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PISA – OF STUDENTS AS AN INTERNATIONAL SCIENCE LITERACY ASSESSMENT PROGRAM

Karaxanova Lobarxan Musaxanovna
Head of the Department "Teaching Technologies of Natural Sciences" of the Scientific Research Institute of Pedagogical Sciences of Uzbekistan named after TNQori Nièziy, Doctor of Philosophy (PhD), Senior Researcher

Madraximova Munojatxan To'lanboevna
Biology Teacher at Kokan State Pedagogical Institute

Abstract:

PISA is an international assessment program aimed at assessing the literacy of students in reading (text comprehension), mathematics and natural sciences, and is designed to determine whether students can apply the knowledge and skills acquired at school in real life situations. PISA tests are a step-by-step introduction to these changes . to be able to apply the knowledge students are getting at school in real life, events to analyze, draw the correct conclusions from them and engage in communication. It provides an opportunity to develop skills , participate in international research, and find out about the country's position . In this article, the questions about the use of PISA international assessment programs in education , its importance and possibilities of efficiency are reflected

Keywords:

PISA, test , mathematical literacy , it is literate in natural and scientific sciences , reading literacy , competence, creativity.

Introduction

According to the decision of the Cabinet of Ministers of the Republic of Uzbekistan [1] ―On measures to organize international research in the field of education quality assessment in the public education system‖ dated December 8, 2018 No. 997 PISA-2021 - an agreement was reached with the International Organization for Economic Cooperation and Development (IHTT) on participation in the international program for assessing students' literacy .

PISA (English - Program for International Student Assessment) is an international program for assessing students' literacy. The PISA survey is conducted by the Organization for Economic Cooperation and Development (OECD). It was first developed in 1997, and in 2000 it was used for the first time. As a result of research the quality of education in the country is concluded taking into account international standards. International research has an effective influence on the quality of national research in the field of education . This makes it possible to create a national evaluation system based on high economic efficiency at the level of international standards i . By participating in international research together with the leading specialists of various organizations in Uzbekistan , the culture of conducting monitoring research develops

among our local experts, which leads to the adaptation of the assessment of the quality of education to international standards.

PISA **-** is an international program for evaluating the achievements of students in the field of education, in which the test evaluates the knowledge of schoolchildren in the countries of the world and the ability to apply them in practice. The main goal of the program -is to assess the ability of 15-year-old students to use the knowledge and experience they acquire at school in social relations and solving problems in various life situations encountered in human activities . This test is conducted once every three years. The main task of the PISA program is to provide countries with information on education policy, to support them in making decisions. Conducting the survey every three years provides an opportunity to provide timely information to countries, including information and analysis to take into account the impact of policy decisions and related programs.

To date, test-tasks of the PISA international assessment program have been conducted a total of 8 times every 3 years (2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2021). The inspection of the quality of education under the Cabinet of Ministers of the Republic of Uzbekistan and the international cooperation research organization have achieved participation in the national program for the assessment of students' literacy (Agreement for participation Program for International Student Assessment - PISA - 2021) . . The PISA program aimed at monitoring the quality of education at school has three main areas: reading, is conducted on mathematics and science literacy .

Reading Literacy: *A person's ability to understand and respond to information presented in text form, in real life is the ability to use the information he has read for his own goals, to increase his knowledge and capabilities.*

Here, the concept of reading literacy acquires a broad meaning . The purpose of this direction is to help students understand the text given to the students on various topics , such as excerpts from works of art, biographies, letters, documents , theses , articles from newspapers and magazines, various manuals, geographical maps , which contain diagrams, pictures, cards, graphs and tables intended to reveal the text. , is focused on determining their competencies, such as being able to think about the content, understand the content of the text and give their own opinion about what they have read.

Mathematical Literacy *: It examines whether a person knows the place of mathematics in the world in which he lives, can justify mathematical processes correctly and completely. It is the main aim of this department to ensure that the individual can use mathematics in a way that meets the current and future needs of the creative, curious and thinking person for mathematical knowledge.*

"literacy" is not to determine the extent to which the knowledge provided in the school program has been mastered , but social attention means the ability to use mathematical knowledge in different life situations, using different methods of thinking and making intuitive decisions. But the knowledge and skills provided in the school program can be the basis for answering these types of questions . This route is in testing mathematical

calculation situations that may be encountered in various areas of life (medicine, housing, sports, etc.) are offered.

The main goal ***of literacy in natural sciences*** *is the ability to identify, observe and analyze problems that can be solved scientifically in life events , and draw conclusions based on experience . These conclusions develop the ability to understand the world around us and the changes occurring in it as a result of human activity, and to make the necessary decisions .* [13]

X peer assessment programs (PISA, PIRLS, TIMSS) by completing interesting tasks prepared for the student, it not only increases the student's enthusiasm for the lesson, but also creates an opportunity to compete with peers around the world.

Pisa assignments are developed by international experts with extensive experience, and the development of similar assignments requires systematic and specialized knowledge. Tasks created without complying with the requirements set for PISA tasks create misconceptions among students. Therefore, in the process of preparing students for the PISA test, the main focus should not be on solving individual PISA tasks, but on increasing the level of general preparation for the tasks they have to solve.

There have been international evaluation studies What is the main difference between PISA and TIMSS ? The main difference between PISA and TIMSS programs is that they are conducted in different age groups and classes. For example, PISA aims to assess the knowledge of 15-year-old students, while TIMSS assesses the knowledge and skills of fourth- and eighth-graders, not specific age groups. Meanwhile, while TIMSS assessments are curriculum-based, PISA focuses on assessing students' acquired knowledge and skills to solve real-world problems. While TIMSS specifically assesses levels of school acquisition of knowledge, PISA focuses on levels of application of knowledge and skills at school, at home, and in the community. Based on this model, we see the content of tasks in the following example.

Activities of TIMSS and PISA tasks on natural science literacy :

Type of activity in TIMSS:

- Knowing;
- Application;
- Reasoning.

Type of activity in PISA:

- Scientific explanation of events;
- Application of natural-scientific research methods;
- Making conclusions based on scientific evidence

Human image in TIMSS and PISA studies: TIMSS is a doer. PISA is a decision maker.

Science focus of PISA research One of the main focus areas of PISA research is science literacy. Natural-scientific literacy is the ability of a person to take an active civic position on issues related to natural sciences and to be interested in natural ideas. A natural-scientifically literate person seeks to participate in the discussion of problems related to natural sciences and technologies, and for this is required to have the following

competencies, scientifically explain phenomena, evaluate and plan scientific research, information and evidence interprets scientifically . PISA has different requirements, the tasks are contextual in nature, that is, the focus is on real-life situations or real problems that need to be analyzed and solved. [4]

Popova O. V , Belikova R. M, Novolodskaya E based on the publications of local and foreign researchers, based on the experience of forming and developing students' literacy in natural sciences in the modern education system, the relevance of effective use of certain approaches in teaching natural sciences, and determining the optimal conditions for the formation of the natural-scientific component of students' functional literacy , try it.

Concept of natural literacy has been given various definitions in recent years. In the works of LM Perminova, natural literacy is characterized by nature and technologies, methods of obtaining scientific knowledge, understanding the validity of these methods and their use . He notes that natural literacy has elementary, functional and general cultural levels. [3]

As stated by Yu.Pentin and others, it is the ability to understand natural phenomena, explain them, describe and evaluate them from a scientific point of view, plan research activities, and scientifically interpret data and evidence to draw conclusions . Demonstration of competences by students in a certain context shows that knowledge and skills within natural literacy are inextricably linked with real life situations that are simple and understandable for children .

Literacy of natural and scientific sciences increases the competence of identifying problems that can be solved scientifically in natural phenomena, drawing conclusions based on observations and experiments . These conclusions are considered to be the development of the ability to understand and understand the world around us and to understand the changes occurring in it as a result of human activity and to make the necessary decisions [2]. A natural-scientifically literate person will have the following competencies:

• scientific explanation of events;
• design and evaluation of scientific researches;
• scientific interpretation of data and evidence.

In the country of Singapore, which regularly participates in the PISA study and achieves high results, the main goal of teaching natural sciences is the formation of students' natural-scientific literacy. In order to form and develop natural - scientific literacy of students in the educational process, special attention is paid to the composition of natural-scientific literacy competencies.

The main task of education is to form the skills that the student will need today and in the future to lead a successful life in society. Creative thinking is an important skill that today's youth need to have. This skill will help them adapt to a world that is constantly and rapidly changing, requiring workers with "21st century" skills that go beyond basic literacy. In general, today's student is expected to work in the future in fields that do not

even exist now, to solve new problems through new technologies [9] The PISA task block is in the form of real situations with problems. Each question, task is classified according to the following categories: - competence - type of natural-scientific knowledge - context - cognitive level.

Competencies - 1. Events be able to explain scientifically; 2. Being able to apply the methods of natural and scientific research; 3. Being able to draw conclusions based on scientific evidence.

Natural - type of scientific knowledge

1. Content knowledge:

a) Natural systems

b) Living systems

c) Earth and space science

2. Imperative knowledge (knowledge related to the process) - knowing how to use different methods in obtaining scientific knowledge.

In the substantive knowledge section - "Natural systems" - mainly physics and chemistry, "Living systems" - biology, "Earth and space science" - geography, geology, astronomy. However, the tasks of the PISA program are interdisciplinary in nature. - Contexts Context is a thematic problem situation related to a question or task department

The PISA study has the following contexts.

- Health - Natural resources - environment - risks and problems - science - integration of science and technology.

Each context can appear in 3 states:

- personal (cases related to the student himself, his family, friends)
- local, scientific - global

Task level (cognitive level)

The following task levels are allocated

1. Lower level - performing one-step procedures, for example, knowing facts, terms, principles.
2. Intermediate level - being able to apply conceptual knowledge in explaining events.
3. High level - ability to analyze complex data, generalize, evaluate evidence, draw conclusions.

Below are some examples of PISA tasks for the assessment of literacy in natural sciences and their evaluation criteria .

Topic: DOUGH FOR BREAD

When making dough for bread, salt, flour, water and yeast are mixed. After that, the dough is left in a container for several hours to start the fermentation process. During fermentation, chemical processes occur in the dough . Yeast (a single-celled fungus) converts the starch and sugar in it into carbon dioxide and alcohol.[11]

Task 1 . As a result of fermentation, the dough rises. Why does the dough rise?

A. The dough rises because the alcohol in it turns into a gas.

B. The dough rises as the unicellular fungus multiplies.

S. The dough rises because carbon dioxide is formed there.

D. Dough rises because water evaporates during proofing.

Evaluation criteria :

In order to complete this task, students must remember the knowledge of single-celled (yeast) fungi from biology, the fermentation process: as a result of their life activity, yeasts break down the sugar and starch contained in flour first into glucose, then into carbon dioxide and alcohol, and dough is formed. increases due to carbon dioxide gas. If the students choose "C. If you check the option "dough rises as a result of the formation of carbon dioxide gas", the answer is fully accepted. Other answers or if there is no answer are not accepted. This question is aimed at evaluating the competence of students to explain phenomena scientifically.

Task 2 . A few hours after making the dough, the chef weighs the dough and finds that the dough has reduced. The mass of the dough is the same at the beginning of each of the four experiments shown in the pictures. Compare and determine which of the two results of the cook's experiment is the cause of the decrease in the weight of the dough?

A. The chef should compare the results of experiments 1 and 2.

B. The chef should compare the results of experiments 1 and 3.

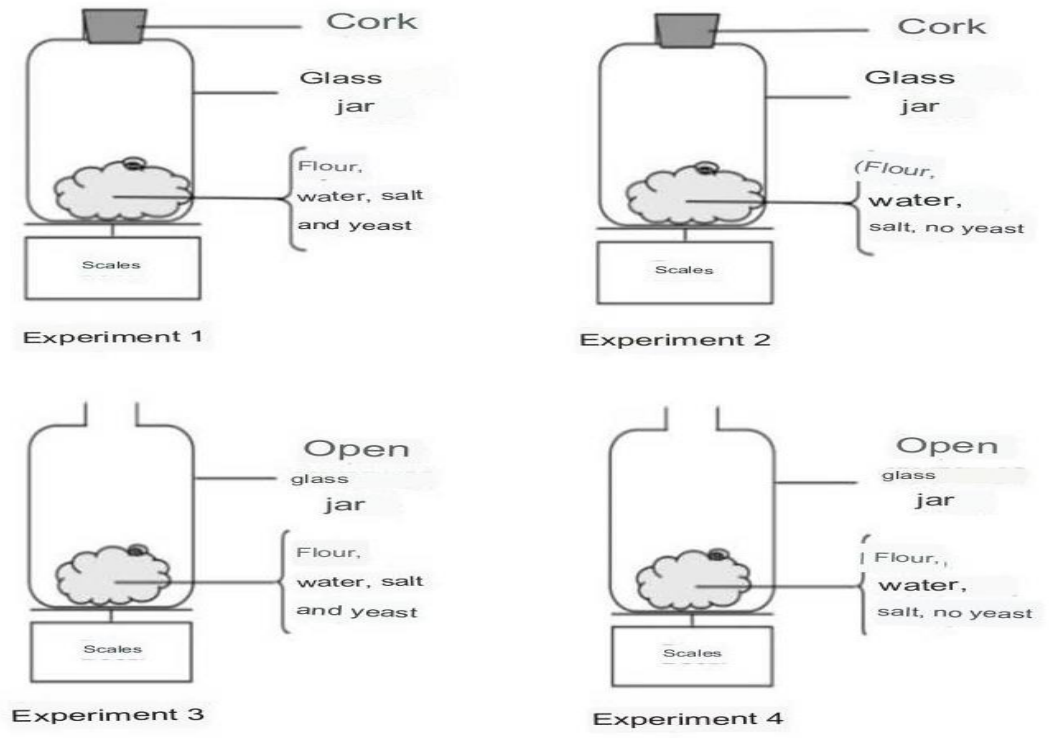
S The cook should compare the results of experiments 2 and 4.

D. The cook should compare the results of Experiments 3 and 4.

Evaluation criteria

To complete this task, students should know how to properly organize the experiment. In order to study the effect of the researched factor, two types of control and test experiments are set. These two experimental conditions differ only in the presence or absence of the factor being studied. By comparing the above experiments 3 and 4, it can be determined that the yeasts are the cause of the decrease in the mass of the dough, because the carbon dioxide formed in the dough is in a gaseous state, so it escapes out of the glass container with an open mouth. As a result, the mass of the dough decreases, which can be determined using a scale (Experiment 3). In experiment 1, the mass of the dough in the container closed with a cork does not decrease, because although carbon

dioxide is formed in the dough in the presence of yeast, it does not go out because the container is closed with a cork, as a result, the scale reading does not change. If you select the answer option "must compare the results of experiments 3 and 4", the answer is fully accepted (1 point). Other answers or no answer will not be accepted (0 points). This question is aimed at assessing the competence of students in designing and evaluating scientific research, and in order to answer it, students need to have methodological knowledge.



Task 3 The yeast in the dough turns the starch and sugar into carbon dioxide and alcohol as a result of a chemical reaction. Where do carbon dioxide and alcohol come from?
Please tick "Yes" or "No" for each of the following explanations
Is this the correct explanation for the appearance of carbon atoms? Yes, no
Some carbon atoms are part of salt molecules. Yes, no
Some carbon atoms come from water. Yes, no

Evaluation criteria

In order to complete this task, students need to memorize the relevant knowledge of chemistry and biology: some carbon atoms in CO 2 pass through sugar, and water and table salt do not contain carbon atoms. If the students mark three correct answers in the specified sequence (Yes, No, No), the answer is accepted completely, if there are other answers or no answer, the answer is accepted. This question is aimed at evaluating the competence of students to scientifically explain phenomena.

Task 4. When the leavened dough is placed in the oven, the gas and steam bubbles in the dough expand. Why do gases and vapors expand when heated?

A. Their molecules are larger.
B. Their molecules move faster.
S. The number of its molecules increases.
D. Their molecules collide less.

Evaluation criteria

When performing this task, it is necessary to remember the knowledge from physics about the thermal expansion of substances: when gaseous substances are heated, the movement of molecules accelerates, the distance between gas molecules increases. If the students mark "B Their molecules move faster" as the correct answer, it It is accepted (1 point), if there are no other answers or there is no answer, it is not accepted (0 points).

Topic: GRAND CANYON

The Grand Canyon is located in the desert of the United States. It is a very large and deep canyon containing many layers of rock. At some point in the past, due to shifts in the Earth's crust, these layers rose up. Currently, the depth of the Grand Canyon is 1.6 km in some places. The Colorado River flows along the bottom of the canyon. Check out the photo below from the South Rim of the Grand Canyon. Several different rock layers can be seen on the sides of the canyon. [12]

Question 1. Grand Canyon Grand Canyon National Park is visited by about five million people every year. The damage caused to the park by the large number of visitors is worrying. Can the following questions be answered using scientific research? Circle "Yes" or "No" for each question.

Can the following questions be answered using scientific research? Yes or no?

How much erosion increases when sidewalks are used? Yes / No

Is the park area as beautiful as it was 100 years ago? Yes / No

Those responses will be accepted in full and full credit will be given when the student answers the following:

Code 1: Answers in this sequence: Yes, No.

Answers submitted by the student in the following manner will not be accepted and no credit will be given:

Code 0: Other responses. Code 9: No response was recorded.

Question 2 . Grand Canyon Temperatures in the Grand Canyon range from below 0 °C to above 40 °C. Although it is a desert area, there is sometimes water in the cracks of the rocks. How do these temperature changes and the water in the cracks help the rocks to erode faster?

A) Ice water melts warm rocks.

B) Water holds rocks together.

C) Ice smooths the surface of rocks.

D) Frozen water expands in rock cracks.

Those responses will be accepted in full and full credit will be given when the student answers the following:

Code 1: D) Frozen water expands in rock cracks.

If the following answers are given by the student, these answers will not be accepted and no credit will be given :

Code 0: Other responses. Code 9: No response was recorded.

Question 3 . Grand Canyon The A limestone layer of the Grand Canyon contains many fossilized remains of marine animals such as molluscs, fish, and corals. What happened millions of years ago that would explain why such fossils appeared there?

A) In ancient times, people brought sea products to this area.

C) Once upon a time, ocean storms were stronger and huge waves drove sea creatures onto land.

C) This area was covered by the ocean at that time and later the ocean retreated.

D) Some marine animals lived on land before moving to the sea

Those responses will be accepted in full and full credit will be given when the student answers the following:

Code 1: C) This area was covered by the ocean at that time and later the ocean retreated

Answers submitted by the student in the following manner will not be accepted and no credit will be given:

Code 0: Other responses. Code 9: No response was recorded.

The presidential decree of April 29, 2019 "On approval of the concept of development of the public education system of the Republic of Uzbekistan until 2030" defines the tasks of achieving inclusion among the first 30 advanced countries of the world according to the rating of the PISA student assessment program by 2030. A plan of measures was drawn up by the national center for security.

In order to prepare for the PISA, TIMSS and PIRLS international assessment programs, the scientific research institute named after A. Avloni created more than 100 training

videos as part of the "Testing" project and launched the "Testing" platform. Additional information about the PISA study can be found on the official website of the National Center for the Implementation of International Research on the Assessment of the Quality of Education, which is responsible for conducting this study in Uzbekistan (markaz.tdi.uz) and IHTT (www .oecd.org/pisa).

What to do to successfully participate in PISA and PIRLS international studies?

necessary to have at least 2 goals: the first is to prepare teachers and the materials they work with. It is not for nothing that international studies say that the quality of education in schools depends on the professional level of teachers. Therefore, it is necessary to allocate funds for the training of teachers and create new teaching materials. Relevant ministries should invest in the training system, finance it and create conditions for methodological support.

In order to improve the results in international studies, **it is necessary to change the teaching methodology and priority principles in the purposeful training of teachers and in the educational process.** For this, we need to train teachers, implement a more active system of developmental education, and provide teachers with materials that they can use more successfully in the educational process. This is the most important and you are now on the right track, long ago you published collections with materials revealing the characteristics of the PISA and PIRLS research tasks. Now it is necessary to implement these tasks step by step and work on solving the emerging problems

On August 24-25, 2022, at the webinar on international evaluation held in Uzbekistan, Galina Kovaleva, the head of the Russian Center for Evaluation of the Quality of Education of the Institute of Educational Development Strategies of the Russian Academy of Education, presented her analysis as follows : I 2000 - In 2020, I was the national coordinator of PISA international studies of Russia . Russia has been participating in international studies since 2000, and our PISA results were below the international average. By investing heavily in education for only 18 years, our PISA results have come close to the Organization for Economic Co-operation and Development (OECD) average. How can this be explained? This is explained by the fact that our Russian school (in a sense, the Soviet school) focuses more on the results of science, that is, on giving good, deep and long-term knowledge to the younger generation. There was no such need to develop creativity, and there was no time to ensure that the acquired knowledge could be used by all students in various life situations. It is known that a lot of work has been done in this regard in Uzbekistan.

In 2018, on the initiatives of our Honorable President , the National Center for the Implementation of International Studies was established under the Education Inspectorate, and it was assigned the task of ensuring the participation of general education institutions in international studies. Over the past period, agreements have been reached with the Organization for Economic Cooperation and Development (OECD) and the International Association for the Evaluation of Educational Achievements (IEA), and

Uzbekistan is participating in the PISA, TALIS, PIRLS and TIMSS international programs for the first time.

In 2021, pilot tests of the PISA study were conducted in 83 schools of the republic, and 202 educational institutions participated in 2022. Of course, participating in such a study, which evaluates the education system of our country on a global scale, is a huge responsibility for all of us.

However, the importance of research is that the process does not stop when the result is announced. On this basis, it is very important to make conclusions related to the improvement of the sector, to implement the necessary reforms. That is, it is not logical to expect a high result simply by changing the educational programs themselves. For this, it is necessary to change the teaching process, the worldview of the students and their parents who are its participants.

In this case, the regular growth of teachers' skills, knowledge and level is of decisive importance. After all, we should prepare students for the future, not for the present.

This is it Based on the analysis and studies, the following conclusion was reached. Recommendations were also developed based on them:

1. To promote the importance of international evaluation programs in the existing general education schools and higher education institutions in Uzbekistan, to support these studies and allocate the necessary financial resources for conducting research;

2. In accordance with the requirements of scientific and technological development, taking into account the individual needs of teachers, introducing a mechanism for systematically improving their qualifications FOR the formation of practical skills in the international field;

3. Creating conditions for improving the independent qualification of teachers:[9]

4. To improve the results of international studies, target training of teachers in the field of natural sciences and changing the teaching methodology and priority principles in the educational process;

5. For this, we should train teachers, implement a more active system of developmental education, and provide teachers with materials that they can use more successfully in the educational process;

6. Development of methods of approach to natural-scientific literacy and creativity in undergraduate and graduate students of higher education in the field of pedagogy;

providing them with modern computer classes (electronic whiteboard, projector, etc.), natural and exact science rooms with multimedia tools and high-speed optical fiber connection to the Internet network with a communication line and taking steps to gradually equip the physical-chemical-biological laboratory with equipment and reagents.

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