

A SIMILAR OBJECTIVE PISA INTERNATIONAL STUDENT ASSESSMENT PROGRAM TO DEVELOP STUDENT LITERACY IN PHYSICS TEACHING

Меликузиев Дадакузи Джуракузиевич,
Lecturer, Department of Physics and Astronomy,
Kokand State Pedagogical Institute named after Mukimi, Uzbekistan
dadaxon.xadjaev@gmail.com

ANNOTATION

The article sets out the task of forming natural science literacy in students of the 8th grade on the basis of performing tasks similar to PISA tasks in physics lessons. An example of a task that meets the didactic requirements is given.

Keywords: physics, PISA, scientific text, competence, literacy, current source, light bulb, generator, battery.

The importance of teaching physics to students lies in its need to study in order to acquire the knowledge, skills and abilities necessary for scientific and technological progress, production spheres and everyday life. The fact that our modern rapidly developing world requires systematic human efforts, both physical and mental, requires constant search and development in both the field of science and education.

The rapid development of science and technology, the development of information and communication technologies, the worldview, potential, abilities and creativity of a person serve as the main capital of society. The role of the concept of physics in the formation of each person in society as a competitive person is as follows:¹

- application of knowledge, skills and abilities acquired in the course of the educational process in physics classes, in independent practical activities, choosing a profession, entering into social relations, forming competencies necessary in the labor market;
- orientation to the creative development of students' talents, the achievement of scientific and technological progress, the ability to apply engineering, mathematical and physical knowledge in everyday life, the formation of national, universal values in them;
- consists in educating students in creativity aimed at designing by combining practical activities with observations, in the manifestation and development of critical thinking skills and logical analysis, intelligence, problem solving, creating news.

The admission to our country of international experience in the implementation of these goals and the development of the sphere of education, the conduct of educational research on the basis of international evaluation programs indicates the release of the education system to another high level.

In accordance with the Decree of the President of the Republic of Uzbekistan, in order to identify priority areas for the systemic reform of general secondary and out-of-school education, raise the spiritual, moral and intellectual development of the younger generation to a qualitatively

¹ Decree of the President of the Republic of Uzbekistan dated April 29, 2019 No. UP-5712 "On Approval of the Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030".

new level, increase the efficiency of educational work, increase the level of knowledge and skills of students of general educational institutions of the Republic of Uzbekistan, as well as raise the level in order to introduce innovative forms and methods of teaching in the educational process, achievements by 2030 of the entry of the Republic of Uzbekistan into the top 30 leading countries of the world in the international ranking PISA and the creation of a national system for assessing the quality of education, focused on assessing the level of literacy of students in reading, mathematics and natural sciences, based on the organization of international studies in the field of assessing the quality of education in the public education system.²

Since 2022, Uzbekistan has taken part in 3 areas of this program: reading literacy, mathematical literacy, natural science literacy. The results of the study are scheduled to be published in 2023. The PISA International Evaluation Program is held every three years. This is why it is important that students are more prepared for the next PISA studies. When preparing students for international studies, tasks similar to PISA tasks are also developed in the types of subjects covered by the direction of natural science literacy, and their use in science lessons also gives positive results. In particular, since natural science literacy is the direction of assessing the literacy of students in the natural sciences (physics, chemistry, biology, geography, astronomy), there is a need to use tasks similar to PISA tasks in physics lessons, combining the integration of physics and other natural sciences, the ability to apply the knowledge gained in physics in life situations, to develop the competence of natural science literacy. To implement the above, it is necessary, first of all, to develop students' natural science literacy and competencies. Information is provided to readers mainly in the form of a text, because only when the skills of reading and understanding natural science data, extracting the necessary facts, processing and applying them in life situations, collecting information are formed to obtain the necessary knowledge, students will have a higher level of practical application of scientific data.

Paying attention to the didactic requirements of the educational and methodological support of the disciplines of physics and astronomy, it can be understood that the following conditions must be met:³

- ensuring the assimilation of educational material;
- these texts should serve not informative, but explanatory purposes of the content of the educational subject;
- be accessible and differentiated for interested readers;
- formation of a scientific worldview, the content of materials based on specific facts;
- the focus of education on ensuring the connection between everyday life and practice, the formation of competence to apply the knowledge gained in practice, ensuring an inextricable link with other academic disciplines;
- illustrations in the form of drawings: drawings, diagrams, tables, diagrams and photographs;

² Project of the State Inspectorate for Quality Control of Education "Concept of Ensuring the Continuity of Physical and Astronomical Education in the System of General Secondary, Secondary Specialized, Vocational and Higher Education". Tashkent-2021. pp. 12--13

³ "The concept of ensuring the integrity of physical and astronomical education in the systems of general secondary, secondary specialized, vocational and higher education" Project of the state inspection of the quality of education. Tashkent- 2021. p. 13

- New concepts, terms, rules, formulas, definitions, etc. should be presented in the form of a dictionary.

To improve the natural science literacy of students, we consider it expedient to use the following task, which has 4 levels of complexity, corresponding to the requirements of PISA tasks and didactic requirements that can be applied when teaching the topic "Current Sources" in physics in the 8th grade [4].

Task. The sources that provide us with electricity in everyday life are sources of current. In current sources, energy of any kind is converted into electrical energy: light energy is converted into electrical energy, thermal energy is converted into electrical energy, mechanical energy is converted into electrical energy, chemical energy is converted into electrical energy, etc. Current sources can be chemical or physical sources of current. Current sources include galvanic cells, solar panels, accumulators, electromagnetic and thermoelectric generators, nuclear power plants, hydroelectric power plants, thermal power plants, wind power plants, etc.

1. Which of the figures is not a current source? Under what conditions is an alternative current gauge used in Uzbekistan?



(A)



(B)



(C)



(D)



Answer _____

Answer: Answer B describes the light source, not the current source.

Since Uzbekistan is a sunny country, so the use of solar electricity is convenient

2. Divide the current sources named above into chemical and physical current sources.

Chemical current sources	physical current sources
galvanic cells, Batteries	electromagnetic and thermoelectric generators, solar panels, NPP, HPP, CHP, wind power plant

3. Compare the production of energy from wind with the production of electricity using fossil fuels such as oil and coal, and write down its advantages and disadvantages.

Advantage: _____

Lack: _____

The correct answer is:

Advantages:

- ▶ Carbon dioxide (CO₂) is not emitted;
- ▶ minerals are not consumed;
- ▶ wind energy is limitless;
- ▶ the cost of electricity produced by wind is cheaper;
- ▶ in the production of electricity due to wind, harmful substances that pollute the environment are not emitted;
- ▶ the forces of nature or «pure» energy are used;
- ▶ Does not have a negative impact on the environment and works for a very long time.

Disadvantages:

- ▶ Electricity will not be generated as much as required, because the wind speed cannot be controlled;
- ▶ the number of suitable areas for the installation of windmills is limited;
- ▶ Windmills can fail due to strong winds;
- ▶ The amount of electricity generated by one windmill comparatively not much;
- ▶ The noise of windmills will be strong;
- ▶ birds that fall into the feathers of windmills die;
- ▶ the original appearance of nature will be disturbed;
- ▶ Installation of windmills is expensive.

4. In Rustam's apartment, 6 LED bulbs with a capacity of 20 watts light up for 8 hours a day. Dilshod has 2 100W incandescent bulbs going on for 8 hours. Who pays more for electricity. (1 kW×hour 325 sum)



LED lampochka



Cho'g'lanma lampochka

Answer: _____

The correct answer is: $W=IUt=Pt$ -formula for calculating electrical energy. W-electric energy, U - electrical voltage, I - current, P-electric power.

Rustam's apartment has 6 light bulbs with a capacity of 20 watts. One light bulb consumes $W=20W \times 8 \text{ soat} = 0.16 \text{ kW} \times H$ energy per day. There are 6 light bulbs in total. Total: $0.16 \times 6 = 0.96$ kWh of energy consumed. If 295 soums for 1 kW, then $0.96 \times 325 = 312$ soums.

Dilshod's house has 2 100W light bulbs. One incandescent lamp consumes $W=0.1 \text{ kW} \times 8$ hours = 0.8 kW hours of energy. For electricity consumption, when two light bulbs receive a total of 1.6 kWh of energy: $1.6 \text{ kW} \times 325 = 520$ soums, a fee is charged.

This means that Dilshad's home pays more for electricity because it uses incandescent bulbs. A light bulb has more power and therefore consumes more electricity.

The advantage of this task is that the thoughts expressed in the task are clearly presented to the reader through illustrations of natural science literacy and allow you to think about the current moments related to electricity. They will be able to express their thoughts in accordance with given scientific texts in the form of tables or images. When teaching students logical thinking, looking at life situations from the point of view of science, saving money spent financially, such tasks give the expected results. For example, after completing this task, the reader counts the number of power tools in the house in which he lives, how much he spends on electricity, studying the values of electricity consumption. He realizes that by turning on power tools at the wrong time, he can increase the cost of electricity bills. With general conclusions on the task, it is certainly advisable to provide information about the sources of electricity generation at the present time, in particular, about solar energy calculated from renewable energy sources, and its prospects, to conduct a conversation with students. Because our country has very favorable climatic conditions for the use of solar energy. In terms of geographic location, 85 to 87 percent of the time will be sunny. With the efficient use of solar energy, it becomes possible to further improve the social conditions of the population. Solar energy can be used for the following purposes: in greenhouses, to produce hot water and fresh water based on solar energy, in solar dryers, semiconductor solar cells, for heating buildings, in solar refrigerators, when driving cars, even with solar energy it is possible to launch airplanes [5]. For example, by inventing and operating types of cars that run on solar energy rather than liquid fuel, its use leads to high positive results, both economically and environmentally. As an assignment, it is necessary to give students independent reading and research of modern sources of information at home, to talk about the study of information on the topic using various sources of information (newspapers, magazines, television, the Internet). Immediately after independent searches for students, these calculations can be tested in practice or inventive work can be carried out.

This is natural when teaching students physics using tasks similar to those of PISA – you can develop natural science literacy in them by expanding their scientific literacy and teaching students to look at science from a life point of view. It consists in systematically informing students about the novelties of science, technology, the world, teaching best practices, demonstrating to students the prospects for the development of physics in each lesson, the formation of life skills through the realization that physics and physical phenomena are an integral part of our lives.

REFERENCES

1. Decree of the President of the Republic of Uzbekistan dated April 29, 2019 No UP-5712 "On Approval of the Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030".
2. The project of the State Inspectorate for Quality Control of Education "the concept of ensuring the continuity of physical and astronomical education in the system of general secondary, secondary specialized, vocational and higher education". Tashkent-2021. S. 12-13.
3. "The concept of ensuring the integrity of physical and astronomical education in the systems of general secondary, secondary special, vocational and higher education" Project of the state inspection of the quality of education. Tashkent- 2021. p. 13
4. P.Khabibullaev, A.Berdyayev, A.Bachromov et al. Physics textbook for the 8th grade of secondary schools. Tashkent 2019.
5. Mazhidovo T.Sh. unconventional and renewable energy sources. Tashkent, 2014. 177-b.
6. <http://earw.tiame.uz>