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Formation Of Creative And Critical Thinking In Students For Preparation Of International Research In The Field Of Chemistry Education

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ANNOTATION

This article examines the creative and critical thinking of students in chemistry lessons. Preparing and teaching students for the international assessment system PISA. The effectiveness of the international assessment system PISA.

Key words: creative and critical education, PISA, PIRLS, school, chemistry.

Today, the Republic of Uzbekistan is pursuing a policy of radical reform of all sectors. It is known that when we gained independence, the work carried out in the educational sphere did not meet the requirements of today. Nowadays, when the world is rapidly developing and progressing, we need to keep up with the times.

Currently, countries participate in the international programs PISA and PIRLS in accordance with agreements signed with the International Association for the Assessment of Educational Achievement. As part of these studies, the literacy level of students in the Republic of Uzbekistan will be checked for the first time. To do this, it is important to develop special skills in students by conducting experimental tests based on tasks developed in accordance with the

requirements of international research, gradually integrating them into the educational process [1-3,8].

Today, PISA and other international studies are conducted to identify and determine the level of readiness of schoolchildren for life.

These projects assess students' creative and critical thinking skills, their ability to apply what they learn to life through a variety of assignments, and then encourage the development of these skills. If we compare these results with other countries, we can see that this is a very low figure. A total of 81 countries took part in the PISA 2022 study. Uzbekistan participating in such prestigious international studies is certainly one of the good steps. Because for the first time since its independence, Uzbekistan took part in international research. So, now those who determine educational policy have accurate analytical data in their hands to correct the mistakes made. All that remains is to admit your mistakes, determine a long-term strategy for eliminating them, and act without deviating from this strategy [8-9].

Introducing the assessment of creative thinking into international research supports positive changes in educational policy and pedagogy. Provides reliable, practical and legal assessment tools to enable evidence-based decision making.

The primary importance of education is to equip students with the necessary skills and abilities to succeed in society. Creative thinking provides modern youth with the necessary competencies for their development.

Schools help students discover their abilities. Teachers need to understand how creative thinking is defined, the situations that create it, and the most effective ways to develop students' creative thinking skills.

Comparing intelligence tests and creativity tests, V.N. Druzhinin showed that one of the most important criteria for their difference is the position of the test on the conditional scale of regulation of the subject's freedom of behavior during testing. Intelligence tests mainly diagnose cognitive abilities that are activated under conditions of strict and unambiguous regulation of the requirements for activity and its conditions. And creativity tests diagnose cognitive abilities that are activated in conditions of freedom and the absence of restrictions. The more freedom of action a test allows, the closer it is to an ideal test of creativity. The more stringent and unambiguous the test regulates the conditions and requirements for activity, the closer it is to the ideal intelligence test [Druzhinin, p. 123].

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In the 1960s, tests of exploratory behavior began to be used to study aspects of cognitive activity not covered by tests of intelligence and creativity [Poddyakov, 2006a, 2004b; Keller et al., 1994]. They diagnose a person's ability to acquire new information through real interaction with unknown objects, to act practically in conditions of novelty and uncertainty, independently setting and solving various research problems. For example, the subject is asked to independently understand the structure of an unfamiliar object (puzzle toy, computer game, etc.) with many hidden elements and unknown connections between them. This puzzle "reacts" to manipulation quite unexpectedly. The subject is usually not given any specific task. The number of elements examined by a person, the number of manipulations, the number of "hides" opened, the number of questions asked to the experimenter, etc. are estimated. and the amount of information that the subject was able to obtain during the allotted period of such fairly free, unregulated and often very complex creative research activity [4,6,7].

We have prepared the following tests for 7th grade students. When creating tests, attention was paid to their simplicity and creativity of thinking, as well as to the fact that they are remembered in the minds of students and can be used in life.

Question 1.

Diffusion is the diffusion of gaseous substances or other substances over the surface of one substance. Give examples of the phenomenon of diffusion.

A) dissolving sugar in water, breaking wood

B) masking gauze, burning paper

C) the spread of odor in the air, glass breaking

D) coloring of gas, spreading of odor in the air, dissolving sugar in water

Question 2.

What is relative atomic mass? This element has an atomic mass equal to 1/12 of a carbon atom, which means how many times larger it is. We learn about carbon. For example, the atomic mass of oxygen is 16, which means it is 16 times larger than 1/12 carbon. Knowing this, find the absolute atomic mass of sulfur? (For example, absolute atomic mass of oxygen = 16 * 1.66 * 10-27 = 26.56 * 10-27)

A) 534.5*10-28

B) 26.56*10-27

B) 12.6*10-23

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D) 53.12*10-27

Question 3.

Aggregate state of a substance. For example, water freezes in the cold, evaporates in the heat, it is in an aggregate state, it is in a liquid state, it is in 3 different states. Thus, on the basis of this, the phenomena of transition of substances directly from the solid to the gaseous state arise. A similar phenomenon of sublimation takes place. Give examples of substances that undergo sublimation (iodine, dry ice)

A) H_2SO_4, Cu

B) Cu, NaCl

B) O_3, CH_4

D) I, CO_2

Question 4.

Name the correct terms in chemistry. Write yes or no in the answer table.

1) Substance; 2) atom; 3) state; 4) reaction; 5) teacher; 6) student; 7) molecule; 8) communication; 9) particle; 10) teaching.

Answer:

1	2	3	4	5	6	7	8	9	10

We have compiled 5 versions of tests to control 7th grade students. We started an experiment on teaching chemistry in primary school. The research was conducted in schools in the Zafarabad district of the Jizzakh city and region on the basis of established tests.

Table 1.

	Number of students	"excellent"	"good"	average level	Quality indicators
1 Test					
7^a	24	1	3	21	29%
7^b	28	0	5	19	27%
2 Test					
^{7a}	24	2	6	18	31%
7^b	28	2	8	15	35

Based on the analysis of students' responses to research behavior, the following rational definition of knowledge in these types of tests can be given. The student is capable of endlessly setting a variety of research goals and diversifying external behavioral and experimental tests, obtaining an unlimited amount of information at each stage.

The results obtained, presented in Table 1, show that further expansion of practical chemical knowledge is necessary. To do this, it is necessary to conduct experiments in chemistry lessons and teach students to apply theoretical knowledge in life. Innovative pedagogical technologies should be widely used in lessons. At the same time, the formation of creative thinking among students is of great importance.

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