






Methodology of Using International Assessment Programs in Developing the Scientific Literacy of Future Teachers

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Abstract: The article is based on the development of the methodology for the development of natural-scientific literacy of future students studying in the field of natural science, the problems and solutions for the development of natural-scientific literacy of students in their continuing education institutions in the future, changes in the educational system of developed countries and our republic. and their efforts to achieve good. results in international evaluation studies, finally, the scientific-methodical foundations of the methodology of developing natural-scientific literacy in our teachers have been explained step by step. Competencies of natural and scientific literacy, scientific explanation of phenomena, design and evaluation of scientific research, scientific interpretation of data and evidence are explained on the basis of examples. Opinions and comments, conclusions and recommendations are given about the development of contextual assignments and the provision of didactic materials for the development of natural-scientific literacy among teachers.


1 INTRODUCTION


The global socio-economic changes in the world, including the changes in the education system, have focused on the practice of training intellectually competent, talented, creative thinking specialists, on increasing the ability of teachers to participate in international evaluation studies, and on natural-scientific literacy. In this way, an integrative activity is carried out, which brings together various modern approaches to the organization of the educational process of teachers, and therefore directs the natural-scientific literacy and creative thinking of students to practice, and allows the formation of functional literacy for students in the educational system. In


particular, in the international evaluation programs implemented by the Organization for Economic Cooperation and Development (OECD), the need to make extensive use of the achievements of science and innovation activity in the education system and to introduce changes in the education system was emphasized (Ergashovich 2023).


Be advised that papers in a technically unsuitable form will be returned for retyping. After returned the manuscript must be appropriately modified. Dated May 11, 2022 "On approval of the national program for the development of public education in 2022-2026", which was adopted in order to develop the quality of education in our country, participate in international evaluation research programs and take

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its rightful place Decree No. PQ-289 of June 21, 2022 "On measures to improve the quality of pedagogical education and further develop the activities of higher educational institutions for the training of pedagogical personnel" on the rating of the PISA international assessment program in the country by 2030 made it a priority to become one of the first 30 advanced countries of the world.

In order to ensure the performance of the specified tasks, scientific research is being conducted to develop and implement innovative methods of assessment and development of students' reading, mathematical and natural-scientific literacy, creative thinking of the International Assessment Research PISA, TIMSS, PIRLS programs (Ergashovich 2023).

Creating a scientific context. The activities of a large number of scientific institutions that carry out pedagogical scientific research in developed countries are aimed at improving and improving educational programs. Effective research is being carried out to ensure that the quality changes in the field of education correspond to international educational requirements, to develop students' reading, mathematical, natural-scientific literacy and creative thinking, to participate in international assessment programs and achieve positive results. Therefore, it is recommended to carry out research aimed at implementing an educational environment that provides conditions for students to use their competencies, realize their abilities, creativity, and initiatives (Shernazarov et al 2023).

No. PF-5538 of the President of the Republic of Uzbekistan dated September 5, 2018 "On additional measures to improve the public education management system", "Republic of Uzbekistan" dated April 29, 2019 Decree No. PF-5712 "On approving the concept of development of the public education system until 2030", Decree of the Cabinet of Ministers of the Republic of Uzbekistan dated December 8, 2018 "Organization of international studies in the field of education quality assessment in the public education system" - activities" This research work serves to a great extent to fulfill the tasks defined in the decision No. 997 and other regulatory and legal documents related to this field.

2 STUDYING LITERATURE RELATED TO RESEARCH

The Oxford University Center for Educational Assessment (OUCEA) and the Organization for Cooperation and Development (OECD) operate as a

national center for assessing students' knowledge and skills in reading, mathematics and science in England, Wales and Northern Ireland. Since 1997, through the international evaluation program, he has conducted research on the assessment of students' ability to reason and effectively apply their knowledge based on the acquired knowledge in school education systems around the world (Bektosheva 2022). According to these international evaluation studies, research related to the development of students' reading, mathematics, science literacy and creative thinking is carried out by the world's leading scientific centers, such as Shanghai and Xi'an Universities (Xitou), East China University (Xitou), Purdue, West Lafayette, Kentucky. , Lexington University (USA), Utara University (Malaysia), Kent University (UK), Singapore National University (Singapore), Hokkaido University (Japan), Bashkir State University (Russia), Belarus State University (Republic of Belarus) along with educational institutions, it is also conducted in several higher educational institutions in Uzbekistan (Ergashovich 2022).

2.1 Level of Study of the Problem.

In the countries of the Commonwealth of Independent States, scientists G.S. Kovaleva, L.O. Roslova, G.A. Sidorova, A. Ue. Pentin on the assessment and development of creative thinking in the context of the international study PISA, B.Ue. Mikhaulovich, Ue.M. Bugakova, L.S. Bautimerova, V.M. Grebennikova, K.B. Belikov "the concept of creative activity of learners", its formation and development, the basic content of the formation of creative and creative abilities, T.P. Pouudis, E.V. Sivak, D.M. Mirzanurova, T.S. Skilevaua, A.Uu. Pentin, G.Uu. Semuonova, Ue.A. Nikishovalar, K.P. Vergeles, N.A. Zagranichnaua, G.G. Nikiforov, A.A. Kozlova, Ue.S. Korolkova, A.A. Bochikhina, A.V. Polovnikova, N.V. Shtilmans on the formation of functional natural-scientific and financial literacy of students and teachers, O.A. Rudze, Ue.S. Kvitko, K.A. Krasnuanskaua, L.O. Roslova, L.O. Denisheva, I.I. Karamova on the formation of mathematical literacy, S.Ue. Duukova, T.V. Koval and others conducted scientific research on global competencies [6].

In order to develop scientific literacy by the 21st century, priority is being given to innovative technologies, conceptual concepts and methods of increasing their significance in teaching subjects. It is explained to the learners the historical, modernity, value compatibility of ideas and concepts about

scientific literacy and their relevance to the reform of science and education.

In developed countries, scientific research works on the formation of students' reading, mathematics, natural sciences and creative thinking have been carried out. In our republic, there is also a methodology for the formation of skills in order to prepare students for international assessment studies. However, developed countries and our republic have not developed methods for developing teachers' natural-scientific literacy (Shernazarov and Xodjabayeva 2022).

The study is aimed at development of a methodology for the development of natural-scientific literacy of teachers working in the field of natural science.

3 THE PURPOSE OF THE RESEARCH IS AS FOLLOWS

Improving the scientific-methodical content of teaching teachers to international evaluation studies based on the analysis of international research results in the continuous education system;

Developing a system of tasks that develop teachers' natural-scientific literacy based on international evaluation studies;

Development of a methodical system of training teachers for professional activity based on the principles of adaptive and practicality, which stabilizes the adaptability of education to the interactive environment;

Improvement of the methodology of transfer to international evaluation programs on the basis of international cooperation;

Implementation of the scientific-methodological support of the development of natural-scientific literacy of teachers based on international evaluation studies by using graphic-design tasks that teach how to create creative tasks

4 LITERATURE

The scientific-methodological support of teaching teachers to international assessment studies has been improved based on the integration of individual complexity into the content of graphic problems aimed at the formation of literacy in international assessment PISA research (creative active, natural-scientific). For example, since creative thinking is an emerging field, a number of strong studies have been

conducted on the broad spectrum of creativity. Plucker, Begetto, and Dau explained that creativity, based on its versatility and social characteristics, is "the interrelationship between adaptation, process, and environment, in which a group or human social context produces a unique and effective result." In order for teachers to teach students to think creatively, they first need to develop the ability to achieve creative results in themselves, as well as broader and specialized characteristics and skills, such as talent, knowledge, or artistic ability. requires.

Interdependence of creativity emphasizes the importance of various internal resources for successful engagement in creative work, as well as the importance of the environment in which creative work is carried out. These comparisons serve as an important framework for assessing creative thinking within the framework of PISA studies.

It reflects the unique aspects of the observation of creative thinking in the educational process and its constituent aspects. This model was developed on the basis of the 5-dimensional model of creative thinking proposed by the Advisory Group of Experts on Creative Thinking (OECD). Social factors, means, achievement and development are expressed in it.

Naming tasks from one subject area in the summation system, legend (triggering event), 3-5 tasks defining the specific aspects of the competency model, assessment for each task is clearly defined.

Components: promotion of various ideas, selection and evaluation of ideas, improvement of ideas.

Assignment examples: verbal expression.

Pictured is the book cover. Check out the book cover. What do you think this book is about? Suggest a few ideas and describe them.

Sample tasks: solving scientific problems

For the purity of the water, the water pipe network of the village houses receives water from under the water. In August, clean and clear water was taken from the tap. By the end of September, the owner noticed that the cold water was still very clean, and the heated water had a smell. When he gave the water for analysis, the analysis showed that the water contained hydrogen sulfide. Hydrogen sulfide is a gas that comes from the active process of bacteria in various organic residues. How are you going to explain the causes of water pollution and the solution to this problem to the owners? Use your imagination and express your opinion in the following line.

The effectiveness of the method of developing natural-scientific literacy of teachers on the basis of international evaluation studies is determined by methodological conditions such as the

comprehensive formation of natural-scientific literacy competencies (scientific explanation of phenomena, scientific interpretation of data and evidence, organization and evaluation of scientific research) and cognitive levels of tasks. improved by providing uicha correluatsiua.

The development of competencies required by the standards of international assessment programs in future biology teachers is being studied as an urgent pedagogical problem. Ball and Hill (2008) classify the content of pedagogical knowledge required of future teachers as follows:

- Content knowledge or subject knowledge: this summarizes the structure of the teacher's teaching material, including the basic concepts of the subject area.

- General pedagogical knowledge: It represents the basic principles that ensure the process of teaching, for example, based on the principles of classroom management, teaching skills, learning time, waiting time, individual and group interactions in the classroom.

- Curriculum knowledge: shows the teacher's knowledge of the curriculum and its main elements, theories, assessment methods, organization of experiences and activities, lesson planning, exam preparation in addition to the use of teaching materials and guides.

- Pedagogical content knowledge: includes content-related knowledge that allows the teacher to teach in real classroom conditions.

- Learners' knowledge and characteristics: This means identifying learners' interests, learning needs, individual differences, prior experiences and understandings, alternative understandings, and appropriate application of knowledge.

- knowledge of educational content: it is related to classroom management, school knowledge, respect for cultural and social diversity among students.

- knowledge of educational goals and values: includes knowledge of the philosophical and historical foundations of education, as well as the professional ethics of teaching.

The cycle of natural sciences includes subjects of nature, biology, geography, physics, and chemistry. Currently, a National curriculum designed to implement didactic support of Science education for integrative education has been developed. Based on the purpose of each subject, integrative points in the study of natural-scientific phenomena are determined. Also, in the section of subjects, experimental work was carried out on the formation of the following special competencies.

From the subject of mathematics: imagining and understanding mathematical concepts, performing operations on real and complex numbers, applying mathematical knowledge in practice, logical analysis. From physics: observing, understanding and explaining physical processes and phenomena, measuring and determining physical quantities, conducting experiments and drawing conclusions, being able to use physical knowledge and tools in practice;

In informatics: Competence of collecting information on electronic means, processing of information on electronic means, competence of transmitting information through electronic means, application of informatics knowledge in practice;

From chemistry: to explain chemical processes and phenomena, to be able to express elements and formulas chemically, to be able to work with the necessary equipment for conducting experiments, to apply the knowledge gained from chemistry in practice;

From the science of geography: observing, understanding and explaining natural processes and phenomena, observing economic and social processes, being able to use ecological culture, geographical atlases and maps, applying geographical knowledge in practice;

From the science of biology: biological process, understanding and explanation of phenomena, environmental culture, working with necessary equipment for conducting experiments, practical application of knowledge gained in biology. In order to realize the above-mentioned goals in the field of natural and concrete sciences, the system of knowledge to be mastered should be delivered to students on the basis of psychological, pedagogical and didactic laws, that is, the process of knowing should be carried out by moving from live observation to abstract thinking and from it to practice.

In fact, the biology teacher has sufficient knowledge of the system of the above subjects, the availability of resources, the understanding and understanding of the tasks required by the International Evaluation Research Program, and the effective methods to convey them to the student.

The methodical system of training teachers for professional activity has been improved based on the introduction of the principles of adaptive and practicality, which stabilize the adaptability of education to the interactive environment, into the content of independent activity of students in a productive manner. At the same time, the method of introducing teachers to international evaluation

research is the intensive stability of the mechanism of development of non-traditional approach to international evaluation programs and scientific competence (knowledge, understanding, practical application, conducting research and experiments, analysis, creative thinking, application in personal and professional activity). improved based on provision. For example, science is divided into types under the category of knowledge:

Knowledge of the content of science is divided into basic concepts, theories, laws (Ergashovich 2022). Methodological knowledge is divided into scientific research methods and research procedures. Epistemic knowledge is divided into the possibilities of scientific research methods and the importance of research. Knowledge of the content of science - physical systems: motion and force (for example, speed, friction) and influence at a distance (magnetic forces, gravitational force and electrostatic forces), structure of matter (particle model, bonds), physical properties of matter (change in state of aggregate, heat and electrical conductivity);

chemical properties of matter (chemical reactions, change of energy, oxide, acid, bases, salts), energy and its transformation (energy conservation, distribution, chemical reactions), interaction of energy and matter (energy and radio waves), sound and seismic waves, vibrations (Ergashovich 2022).

Knowledge of living systems: cells (structure and function, DNA, plant and animal cells), structure of organisms (unicellular and multicellular);

people (organ systems such as health, food, digestion, respiration, blood circulation, circulation, reproduction and the relationship between them);

populations (species, evolution, biodiversity, genetic changes), ecosystems (food chain, exchange of matter and energy), biosphere (activity of ecosystems, stability).

Knowledge of earth and space system: structure of earth layer (lithosphere, atmosphere, hydrosphere), changes in earth (movement of tectonic layers, geochemical cycles, constructive and destructive forces), energy (resources, global climate), history of earth (e.g. fossil fuels, formation and evolution), the movement of matter in the universe (gravitational force, the quantum system, galaxies), the scale of the universe and its history (the universe, the big bang theory).

Methodological knowledge. Knowing about scientific research methods used by scientists for the purpose of forming scientific knowledge is called "methodological knowledge" (Norboboeva 2023).

Includes methodological knowledge:

measurement concepts, such as quantity (measurements), quality (observations), scaling, continuous variables, methods for reducing and estimating uncertainties such as determining repetition and averaging;

mechanisms for ensuring repeatability (the lack of differences in them when measuring certain quantities) and accuracy of measurement, general methods of abstracting and expressing data in the form of tables, graphs, diagrams and their appropriate use.

Epistemic knowledge. Determining the importance and basic aspects of various structures necessary for the formation of scientific knowledge in science is called "epistemic knowledge".

Epistemic knowledge covers the following: understanding the meaning of ideas, theories, observations, problems, evidence in science, recognizing various forms of scientific research, the importance of "expert assessment" in the formation of reliable knowledge.

In order to form the necessary competences in the formation of natural-scientific literacy in future teachers, it is necessary to study the composition of assignments and form the skills and abilities of their implementation (Karakhonova 2020).

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

Competence to explain phenomena scientifically - to know, propose and evaluate explanations of technologies, natural phenomena and processes. The following skills are demonstrated.

Competency of organization and evaluation of scientific researches - to describe and evaluate scientific researches and to propose ways to solve problems based on science. The following capabilities are demonstrated.

Competence of scientific interpretation of data and evidence - analysis and evaluation of various forms of scientific data, evidence, and drawing appropriate conclusions. The following skills are demonstrated.

The didactic system of the scientific-methodical support for the development of students' natural-scientific literacy based on international assessment studies was determined based on the optimization of the teaching methods for creating creative tasks in

optimal combinations with professionally used graphic-design tasks.

We use the methods of "Heuristic education" and "Problematic situation" in the formation of mathematical literacy.

Heuristic learning method. The meaning of the word "heuristic" is to "find" based on the answer to the question. In order for classes to be interesting, each problem or task in these classes should be of a character that activates their higher activities and not for rote learning. American scientist D. Pouta said the following about the heuristic education method. The purpose of heuristics is to find methods and rules that lead to success. He recommends implementing the heuristic method through a consistent plan as follows:

understanding the issue, making a plan to solve the problem, implementing the plan, looking back (checking the solution). In the process of implementing this plan, teachers will find answers to the following questions:

What is unknown in the matter? What is known about the matter? What are the terms of the matter? Have similar issues been resolved before? If such issues have been resolved, will the issue be resolved? Of course, the above scheme forms the students' creative and thinking activities, but this scheme cannot be the only one that forms the students' creative abilities. (Musaхоновна 2022, Shruthi & Aravind 2024).

"Analysis of concepts" method.

The purpose of the method: this method is used in order to determine the level of mastery of important concepts by students or participants, to independently check and evaluate their knowledge, as well as to diagnose the level of preliminary knowledge on the subject. Procedure for implementing the method:

participants are introduced to the training rules;

students are given handouts with the names of words and concepts related to the topic or chapter (in individual or group order);

students provide detailed information about what these concepts mean, when and in what situations they are used;

after the specified time, the teacher reads out the correct and complete explanation of the given concepts or demonstrates it on the slide;

each participant compares his personality and attitude with the given correct answers, identifies the differences and checks and evaluates his level of knowledge.

Students learn to think independently, analyze the causes and consequences of a problem, and find a solution based on the methods of problem solving.

Steps of the "Problem Situation" method:

Future kimuo teachers will be divided into 2 groups. Each group determines the causes of the problem, and each group offers its own solutions. After all groups have proposed their solutions, the same opinions are collected (Musaхоновна 2022).

They discuss and analyze different possibilities of solving the problem. They develop solutions to the problem situation.

Small groups make a presentation about the solution to the problematic situation and offer their options.

We can use T-table technology to work out the problem.

T-table technology is a technology that is convenient to use in the current part of lectures and practical training. In this case, one problem is considered from different opposite points of view (positive and negative, advantage and disadvantage, advantage and disadvantage, right and wrong).

In this case, one problem is considered from different opposite points of view (positive and negative, advantage and disadvantage, advantage and disadvantage, right and wrong). For example, future kimuo teachers present their thoughts on correct and incorrect answers while working on a problem. After the work is completed, a table with correct and incorrect answers will be displayed on the screen. Future kimuo teachers compare their answers with the table on the screen, come to appropriate conclusions and determine the correct answer (Musakhonovna 2022).

Future teachers should have the ability to fully analyze the issues involved in the formation of reading literacy using the "Dialogue training" method.

Forms of verbal communication, "Scarabeu", "Discussion", "Research", "Synectics" and "Why?" We learn from schematic technologies and natural phenomena. We can do this by completing the tasks given in the formation of natural-scientific literacy in future teachers. When completing tasks in international evaluation studies, information about the tasks is given before. Based on this information, it is possible to form natural-scientific literacy in future teachers to fulfill the task given by the law.

"Concept analysis", "Problematic education", "Discussion", "Louiha", "Independent work", "Work in pairs", "Blitz-so" We use the methods of "rows", "Venn diagram", "Fish skeleton", "Cluster".

The content of the discussion consists of the following:

developed a methodology for developing natural-science literacy of teachers. It is the development of natural-scientific literacy of teachers that was carried

out on the basis of the tasks of the research, and they are as follows:

a system of problem-research-creative assignments aimed at developing students' creative activity has been developed;

The training manuals "PISA context task set for teachers" and "Task set for improving natural literacy" were created and put into practice;

The textbook "Fundamentals of International Evaluation" and the "Research of International Evaluation" textbooks for teachers have been created and are being used in practice;

A methodology for developing teachers' creative activity has been developed on the basis of problem-based communication, and a system of methodological instructions and recommendations has been developed for the development of natural-scientific literacy of teachers based on international evaluation studies.

The reliability of the research results is based on methodological principles and principles, it is based on the logical foundations of research and sciences, the validity of research methods, the identity of the purpose, tasks and results of the research is ensured, the proposals and recommendations developed within the framework of the research have been approved, experimental works, lectures, practical and carried out in laboratory training, the level of significance of the obtained results is qualitatively analyzed, provided by the approval of the obtained results by the competent authorities.

The scientific significance of the results of the research reveals the educational possibilities of systematized domestic and foreign experiences on the problem of developing mathematical, natural-scientific literacy and creative activity of students and future teachers. Based on asynchronous and synchronous assignments, the didactic, methodical and ergonomic requirements for the organization of an integrated educational environment are the basis for the development of competences of learners [6].

The practical significance of the results of the research is that tasks for the intensive use of problem-research-creative situations have been developed, the organizational-methodical environment of modern educational technology, diagnostic systems of evaluation have been improved, and the natural-scientific literacy of teachers has been developed.

Implementation of research results. On the basis of the scientific results obtained on the method of developing natural-scientific literacy of teachers on the basis of international evaluation studies:

The scientific-methodological support of teaching teachers to international assessment studies was

based on the proposals of the international assessment PISA study (creative active, natural-scientific) to inculcate individual complexity in the content of graphic problems aimed at the formation of literacy. As a result, the functional and natural-scientific literacy of future teachers and students was formed based on the program and model.

The effectiveness of the method of developing natural-scientific literacy of teachers on the basis of international assessment studies is determined by methodological conditions such as the comprehensive formation of natural-scientific literacy competencies (scientific explanation of phenomena, scientific interpretation of data and evidence, organization and evaluation of scientific research) and cognitive levels of tasks. The practical suggestions and recommendations for ensuring the correlation of these were used in the organization of the work activity of the organization A&A Ausbildung und Arbeit Plus GmbH in Bremen in Germany. As a result, in the future professional activity of teachers, it has been achieved to increase the effectiveness of teaching in terms of tasks based on asynchronous integration of sciences in solving epistemological problems of natural science literacy in the scientific interpretation of natural phenomena (Ergashovich 2022).

The methodical system of training teachers for professional activity is the introduction of adaptive and practical principles that stabilize the flexibility of the interactive environment of education into the content of independent activity of students in a productive and stable manner, and the methodology of training teachers for international evaluation studies is the non-traditional orientation and scientific competence of training for international evaluation programs (knowledge, understanding, from recommendations on ensuring the intensive stability of the mechanism of development (practice, conducting research and experiments, analysis, creative thinking, personal and professional activity). As a result, the scientific-practical competence, natural-scientific literacy of students in the model school was developed;

The didactic system of the scientific-methodical support for the development of students' natural-scientific literacy based on international assessment studies was developed in the development of the National curriculum based on the proposal to optimize the methods of teaching creative tasks in optimal combinations with professional graphic-design tasks. As a result, the formation of scientific and practical competencies and creative activity of students was achieved (Musakhonovna 2022).

5 CONCLUSION

It has been determined that it is necessary to develop scientific-methodical support for the formation of natural-scientific, mathematical and reading literacy in the training of future teachers for international studies in the continuing education system.

2. During the professional activity of future teachers, a mechanism for improving the didactic content of the development of natural-scientific, mathematical and reading literacy of students of general secondary schools has been developed.

3. The development of scientific and practical competence of students is improved through integrative learning and its criteria (knowledge, understanding, practical application, conducting research and experiments, analysis, creative thinking, application in personal and professional activity).

4. In the professional activity of future teachers, the need to adapt the assignments to the educational process, aimed at developing students' natural-scientific literacy, creative thinking skills, was determined.

5. Based on the development of the didactic system of scientific-methodical support for the development of students' natural-scientific literacy based on international assessment studies, students of secondary education and specialized schools were trained in international assessment studies and students' creative thinking and natural-scientific literacy were formed.

6. Competence (cognitive, motivational, creative, person-oriented and practical) and levels (creative, productive, reproductive) of effective teaching of natural-scientific literacy of future teachers are determined.

7. International evaluation studies, which include evaluation criteria (factors), indicators (levels), assessment tools (questionnaires, tests, tasks that form natural-science literacy, etc.) Contextual tasks are developed that allow the formation of translation. The following suggestions and recommendations were developed based on the results of the scientific research on the methodology of developing the natural-scientific literacy of future teachers based on international evaluation studies:

1. Pedagogical diagnostics (initial, intermediate, advanced) aimed at obtaining information about the stages of formation of students' skills for working on international assessment research tasks and improving the quality of communication in the formation of natural-scientific literacy are proposed.

2. To increase the quality of teaching of teachers by using the information and tasks of international

evaluation studies in the teaching process of Kimuo and systematically applying them to the teaching process in accordance with the requirements of the time.

3. Development of high-quality electronic didactic materials, textbooks and training manuals aimed at the development of natural-scientific literacy of future teachers and their wide application in the educational process.

4. Implementation of the context tasks related to the literacy of creative thinking, obtained as a result of the collaborative activity of international evaluation research experts, to educational processes.

5. Development of reading, mathematical, financial, computer, global and natural-science literacy of teachers in the training courses of chemical science pedagogues, extensive use of qualification requirements and programs in the educational process.

6. Wide implementation of international evaluation studies of future teachers based on tasks that develop creative thinking, natural-science, mathematics, reading, learning, and functional literacy.

In accordance with the conclusions and recommendations presented above, the training of future teachers in international evaluation studies will develop their professional competence and ensure that in the future general and secondary school students will have good results in international evaluation studies.

In a word, the future natural science direction will enable teachers to use innovative and integrative methods to use modern teaching methods to develop students' mathematical, natural scientific and reading literacy and creative thinking, to solve problems together, based on the requirements of international assessment studies. preparation is an important urgent task today.

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