



USE OF PRACTICAL TRAINING IN DIRECTING STUDENTS TO RESEARCH BASED ON INTERNATIONAL EVALUATION PROGRAMS

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ABSTRACT

Today, the use of international assessment programs and their introduction into educational forms is considered an urgent problem in order to achieve efficiency in the educational process. Therefore, it is important to develop students' knowledge and skills in accordance with the existing standards of natural and scientific literacy of the world's leading countries, to prepare them for the international assessment programs PISA and TIMSS. This article is devoted to the issues of development of students' skills in biology with the help of international research programs in practical training.

KEYWORDS: Scientific literacy, educational process, educational activities, knowledge and skills, international assessment programs, research competence, research competence, students, biology lessons, independent learning activity classes, practical training, independent study, self-assessment, homework, competence approach.

INTRODUCTION

Use of international experience in the development of educational tasks based on the competency approach in general education subjects, TIMSS (Trends in Mathematics and Science Study) is an international monitoring system that studies the quality of mathematics and science education. Students of 4th, 8th, 11th grades will take part in it. Held in 1995, 1999, 2003, 2007, 2008, 2011, 2015. In 2008, TIMSS Advanced monitoring studies were conducted among students of schools that study mathematics and physics in depth. These two subjects are a priority area in assessing the abilities of the growing generation to use and improve new technologies, as well as the country's intellectual potential. While TIMSS assesses levels of knowledge acquisition at school, PISA focuses on levels of application of knowledge and skills at school, at home, and in the community.

In PISA studies, questions are asked that are not based on any facts. Elements of several sciences are combined in one question, and it can include chemistry, physics, and biology. The test is a test that evaluates children's readiness for independent life.

PISA is an answer to all questions about how to improve education. It certainly requires a lot of preparation. Many experts are working on it. But in the end, we will be able to get objective information.

Participation in international evaluation programs, that is, in international educational research, has many advantages, first of all, the process of adaptation to international standards and requirements of education takes place. By organizing and monitoring education based on international standards, comparing it with the educational system and level of other countries,

deficiencies in education are identified and studied, and plans are made for the future development of education. It has a positive effect on the creation of a national assessment system, which is important for our education system, and on the quality of national research in the field of education.

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

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

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

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

Students' demonstration of literacy competencies in natural sciences depends on three types of scientific knowledge.

Types of scientific knowledge include:

- knowledge about physical systems (physics and chemistry), living systems (biology), earth and space systems (geography, geology, astronomy), that is, knowledge about the content of science;

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

- epistemic knowledge, that is, knowing that our scientific imagination is the result of our understanding of the possibilities of scientific research methods, as well as the essence of concepts such as hypothesis, hypothesis, observation.

Below, we will consider the practical training organized for the development of research competence on the basis of international evaluation programs of students.

Practical training assignments:

1. Familiarize yourself with theoretical materials on the topic.
2. Frameworks for mathematics and natural sciences developed as part of the TIMSS international assessment program, as well as the structure of school, teacher, student and early learning (home) questionnaires, frameworks analyze evidence-based data for change.
3. Tell the specific aspects of mathematics and natural sciences in the TIMSS international assessment program and the forms of research (paper and computer) and the similarities and differences between them, or the tasks in the TIMSS international assessment program Learn to group according to the criteria (context, content areas, cognitive processes, etc.) presented in the scope of the study.

The TIMSS 2023 math coverage for grades four through eight builds on the 28-year assessment history of TIMSS, which has been administered every four years since 1995, the eighth assessment cycle. The TIMSS 2023 mathematics assessment system is organized in two directions:

1. The content area intended for the assessment of science-related areas.
2. Cognitive field designed to evaluate thinking processes.

In 2023, the IEA and TIMSS & PISA will conduct the eighth cycle of TIMSS (Trends in International Mathematics and Science Learning) in grades four and eight, providing nearly 30 years of trend data on student achievement in mathematics and science. TIMSS 2023 TIMSS 2019 completes the transition to digital assessment that began with , reflecting the

widespread use of technology in schools and society. TIMSS 2023 assessments include new and engaging item formats, interactive features, and scripted problem-solving and inquiry tasks that engage learners and leverage the digital environment.

Singapore is the country with the best results in mathematics in the fourth grade study. Along with Hong Kong, Korea, Chinese Taipei and Japan, East Asian countries led by a wide margin among other countries surveyed by TIMSS. Also, a difference of 26 points separated them from the next highest scoring countries [2].

In the eighth-grade study, five East Asian countries outperformed the rest. These are Singapore, Chinese Taipei, Korea, followed by Japan and Hong Kong. These countries showed a difference of 35 points more than the rest of the countries. In science, the results look a little different, especially in the fourth grade.

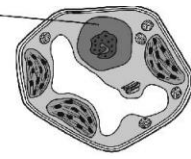
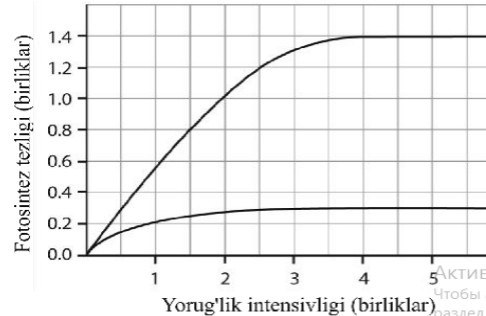
In the study of fourth-grade science, Singapore and Korea achieved the highest results, with an average of 21 points ahead of the Russian Federation and Japan. Chinese Taipei and Finland also did very well. In the eighth-grade study, Singapore scored the highest, beating Chinese Taipei, Japan and Korea by 34 points. The Russian Federation and Finland showed a result 18 points higher than the rest of the countries. By comparison, 51 percent of Singapore's eighth-graders met the advanced benchmark, based on their best achievement in fourth-grade math. Science content domains for grades 4 and 8 differ depending on the specificity and complexity of the science taught in each grade. 4th grade focuses more on life science, which is the analog of 8th grade biology. In Grade 8, physics and chemistry are assessed as separate content areas, and in Grade 4 there is a greater focus on physics, which is assessed as a single content domain. The three cognitive domains (Knowing, Applying, Reasoning) are the same for both grades, dealing with learning science concepts and then applying and reasoning using those concepts. a number of cognitive processes are covered.

In summary, the TIMSS International Survey assesses students' academic achievement in cognitive domains such as knowing, applying, and reasoning. The cognitive domain "Knowing" includes mathematical problems that require the student to have knowledge of the properties of numbers and simple geometric shapes, to correctly extract information from standard graphs and diagrams. In natural sciences, it is necessary to show the level of knowledge about the properties of individual organisms and substances, phenomena and processes, terms and units of measurement related to natural science. When completing some test tasks in mathematics and natural sciences, it is necessary for students to demonstrate the skills of solving problems related to various life situations, interpreting data from tables, diagrams and graphs, and performing experimental work. Logical and systematic thinking abilities of students are determined through reasoning tasks. Issues that require consideration may differ from each other in terms of the novelty of the proposed situation, the complexity of the question, the number of solution steps, and the need for integration.

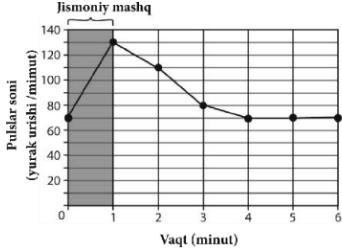
Samples of TIMSS test tasks from natural sciences for 8th grade students

Tasks related to the cognitive domain "Knowing".	Tasks related to the cognitive domain "Application".	Tasks on the cognitive domain of "reasoning".
Cells and their functions		



<p>S8_01 Which of the following best describes the purpose of cellular respiration? A providing energy for cellular activity B producing sugar for storage in cells C releasing oxygen for respiration D delivering carbon dioxide for photosynthesis</p>	<p>S8_12 This picture shows a plant cell. What is the function of the part of the cell labeled X?</p>  <p>A. He stirs the water. B. It produces nutrients. C. It absorbs energy. D. He directs the activity.</p>	<p>S8_26 Aziza is researching the effect of light intensity and carbon dioxide concentration on the rate of photosynthesis. He measured the rate of photosynthesis in two identical plants at different light intensities. The plants were placed in closed containers. The initial concentration of carbon dioxide in one container was 0.40%. In another container, the initial concentration of carbon dioxide was 0.03%. He graphed his results as shown below. Look at the graph. Does increasing the concentration of carbon dioxide affect the rate of photosynthesis? (Check one box). Yes No Explain your answer.</p> 
<p>Life cycles, reproduction and heredity</p>		
<p>S8_02. Most seeds can germinate in light or darkness. Write two conditions necessary for germination.</p> <p>1. ----- -- 2. ----- ----</p>	<p>S8_13 Kidneys are organs located in the human body. A young man had one of his two kidneys removed due to disease. Now he has a son. How many kidneys did her son have at birth?_____ Explain your answer. _____</p>	<p>S8_27 Komila and Elmira are studying plants. They learned that traits such as stem length and fruit color are inherited in plants. They are looking at some green and red bell peppers. According to Komila, they are different types of bell peppers because they have different colors. According to Elmira, they are a type of bell pepper, and red bell peppers are red because they have been on the plant longer and have matured. Describe an experiment you would do to determine whether Comilla or Elmira is right.</p>
<p>Characteristics of living organisms, classification and life processes in them</p>		
<p>S8_10 The uterus is part of the reproductive system in mammals. Write one function of</p>	<p>S8_20 In the table below, animals are divided into two groups. Group 1 rabbit, giraffe, elephant</p>	<p>S8_31 Brave measures his pulse before exercising. His pulse beats 70 times per minute. He exercises for a minute and measures his pulse again. Jasur then measures the heart rate every</p>



<p>uterus.</p> <hr/>	<p>Group 2 frog, spider, lion Which of the following was used to classify these animals into groups? A. organs involved in respiration B. food source C. method of reproduction D. way of moving</p>	<p>minute for several minutes. He presents his results in the following graph:</p>  <p>According to his results, what conclusion can be drawn? A. His pulse increased to 50 beats per minute. B. It takes less time for his heart rate to slow down than to increase. C. His pulse was 80 beats per minute after 4 minutes. D. His pulse returned to normal in less than 6 minutes.</p>
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S8_01 Correct answer: A - providing energy to cell activity

S8_12. Correct answer: D. He directs the activity.

S8_26 The correct answer is: Yes, and the explanation that carbon dioxide is needed (needed, used in the process) for photosynthesis. The caption may or may not refer to the graph, for example: Carbon dioxide is needed for photosynthesis. The higher the concentration of carbon dioxide, the faster the rate of photosynthesis. Carbon dioxide is necessary for photosynthesis. Yes, at a light intensity of 3, the rate of photosynthesis is 1.2 at 0.40% and 0.3 at 0.03%. Because carbon dioxide is needed for the photosynthesis process to take place. Plants need carbon dioxide and sunlight for photosynthesis, and carbon dioxide affects the rate of photosynthesis and growth. Yes A comment (exact or vague) referring to the graph only, eg: Yes, at light intensity 3, the rate of photosynthesis is 1.2 at 0.40% and 0.3 at 0.03%. As the concentration of carbon dioxide increases, the rate of photosynthesis increases. Plants carry out photosynthesis faster.

S8_02. Correct answer: Water (moisture, rain) or a similar answer is recorded, for example: Wet conditions. Humidity. Wet weather. Wet soil. Favorable temperature (warm, heat) or a similar answer, for example: Favorable temperature for seeds to survive. Heat around 270 C. Hot weather. Heat from the sun. Oxygen (air), eg: They need oxygen. They need air.

S8_13. Correct Answer: Two and an explanation is given that kidney removal is a non-inherited trait (or similar), eg: It is not in her gene to have her kidney removed, so it is not inherited. It is not hereditary. Due to the removal of his father's kidney, the son's genes will not change. It is not genetically influenced. Two and (usually) all humans are born with two kidneys (or similar) are explained (heredity is not explicitly stated), for example: Everyone is born with two kidneys unless a person has the disease . Her child will have 2 normal kidneys. There are always two kidneys at birth. His father's illness is not contagious. There are two kidneys in the human body. If she has one kidney left, it does not mean that her son will have one too. Her kidney was removed, but not her son's. As much as most people have. It does not directly affect his son.

S8_27 The answer is fully accepted: 1) grow green and red bell peppers (from seed) AND observe the color of the fruit OR 2) grow green bell peppers (from seed) AND the fruit turns red or observing that it does not enter, for example: I would take one seed from each bell pepper and plant them under the same conditions and at the same time. When the bell peppers sprout, I observe them at the same time. If red bell peppers turn red and green bell peppers do not, then red and green bell peppers are different species. Growing plants from the seeds of red and green bell peppers. Observing the color of bell peppers. Sow both green and red bell pepper seeds. Pollination. Waiting for bell peppers to bear fruit. Planting green bell pepper. When the plant grows and produces fruit, leave the fruit on the plant and see if it turns red. The answer is partially accepted: ONLY plant green / red bell peppers (from seed), for example: You can grow seeds from each bell pepper. Grow them together and at the same time.

S8_10 Correct answer: The answer mentions the development of an embryo (fetus, child, fertilized ovum, etc.) inside the uterus (or similar), for example: The uterus protects the baby as it grows. A child develops from an egg in the womb. It provides nutrition and oxygen to the embryo (fetus, child). To carry the baby. There will be a child in it. The child lives on its end for 9 months. The fertilized egg is placed in the wall of the uterus

S8_20. Correct answer: B. food source

S8_31. Correct answer: D. Her pulse returned to normal in less than 6 minutes.

Mastering the research method allows you to acquire the ability to analyze and find cause-and-effect relationships. A.I. Savenkov "research practice" is not only one of the methods of teaching, but also a way of forming a special style of life and educational activity. It is based on exploratory behavior. This allows you to turn learning into self-learning, in fact, starting the engine of self-improvement.

It should be noted that students engaged in scientific research are distinguished from others by their calmness, purposefulness, and curiosity.

When involving schoolchildren in research work, it is necessary to organize the sequence of mastering creativity skills in such a way that, on the one hand, this ability of the student is not "paralyzed". Very simple and very difficult tasks can have a negative impact on the formation of research skills that direct students to scientific and research work.

Why do very simple and complex tasks negatively affect students' research skills?

Very simple tasks seem simple to students and take less time to complete, and less time is required to engage students.

Difficult tasks can hold students' attention for a long time, and a high level of difficulty can keep students interested.

Therefore, performing tasks of an average level (tasks prepared based on the characteristics of the age of students) increases the interest of students. When performing tasks, it is required to give students taking into account their knowledge levels. Providing students with a variety of tasks (taking into account the types of tasks and methods of their implementation) is the basis for more complete use and development of skills.

In our opinion, scientific-research work is aimed at creating conditions for graduates to achieve a high level of education, which differs mainly not by the amount of knowledge, but by mastering the methods of production activity. It is necessary to gradually prepare for research methods of teaching children, these methods require hard work and well-formed general educational skills. In parallel with the research method, there is a project method in education.

Research is a powerful teaching tool and in solving educational problems, and incorporating this tool into the curriculum provides students with useful practical life skills, regardless of their chosen career.

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