings of real experiments, but also improve the safety, operability and fun of experiments. To further promote the innovative teaching of junior high school chemistry experiments under the information technology environment, it requires the joint efforts of education departments, schools, teachers and parents to contribute to improving the quality of junior high school chemistry education in my country. In short, the innovative teaching of junior high school chemistry experiments under the information technology environment has broad development prospects and is of great significance to improving the quality of junior high school chemistry education in my country. It is hoped that through the research and discussion of this article, it can provide certain reference and reference for the reform of junior high school chemistry experimental teaching.

COMPETING INTERESTS

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

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