Journal of Positive School Psychology http://journalppw.com
2023, Vol. 7, No. 4, 1193-1208

Methodology For Developing Tasks Similar To The Tasks Of The Pisa International Assessment Program In The Development Of Scientific Literacy Of Students

Meliqo‘ziyev Dadaqo‘zi Juraqo‘ziyevich

Teacher of the Department of Physics and astronomy, Faculty of physics and mathematics, Kokand State Pedagogical Institute , e-mail: dadaxon.xadjaev@gmail.com

Abstract

This article discusses the methodology for developing tasks similar to those used in the PISA international assessment program for the development of science literacy among students in general education schools. To form in students a sense of confidence in the organization of the environment, to observe and analyze processes and phenomena in nature, to be able to use tools, means and methods in the study of natural phenomena, to be able to express terms, concepts, laws, quantities with mathematical formulas, achievements in the field of science, their development of a scientific worldview among students through practical application, respect for the creators of science and technology in the correct use of the achievements of science and technology for mankind in the future, careful preservation of the spiritual and cultural heritage, and the education in them of elements of universal culture were prepared on the basis of tables.

Keywords and phrases: scientific literacy, society, environment, natural phenomena, engineering and technology, human development, health, global and daily life, PISA international assessment program, Organization for Economic Cooperation and Development,

Introduction.

Tasks similar to those used in the international PISA assessment program are widely used in the development of the natural science literacy of secondary school students. Tasks are developed in relation to society, environment, natural phenomena, engineering and technology, human development, health, global and everyday life situations, information and problems associated with modern sciences. Recent research in the field of pedagogy shows that the expansion of international assessment programs has increased attention to the tasks used in the educational process. The widespread use of tasks similar to those used in the PISA international assessment program in the educational process and thereby the formation of science literacy in students is considered one of the educational strategies of the countries participating in the assessment program, and a number of scientific studies are being carried out.

Throughout their lives, secondary school students develop the ability to find solutions to various life situations, problems and situations, and thanks to this, their social experience increases. By observing and reflecting on natural phenomena, students develop the foundations of natural science literacy. Of great importance in the development of natural science literacy of students are school education, self-study, family environment, extracurricular educational environment. The development of natural science literacy among students is an integral part of their successful preparation for professional activities.

According to the concept of the international PISA assessment program, the development of natural science literacy of students is little reflected in the educational and regulatory documents of the national education system. The knowledge, skills and abilities that need to be acquired are given in the form of

competencies. To form in students a sense of confidence in the organization of the environment, to observe and analyze processes and phenomena in nature, to be able to use tools, means and methods in the study of natural phenomena, to be able to express terms, concepts, laws, quantities with mathematical formulas, achievements in the field of science, to develop in students a scientific worldview through practical application, to look with respect to the creators of science and technology in the correct use of the achievements of science and technology for humanity in the future, to preserve carefully the spiritual and cultural heritage, to educate it in the elements of universal culture.

The development of natural science literacy of students requires the teacher to play a guiding and supporting role in the educational process. The development of natural science literacy of students in the learning process involves the following requirements:

- ensuring cognitive activity and independence of students;
- the formation of a healthy, strong and impressive motivation to flow;
- to feel like an independent and self-governing subject;
- support for free customization and active participation.

It is important to develop in students the ability to analyze their learning activities, organize the practice of solving important life problems, objectively evaluate the results and possibilities of their activities, develop reflective thinking in the formation of natural science literacy of students. based on the international PISA assessment program.

Analysis of the literature on the topic (Literature Review)

The items used in the PISA assessment program have been the subject of much scientific and pedagogical research. The use of tasks in the international assessment program PISA is determined by educational and regulatory documents[1]. In addition, the implementation of tasks of the level of complexity of program tasks directly related to the content of educational standards, curricula and programs was determined in the form of necessary knowledge, skills and competencies.

The effective organization of educational activities depends on the professional approach of the teacher, the selection of tasks in accordance with educational goals, didactic justification and didactic means that guide educational goals. Tasks serve as a didactic tool that serves the formation and development of natural science and natural science literacy, provided for by the state educational standard. The teacher must achieve adaptability and completeness of the educational process through tasks.

Tasks used in the educational process are divided into training and control[2]. Study assignments are created in order to explore a new topic on your own or in the classroom. Students will be able to exchange and compare learning tasks, discuss ways to solve a task, and compare their solutions. Learning tasks are used to form the student's knowledge about self-holding of the previously indicated methods. In textbooks, tasks are determined by the level of difficulty. Completing tasks of a high level of complexity determines a good understanding of the subject by the student. The student's individual literacy is assessed using control tasks. In most cases, control tasks consist of a combination of several study tasks, and include several tasks related to topics given at a certain time. In these tasks, cross-topic tasks are rare and mostly consist of tasks related to topics. Students often solve such tasks during final exams or transfer exams from class to class.

[1] Kulgemeyer C. PISA tasks in comparison. Structural analysis of the natural science items from the PISA runs 2000 to 2006 // Books on Demand GmbH, 2009. – p. 3.

[2] Lethiger H. Learning and performance tasks in competence-oriented teaching // https://www.budrich-journals. de/index.php/ HiBiFo/article/ view File/10123/8722.-p.12-24

In the educational process, tasks related to the natural sciences are considered as a necessary condition for the development of natural science literacy. The objectives of the PISA international assessment program are developed by testers from three international institutes of an international consortium. After that, the opinions of national experts of the countries participating in the program will be systematized and appropriate changes will be made. In addition, each participating country will supplement the objectives of this program with tasks and questionnaires in order to implement them at the national level[3].

According to the concept of the international PISA assessment program of the Organization for Economic Cooperation and Development (IHDT), scientific literacy is described as follows.

Scientific literacy	is understood as the ability to understand the classification features of natural science and their significance at the present time, to apply natural science, to know the problems associated with natural science, to be able to describe natural phenomena, to be able to draw conclusions on the basis of scientific evidence, in order to be able to explain ideas related to natural sciences and scientific questions[4].	1. Assignments for natural science literacy test students' knowledge of natural processes and human influence on them, their consequences. The PISA tasks are based on concepts from the physics, chemistry, biology, and geography curricula, but do not require specific knowledge. Students must retain this knowledge in order to answer scientific questions in everyday life. These assignments concern the application of natural sciences in everyday life, health care, the environment, engineering and technology. 2. The student's reasoning, interpretation and implementation skills are tested in tasks involving processes related to the natural sciences. At the same time, the ability of students to understand scientific issues, be able to scientifically substantiate, establish relationships, state their conclusions, and understand scientific concepts is explored. 3. In tasks that briefly reflect situations related to natural science, reactions, opinions, conclusions are given on situations that occur in everyday life, rarely observed in natural science classes and laboratories. These assignments may deal with situations that students encounter in their personal lives or in global interests.

[3] Lehmann P. Aspects of the initial learning situation and learning development // https://bildungsserver.hamburg.de/contentblob/2815702/3b66049d4257501a0d44dce9b7ca449c/data/pdf-schulleistungstest-lau-5.pdf;jsessionid=41BC7B89339EDDFA1C84B4F5DA60AEE8.liveWorker2 , 1999. – p. 17.

[4] OECD. learning for life. First results of the school performance study PISA2000//http://www.oecd.org/education/school/programmeforinternationalstudentassessmentpisa/33691612.pdf . – p. 24.

Table 1. Organization for Economic Co-operation and Development description of the concept of science literacy

Modern educational activity "is aimed at memorizing and retaining information, which hinders the development of critical thinking, the skills of independent search and analysis of information, and other skills.[5]" In most cases, students are not given a complete complex task, but parts of this complex task or "partial tasks" in the learning activity. In most cases, assignments are only used to assess students.

PISA tests a student's literacy during the assessment, not during the learning process. Tasks are developed in relation to society, environment, natural phenomena, engineering and technology, human development, health, global and everyday life, situations, situations, information and problems associated with modern sciences.

Context information is widely used in PISA tasks. The tasks, designed to assess students' fluency, math and science literacy, mention various processes in real situations and the requirements for students to solve problems associated with these processes.

Processes and requirements for students set out in the concept of the international PISA assessment program

Procedures	**Necessary requirements for a person**
Globalization	Formation of a sense of duty to humanity
Political	Formation of an active citizenship
Economical	Consumer behavior with a rational attitude
Social	Formation of the position of an active and developed personality with a developed social consciousness
Technical	Technological striving for novelty, convenience
Depends on the environment	Wise use of resources and active promotion

[5] Ўзбекистон Республикаси Президентининг «Ўзбекистон Республикаси Халқ таълими тизимини 2030 йилгача ривожлантириш концепциясини тасдиқлаш тўғрисида» 2019 йил 29 апрелдаги ПФ-5712-сон Фармони // Қонун ҳужжатлари маълумотлари миллий базаси, 29.04.2019 й., 06/19/5712/3034-сон.

Table 2. Processes and requirements for students presented in the concept of the international PISA assessment program

In science literacy tasks, contextual information is critical and helps the student understand the task. The context data contains as many data sets as the real situation. Although not all information directly provides information for finding a solution to the problem, indirectly it helps to assess the overall situation, as well as to find basic information. The following contexts are widely used in the natural sciences.

Contexts	**Examples**
Natural resources	Extraction of oil, gas, non-ferrous metals, rational use of resources
Dangers	Floods, melting ice, drought
Health and disease	Epidemic, pandemic, malnutrition
Environment	Aging, biodiversity, endangered flora and fauna
New knowledge in science and technology	Artificial intelligence, virtual laboratories

3. Table. Contexts used in the natural sciences and their examples

The use of these contexts serves to reduce the content of students' assignments, as well as for their cognitive activation. In the PISA International Assessment Program, students must complete the following science literacy assessment tasks:

- reading scientific texts;
- interpretation of graphic, pictorial, sketch assignments;
- draw conclusions from the data;
- creation of mental models;
- substantiation of thesis, creation of hypotheses and comparison of opposites;
- purposeful verbalization of problems, taking a position and evaluating facts.

The objectives of the PISA international assessment program, in turn, launched the pineapple of "objective development" in the participating countries. The term "job pineapple" refers to the targeted and optimal placement of tasks in a study session[6].

K. Aufschnaiter points out that “systematic memorization of tasks in training has a decisive influence on the optimal learning process”, and, continuing his remarks, states that another important factor in the development of “task pineapple” is the development of students' self-explanation skills[7]. The tasks should be based on the fact that the information presented to students is not ready, and they find information by independent search, repetition and comparison with other tasks. Tasks should become more difficult depending on the course of the educational process.

H. Gudjons "by performing increasingly complex tasks, knowledge becomes systematized anew. And by completing the tasks related to practical application, it is integrated with other knowledge and becomes connected to

[6] Aufschnaiter C. Process-based detailed analyzes of the educational quality of physics lessons: An exploratory study // Journal for Didactics of Natural Sciences; Vol. 9, 2003. – p. 105

[7] Haeußler P., Lind G. "Task Culture" - What is that? // In: Practice of Natural Sciences - Physics 49 (2000) No. 4. - p. 2-10

the basic knowledge[8]. The teacher should explain the topic of the new lesson, give the students the opportunity to solve the tasks related to this topic independently, and present their solutions. Through this, the teacher assesses the "current state" and "potential state" of the student[9].

Effectively dealing with mistakes made by students in completing tasks is one of the aspects that are neglected in the development of tasks. Mistakes made by students serve to improve the quality of assignments. It is necessary to encourage students not to be afraid of making mistakes in solving the task, to come to the final correct solution through mistakes. P. Heuslur and G. Lind in their scientific research came to the firm conclusion that "whoever knows how to make a mistake, knows how to get the right solution.[10]" From the pedagogical point of view, mistakes should not be accepted as a necessary or unavoidable solution in the course of the lesson, but it should be considered that it is possible to learn from mistakes and through mistakes[11].

Research Methodology (Research Methodology)

It is known that natural-scientific literacy requires students to acquire scientific knowledge. Types of scientific knowledge are classified as follows.

1. Knowledge of the content of science: basic concepts, theories, laws in science

2. Methodological knowledge. Scientific research methods and research processes

3. Epistemic knowledge. Opportunities of scientific research methods and importance of research

When creating tasks, it is necessary to pay attention to the classification of scientific knowledge. Based on this classification, we analyze the knowledge of each class separately.

[8] Gudjons H.Intelligent practice. Methods and strategies// https://www.fachportal-paedagogik.de/literatur/vollanzeige.html, 26 (2006) 138-139. – p. 13.

[9] Schelten A., Riedl A. Cross-curricular and action-oriented teaching: teaching of prerequisites for the ability to act in professional practice // In: VLB-akzente 6 (2), 1997. - p. 11-13.

[10] Haeußler P., Lind G. "Task Culture" - What is that? // In: Practice of Natural Sciences - Physics 49 (2000) No. 4. - p. 2-10.

[11] Riedl A. Didactics of vocational training// Stuttgart: Steiner (pedagogy) 2004. – p. 121

	A type of scientific knowledge	**The content of the type of scientific knowledge**	**The main aspects of the content of scientific knowledge**
1.	Knowledge of the content of science:	Physical systems (physics and chemistry)	Motion and force (speed, friction) and distance effects (magnetic forces, Earth's gravity and electrostatic forces); The structure of matter (model of particles, bonds); Physical properties of matter (changes of aggregate states, thermal and electrical variability) Chemical properties of matter (chemical reactions, energy changes, acids, bases) Energy and its transformation (energy storage, distribution, chemical reactions) Interaction of energy and matter (light and radio waves, sound and seismic waves/vibrations)
		Knowledge of living systems (biology).	Knowledge of living systems (biology). Cells (structure and function, DNA, plant and animal cells); Humans (organ systems such as health, food, digestion, respiration, blood circulation, excretion, reproduction and their interrelation); Populations (species, evolution, biodiversity, genetic variation); Ecosystems (food chain, substance and energy exchange); Biosphere (activity of ecosystems, stability).
		Knowledge of earth-space systems (geography, geology, astronomy).	Structure of Earth's layers (metosphere, atmosphere, hydrosphere); Earth changes (shifting of tectonic layers, geochemical cycles, constructive and destructive forces); Energy (resources, global climate change); History of the Earth (fossil resources, origin and evolution); Location of the Earth in space (gravitational force, Solar system, galaxies);

			The universe and its history (light year, big bang theory).

The second type of scientific knowledge is classified as methodological knowledge. Knowing about scientific research methods used by scientists for the purpose of forming scientific knowledge is called methodological knowledge. Methodological knowledge covers:

Concept of measurement eg quantity (measurements), quality (observations), use of scale, continuous variables

Uncertainty reduction and estimation methods such as repeatability and averaging;

Mechanisms to ensure repeatability (the lack of differences in re-measurements of certain quantities) and accuracy of measurements;

General methods of abstraction and representation of data using tables, graphs, diagrams and their appropriate use.

It is recommended to use one or more of methodological knowledge when creating tasks. Based on the content of the task and the expected result, the appropriate methodological knowledge is used for the task.

The third type of scientific knowledge is classified as epistemic knowledge. Understanding the importance and main aspects of certain structures necessary for the formation of scientific knowledge in science is called epistemic knowledge. Epistemic knowledge covers:

Understanding the essence of ideas, theories, observations, problems, evidence in science;

Recognition of various forms of scientific research;

It includes the importance of expert assessment in the formation of reliable knowledge.

In the formation of tasks, epistemic knowledge is of great importance in determining the nature of the task and in increasing its importance in the development of natural-scientific literacy. An analysis of the tasks of international assessment studies shows that the identification of different cognitive levels in the tasks is clearly visible. Although the level of complexity of tasks widely used in pedagogical practice is relatively close, it is possible to observe that the formation of tasks is fundamentally different.

Cognitive levels are divided into three levels: high, middle and low.

A higher cognitive level involves analyzing complex data or results, evaluating evidence, justifying opinions, and creating a problem-solving plan.

Intermediate cognitive level refers to the ability to perform two or more step-by-step activities and use relevant knowledge to describe and explain events.

The lower cognitive level represents performing a single-step activity, finding a concept, argument, or pattern from information in a table or graph.

When creating tasks, cognitive levels are freely chosen according to the content of the task and the expected result. In order to ensure the perfection of the task, it is appropriate to keep the cognitive levels from the bottom up. The purpose of this is for students to find solutions to tasks from simple to complex, accordingly, an opportunity for cognitive development is created.

The tasks of the PISA international assessment program consist of a number of units. Each part of tasks contains up to 4 tasks (Items). Part assignments are interdependent and mutually reinforcing in terms of content and

structure. A picture, table, or graph in one assignment applies to all part assignments and tasks. Contextual information is provided when tasks are posted, and this information is common to all subtasks. Partial assignments require all aspects of the assignment as much as possible, including guessing, probabilistic, imagining, inferring, making decisions, summarizing, analyzing, and making recommendations.

There are 5 different types of tasks in the assignments. They are as follows:

several correct answer tasks;

single-answer tasks;

short answer assignments;

two closed-form assignments;

includes multiple choice assignments[12].

Based on the analysis of the content of development of natural-scientific literacy in students, it implies the formation of the following competencies in students.

Competence to scientifically explain phenomena

Competence in designing and evaluating scientific research

Competence in researching data and evidence

The goal of creating assignments from natural sciences should be the development of these competencies. Competence to scientifically explain phenomena - describes knowledge, proposal and evaluation of explanations of technologies, natural phenomenon processes. Competency in research design and evaluation demonstrates the following skills.

The content of these competencies is presented in the table below.

[12] Reiss K., Weis M., Klieme E., Köller O. PISA 2018. Basic education in an international comparison // 1st edition. Münster: Waxmann, 2019. -p.266.

	Competencies describing natural-scientific literacy	**Content of competences describing scientific literacy**
1.	Competence to scientifically explain phenomena	Remembering and using relevant knowledge from natural sciences Proposing explanatory hypotheses; Make and justify appropriate forecasts; Understand, create and use explanatory models and images; Understanding the practical importance of scientific knowledge for society
2.	Competence in designing and evaluating scientific research	Evaluation of methods of scientific research of a given problem; Differentiate the questions that can be researched; Description and evaluation of methods used by scientists to ensure objectivity and reliability of data; Propose a method of scientific research of a given problem; Identifying the problem being organized in a given scientific research
3.	Competence in researching data and evidence	Representation of information in a certain form in another form; Analyze and interpret data and draw appropriate conclusions; Be able to distinguish opinions based on scientific evidence from other views; Identify hypotheses, arguments and conclusions in texts taken from scientific literature; Evaluating scientific judgment and evidence from various sources.

Table 4. Competencies and their content describing natural-scientific literacy

As it is known, it is widely used for the purpose of strengthening the acquired knowledge through the tasks used in the educational process, repeating it, maintaining it in various real situations, and evaluating the acquired knowledge. Assignments in pedagogical practice are considered one-step. Tasks mainly consist of explaining a question or term, performing a mathematical operation. The analysis of the tasks shows that these types of tasks do not create sufficient opportunities for the development of students' natural-scientific literacy. In pedagogic practice, questions from tasks are widely used, and these questions are developed only in accordance with a reduced topic. Assignments act as a tool that determines the achievement of the goal of the lesson. Assignments determine the possibility of checking the achievement of the learning outcomes of the students. Also, the control assignments require the student to accept the assignments as "not in the educational process, but in the testing process, and the student's current level of knowledge is determined"[13]. Below we consider a comparative analysis between the traditional approach and science literacy.

[13] Lethiger H. Learning and performance tasks in competence-oriented teaching // https://www.budrich-journals. de/index.php/ HiBiFo/article/ view File/10123/8722.-p.12-24

	Traditional question	Science literacy questions
1.	What is called an electrical exchange?	Where does the energy for all life processes in the human body come from?
2.	Define Newton's first law.	Why must a driver wear a seat belt while driving?
3.	Rate the neutralization reaction	Drop the indicator into the acetic acid. Pour ammonia solution until the resulting color fades. What process takes place?
4.	Rate the osmotic pressure	Why is it impossible to water fruit, seed and vegetable crops before ripening?
5.	What are the parts of a cell?	What part of the cell do scientists use to change the genetic makeup of an organism?
6.	Find the formula that relates the speed, period and length of sound waves	How and when can we know about an earthquake thousands of kilometers away?

Table 5. Difference between traditional approach and science literacy

The tasks used in the educational process in comprehensive schools differ from the tasks of the PISA international assessment program in the following aspects:

1. Knowledge of a certain subject is systematically taught in training sessions, and topics are organized from simple to complex. This coherence ensures systematic learning of students and is integrally connected with the previous topic. In turn, tasks are formed accordingly. The disadvantage of such an approach is that students have a general idea about the subject or the chapters of the subject on the eve of the final lesson.

2. In the educational process, great attention is paid to the knowledge, questions, and terms related to exams and tests. Based on this, these topics, terms and tasks similar to the exam tasks are presented to students as often as possible.

3. Pupils are given reinforcement assignments as homework, and the student's complete and quality completion of all assigned assignments is the basis for a good grade.

4. Tasks aimed at developing natural-scientific literacy, developing independent research, creativity and research competencies related to real life, everyday situations or global problems are rarely recommended. Of course, the reason why such assignments are not included in the educational process is that reaching the final solution in assignments always requires a lot of time and feedback. On the other hand, the failure of such assignments is explained by the fact that they are not directly related to the lesson topics. On the other hand, the educational process is organized on the basis of a strict plan, and assignments sometimes take a lot of time. Tasks help students understand the essence of various tasks in society, everyday life, and professional life, and through this, they feel a sense of responsibility and accountability, and allow them to understand the importance of interdependence and independent organization.

According to J.Usarov, tasks are divided into the following three groups according to their levels:

- level of recovery (retention of basic knowledge in standard situations);

- the level of establishing connections (integration of materials on various topics, interpretation of information given through graphs and tables);
- level of discussion (generalization, solving non-standard problems, justifying conclusions)[14].

In the PISA international assessment program, we can say that scientific literacy is defined as "the ability to apply knowledge of natural sciences, understand the problems of natural sciences, develop conclusions using scientific sources, understand decisions about nature and changes in nature caused by the human factor"[15]. Natural-scientific literacy is indirectly examined in connection with everyday life, various socio-economic and political issues in society. The student is required to be able to express an independent opinion, make decisions and evaluate his results.

Assignments in natural sciences are mostly used in the repetition and examination phases of training[16]. Assignments are mostly used to assess students. Assessment is seen as a tool for the teacher to encourage students to be active.

Pedagogical scientist R. Duit analyzed the assignments in the physics textbooks and came to the following conclusion: "The assignments in the physics textbooks consist of repeated formal assignments and this is 90%. Tasks related to everyday life are rare. Such tasks usually help students to observe daily life, connect with the knowledge they are learning in the classroom, and develop their problem-solving competence. Tasks with several answers are rarely found in physics textbooks"[17]. Based on this analysis of the scientist, we can come to the conclusion that it is intended for students to engage in the algorithm of solving certain tasks in the physics class and to repeat this algorithm by memorization. In most cases, students are only required to solve or modify a formula or equation in tasks with a high level of complexity. However, the ability of students to work on these types of tasks does not mean that they have fully understood the content of the subject. Based on this, it is worth noting that the students' interest in science decreases, which leads them to conclude that natural sciences are abstract and seldom used in life. It will be easy to understand the importance of science if the assignments given to students are connected with information about their life and interests.

According to N. Sheker and J. Gerdes, "constantly repetitive tasks included in the scheme provide a limited amount of organized knowledge"[18]. Researchers emphasize the firm opinion that "students organize solving tasks, but rarely organize solving problems." Based on the stated scientific analysis, the function of the tasks given in the educational sessions is the basis for expressing our opinion that the students' attitude towards solving the problem situations should be changed.

In natural sciences, it is most appropriate that tasks are at the center of educational activities. Tasks should be developed and kept by the teacher, which should not lead to the correct solution of the task, but should ensure the student's thinking through this task, a little approach to the task. When developing such assignments, it is appropriate to

[14] Усаров Ж.Э. Таянч ва фанга оид компетенциялар асосида таълим мазмунини такомиллаштириш ва ўқувчилар компетентлигини ривожлантириш (физика фанини ўқитиш мисолида): пед. фанл. докт. ... дис. автор. – Т.: 2019. -67 б.

[15] OECD. learning for life. First results of the school performance study PISA2000//http://www.oecd.org/education/school/programmeforinternationalstudentassessmentpisa/33691612.pdf. – p. 24.

[16] Haeußler P., Lind G. "Task Culture" - What is that? // In: Practice of Natural Sciences - Physics 49 (2000) No. 4. - p. 2-10

[17] Duit R. Learning everyday ideas and physics // In E.Kircher & W.Schneider, eds., Physics didactics in practice (pp. 1-26). Berlin: Springer, 2002.-p. 184

[18] Schecker H., Gerdes J. Interviews about experiments on movement processes // In: Journal for Didactics of Natural Sciences4, 1998. - p. 61-74.

develop assignments based on the example of the region where students live and know well.

In pedagogical practice, it is widely observed that a student who cannot complete a certain task solves it with the help of sample tasks. Such tasks can be used in math class, working on formulas or solving equations. In the natural sciences, tasks covering more information, being able to give priority to the necessary information among a large amount of this information, and thereby developing the knowledge of independent research in students, serve the development of natural-scientific literacy.

Analysis and results

Working on errors is an important didactic strategy in science. From the point of view of science didactics, it is considered appropriate to explain the mistakes made on the basis of tasks corresponding to this mistake. For example, by presenting students with a problem on the board that has been done incorrectly, asking them to come up with a different solution will arouse the interest of students. It is also one of the tasks of the teacher to form and systematically develop students' opinions on identifying mistakes and why they are mistakes. Through this, students' critical thinking and constructive solution competencies are formed.

In recent years, in natural sciences, a lot of attention has been paid to the formation of multi-solution assignments. Cope refers to the approach based on one or several laws in solving tasks. As an example, in physics, tasks related to mechanics, the law of conservation of energy or the rule of balance of motion can be cited. Explaining the solution of the task in one way is simple, on the other hand it is not appropriate. Of course, through this, the teacher will achieve the goal in a short time. As a result, the basic skills of students such as finding solutions, reasoning, logical thinking, and comparative comparison are not developed. Such tasks encourage students to think narrowly and not to solve tasks with only one solution and not to look for other solutions[19].

In particular, the addition of constructive tasks in the educational process is becoming more popular. The purpose of the construction tasks is that students will gain natural and scientific knowledge by designing a certain product, item or structure. Students are provided with limited tools and materials to complete the assignment. As an example, students are asked to design a draw bridge. Through such assignments, students develop practical skills along with complex thinking. The advantage of constructive assignments is that they encourage students to develop observation skills, and on the other hand, such assignments remain in their memory. Also, constructive tasks help students to strengthen their interdisciplinary knowledge, to understand that organized knowledge is generalized in professional and personal life. By completing the assignment given as an example, students will be able to understand and practice concepts such as materials used in the process of designing copier, their physical and chemical properties, strength, density, late distribution and economic efficiency.

In natural sciences, it is recommended to use less assignments based on a certain formula. Such tasks encourage students to find solutions without connecting to the content, rather than understanding the content of the task[20]. As a result, the student considers it more important to memorize a certain formula than the content of science. As a result, the content of the assignment becomes of secondary importance.

In the sciences of pedagogy and psychology, there is the concept of "Scaffolding", and it is understood that tasks are brought to the "potential state" taking into

[19] Häußler P., Lind G. "Task Culture" - What is that? // In: Practice of Natural Sciences - Physics 49 (2000) No. 4. - p. 2-10

[20] Meyer H. Competence orientation alone does not make good teaching! Handout for the lecture at didacta 2012// Carl von Ossietzky University of Oldenburg. - p 129.

account the "current state" of the student[21]. Considering this principle, it is understood that assignments are given based on the current state of the student's knowledge. Russian pedagogue L.S. Vgotsky defined this concept as "next zone of development"[22]. Tasks should have a vertical relationship with the previously taught lessons, repeat and reinforce them. Also, these tasks should reflect horizontal connections with related disciplines, everyday and professional life.

The basis of natural-scientific literacy is formed in the continuous education system. In this case, "the purpose, content, methods, tools, and organizational forms of education and training are interconnected, compatible, and oriented towards the future" is important[23]. Continuous system aims to "ensure the student's development by increasing the level of education and education"[24]. The quality of continuing education consists of "...a set of consumer characteristics of educational services that ensure the satisfaction of the needs of comprehensive development of the learner".

Tasks similar to PISA international assessment tasks develop students' research, creativity and reflexive skills. "Two interrelated tasks should be taken into account when organizing students' creative activities. The first of them is the task of developing students' independent thinking in their creative activities, their desire to acquire knowledge, and the formation of their scientific worldview; the second one is the task of teaching to independently maintain reduced knowledge in education and practical activities[25].

Natural-scientific literacy does not develop within the framework of one discipline, but requires interdisciplinarity. In V.N. Fedorova's scientific researches, it is emphasized that the introduction of the condition of implementation of interdisciplinarity "ensures the scientificity, systematicity of students' knowledge, the development of cognitive abilities and interests, that is, it helps the implementation of other didactic principles"[26]. Tasks are one of the main pedagogical conditions for the development of natural and scientific literacy in students. It is necessary not to be limited to one topic in the development of assignments, it is preferable that the assignments include interdisciplinary and interdisciplinary knowledge. At the same time, "there is a law of interdisciplinary connection in the educational process. The integrity of the objective world requires the organization of sciences in an integral relationship. In addition, interdisciplinarity "complements each other, increases the effectiveness of forming a well-rounded personality and preparing young people for life." Different parts of a subject can be a component of competence and are systematically formed over years.

Development of natural-scientific literacy in students requires increasing cognitive activity and independence of students. Natural-scientific literacy is formed not only by completing assignments, but also by observing the essence of the assignment, forming an

[21] Краевский В.В. О культурологическом и компетентностном подходах к формированию содержания образования // Доклады 4-й Всероссийской дистанционной августовской педагогической конференции «Обновление российской школы» / – М.:, 2002.– 17-23 с.
[22] Выготский Л.С. Психология развития человека // – М.: Смысл Экасто, 2005. – с. 220.
[23] Ходиев Б. Иқтисодиёт ва маънавий тарбиянинг инсон манфаатларига хизмат қилиши // «Талаба-ёшлар тарбиясида инновацион ёндашув: тарбиянинг янги методлари ва унда ахборот коммуникацион технологияларнинг ўрни» мавзусидаги республика илмий-амалий конференциянинг мақола ва тезислар тўплами. – Т.: ТДИУ, 2018. 6-12б.
[24] Тарбия (ота-оналар ва мураббийлар учун энциклопедия). – Т.: Ўзбекистон миллий энциклопедияси. М.Аминова таҳрири остида, 2010. -406 б
[25] Шарипов Ш.С. Ўқитувчилар касбий ижодкорлиги узвийлигини таъминлаш технологиялари // Замонавий узлуксиз таълим муаммолари: инновация ва истиқболлар халқаро илмий конференцияси материаллари. –Т.: ТДПУ, 2018. –6 11 б.
[26] Федерова В.Н., Кирюшин Д.М. Межпредметные связи. –М.: Педагогика, 1989. – 233 с.

attitude towards it, analyzing the results of the assignment, and clarifying misunderstandings.

Self-assessment sheets are of great importance in the development of natural-scientific literacy in students. Self-assessment sheets are an integral part of the assignments. The importance of assessment sheets is explained by the following:

1. Pupils will learn how to develop their competencies by completing various educational tasks during training sessions. They will also have the opportunity to assess their science literacy through assessment sheets. As a result, students have little control over the whole activity by solving assignments. Full-time activity means searching for the necessary information to solve the task, planning the steps and necessary tools for completing the task, solving the task, evaluating and demonstrating the results of the task.

2. The teacher gives the students specific goal-oriented assignments and checks the results achieved by the students through evaluation forms filled in by the student.

3. Organizes interviews with the students regarding the evaluation forms filled in by the students. The teacher gets to know the students' opinions about the assignment and in this way constantly improves the educational assignments and materials.

Conclusions and recommendations (Conclusion/Recommendations)

When using assignments similar to those used in the PISA international assessment program in the educational process, attention should be paid to the following aspects:

In the main time of the training session, it is appropriate to give the training tasks, which are designed to be solved independently by the students, not exercises and repetitions, strengthening of knowledge. These tasks should be of different complexity and students should be given the opportunity to choose from several tasks.

It is better for the teacher to talk with the student about the strategy for solving the task, but it is better not to discuss whether the solution of the task is right or wrong. If the student is working in the wrong way while solving the task, it is necessary to wait as long as possible. It forms the student's skills of independent learning, working with mistakes and mistakes.

There are also comments on the successful development of natural-scientific literacy based on an individual approach. In one classroom, students are engaged in different tasks and different solving methods and analyze their strengths and weaknesses through this.

Pupils develop competencies related to the profession they want to acquire in the future by completing tasks. Through tasks, the student performs a full range of activities, such as systematic search for information, planning to solve the task in a logical sequence, implementation based on the plan, evaluating the results and working on new information for improvement. This gives a great impetus to the development of competencies such as analyzing the positive and negative aspects of the student's opinion, solving the task through a deep and comprehensive approach, proving the strengths of the opinion with evidence, expressing his position, as well as accepting critical opinions on the solution of the task. These competencies are developed in an integral relationship with the professional identity.

The PISA international assessment program is a broad pragmatic program that includes general education and is a qualitative assessment of the processes that develop the worldview and personality of the young generation. In the implementation of the PISA international assessment program into the national education system, tasks are also the main focus.

References

1. Aufschnaiter C. Process-based detailed analyzes of the educational quality of physics lessons: An

exploratory study // Journal for Didactics of Natural Sciences; Vol. 9, 2003. – p. 105
2. Duit R. Learning everyday ideas and physics // In E.Kircher & W.Schneider, eds., Physics didactics in practice (pp. 1-26). Berlin: Springer, 2002.-p. 184
3. Gudjons H.Intelligent practice. Methods and strategies// https://www.fachportal-paedagogik.de/literatur/vollanzeige.html, 26 (2006) 138-139. – p. 13.
4. Haeußler P., Lind G. "Task Culture" - What is that? // In: Practice of Natural Sciences - Physics 49 (2000) No. 4. - p. 2-10
5. Kulgemeyer C. PISA tasks in comparison. Structural analysis of the natural science items from the PISA runs 2000 to 2006 // Books on Demand GmbH, 2009. – p. 3.
6. Lehmann P. Aspects of the initial learning situation and learning development // https://bildungsserver.hamburg.de/contentblob/2815702/3b66049d4257501a0d44dce9b7ca449c/data/pdf-schulleistungstest-lau-5.pdf;jsessionid=41BC7B89339EDDFA1C84B4F5DA60AEE8.liveWorker2 , 1999. – p. 17.
7. Lethiger H. Learning and performance tasks in competence-oriented teaching // https://www.budrich-journals. de/index.php/ HiBiFo/article/ view File/10123/8722.-p.12-24
8. Meyer H. Competence orientation alone does not make good teaching! Handout for the lecture at didacta 2012// Carl von Ossietzky University of Oldenburg. - p 129.
9. OECD. learning for life. First results of the school performance study PISA2000//http://www.oecd.org/education/school/programmeforinternationalstudentassessmentpisa/33691612.pdf . – p. 24.
10. Reiss K., Weis M., Klieme E., Köller O. PISA 2018. Basic education in an international comparison // 1st edition. Münster: Waxmann, 2019. -p.266.
11. Riedl A. Didactics of vocational training// Stuttgart: Steiner (pedagogy) 2004. – p. 121
12. Schecker H., Gerdes J. Interviews about experiments on movement processes // In: Journal for Didactics of Natural Sciences4, 1998. - p. 61-74.
13. Schelten A., Riedl A. Cross-curricular and action-oriented teaching: teaching of prerequisites for the ability to act in professional practice // In: VLB-akzente 6 (2), 1997. - p. 11-13.
14. Выготский Л.С. Психология развития человека // – М.: Смысл Экасто, 2005. – с. 220.
15. Краевский В.В. О культурологическом и компетентностном подходах к формированию содержания образования // Доклады 4-й Всероссийской дистанционной августовской педагогической конференции «Обновление российской школы» / – М.:, 2002.– 17-23 с.
16. Тарбия (ота-оналар ва мураббийлар учун энциклопедия). – Т.: Ўзбекистон миллий энциклопедияси. М.Аминова таҳрири остида, 2010. -406 б
17. Ўзбекистон Республикаси Президентининг «Ўзбекистон Республикаси Халқ таълими тизимини 2030 йилгача ривожлантириш концепциясини тасдиқлаш тўғрисида» 2019 йил 29 апрелдаги ПФ-5712-сон Фармони // Қонун ҳужжатлари маълумотлари миллий базаси, 29.04.2019 й., 06/19/5712/3034-сон.
18. Усаров Ж.Э. Таянч ва фанга оид компетенциялар асосида таълим мазмунини такомиллаштириш ва ўқувчилар компетентлигини ривожлантириш (физика фанини ўқитиш мисолида): пед. фанл. докт. ... дис. автор. – Т.: 2019. -67 б.
19. Федерова В.Н., Кирюшин Д.М. Межпредметные связи. –М.: Педагогика, 1989. – 233 с.
20. Ходиев Б. Иқтисодиёт ва маънавий тарбиянинг инсон манфаатларига хизмат қилиши // «Талаба-ёшлар тарбиясида инновацион ёндашув: тарбиянинг янги методлари ва унда ахборот коммуникацион технологияларнинг ўрни» мавзусидаги республика илмий-амалий конференциянинг мақола ва тезислар тўплами. – Т.: ТДИУ, 2018. 6-12б.
21. Шарипов Ш.С. Ўқитувчилар касбий ижодкорлиги узвийлигини таъминлаш технологиялари // Замонавий узлуксиз таълим муаммолари: инновация ва истиқболлар халқаро илмий конференцияси материаллари. –Т.: ТДПУ, 2018. –6 11 б.