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USE OF NON-STANDARD EXPERIMENTS IN THE TEACHING CHEMISTRY

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Abstract
Chemistry is important in the formation of not only theoretical knowledge, but also practical skills in the educational process. Teaching students through non-standard experiments in chemistry is effective in increasing their interest and developing scientific thinking. This article talks about the advantages, methods and role of using non-standard experiments in teaching chemistry.

Keywords: Chemistry, teaching methodology, chemical compounds, laboratory, results, creative thinking, non-standard experiments.

Introduction

Chemistry is a science that provides knowledge about chemical processes occurring in nature, substances and their interactions. The main goal of teaching chemistry is to provide students with practical skills in addition to theoretical knowledge. In teaching chemistry, it is important to give theoretical knowledge first. It is necessary to inform students about chemical elements, connections between them, chemical reactions and their types. In the process of learning theoretical knowledge, teachers can use various didactic materials, including textbooks, presentations and videos. These materials help improve student understanding and make the subject more interesting. Practical training plays an important role in teaching chemistry. Students should be able to apply their theoretical knowledge in practice. Carrying out laboratory work, observing chemical reactions and analyzing them will help to strengthen the knowledge of students.
Through hands-on activities, students can see how chemistry is used in everyday life. This will increase their interest and increase their motivation in science.[1]

MATERIALS AND METHODS

Teachers can use different methods in teaching chemistry. For example, through problem-based teaching methods, students are given the task of solving certain problems. This method helps to develop students' ability to think analytically. Interactive lessons, group work and discussion methods are also effective. Students expand their knowledge by sharing ideas with each other, asking questions and getting answers. One of the most important aspects of teaching chemistry is to increase students' interest. For this, teachers need to make the lessons interesting and interactive. For example, lessons can be made

more lively by conducting chemical experiments, showing interesting experiments and listening to students' opinions. Also, showing the importance of chemistry in life, for example, giving information about the role of chemistry in the fields of food industry, pharmaceuticals and ecology, also increases the interest of students.[2]

RESULTS AND DISCUSSIONS

Teachers can also use innovative approaches in teaching chemistry. For example, the use of modern technologies, including multimedia tools and online platforms, helps to make lessons more interesting and interactive.

Students have the opportunity to conduct experiments through online laboratories and simulations. This method allows students to experiment in a safe environment and helps them apply theoretical knowledge in practice. In addition, it is important to develop students' independent work skills in teaching chemistry. It is necessary to give students the opportunity to conduct independent research, perform project work, and express their opinions. This process increases students' self-learning ability and helps them to work independently in the future. There are also problems that arise in the teaching of chemistry. Students sometimes have difficulty understanding and applying chemical processes. This situation requires additional attention and approaches for teachers. Teachers can provide extra lessons, tutoring, or individual counseling to identify students' difficulties and help them.[3]

Non-standard experiments are experiments that stimulate students' creative thinking and require new ideas and approaches, unlike traditional laboratory work. These experiments give students a deeper understanding of chemical processes and also develop their creativity. Non-standard experiments are often conducted using simple and available materials, which brings students closer to chemistry. The first advantage of non-standard experiments is that they are interesting and interactive.It is often very interesting for students to see complex theoretical issues through practical experiences. For example, showing simple household chemical reactions helps students understand how chemistry is used in everyday life. Through such experiences, students will have the opportunity to apply their knowledge in practice. The second advantage is that these non-standard experiments develop students' ability to think creatively. Students develop a creative approach in the process of inventing their own experiences, creating new ideas and implementing them. For example, students gain new knowledge in the process of studying chemical reactions created by themselves and analyzing the results. This increases their ability to think independently. In addition, non-standard experiments develop students' teamwork skills. Often, such experiences are conducted in groups, which encourages cooperation, exchange of ideas and learning from each other among students. In the process of teamwork, students share experiences, listen to each other's opinions and work together to achieve a common result. One of the important aspects in conducting non-standard experiments is to ensure safety.[4]

Students should be careful with the materials and equipment they work with. Therefore, it is necessary for teachers to explain safety rules in detail before conducting experiments. This not only ensures the safety of students, but also forms a sense of responsibility in them. Another important aspect of using non-standard experiments in teaching chemistry is to develop students' problem-solving skills. Students will encounter different problems during experiments and need to look for new approaches to solve them. This process increases students' analytical thinking skills and helps them to solve problems in different situations in the future. To increase the effectiveness of using non-standard experiments in the educational process, teachers can use different methods. For example, giving students the task of preparing experiments on a specific topic creates an opportunity for them to implement their ideas. It is also effective to hold special seminars or exhibitions for students to present their experiences and share their results. Through non-standard experiments, students not only learn chemistry, but also develop the skills of practical application of their knowledge, creative thinking and problem solving. All this helps students to develop themselves, think independently and be successful in scientific activities in the future.[5]

CONCLUSION

In conclusion, the use of non-standard experiments in the teaching of chemistry ensures that the educational process is interesting and effective. These experiences help students develop their creative thinking, teamwork skills, and problem-solving skills. Teachers should be careful and ensure safety when conducting such experiments. As a result, students will increase their interest in chemistry and have the opportunity to apply their knowledge in practice. The process of teaching chemistry includes not only imparting theoretical knowledge, but also development of practical skills. Teachers need to use different methods to increase students' interest and encourage them to think independently. Innovative approaches and modern technologies increase efficiency in teaching chemistry. The development of students' independent work skills is important for their future success. Chemistry plays an important role in students' lives and prepares them for scientific thinking, experimentation and innovation.

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