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FORMATION OF CREATIVE ACTIVITY OF STUDENTS BASED ON STEAM APPROACH IN TEACHING CHEMISTRY

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Abstract: This article discusses the methodology for organizing classes based on the STEAM approach to teaching chemistry. STEAM learning is an innovative methodology that represents a full-fledged systematic education, including the study of natural sciences together with engineering, technology, art and mathematics. Based on this technology, it is also possible to realize the creative ideas of students in educational institutions when studying the basics of chemistry.

Keywords: teaching methods, chemistry, carbohydrates, STEAM approach, integration, creativity, lapbook

Introduction

The modern educational process is unthinkable without the search for new, more effective technologies that promote the development of creative abilities. The creative orientation of the individual is cultivated in the process of developing motivation for cognitive creative activity. After all, the ability to create begins with the desire to create, to create something new. The realization of the creative potential of the individual is currently considered as an urgent need of today, a social order for shaping the future.

Chemistry is a very difficult subject, and already in the first year of study, many schoolchildren lose interest. Every teacher wants his subject to arouse interest among schoolchildren, so that students can not only write chemical formulas and reaction equations, but also understand the chemical picture of the world, be able to think logically, so that every lesson is a holiday, a small performance that brings joy to students and teachers [1].

Literature review. Many educational programs of our time, which are developed by methodological researchers, are based on the application and implementation of the so-called STEAM approach, which allows schoolchildren to comprehensively and integratedly acquire knowledge in natural sciences, mathematics and engineering academic disciplines, which is extremely convenient for forming a holistic view of the world around them without the need to constantly refer to knowledge from other educational subjects [2-4].

A group of foreign authors specializing in STEAM education methodology Fenyvesi, K., Brownell, C., Pekonen, O., Lavicza, Z., & Somlyódy, N., especially highlighting those components that are focused on “mathematical arts and creativity” that unite these different educational cultures with a more global perspective, believe that “Developing collaborative and inter-, multi- and trans-disciplinary problem solving abilities that enable students to discover unexpected connections

between different aspects of different complex phenomena is not only a useful tool, but is also recognized one of the most important goals of modern learning societies. STEAM in modern European schools is a dynamically developing, but still under-researched area [5].

Methods

Of particular interest in the STEAM model are its main features: practice; interdisciplinary approach; innovation. With the help of STEM technologies, students are immersed in the creative process, where they learn new information based on already accumulated knowledge in individual disciplines of the school course. In addition, students can always count on the support of the teacher when solving practical or scientific problems. As a result, by being involved in this work, the student gains new knowledge [6-7].

One of the effective modern teaching methods that shape the experience of creative activity of students in the classroom is the creation of lapbooks by students as products of independent activity. This method and teaching technique is more suitable for a lesson on consolidation or a lesson on generalization and repetition, when students have a certain degree of knowledge on a given topic, and while creating a lapbook, they have to detail information on the central topic, take a creative approach to the design and explanation of what has already been studied , and new material [8-9].

Result and Discussion

In the process of undergoing teaching practice, we organized independent activities for students when teaching chemistry based on studying the “Carbohydrates” section, based on the STEAM approach. STEAM education (Science, Technology, Engineering, Art and Mathematics) is an approach that integrates science, technology, engineering and mathematics disciplines to encourage children to develop critical thinking, problem-solving, creativity and collaboration skills.

For example, studying the “Carbohydrates” section based on the STEAM approach can be represented by the following diagram:

S - Science	Study of the structure, nomenclature, classification of carbohydrates. Study the structure of carbohydrates, analyze it in detail using the example of various representatives of this class of chemicals
T- Technology	Study of the physicochemical properties of carbohydrates, technological properties necessary for the production of products from them
E - Engineering	Study of the technological production of sugar from sugar beets, as well as various areas of application of carbohydrates 
A- Art	Riddles, interesting facts, poems about carbohydrates. For example: We all know very precisely: Carbohydrates are a source of energy. Enter the body with plant foods And they supply him with energy, The brain and heart are nourished. There are countless carbohydrates in sugar, They are found in vegetables and fruits
M - Mathematics	Calculation problems on the topic “Carbohydrates”, for example: During the alcoholic fermentation of glucose, 230 g of ethyl alcohol was obtained. What volume (n.v.) of carbon monoxide (IV) was released in this case? Answer: 112 l

When conducting the lesson based on the STEAM approach, the following goals were set:

Educational: give an idea of carbohydrates, reveal the structural features of carbohydrates, establish the place and role of carbohydrates in life.

Developmental: continue to develop the scientific worldview of students based on studying the topic of the lesson, skills in working with chemical terms, intensify the cognitive activity of students by solving problematic issues.

Educational: to form a culture of dialogue communication, to promote the labor education of students through group work when compiling lapbooks, Fig.1.

Fig.1. Lapbook on the topic "Carbohydrates"

The students of the class were divided into 5 groups according to the abbreviation STEAM learning technology. Each group received an assignment in their own direction, independently collected material and visual drawings for the presentation of the work, which were then compiled into laptops. The educational and creative activities of students organized in this way allowed them to study the material on this topic more deeply, select diagrams and drawings that would allow them to clearly and competently explain certain properties of carbohydrates to the class.

Conclusion

When using this technology, critical thinking skills and the ability to solve problems develop. These skills are necessary to overcome difficulties that children may face in life and to use these skills in life situations.

Thus, it can be noted that STEAM education acts as a tool for the development of research competencies, teamwork skills and creativity; it is aimed at forming a scientific picture of the world through design, research, engineering, and creative approaches that increase motivation to study chemistry . With the help of STREAM technology, it is possible to develop competencies at a sufficient level of maturity for their practical application.

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