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Development of Functional Literacy Through Creative Thinking Tasks

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Annotation

The article develops proposals and recommendations for preparing students for an international assessment program using creative thinking tasks from international initial studies, as well as for the development of reading literacy, mathematical literacy, global competence and natural science literacy, as well as for the adaptation of students to the integration of sciences in life.

Keywords: creative thinking, natural science literacy, integrative approach, reading literacy, mathematical literacy, global literacy, financial literacy, creative tasks, non-standard solutions to creative tasks, logical tasks.

Introduction

In 2021, the assessment of creative thinking was included for the first time in the PISA study as one of the leading components, which led to a significant increase in both the importance of the field of research and interest in it. First of all, it should be noted that creative thinking through the ability to enlighten and discover is the basis for the development of all branches of human culture: science, technology, philosophy, art, humanities and others. Today, the development of society, the rise of material and spiritual culture, the development of production are more than ever directly related to the emergence of innovative ideas, the creation of new knowledge and new technologies [3]. Research shows that everyone is more or less able to think creatively, innovatively, creatively.

Creative thinking and habitual thinking are associated with involvement in productive activities and make an invaluable contribution to the development of all aspects of the personality. Creative thinking is not just a random burst of new ideas, it is an opportunity to get a real big income [3]. Creative thinking helps people achieve better results in changing the surrounding reality, effectively and competently respond to emerging problems. Assessment of creative thinking serves as an integral part of the All-Russian monitoring of functional literacy [1].

The introduction of this direction, in our opinion, will allow for positive changes in teaching practice and educational policy, which will serve to solve strategic tasks of socio-economic development of our country in the future [2].

How to be creative? The conceptual approaches of the PISA study were taken as the basis for the development of tools for the project “Monitoring the formation of functional literacy". In this regard, we consider it appropriate to give a brief description of these approaches with comments from developers. From the point of view of assessment and, above all, its validity, it is important to understand and correctly interpret the various reactions of students to the questions asked to them [3].

In our case, the main thing we need to know is what manifestations we can use to determine whether creativity exists or not. It is widely believed that creativity manifests itself as a feature [6].

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However, creativity can also manifest itself in everyday activities, such as decorating a gift or photo album, the ability to cook delicious food from leftovers, or the ability to find the perfect solution to a complex logistical problem. Finding the benefits of complex tables and much more. In this case, we call the ability to an effective creative approach "a little creativity" [3].

The purpose of the study.

To develop the functional literacy of students and future chemistry teachers with the help of creative thinking.

The study of literature related to the study.

The analysis shows that Singapore, China, Taiwan and Hong Kong have overtaken Finland and become world leaders, especially in the field of mathematics and natural sciences [3]. It should be noted that in Finland teachers are considered as a key factor in improving the quality of education, along with high requirements for their knowledge and experience, while their work remains in demand and is well paid [4].

But there are aspects of the education system in which European countries should follow the example of Asian ones: students in Asia start their education early and work more on themselves. Training in them begins at the age of 6. Simply put, the more time students spend developing skills and knowledge, the more they learn both. The Finnish education system adapts to the talents and skills of the student; in East Asian countries, students must work to meet the universal standard. East Asian systems encourage competitiveness and guide educational strategies towards excellence. In Finnish culture, such open rivalry is less socially acceptable. The Finnish education system encourages teamwork both in the workforce and among students [5].

Finland strives to make learning interesting and creative, but does not attach much importance to the memorization of knowledge by students. However, in China and Taiwan, special attention is paid to memorizing knowledge [3].

But when comparing the education system of China with other countries, there are more shortcomings. In particular, the population of remote areas of the country was not fully involved in the education system. For this reason, the system of quality education flourished. The Singapore and Finnish education systems are similar to each other, with a special emphasis on teacher training [7]. Universities that train teachers are considered universities with high entrance scores.

Research methods.

Given the nature of the PISA study, which involved 15-year-old students from all over the world, we can add the idea of ”a little creativity" to the recent understanding of creativity in this study [8].

This, in turn, imposes tasks and certain limitations on the assessment of creativity - the solution of which should depend more on the organization of thought processes than on the depth of knowledge on a particular subject [3].

The described direction of assessment should not be aimed at identifying gifted children, but at identifying the boundaries of students' creative thinking, as well as finding out how this ability correlates with the features of the educational process – educational practice [9].

The main disadvantages of student assessment in the PISA program are: lack of time to complete the assigned tasks, the inability of the student to write answers to creatively thinking questions, i.e. limited options [4].

By developing students' creative thinking, we can use the educational and social spheres if we have made the most of our potential.

Methods of functional literacy development using creative thinking tasks [3].

Imagine that! 95% of all global trade practices are carried out through ocean and sea transit routes. It uses about 50,000 tankers, large cargo ships and vessels loaded with large container ships.

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Many of these vessels are powered by a diesel engine. Engineers are now promoting the creation of vessels that can move with the help of wind power [10].
According to this proposal, huge sails will be installed in the bow of the ships. If this proposal is supported, we will achieve a sharp reduction in diesel fuel consumption and reduce emissions of harmful gases into the environment [3].

Q1: One of the advantages of using such sails is that they are located at an altitude of 150 meters. At this altitude, the wind speed is on average 25% higher than the wind speed on the deck of the ship. If the wind speed on the deck of the ship is 24 km/h, what is the approximate speed of the wind blowing into the sails?

a) 6 km/h b. b) 18 km/h c) 25 km/h d) 30 km/h
Answer: 24---100 % x = (24*25)/100=6
x------25% 24+6=30 Answer: 30 km/h

Q2: If the sail pulls the vessel at an angle of 450, find the length of the sail rope if its height is 150 m.

a) 173 m b) 212 m c) 285 m d) 300 m
Answer: Since it is an equilateral triangle, we use the Pythagorean equation: $a^2+b^2=c^2$ $150^2+150^2 = \sqrt{45000} =212$

Q3: Since a liter of diesel fuel is expensive -0.42 Zed (monetary unit), the owners of a vessel called the "New Wave" plan to install sails on the vessel. It is known that the installed shoulder with cutouts reduces the total consumption of diesel fuel by about 20%.

Answer: 0.42×3500,000=1470,000 per year, which go to diesel.
1470000------100% x = (1470 000*20)/100=294000
x----------20
in 294000 zed cost reduction
This means that 2500000:294000=8.5
Answer: after 8.5 years, the cost of the voyage will be reimbursed.

With the help of this task, we can develop students' mathematical and natural science literacy. During the assignment, the student first uses his creative thinking, i.e. he thinks about the ship, its sails and the degree at which they are located [11].

Then he used his mathematical literacy to solve problems, during the task we could develop global competence by thinking about ways to clean the environment from harmful gases, and financial literacy with the help of question 3 [3].

The problem of natural science literacy:

We all know the process of foaming dough. For its preparation, flour, water, salt and yeast are mixed. After that, the dough is wrapped at the same temperature for an hour to start the fermentation process. When the dough is fermented, a chemical process takes place. Yeast converts starch and sugar contained in unicellular fungi into carbon dioxide and alcohol.

Q1: The dough rises during fermentation, what is the reason?

As the resulting alcohol turns into a gaseous state, the dough rises.

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The dough rises as the unicellular mushrooms divide and multiply
The dough rises due to the formation of carbon dioxide
During fermentation, the dough rises as the water turns into steam.
During this task, students must first react by concentrating the knowledge gained from nature and positive thinking skills [12].

The task “philosophical cafe” on the basis of computer technology, an image of the kitchen and the boilers talking on it is presented on the screen, the data must be performed using graphic images and text applications specified in the task [3].
We turn to the illustrated image: on the right are 3 philosophers: Zeno, Confucius and Bentham, as well as students of the Faculty of Philosophy. The images show the text of questions reflecting the philosophical views of scientists, and on the right is a hyperlink from the web for use in finding solutions.

The script reads: “How do I interact with other people?”, “Where can ideas about how we should behave come from? For thousands of years, people have been thinking about such issues as "people always weigh something", exchanging opinions. Under each picture of the philosopher there are sources containing brief historical information and ideas about them [3]. Most readers could know about the science of philosophy only thanks to the names of philosophers, but did not have complete information about their lives, views and ideas, or diligently approached their studies [13].

Task for illustrative information: The text of Confucius' teaching entitled “Don't let others see what you don't want for yourself” was written “Confucius is a Chinese philosopher who lived between 551 and 479 AD. His father died when he was three years old, so he and his mother are going through difficult times of poverty and reaching adulthood [3]. It was a time of massacre and war in China. Confucius, seeing how the people around him were fighting, wanted to stop it. He wanted peace and development of the existing world. Confucius argued that in order to change society, everyone must change their individuality. He believed that this is especially true for property owners whose behavior affects the lives of ordinary people. Our main goal should be to live in harmony with the people around us [3].

One of the significant ways to achieve consistency in Confucius is considered to be “REN”, the meaning of which in translation means “kindness”, that is, the manifestation of kindness of one person to another” [17].

Task 1: On the page of the website "philosophical café "click on the application" Confucius “and by the reflected word ” Ren " you need to find out exactly what Confucius wanted to convey.

A. Peace and Development.
B. He lived in harsh and wartime times.
C. Behavior of owners.
D. Kindness to people.
E. Living in harmony.
Correct answer: Option D

With the help of these tasks, we want to convey to you that it is creativity that helps a lot in solving certain pragmatic problems [14]. The main factors necessary to resolve the situation are:

commenting and protection;
learning positive thinking, because the fear of failure, mistakes (and, as a result, loss of self-confidence) hinder the achievement of the goal, a mistake is also a step to victory;
teach to focus on the problem that needs to be solved;
finding the opposite solution;
logical thinking;
formulate expectations;
finding logical connections between phenomena, objects, facts;
overcoming stereotypes;
decision-making in unfamiliar and non-standard situations;
search for the right knowledge and suitable methods [15].

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Thanks to creative thinking, we invent something new, make scientific discoveries and thereby increase our chances of skillfully getting out of any confusing situation [16].

The results of the study. The tasks created during the research work were also taught to students of secondary schools and future chemistry teachers, and according to the results obtained, it was found that creative thinking and natural science literacy of students and future chemistry teachers increased by 10-12%.

In conclusion, we can say that during the study, studies, textbooks and assignments conducted in several countries on this topic were studied. The conducted studies were analyzed. In the course of the study, the researcher achieved his goal. All tasks have been completed, the results of the research work have been analyzed and summed up.

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