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THE ROLE OF THE EDUCATIONAL ENVIRONMENT IN THE DEVELOPMENT OF CRITICAL THINKING OF SCHOOLCHILDREN IN TEACHING PHYSICS

Abstract: The article discusses the basic conditions for the development of critical thinking. The influence of the educational environment in teaching physics at school has been studied in detail. The levels of the student's educational environment in teaching physics are considered.

Keywords: critical thinking, educational environment, components of the educational environment.

The works of many researchers are devoted to the formation and development of critical thinking – I.O. Zagashev, S.I. Zair-Bek, I.V. Mushtavinskaya, Yu.G. Tamberg, D. Halpern, etc. Based on the analysis of the definitions proposed by these authors, we adopted the following as a working principle: "critical thinking is the intellectual ability of a person to question incoming information, their own opinions and to search for the truth" [4].

The ability to carry out critical thinking activities is formed and developed when teaching various school disciplines. The school subject "physics" plays an important role in this. We believe that the main conditions for the development of critical thinking in teaching physics are:

- the use of various techniques of proven critical thinking development technology (TRCM) in physics lessons ("insert", "Bloom's daisy", "true and false statements", etc.) in the following sequence of stages: "challenge – comprehension – reflection" [1];

- organization of various types of experimental activities of schoolchildren (demonstration experiments, laboratory work, physical practice, home observations and experiments), because experiment is the criterion of truth, and its role in the development of critical thinking is undeniable [2].

However, in our opinion, another condition for increasing the effectiveness of the process of developing critical thinking among schoolchildren is the need to create and competently use an appropriate educational environment

The importance of the environment and the surrounding society for the comprehensive development of students was emphasized by many well-known teachers. In particular, M.A. Pinskaya and A.M. Mikhailova argued that the object of the teacher's influence should be the conditions, the environment of the child's existence – objects, people, their interpersonal relationships, activities [5].

In order to develop students' critical thinking, the physics teacher is faced with the task of constantly expanding the educational environment of each student in accordance with his educational needs and using for this purpose all the resources available in a given place and at the moment – components of the environment: information resources, subjects of education, material and technical base, social and industrial infrastructure of the region, etc.

We consider it possible, based on the analysis of the activities of various educational institutions, to identify the following levels of the student's educational environment when teaching physics [3]:

- The first level ("classroom") is limited to the physics classroom and the time allocated by the curriculum for its study. In order to develop students' critical thinking, a teacher can organize the process of teaching physics based on TRCM at this level, as well as apply various types of experimental activities. Let's consider an example of using the TRCM technique – "brainstorming" – in a physics lesson on the topic "Surface tension". The teacher sets a goal for the students: to study the phenomenon of surface tension, while the following materials are on their tables: a bowl, water,



scissors, a paper towel, a small paper clip, a toothpick. Students should generate their own ideas and analyze them. Students in mini-groups express their suggestions, listen to their friends, select the most interesting solutions and appoint speakers who will tell ideas and show experiments to the whole class.

- The second level ("school") – the educational environment goes beyond the classroom and lesson, at this level, various extracurricular activities in physics are organized for students within the framework of an educational institution (scientific and practical conferences, Olympiads, electives, elective courses, clubs, competitions, project activities, etc.). For development the critical thinking of schoolchildren involves other subjects – the class teacher, parents of students, subject teachers, etc. An example is the organization of the Physics in Toys circle for students of different ages, including elementary school students, in which students study the principle of operation of various children's toys (tumbler, spinner, neocube, nanobook, etc.) and talk about them at school exhibitions and conferences.

- The third level ("regional") – at this level of the educational environment, the infrastructure of the region is used to organize various extracurricular activities in physics (visiting exhibitions, museums, construction sites, conducting classes in institutions of additional education, etc.), which are also attended by employees of these social and industrial facilities (specialists from various fields, teachers additional education, etc.). For example, in Yekaterinburg, an excursion of schoolchildren to the Galileo Wonder Park or Newton Park can be organized, during which students learn to question the information received, ask questions, analyze and verify the reliability of the answers received. It can also be, for example, excursions (including virtual ones) to various industrial enterprises and exhibitions (Innoprom, Uralinova, etc.), where students see the practical significance of physics.

- The fourth level ("open") – at this level of the educational environment for schoolchildren, all temporary and territorial boundaries are "erased". To develop their critical thinking, they should use a wide range of Internet resources – communication with famous people, masters, participation in Internet contests, Olympiads held both in Russia and abroad, etc. For example, at this level, students can take part in the All-Russian Internet contest "MYTH", in which they are faced with the task of detecting and analyzing "physical lapses" in the proposed fragment of a feature or animated film and simulate the correct version of the course of physical phenomena and processes.

The use of various components of the educational environment – information resources (encyclopedias, the Internet, mass media, fiction, etc.), subjects of education (teachers of additional education, representatives of various professions, scientists and specialists from different fields, etc.), social and industrial infrastructure of the region (factories, transport enterprises, scientific laboratories, museums, exhibitions, etc.), etc. It allows students to expand the boundaries of the educational space and develop the whole set of critical thinking skills.

The role of the teacher in the step-by-step development of critical thinking of schoolchildren is to timely identify the educational needs of schoolchildren, their cognitive interests and, in accordance with them, offer students the appropriate components of the educational environment.

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