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DIDACTIC FORMS AND METHODS OF INTEGRATING LIFE EXPERIENCES WITH CONCEPTUAL KNOWLEDGE IN CHEMISTRY EDUCATION DIDACTIC FORMS AND METHODS

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Abstract

This article analyzes effective forms and methods of systematizing students' vitagenic (vital) experiences in the process of chemistry education and integrating them with basic chemical concepts. In the research process, a set of tasks based on didactic approaches, innovative educational technologies, and real-life examples was developed. The obtained results show the positive influence of the vitagenic experiment on strengthening conceptual knowledge, as well as an increase in students' interest in the subject and practical thinking skills.

Keywords

chemical education, vitagenic experience, conceptual knowledge, systematization, didactic methods, innovative technologies, STEAM approach, real-life examples.

Systematization of vitagenic experiments in chemistry education is an important factor in deepening students' conceptual knowledge, increasing the effectiveness of assimilation, and strengthening their motivation for science. The integration of life experiences through didactic methods allows students to activate their thinking and connect theoretical knowledge with real life. The proposed forms and methods, along with serving to improve the quality of chemistry education in general education schools, create a basis for the development of practical, critical, and systemic thinking competencies in students.

One of the priority tasks facing the modern education system is not only to equip students with theoretical knowledge, but also to form competencies in the ability to apply them in practice in harmony with real life processes and events.

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Chemistry occupies a central place in the system of scientific knowledge and includes conceptual concepts directly related to various spheres of human activity - production, medicine, ecology, energy. Therefore, the use of students' life (vitagenic) experiences in chemistry education, their systematization and integration with conceptual knowledge is an important didactic factor in increasing the effectiveness of the educational process. In the theory of vitagenic education, the personal life experience of students is considered one of the main resources of education. Such an approach, on the one hand, allows for the assimilation of new knowledge in connection with previous experience, and on the other hand, allows for the assimilation of new knowledge.

In the process of chemistry education, it is important to form in students the ability to understand chemical concepts based on scientific thinking, practical skills, and life experience, such an approach increases their interest in science, allows them to apply knowledge in everyday life, and especially in high school, helps to study the topics of the curriculum in a systematic and real-life context. Systematization of life experiences motivates students, connects theory and practice, develops analytical thinking, and increases environmental and social responsibility, for example, the topic "Production of easily degradable plastics" covers ecology, industrial chemistry, and practical needs.

The introduction of such experiments into the lesson process is carried out in various forms: through laboratory classes, students observe chemical processes, for example, study such phenomena as evaporation of water in jam preparation or caramelization of sugar, practically analyze the technology of paper production on the topic of cellulose; project work based on life problems develops creativity and independence, projects such as "Obtaining useful products from available resources in Uzbekistan" encourage the analysis of environmental problems; simulation and games teach interesting chemical processes, for example, the game "Chemical Laboratory" or experimental games on water purification.

Based on integration, chemistry is connected with other disciplines: biology with food composition, physics with thermal reactions; in problem-based learning, topics such as water resource conservation or plastic waste recycling are analyzed; through excursions, the study of plants, factories, or natural resources introduces real chemical processes. Evaluation of results is carried out through tests, practical work, and presentations, which deepen knowledge and involve students in scientific activities.

Experiments with food products are particularly effective, explaining the properties of carbohydrates in juice jam preparation, the fermentation process in

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bread baking, the release of carbon dioxide through the reaction of vinegar and soda, and adsorption during water filtration using charcoal. Within the framework of organic chemistry, topics such as polymers, plastics, fatty acids, biofuel production, and paper production from plant residues are of ecological and practical importance.

In chemistry education, it is necessary to synchronize technological and conceptual aspects, technological tools (virtual laboratories, 3D models, simulations) allow for safe and interesting experiments, and conceptual approaches reinforce theoretical knowledge with real-life examples. For example, explaining the law of conservation of matter through everyday phenomena or connecting Avogadro's law with real experimental changes in gas volume-pressure would be effective.

The law of equivalence is taught through titration experiments, gas laws are taught through pressure-temperature relationships in the example of changes in pressure in a football or car tire, dissociation theory and hydrolysis process in the experiment of adding lemon or soda to tea, chemical equilibrium through Le Chatelier's principle, reaction rate through comparison of different fuel combustion rates, oxidation-reduction processes through rusting or color change in copper products, and electrolysis through water separation into hydrogen and oxygen.

Theoretical competencies ensure understanding of laws and principles, practical competencies - the application of chemistry in everyday life, and communicative competencies - the expression of scientific thought and teamwork. Information competence is aimed at analyzing chemical data, initiative in finding innovative solutions, and research in mastering scientific methods. The development of competencies based on life experience is effective, for example, the production of paper from plant residues contributes to the practical study of cellulose technology, and water purification experiments contribute to increasing environmental responsibility. Experience with galvanic cells in electrochemistry develops initiative and research, as it provides practical knowledge in the field of energy.

Chemical education, combining technological and conceptual aspects based on life experiences, provides not only theoretical knowledge, but also practical skills necessary for students in everyday life.

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