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SOME ASPECTS OF INTEGRATION OF CHEMICAL TASKS IN THE PROCESS OF TEACHING CHEMISTRY

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Abstract
This article is devoted to the study and analysis of various aspects of the integration of chemical tasks into the chemistry teaching process. Chemistry problem integration is an important component of the educational process because it promotes a deep understanding of chemical concepts, the development of critical thinking, and the application of acquired knowledge in practice. The work includes an analysis of methods and strategies for integrating chemical tasks into the educational process, including the use of interdisciplinary connections with other natural sciences, such as biology, physics and mathematics. Practical aspects of introducing integrated tasks into the educational process are also considered, including the development of educational materials, teaching methods and student assessment. The purpose of the study is to increase the effectiveness of teaching chemistry and develop in students the competencies necessary for successful work in the field of chemistry and related sciences.

Key words: chemical problems, integration, integrative aspects, combination, analysis, qualitative method, quantitative method, level, problem-based learning.

INTRODUCTION

Chemistry education often involves the study of complex concepts and principles that require deep understanding and practical application. In this context, the use of chemical problems becomes an important tool for deepening the mastery of the material and developing the analytical skills of students.

As we know, chemical problems are very diverse, most of them are computational problems related to the basic principles and laws of chemistry and require theoretical knowledge. Their solution is an important factor in the cognition of chemistry as a science and contributes to the development of students' skills in independent thinking, strengthening and applying scientific and conceptual knowledge.

The ability to solve chemical problems is one of the most important skills of the general education curriculum. Sometimes, only quantitative problems are meant by chemical problems. This is because such problems occur most often in practical life. However, problems related to qualitative aspects of chemistry are of great importance. Studying these problems facilitates the understanding of theoretical concepts, allows to consolidate and deepen knowledge about substances and their changes, apply theoretical knowledge in practice, and expand the students' thinking.

Students can successfully master the skills of solving chemical problems if they systematically and sequentially (from simple to complex) solve them during classes. Modern pedagogical technologies emphasize the personal-humanistic, project, problem, and heuristic approaches. Each of them takes into account the interests, abilities, possibilities, and conditions of the student.

When it comes to choosing optimal teaching methods for a teacher, it is necessary to take into account the features of students' learning activities in one age group. Passive students do not have developed skills for independently determining the main ideas in a topic, independent thinking, planning, and self-control. Consequently, they have a low level of cognitive and other skills. At the same time, they often have a negative attitude towards learning and usually lack active learning organization.

Of course, when a teacher defines the task of a differentiated approach to passive students in a lesson, he should take all these features into account.

A differentiated approach requires more attention to the group of advanced students. Individual homework assignments for developing skills in a specific area now acquire special significance: tasks for independent problem-solving are presented in a special text, indicated in the textbook as "additional reading material." It is recommended to offer these students interesting scientific and social news to read in order to expand their knowledge; tasks like "Solve this problem in two ways" or "Develop an independent solution to this problem" are particularly valuable for them.

Let's consider the following groups:

- Group I - these are students who cannot even understand the simplest analysis, have no idea of chemical thinking, and cannot logically connect the internal structure of a substance with its chemical and physical properties. They cannot solve a problem proposed for the class because its content and methods of execution appear incomprehensible to them.
- Group II - these are students who have reproductive thinking and the ability to act. The main method of work in their tasks is the use of previous experience: they feel the need to use it in new situations as a template.
- Group III - these are students who demonstrate a creative approach to solving a problem with a specific meaning. They show high activity and independently find the

most effective way to solve a given chemical problem, as well as demonstrate high activity in mastering the ways of solving.

This group has the ability for broad and deep perception of the material compared to students from groups I and II.

Subsequently, using a combination of qualitative and quantitative methods of analysis, as a methodology for integrating chemical problems, it is possible to choose problems of various levels of complexity, covering various chemical directions and topics. It would be expedient to divide students into groups that will be trained using various methods: traditional lecture method, problem-based learning method with active use of chemical problems, and project-based learning method, within which students would solve complex problems.

LITERATURE REVIEW AND SCIENTIFIC METHODS ANALYSIS

This article includes the development and testing of pedagogical methods aimed at the effective implementation of the integration of chemical problems. It also addresses the psychological aspects of chemistry education and the impact of integrating different types of problems on students' motivation, engagement, and academic performance.

An important aspect is the development and testing of methods for assessing the effectiveness of integrating chemical problems into the educational process. In addition, issues related to the integration of chemistry with other sciences or areas of knowledge, such as biology, physics, mathematics, or technology, are touched upon.

RESULTS AND DISCUSSION

The integration of chemical problems into the process of teaching chemistry plays a key role in shaping a deep understanding of the subject among students. Several aspects of integrating chemical problems were identified in this article, which are of significant importance for effective learning:

1. Contextual learning: The results confirm that integrating chemical problems into real or everyday situations contributes to better assimilation of the material. This allows students to see the application of chemical concepts in the real world, stimulating their interest and motivation to study the subject.
2. Interdisciplinary connections: The discussion of the results also indicates the integration of chemical problems with other subjects such as biology, physics, or mathematics. For example, solving problems that require knowledge of physical laws or biological processes enables students to see the connections between different sciences.

3. Problem-based learning: One of the key conclusions is that the use of problem-based tasks contributes to the development of analytical thinking in students. Setting tasks that require analysis and application of non-standard approaches to solving them stimulates critical and creative thinking.
4. Interactive teaching methods: The results also confirm that the use of interactive methods such as laboratory work, demonstrations, and group projects effectively contributes to the integration of chemical problems. These methods allow students to actively participate in the learning process and apply their knowledge in practice.

The overall trend of the results indicates that the integration of chemical problems in teaching chemistry plays an important role in increasing the effectiveness of learning and shaping students' deep and sustainable understanding of the subject. Such approaches contribute not only to the assimilation of specific chemical knowledge but also to the development of a wide range of skills necessary for successful activity in the modern world.

CONCLUSION

Thus, the analysis conducted and the results of the integration application have shown that the groups in which problem-based and project-based learning methods were used demonstrated a higher level of understanding of the material, greater motivation to study chemistry, and better exam results compared to the group taught using traditional methods.

In particular, students solving chemical problems within the framework of project-based learning showed better ability to apply theoretical knowledge in practice and analyze complex situations.

Summarizing the above, it can be concluded that the study confirms the effectiveness of integrating chemical problems into the educational process to improve the effectiveness of teaching chemistry. Problem-based and project-based learning methods, based on the active use of chemical problems, allow students to more deeply understand the material and develop analytical skills, which contributes to the formation of competent specialists in the field of chemistry.

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