
# USING PROBLEM SITUATIONS IN SCIENCE TEACHING

**Akbarova Munira Asqarovna**
Teacher of Namangan state university
https://doi.org/10.5281/zenodo.8128911

**Annotation:** Problem-based learning is a method of active interaction of the subject with the problem-represented content of learning, organized by the teacher, during which he is attached to the objective contradictions of scientific knowledge and ways to solve them. Learns to think, creatively acquire knowledge.

**Key words:** problem-based learning, awareness, acceptance, resolution, heuristic learning, knowledge, skills, attitudes, requirement.

An alternative to problem-based learning is heuristic learning .

Problem-based learning was based on the ideas of the American psychologist, philosopher and educator John Dewey (1859-1952), who in 1894 founded an experimental school in Chicago , in which the basis of learning was not the curriculum, but games and work. Methods, techniques, new teaching principles used in this school were not theoretically substantiated and formulated in the form of a concept, but became widespread in the 20-30s of the 20th century. In the USSR, they were also used and even considered as revolutionary, but in 1932 they were declared a scheme and banned.

The scheme of problem-based learning is presented as a sequence of procedures, including: setting a learning-problem task by the teacher, creating a problem situation for students; awareness, acceptance and resolution of the problem that has arisen, in the process of which they master generalized ways of acquiring new knowledge; application of these methods for solving specific systems of problems.

A problem situation is a cognitive task, which is characterized by a contradiction between the available knowledge, skills, attitudes and the requirement.

The theory proclaims the thesis about the need to stimulate the student's creative activity and assist him in the process of research activity and determines the ways of implementation through the formation and presentation of educational material in a special way. The basis of the theory is the idea of using the creative activity of students by setting problem-formulated tasks and activating, due to this, their cognitive interest and, ultimately, all cognitive activity.

Modern approaches to teaching are conditioned by the need to change the student's position in the educational process - turning him from an object of study into an independent subject of educational and cognitive activity, an active participant in the process of cooperation and co-creation.

At the heart of these changes is a rethinking of the goals of education: today the priority is not so much the acquisition of ready-made knowledge, but the assimilation of a certain way of thinking that ensures the acquisition and discovery of new knowledge. Modern

approaches to teaching involve the use of active types of cognitive activity of students in the classroom , one of which is the problematic presentation of knowledge.

Problem presentation is an activating presentation , when the teacher, in the course of communicating new knowledge, systematically creates problem situations, raises questions and indicates ways to solve problems, constantly encourages students to independent cognitive activity [1, p.51]. You can implement the method of problem presentation by creating various problem situations.

There are various ways to create problematic situations. Makhmutov M.I. identifies ten ways [2, p.83].

The first way is to encourage students to a theoretical explanation of phenomena, facts, external inconsistencies between them.

For example, when studying the topic: “Biogeocenosis. Food chains”, you can use the following historical example: In 1953, in one of the Japanese villages located on the shores of Minamata Bay, people began to die. Doctors who arrived in this village of fishermen noticed that cats had died along with people. A thorough examination showed that the cause of death was mercury poisoning, which occurred after the dumping of waste into the bay by a chemical plant located nearby.

How could mercury compounds get into the body of humans and animals?

The second way is the use of educational and life situations that arise when students perform tasks at school, at home or in the course of observing nature.

For example, in a lesson on the topic "Reproduction and development of plants" you can use biological tasks:

The guys soaked the bean seeds. The seeds swelled and they planted them in the beds of the school grounds. It was hot sunny weather. The boys went on a hike. But returning two weeks later, the seedlings were not seen. What is the reason for the failure of the guys?

- Youths soaked pea seeds. The peas were very dry. Let them lie in the water a little longer, they decided . Five days later, they poured water out of the jar and sowed peas. But the peas did not grow. What is the mistake of the juniors?

- In early spring, as soon as the snow melted, Victor sowed swollen bean seeds, but the seeds never sprouted. Then Vitya dug up the seeds and saw the dead moldy embryos. Why did the seed germs die?

The third way is to set educational problematic tasks to explain the phenomenon or to find a way to apply it in practice.

For example, when studying the topic: “Hydrosphere”, you can use questions . The water that cools the turbines of power plants causes thermal pollution of the lakes into which it is discharged after use. Explain why heated water causes negative effects in lake ecosystems. How can thermal pollution of water bodies be prevented? The total amount of oil and oil products annually entering the waters of the World Ocean exceeds 10 million tons . How do oil slicks affect the exchange of matter between the ocean and the atmosphere? What effect do oil products entering the ocean have on the vital activity of living organisms?

The fourth way is to encourage students to analyze the factors and phenomena of reality, which generates contradictions between worldly ideas and scientific concepts about these facts.

For example, when studying the topic: “Atmosphere, properties of air”, questions can also be used. Why doesn't water enter a glass when it is turned upside down? It was a hot day,

the thermometer showed +32 C. The ship with a group of passengers sailed away from the shore. The farther it moved away from the coast, the cooler it became, although the sun was still warm , the air temperature was +29 C. Why do you think the air temperature dropped after the ship moved away from the coast?

The fifth way is to put forward assumptions (hypotheses), formulate conclusions and test them experimentally. If you put a warm coat on a snowman, will it melt? Why? The ladybug, the Colorado potato beetle have a bright, highly visible color, but the birds do not peck them. Why? Does this bright coloring always help these insects to survive?

The sixth way is to encourage students to make comparisons , compared to the confrontation of the factors of phenomena, rules, actions, as a result of which a problem situation arises. How is acid rain related to the increase in the number of cars on the roads? Why is there a shortage of water on Earth, where most of the surface is covered with water? Why is prohibitive protection of plant resources irrational and why should they be protected in the process of use? What happens if a person completely cuts down all the forests on Earth, replacing them with fields and pastures?

The seventh way is to encourage students to preliminary generalize new factors.

Students are given tasks to consider new facts, phenomena contained in new material for them, compare them with unknowns and make an independent generalization.

For example, when studying the topic: “Earth is a planet in the solar system”, you can discuss the following question: Many centuries ago, people assumed that the earth is a flat body held by large animals and creatures (Elephants, whales, turtles) and you can reach the edge of the Earth. Now everyone knows that the shape of the Earth is a sphere. Does life on earth matter if its shape is a sphere rather than a flat plate?

Topic: “Natural communities. Biocenosis":

- Why, after the destruction of birds of prey, the number of quails and partridges on which they ate decreases?

- Ch. Darwin in the 19th century noticed a peculiarity: the more cats live in the area, the more cows gave milk in the area. How can this be explained?

The eighth way is to familiarize students with facts that seem to be of a necessary nature and have led in the history of science to the formulation of a scientific problem.

So when studying the topic: “Air pressure. Wind” you can consider the following problem: for a long time air was considered weightless, in the 16th century the scientist Avogardo put forward the following statement: “Air is a weightless nothing”. However, in the 17th century, the Italian scientist Galileo proved the weight of air. He did a simple experiment - he weighed an empty bottle, and then the same bottle after heating. It turned out that the bottle became lighter after heating. Galileo explained this by saying that air, like any material body, expands when heated, therefore, part of it came out of the bottle, so it became lighter. But if air has weight, it must exert pressure on all objects on the surface of the Earth. Galileo's student, Toricelli, dealt with this issue . Subsequently, he weighed the air, it turned out that at sea level 1 m3 of air weighs 1.3 kg, and the whole atmosphere presses on 1 m2 with a force of about 10 tons. Why then does a person not feel the weight of air and its pressure?

The ninth way is the organization of intersubject communications. In this case, one should use the facts and data of sciences that are related to the studied material.

The upbringing of a modern teacher who owns active teaching methods is possible in conditions where the future teacher himself is in the role of a subject of learning. This is

facilitated by problematic lessons, which form the creative thinking of students in the course of analysis, comparison, highlighting essential features, contradictions, evidence, assumptions and facts[12].

The ability to build a lesson is problematic, knowledge of problematic teaching methods is necessary when teaching natural science in the framework of the new Federal State Educational Standards of primary education.

At the lessons of "natural science with teaching methods", we with students not only solve problem situations, but also work on creating a methodical piggy bank of directions for the accumulation of problem situations and problem tasks according to the "World Around the World" program in elementary school, which facilitates lesson planning both at the lesson and and state practice.

## References:

1.Scholtz, Z., Watson, R. & Amosun, O. (2004). Investigating science teachers' response to curriculum innovation. African Journal of Research in Science, Mathematics and Technology Education, 8(1): 41-52.

2.Sherman, A. & MacDonald, L. (2007). Pre-service teachers' experiences with a science education module. Journal of Science Teacher Education, 18: 525-541.

3.Shulman, L. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 15(2): 4-14.

4.Sidhu, K. S. (2006). The teaching of mathematics. Sterling Publishers: India. Smith D. C. & Neale, D. C. (1989). The construction of subject matter knowledge in primary science teaching. Teaching and teacher education, 5(1): 1-20.

5.Struwig, F. W. & Stead, G. B. (2004). Planning, designing and reporting research. Maskew Miller Longman: Cape Town. Thomas, J. T. (2000). A review of research on project-based learning. [Online.] Available from: http://www.bobpearlman.org/BestPractices/PBL_Research.pdf. (Accessed 7 November 2009.)

6.Vygotsky, L. S. (1998). The collected works of L. S. Vygotsky. Child Psychology. 5, Riebert, R.W. (ed.). New York: Plenum Press. Yilmaz-Tuzun, O. (2008). Preservice teachers' beliefs about science. Journal of Science Teacher Education, 19: 183-204.

7.Rahimjanovna, S. M. . (2023). Primary Class' Technology as a Creative Subject. AMERICAN JOURNAL OF SCIENCE AND LEARNING FOR DEVELOPMENT, 2(1), 84–87. Retrieved from http://inter-publishing.com/index.php/AJSLD/article/view/917

8.Shermatova, M. R. . (2023). Spiritual Wealth Education of Students in the National Spirit through. Miasto Przyszłości, 31, 396–400. Retrieved from http://miastoprzyszlosci.com.pl/index.php/mp/article/view/1066

9.Shermatova, M. R. . (2023). Continuity of Education and Education in Technology. AMERICAN JOURNAL OF SCIENCE AND LEARNING FOR DEVELOPMENT, 2(1), 213–217. Retrieved from http://inter-publishing.com/index.php/AJSLD/article/view/1004

10. Kulnevich S.V., Lakotsenina T.P. Modern lesson. Part 3. Problem lessons. - Rostov -on-Don: "Teacher", 2006;

11.Makhmutov M.I. Organization of problem-based learning. - M.: Pedagogy, 1997

12.Akbarova M. METHODS OF TEACHING NATURAL SCIENCE IN PRIMARY GENERAL EDUCATION //International Bulletin of Applied Science and Technology. – 2023. – T. 3. – №. 5. – C. 790-795.