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DEVELOPMENT OF PHYSICS-THEMED QUESTIONS IN ORDER TO IMPROVE STUDENTS' NATURAL SCIENTIFIC LITERACY

Shahnoza Anvarova Asqarjon kizi
Researcher at UzMU

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Abstract:

This article is devoted to the issues of increasing natural scientific literacy of the PISA international program for improving the quality of education. Samples of physics-themed questions based on PISA tasks are presented.

Keywords: TIMSS, PIRLS, PISA, Natural-scientific literacy, Context, competencies, friction.

TIMSS - international monitoring of the quality of teaching mathematics and natural sciences at school (Trends in Mathematics and Science Study);

PIRLS is an international study that determines the level of reading and comprehension of the text (Progress in International Reading Literacy Study).

Our work is mainly aimed at increasing natural scientific literacy, one of the directions of the PISA international program.

PISA (The Program for International Student Assessment) is an international program for assessing the educational achievements of students. is to evaluate literacy levels in the form of various tests. These projects aim to assess the creative and critical thinking of students, their ability to apply the knowledge they have acquired in life, and encourage them to develop these skills later.

This program was introduced in 1997 and is held every three years, for the first time in 2000. One subject is preferred every three years, and almost 50% of the total test set belongs to this subject. In 2000, reading literacy was emphasized for the first time. The reason for the implementation of the program among 15-year-old schoolchildren is that at this age the schoolchildren of most of the member states of the Organization for Economic Cooperation and Development enter the last stage of compulsory education.

The main goal of the program is not to know the knowledge that students have received at school, but to know how to apply the acquired qualifications, knowledge and skills in life and to analyze the result, to get out of the situation, to check the knowledge of evaluation. The PISA program is a program that serves as a basis for motivating, persuading, and strengthening the knowledge of students in their preparation for life. According to the results of the research conducted between 2000 and 2019, the secondary education system of countries such as Finland, Estonia, Switzerland, Poland and the Netherlands is well developed today in East Asia - China, Korea, Singapore, Japan, Europe .

PISA tests are conducted in 5 directions:

-Reading,
-mathematical literacy,
- natural sciences,
-collaborative problem solving and
- directions of financial literacy.

(In Uzbekistan, he plans to participate in tests in three areas: reading, mathematical literacy and natural sciences). With the help of the program, changes in the education system of different countries are identified, compared, and evaluated.

My scientific work, PISA is to contribute to the improvement of natural scientific literacy among students by providing a wider coverage of natural scientific literacy and developing questions.

Natural-scientific literacy is a person's ability not only to have knowledge on issues related to natural sciences, but also to analyze them and find solutions in life situations.

A person who is literate in natural sciences will have the following competencies.

Competence to scientifically explain phenomena - to know, propose and evaluate explanations of technologies, natural phenomena-processes;

Competency in designing and evaluating scientific researches - describing and evaluating scientific researches and proposing ways to solve problems on a scientific basis;

Competence of scientific interpretation of data and evidence - analysis and evaluation of various forms of scientific data, evidence, and drawing appropriate conclusions.

It should be noted that the PISA tasks have specific characteristics in terms of their structure, and they do not intend to correspond to specific subjects or topics. However, in some cases, subjects may or may not correspond to any subject. While studying them, it is important to activate the basic knowledge related to the specific task.

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Based on the literacy model and competencies in natural sciences, I present the tasks I have compiled below on the topic of friction:

Questions dedicated to revealing the topic of "Friction" created in order to increase natural scientific literacy

1. Sayyid wanted to go for a walk in the park, so he set out on a bicycle, he rode on the asphalt road until he reached the park. After his walk, Sayyid returned home on another dirt road, where he felt that he exerted more effort than on the asphalt road.

Why did Sayyid spend more effort on the sand-dirt road than on the asphalt road?

Answer: Yes, here on the sand-dirt road, there is a great force of friction.

In the example we saw above, the force of friction caused us to overexert ourselves.

2. Choose the correct statements about the force of friction

A) If the surface roughness increases, the force of friction increases

B) Frictional force can make parts of technical structures unusable.

D) usually resists movement

E) sometimes helps movement

F) The greatest frictional force is created between ice and ice.

J: A, B, D, E are correct.

3. Does friction occur only in moving bodies on the ground? Why do airplane and submarine shapes have a pointed part? What's the harm in rubbing against airplanes?

A: The force of friction is not only in moving objects on the ground, but also in water and air. That is, the structure of the ships and the appearance of the airplanes were chosen in such a way that they are convenient for movement and reduce frictional forces. That is, the front part of the ships is specially prepared to cut water. The shape of the airplanes moving at such a high speed is also chosen in this way, the friction force in airplanes is highly dependent on the speed. Airplanes traveling at speeds greater than the speed of sound heat up due to friction.

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