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# Preparation Of Future Chemical Chemistry Teachers for Preparation for International Research.

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**Annotation:** The article presents contextual tasks aimed at developing the skills of performing work tasks in the programs of international assessment of future chemistry teachers, the concept of improving the literacy of future chemistry teachers for the preparation of these tasks.

**Key word:** natural science literacy, reading literacy, mathematical literacy, PISA

**Introduction.** The decree of the President of the Republic of Uzbekistan "On approval of the concept of development of the higher education system of the Republic of Uzbekistan until 2030" on the basis of international experience provides for the introduction of advanced standards of higher education, including a gradual transition from education aimed at obtaining theoretical knowledge to educational programs to an education system aimed at;

such tasks as raising the content of higher education to a qualitatively new level, creating a system of training highly qualified personnel who will make a worthy contribution to the sustainable development of the social sphere and economic sectors, will be able to find a place in the labor market [1].

To fulfill the above tasks, international assessment programs in pedagogical universities and tasks were defined in accordance with the state of implementation of these programs. One of these tasks is to prepare future chemistry teachers for international assessment studies.

The International Student Assessment Program-PISA (ing. Program for International Student Assessment) is a program that evaluates the literacy of 15-year-old students (reading, mathematics, natural sciences) and the ability to apply their knowledge in practice in different countries [2].

PISA tests are conducted in order to analyze the phenomena that schoolchildren need in real life, draw conclusions from them and determine to what extent they acquire the skills of entering into communication, how well the education system adapts to these changes [3].

The test was organized by the Organization for Economic Cooperation and Development (OECD) in a consortium with leading international scientific organizations, with the participation of national centers. The study will involve countries that are members of the Organization for Economic Cooperation and Development, as well as countries with cooperation relations with the OECD [15]. The PISA study is a monitoring study that allows you to identify and compare the changes taking place in the educational systems of different countries, to assess the effectiveness of strategic decisions in the field of education.

PISA tests are conducted in 7 areas of study: mathematical, natural science, financial literacy, global competence, joint problem solving and creative thinking. PISA studies to date have included 5 areas. For example: on the basis of reading, metematics, natural science, financial literacy and creative thinking, mtopshiriki were prepared. Financial literacy tasks were formulated in combination with mathematical literacy[4].

PISA assignments focus on the fact that students know the most basic concepts in these areas, acquire basic knowledge and skills and can use them in life situations.

PISA tests use four different testing methods:

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1) tests with one answer;
2) multiple-response tests;
3) questions to which a short or detailed answer will be written;
4) the reader's opinion about the solution to the problem (usually there are general answers to such questions in the controller, the reader's answer does not necessarily have to exactly match the answer of the test developer, the reader's creative approach is supported) [5].

It is also provided to receive questionnaires from students at the same time as testing.

**Material and Methods.** Therefore, future chemistry teachers should be prepared for international examination studies. The reason is that future chemistry teachers should also be formed at the level of capacity-building personnel in order to prepare students of secondary schools in which they work for international examination studies and achieve good results after graduation. The international assessment of future chemistry teachers should be able to perform research tasks and have the skills and abilities to explain to students. Therefore, future chemistry teachers need methodological support in order to have the necessary competencies and literacy to perform research tasks on international assessment. Therefore, we will consider the methodology of preparing future chemistry teachers for an international assessment study. For example, in the sequence given below, we propose methods for the formation of literacy of future chemistry teachers based on assignments, as well as the formation of their skills and abilities [6].

Reading literacy: the ability of a person to understand and be able to respond to information provided in the form of a text, the ability to use the information read by him in the process of active participation in the life of society on the way to achieving his goals, to increase his knowledge and capabilities [16].

Here the concept of reading literacy takes on a broad meaning. The purpose of this direction is to identify the reader's competencies in colorful thematic, such as excerpts from this work of art, biographies, letters, documents, articles from newspapers and magazines, various manuals, geographical maps, diagrams, pictures, cards, graphs and tables designed to disclose the text in order to be able to reflect on the content, evaluate Consequently, when mastering topics in chemistry, the skills of future chemistry teachers are formed to work with diagrams, drawings, graphs and tables [8].

Mathematical literacy: checks whether a person knows the place of mathematics in the universe in which he lives, whether he is able to correctly and fully justify mathematical processes. Ensuring that a person can use mathematics to such an extent that he can satisfy the need of a creative, inquisitive and thinking person for current and future mathematical knowledge is the main goal of this section [7].

The term "literacy" in this section has been used to indicate that the purpose of this section is not to determine to what extent he has mastered the knowledge that is usually given in the school curriculum. The main focus is on the ability to use mathematical knowledge in various life situations, applying different styles of thinking and making managerial decisions that are required. But answering such questions may require knowledge and skills that will be given in the school curriculum. In tests of this direction, it is usually carried out in different spheres of life (medicine, housing, sports, etc.).) situations related to mathematics that can be encountered are offered [17]. For example: future chemistry teachers, upon admission to their universities, take entrance exams with knowledge of mathematics. Thus, they are staff with mathematical literacy. But in order to improve their mathematical literacy, it is necessary to learn how to work with the following questions and teach them to think correctly about tasks in order to develop skills of working with students [9].

Task 1: You can write numbers in any way to determine the answer to the question asked below. Therefore, the result of the task should be expressed in the way indicated in the question. Think carefully when you develop this question. Subtract the value 0 by subtracting the number four from the number fifteen $(15 - 4 = 0)$.

**Results**. Answer: only if we represent the numbers in Roman numerals to subtract four numbers from the number fifteen, the result will be correct [10]. For example:

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15-IV = 0

Task 2: Take a close look at the picture below and complete the task based on your mathematical literacy.

The tourist left the hotel, went to the casino and started playing. According to the terms of the casino, the entrance to the casino is $ 2, and the exit is $ 2. At the same time, a person entering the casino is obliged to put all the funds in his wallet on casino games. If the tourist wins, he will have an amount equal to his own - this is one of the conditions of the casino. The tourist entered each of the casinos and, arriving at the hotel, found that he had no funds in his wallet. You might also consider, of course, determining how much money (dollars and cents) you have in your wallet before heading to a tourist casino [11].

**Results.** Answer: we need to calculate the opposite in order to calculate that a tourist has spent funds in his wallet to enter and play at each casino.

If the tourist had no funds in his wallet when he left the casino and arrived at the hotel, he paid all the money he had to get out of the casino. So, to get out of the casino, the tourist had $2. Considering that the tourist played at the casino, how much money will be withdrawn.

2/1=$1 means that the tourist played with $1 and won $1. Considering that the casino enters $1 + $2 = $3, the amount before entering the last casino was $3.

To calculate the amount before entering the second casino, it is necessary to take into account the exit from the casino, the entrance and the game in the casino.

Tell me 3$ + 2$ = 5$; 5$ / 2 = 2,5$; 2,5$ + 2$ = 4,5$ which it is.

To calculate the amount before entering the first casino, it is necessary to take into account the exit from the casino, the entrance and the game in the casino.

Tell me 4,5$ + 2$ = 6,5$; 6,5$ / 2 = 3,25$; 3,25$ + 2$ = 5,25$ which it is.

Answer: there were 5 dollars and 25 cents.

To strengthen the mathematical literacy of future chemistry teachers, it is necessary to form and improve the skills of working on such tasks [12].

Literacy in the natural sciences is the competence to identify problems that can be solved in a scientific way in life phenomena, to draw conclusions based on observations and experiments. These conclusions are the main goal of this department - to bring down the world around us and realize the changes taking place in it as a result of human activity, and, accordingly, to develop the ability to make the necessary decisions [13].

It is assumed that the basics of literacy will be given in the process of teaching physics (along with elements of astronomy), biology, chemistry and geography.

Competencies in the field of literacy in the field of natural sciences [14]

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

Competence in the scientific explanation of phenomena - technology, natural phenomena - knowledge, suggestion and evaluation of explanations of processes.

Competence in the field of design and evaluation of scientific research is to describe and evaluate scientific research and propose scientifically based ways to solve problems [6].

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Competence in the scientific interpretation of data and evidence – scientific data of various manifestations, analysis and evaluation of evidence and drawing up appropriate conclusions.

Future chemistry teachers demonstrate literacy in the field of natural sciences using assessment tools that reflect the types of scientific knowledge listed below:

knowledge of the contents of physical systems (physics and chemistry), living systems (biology), Earth and universe sciences (Geography, Geology, astronomy;

methodological knowledge concerning the knowledge of various methods used to obtain scientific information (knowledge), as well as standard research processes;

epistemic knowledge, that is, knowledge of the essence of concepts such as hypothesis, assumption and observation, as well as their justification, that our scientific fantasies are the result of our understanding of the possibilities of scientific research methods [15].

Knowledge of the content of natural sciences expresses the knowledge and understanding of future chemistry teachers about the main ideas and theories in science, including the history and scale of the universe, the structure of matter from particles, evolution. Knowledge of the content of science is understood as knowledge of facts, laws, ideas, theories about nature defined by science. For example, knowing how plants synthesize complex molecules from carbon dioxide, water and mineral salts dissolved in it under the influence of light.

Future chemistry teachers should be taught to form literacy in the field of natural sciences and scientifically substantiate these phenomena. Let's look at the tasks of improving the skills and abilities of future chemistry teachers to work with tasks aimed at forming their literacy, and give an idea of the methodology of working with these tasks.

The tasks that need to be prepared should be aimed at the formation of competencies in the scientific explanation of natural phenomena, the design and evaluation of scientific research, the design and evaluation of scientific research. In the tasks given below, we will consider the task of scientific interpretation of certain natural phenomena [9].

Task 3: In order for future chemistry teachers to learn how to scientifically substantiate the phenomena of climate change, the onset of cold days, they must develop the following tasks. On winter days, the water freezes when it is cold with snow, usually when the temperature reaches a negative value (below 00 degrees). Even the melted part of the snow that fell naturally freezes. On such days, traffic protection organizations spray cars with a mixture of inclusions and salt on the roads to clean the roads and improve the movement of cars. Try to find out why a mixture of coarse grinding and salt is used. Scientifically explain the function of salt and hands in this mixture [16].

General secondary education on the topics of the national curriculum prepared for 8th grade students:

Mineral fertilizers. The importance of mineral fertilizers in agriculture.

The concept of mineral fertilizers, their classification.

The most important basic mineral fertilizers. Production and rational use of nitrogen, phosphorus and potash fertilizers in Uzbekistan.

Project work: the importance of mineral fertilizers for plant growth and development.

Practical training:

Familiarity with samples of mineral fertilizers. The definition of mineral fertilizers is determined by teaching laboratory experience.

In order for future chemistry teachers to be able to prepare secondary school students for international assessment studies in the future, they must teach this topic and explain the implementation of project work.

For project work, it is also necessary to study the tasks of scientific justification of which mineral fertilizers should be used during the growing season of one of the plants (tomatoes, corn or cucumbers).

Future chemistry teachers will have the skills to perform tasks based on international assessment studies and prepare contextual tasks related to them to form the competence of scientific interpretation of data and evidence. It is during the execution of the tasks set in the project work that the results and conclusions obtained should be presented scientifically [4]. For example:

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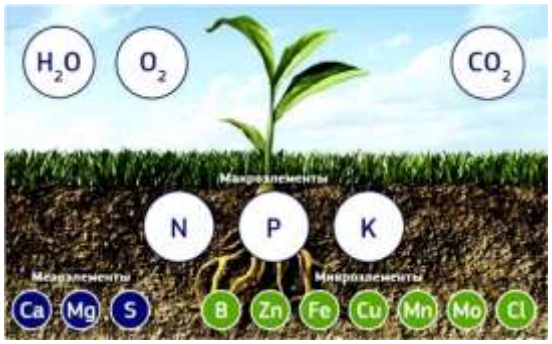
Task 5: expressed mineral fertilizers, which are given to students as top dressing for growing varieties of corn, given as a project work. To scientifically substantiate when the mineral fertilizers expressed in the figure are introduced into the corn variety and what significance they have in their growth. It takes at least 3-6 months to complete the project work. During this time, indicate in writing in the following lines which mineral fertilizers will be applied and how they will affect the corn variety [3].




**In conclusion**, it can be said that when forming the literacy of future chemistry teachers, it is necessary to form the above competencies and develop the skills of working out tasks in them, preparing similar tasks.

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