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MONITORING THE QUALITY OF THE EDUCATIONAL PROCESS AGAINST THE REQUIREMENTS OF THE PISA INTERNATIONAL STUDIES: STRUCTURE, TECHNOLOGY MAPS, RESULTS

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Abstract. The article analyzes the results of the work on Kazakhstan's participation in the PISA international comparative studies, the results of monitoring conducted in Kazakhstani schools, and also provides recommendations for improving the quality of the educational process in educational institutions of the Republic of Kazakhstan, taking into account the requirements of international comparative studies. The quality of education is considered in this sense by such internationally recognized means of monitoring the cognitive development of students as the PISA international comparative studies. The purpose of our work is to analyze research data, which allows us to track the level of formation of reading, mathematical and natural science literacy of students. The study examines the features of the content of basic secondary education, the organization of the educational process, as well as factors related to the characteristics of the organization of education, teachers, students and their families. To assess educational achievements, students are tested, and to obtain information about factors affecting learning outcomes, students, teachers and school administrators who participated in the study are surveyed. We see that the results of international PISA studies represent one of the important factors in improving the quality of education. The development of strategies for the renewal of education, taking into account international comparative studies, seems very relevant and appropriate, since in the context of globalization, countries around the world cannot develop without developing common approaches to the most important issues of socio-economic development, without correlating their achievements with each other. Each participating country receives a rich analytical material on the state of the content of secondary education, the prospects for its development in the world with which it is necessary to work. This project is recommended to managers and employees of educational organizations, heads and methodologists of education departments.

Key words: PISA, monitoring, technological maps, research, context, competencies, natural science knowledge, categories of knowledge about science

Introduction

PISA is an international programme for assessing the educational achievements of students.

The aim of the PISA programme is to assess the ability of 15-year-old students to use their school knowledge and experience for a wide range of life tasks in different areas of human activity, communication and social relationships.
The choice to involve 15-year-old students in the study is explained by the fact that in many countries compulsory schooling is completed by this age, and training programs in different countries have a lot in common. It is at this stage of education that it is important to determine the state of those knowledge and skills that may be useful to students in the future, as well as to assess the ability of students to independently acquire the knowledge necessary for successful adaptation in adulthood.
International comparative studies, identifying the result of teaching schoolchildren from different countries in accordance with their cycle of conducting, on the basis of the participating contingent, determine the level of skills development within the framework of a particular literacy: mathematical, natural science and reading. Summing up the results of the research, conclusions are drawn about the factors influencing the result, in particular:

- study programs on the subject;
- training of subject teachers, the effectiveness of their activities and the role of learning technologies;
- the influence of textbooks on the content of education;
- students' academic performance, their relationship with teachers;

- the level of participation of schoolchildren in preparatory courses for admission to university;
-the impact of national monitoring tools, etc.

Basic provisions

Monitoring in education is a system for collecting, processing, storing and issuing any information related to the pedagogical process and the results of pedagogical activity.

The purpose of monitoring in education is to create a data bank to identify the effectiveness and efficiency of pedagogical activity. At the same time, the data bank is formed by sections, rubricators and is recorded in technological maps with an indication of the term of the information provided.

The effectiveness of pedagogical activity is understood as an assessment of the degree of fulfillment of the set goals and objectives. Quality in this context is understood as the degree to which the results obtained correspond to the goals set. Under the effectiveness of pedagogical activity, the assessment of the ability to perform tasks with the least expenditure of available resources is measured by the volume of input and output data.

Consequently, the identification of the effectiveness and efficiency of pedagogical activity is not included in its own monitoring tasks, but the entire data bank is used for a comprehensive or local assessment of certain aspects of this activity.

The identification of indicators on the quality of pedagogical activity is a complex and multidimensional process, therefore it requires a separate (special)

calculation methodology, as well as a system of indicators, meters and evaluation criteria.

Materials and methods

The following methods were used for the monitoring exercise:

– Approbation of monitoring flowcharts on the basis of several schools;

– Discuss the problems of preparing for participation in the MSI in round tables with subject teachers and school leaders;

– Expertise of textbooks in mathematics, biology and chemistry, with the involvement of teacher practitioners;

– Systemstisation of statistical data;

– Summarising and debriefing.

The study of students' educational achievements in this international program is carried out in three main areas: "reading literacy", "mathematical literacy" and "natural science literacy". Special attention is paid to the assessment of students' mastery of general academic and intellectual skills.

The PISA study is conducted in three-year cycles. In each cycle, the main attention (two-thirds of the testing time) is paid to one of the three directions indicated above. According to the other two, a generalized characteristic of the literacy of students in this area is obtained.

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It should be emphasized that the main directions of research, conceptual approaches to the development of tools, methods of processing and presentation of results are discussed at scientific forums attended by leading experts of the world, and approved by representatives of the participating countries of the project (usually representatives of ministries of education), taking into account their practical significance for these countries.

A cross-country comparison of the average academic performance of students, taking into account country-dependent factors such as the level of development (GDP per capita by PPP), socio-economic conditions (using the PISA index for socio-economic factors) are as follows:

1) cross-country comparison of discrepancies in students' academic achievements:

Reading literacy scores are regressed by gender, month of birth, socio-economic index and average socio-economic index of the school;

The proportion of discrepancy explained by socio-economic indices (especially at the school level) is a reasonable measure of the discrepancy of opportunities.

2) linear regression of average scores in reading, mathematics and science on individual and school factors of the country:

individual factors are gender, month of birth, socio–economic index, native language, knowledge of strategies for learning new material, age at admission,

preschool education …

and school factors can be the language of instruction, socio-economic factors, the type of program (for example, special versus general) …

3) decomposition of differences between groups using the Oaxaca-blinder method to analyze the causes of discrepancies.

Discussion and results

The first PISA survey was carried out in 2000, with 32 countries participating, followed by 43 in 2003, 57 in 2006 and 65 in 2009.

The PISA - 2012 research covered about 510,000 students from 65 countries. More than 70 countries decided to participate in the PISA test in 2015 [1].

The structure and technology maps of our monitoring were developed taking into account the specifics of the holistic pedagogical (educational) process based on subject-object-subject interaction between teachers and students.

This is explained by the fact that a teacher (the subject of relations, activity), interacting with students (the same subjects of relations, activity), directs not their activity, but the pedagogical process as an object of pedagogical interaction. In this case, the teacher develops tasks, thinks over the technology of their performance, and students perform these tasks. The range of assignments may vary from the simplest academic tasks on a particular topic and in a particular subject to the integrated ones in the form of scientific projects or business projects.

In addition, in order to analysis and assess the quality of the educational process in schools, taking into account the requirements of the international comparative PISA studies, the level of awareness of teachers, students and their parents in the field of these studies should have been investigated [2].

With the above in mind, the monitoring framework contains two blocks:

1) A system of learning tasks aimed at developing reading, mathematics and natural science literacy in school children;
2) Information support for MSIs (Table 1).

The technology maps were developed in accordance with the monitoring study methods.

Table 1 - Structure of monitoring the quality of the educational process in general education schools, taking into account the requirements of international PISA research

Names of monitoring sections and technology maps	**Liter TK**
1. PISA, TIMSS **type assignment system**	
1.1 Scientific and natural literacy	
Context (Classes 8-11)	TK I.1.4
Competencies (Classes 8-11)	TK I.1.5
Scientific knowledge (Classes 8-11)	TK I.1.6
Categories of knowledge about science (Classes 8-11)	TK I.1.7
1.2 Mathematical literacy	
Fundamental mathematical ideas (Classes 8-11)	TK I.2.4
Mathematical competence (Classes 8-11)	TK I.2.5

1.3 Literacy in reading	ТК I.3
2 Information support for PISA, TIMSS	
2.1 Awareness of teachers, learners and parents about MSIs	ТК II.1
2.2 The media coverage of MSI questions	ТК II.2

The technological procedures for monitoring are reflected in Table 2.

Table 2 - Technological monitoring procedures

Monitoring functions	Technological procedures	Abbreviation
Establishment of a database on the object under study	collection of baseline data	CBD
	information flow processing	IFP
Using the database for management decisions (in particular to assess the effectiveness and efficiency of pedagogical activities)	negotiating solution options	NSO
	making of management decisions	MMD

In order to be objective, the database must reflect meaningful and reliable information. The completion of the monitoring technology maps is therefore accompanied by appropriate instructions [3].

A sample of schools was selected for the monitoring, which was based on the calculations of V.I. Paniotto, who justified the representativeness of the sample by assuming a 5 per cent error. According to his calculations, with the general population of 10,000 units, the sample size should be 385 units. There are currently 7,649 schools in Kazakhstan. The monitoring surveys were conducted in 162 schools, which gives grounds to acknowledge the unquestionable objectivity of the data obtained (Table 3).

In addition, the representativeness of the research carried out is conditioning by the observance of conditions that ensure the reliability of the results of the study:
– each element in the general population had the same probability of being included in the sample population;
– the general population was homogeneous;
– there was preliminary information about the structure of the general population and its characteristics.

Table 3 - Objects of the monitoring studies

Region/area	Number of schools (urban and rural)
I the Almaty Region	50 rural schools
In the South Kazakhstan region	80 (20 urban, 60 rural)
Astana city	12 urban schools
Almaty city	20 urban schools

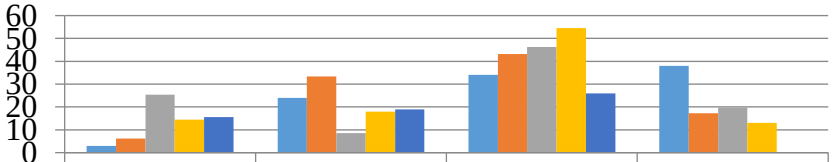
The monitoring covered urban, rural and small schools with Kazakh and Russian as languages of education.

The developed technological charts were tested at seminar-meetings with teachers and managers of educational organizations (52 persons) in Almaty Province and the cities of Astana and Almaty. After the discussion, the technological charts were supplemented with supporting documents to the statistical data in the form of the list of analyzed textbooks and annexes of lesson plans (at least ten) of those lessons where subject teachers use PISA-type teaching tasks.

In this case, this analysis was aimed at identifying the share of PISA-type learning tasks aimed at formation of scientific literacy. Thus, for basic secondary school students, these tasks are grouped into three indicators: "Knowledge", "Application" and "Reasoning". Analysis of biology textbooks recommended by the Ministry of Education and Science of the Republic of Kazakhstan showed that the share of learning tasks in the first group averages 41.2% in sixth grade, around 75% in seventh grade and 41% in eighth grade; in the second group - 30%, 19% and 30%, and in the third group - 28%, 4.6% and 28%.

It should be noted that all TIMSS as well as PISA items are integrated. However, the basis for grouping test items in the second programme is slightly different. There are four groups of test items: "Context", "Competencies", "Natural Science Knowledge", "Categories of Knowledge of Science" [4].

For example, the analysis of biology textbooks for grades 9-11 has shown that Kazakhstani senior schoolchildren have a direct opportunity to perform integrated tasks, aimed at the formation of scientific literacy, only 3% in the 'Context' block, 24% in the 'Competencies' block, 34% in the 'Natural Science Knowledge' block and 38% in the 'Science Knowledge Categories' block (Grade 9). Approximately the same picture emerges with the biology textbooks for 10th and 11th grades (Figure 1).

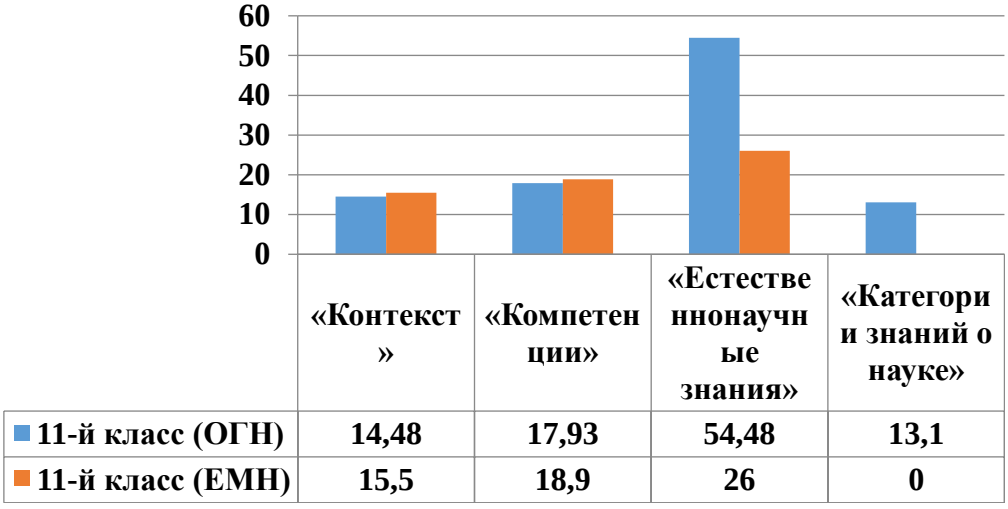


	«Контекст»	«Компетенции»	«Естественнонаучные знания»	«Категории знаний о науке»
9-й класс	3	24	34	38
10-й класс (ОГН)	6,17	33,3	43,2	17,2
10-й класс (ЕМН)	25,4	8,6	46,2	19,8
11-й класс (ОГН)	14,48	17,93	54,48	13,1
11-й класс (ЕМН)	15,5	18,9	26	0

Figure 1 - Proportion of PISA-type tasks in biology textbooks (in %)

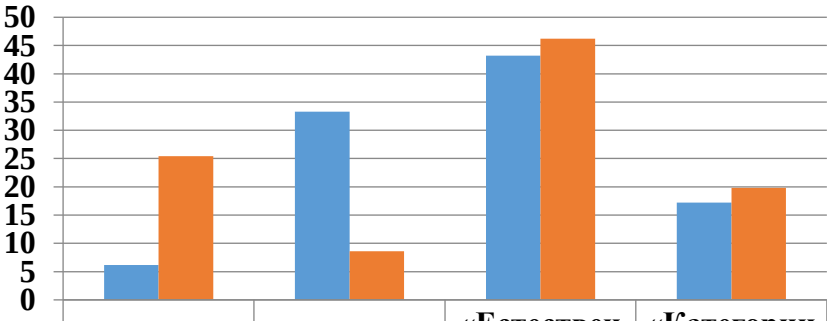
If we compare the proportion of PISA-type assignments in the textbooks for 10th and 11th classes in biology, the following picture is observed: in the textbook for 11th classes of the natural-mathematical direction the proportion of assignments for the formation of natural-science literacy is to a certain extent lower than in the textbooks for the social-humanitarian direction (Figure 9), in the textbooks for 10th

classes such paradoxicality is observed in relation to the assignments of the group "Natural-science knowledge" and the group "Categories of knowledge about science" (Figure 2).



	«Контекст»	«Компетенции»	«Естественнонаучные знания»	«Категории знаний о науке»
11-й класс (ОГН)	14,48	17,93	54,48	13,1
11-й класс (ЕМН)	15,5	18,9	26	0

Figure 2 - Proportion of PISA-type tasks in biology textbooks for natural sciences and mathematics (in %)



	«Контекст»	«Компетенции»	«Естественнонаучные знания»	«Категории знаний о науке»
10-й класс (ОГН)	6,17	33,3	43,2	17,2
10-й класс (ЕМН)	25,4	8,6	46,2	19,8

Figure 3 - Proportion of PISA-type tasks in biology textbooks for social-humanities education (in %)

In both case, learning tasks oriented towards the knowledge-based paradigm of education predominate to a large extent [5].

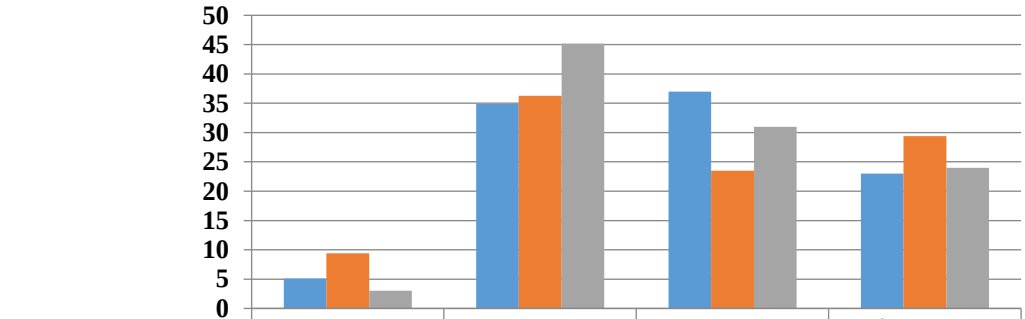
In both cases, there is a strong predominance of knowledge-oriented learning tasks.

For example, in the chemistry textbook for the 8th grade (authors N. Nurakhmetov, K. Sarmanova and K. Dzeksembina, year of publication 2012, publishing house "Mektep") the PISA-type tasks are 5.1% in the "Context" section, 34.9% in the "Competencies" section, 37% in the "Natural science knowledge" section and 23% in the "Science knowledge categories" section.

In the chemistry textbook for Grade 9 (authors N.N. Nurakhmetov, K.M. Dzheksembina, N.A. Zagranichnaya, 2013, Mektep Publishers) and in the chemistry

textbook for Grade 10 for both the social-humanitarian and natural-mathematical strands (authors N. N. Nurakhmetov, K. Bekishev, N.A. Zagranichnaya, G.V. Abramova, 2014, Mektep Publishers) PISA-type tasks are used only in individual topics related to the study of the properties of metals and non-metals and their compounds and account for 4.4% .

In the chemistry textbook for 11th grade in social sciences and humanities (authors N. Nurakhmetov, K. Zheksembina, N. Zagranichnaya, 2011, published by 'Mektep') the PISA-type tasks constitute 9.4%, 36.3%, 23.5% and 29.4% (respectively, for the sections mentioned above). In the chemistry textbook for grade 11 in natural sciences and mathematics (authors A. Temirbulatova, N. Nurakhmetov, R. Jumadilova, S. Alimjanova, 2011, Mektep Publishers) these figures are 3%, 45.2%, 31% and 2% respectively for the generalized PISA indicators (Figure 4).



	«Контекст»	«Компетенции»	«Естественнонаучные знания»	«Категории знаний о науке»
8-й класс	5,1	34,9	37	23
11-й класс (ОГН)	9,4	36,3	23,5	29,4
11-й класс (ЕМН)	3	45,2	31	24

Figure 4 - Proportion of *PISA*-type learning tasks in chemistry textbooks (in %)

It follows from the bar chart above that the situation with the tasks aimed at the formation of scientific literacy in chemistry textbooks is more comforting than in biology textbooks, since in the first case a certain share of tasks is focused on the formation of natural-science "Competencies" (there are more tasks than in the "Natural-science knowledge" group). At the same time, the predominance of tasks in the "Science knowledge categories" group over those in the "Context" group indicates the fundamental nature of the teaching material rather than its applied (practice-oriented) nature [6].

In contrast to chemistry textbooks, biology textbooks show a lack of clarity about the fundamental differences between the social humanities and natural sciences curricula. This is especially true of biology textbooks for the 11th grades, where we observe a sharp decrease in the share of learning tasks oriented towards the formation of natural science literacy for those schoolchildren who have chosen this particular direction of study (Figure 5).

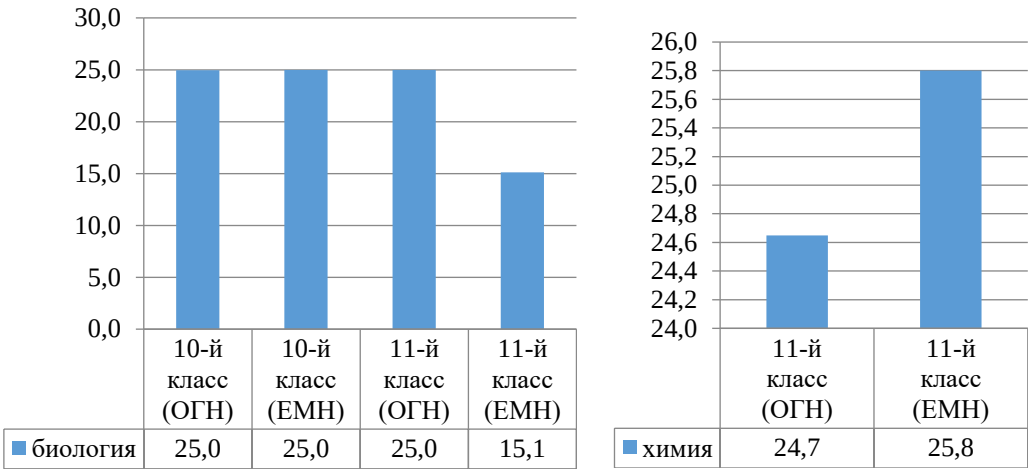


Figure 5 - Proportion of learning tasks oriented towards the development of scientific literacy in the context of science and social-humanities curricula (in %)

The analysis of biology and chemistry textbooks in terms of their relevance to international comparative studies was carrieing out by completing monitoring technology charts. As an example, below is a flow chart (Table 4) for the analysis of a chemistry textbook for grade 10 in the natural-mathematical field (by Gabrielyan O.S. and Shokybaev J.A., published by Atamura, 2018).

Monitoring section: 1. A system of *PISA*-type tasks aimed at the formation of natural science literacy of schoolchildren.

Table 4 - Monitoring Technological Map (Natural Science Literacy, *PISA*)

Types of training tasks by type PISA	*information about the tasks used in training (total tasks in the textbook – 530)*	
	number of tasks	*fraction (%)*
1	2	3
CONTEXT		
Health		
Preservation of health, injuries, proper nutrition	12	2,3
Immunity support, diet		
Epidemics, common infectious diseases		
Natural resources		
Individual consumption of substances and energy	8	1,5
Human population, quality of life, safety, production, distribution of food	4	0,75

Renewable and non-renewable resources, natural systems, population growth, protection of endangered species		
Environment		
Attitude to nature, the use of various materials and substances	40	7,5
Population distribution, cost planning, environmental impact, weather	7	1,3
Biological diversity, pollution control, soil reproduction and use	10	1,9
Sources of danger, risks		
Natural and human-induced choice of residence	3	0,6
Abrupt changes (earthquakes), harsh climate, slow and increasing changes (coastal erosion), risk assessments		
Climate change, the impact of modern clashes and wars		
The connection of natural science and technology		
Interest in the scientific explanation of natural phenomena, science-oriented hobbies, sports and recreation, music and technology		
New substances and materials, devices and processes, genetic modifications, technology weapons and transport		
Extinction of species, space exploration, the origin of the universe and its structure		
Total	**84**	**16**
COMPETENCIES		
Recognition and formulation of scientific questions		
identification of problems that can be scientifically investigated	3	0,6
definition of keywords necessary for the search for scientific information	56	10,6
identification of the main features (characteristics) of natural science research	7	1,3
Scientific explanation of phenomena		
application of scientific natural knowledge in a given situation	21	4
scientifically based description or interpretation of phenomena, forecasting of changes	6	1
recognition of scientifically based descriptions, explanations and forecasts	4	0,75
Use of scientific evidence		
interpretation of scientific facts, data and formulation of conclusions		
identification of assumptions, facts, data or evidence underlying the conclusions		

assessment of the consequences of the application of science and technology in society		
Total	**97**	**18**
NATURAL SCIENCE KNOWLEDGE		
Physical systems		
the structure of a substance (for example, a model of an atom)	6	1
properties of a substance (change of state, heat and electrical conductivity) phys.sv-va	40	7,5
chemical changes of a substance (chemical reactions, energy transfer, acids/bases)	38	7,1
motion and forces (velocity, friction)		
energy and its transformations (energy conservation, energy dissipation)		
interaction of matter and energy (light and radio waves, sound and seismic waves)		
System of living organisms		
cell (for example, structure and functions, DNA, plant and animal cells)		
human (health, nutrition, diseases, reproduction, digestive, respiratory systems and blood circulation)		
populations (representatives, evolution, biological diversity, genetic variations)		
ecosystems (food chains, flows of substances and energy)		
biosphere (support ecosystems, sustainable development)		
Earth and space systems		
of the Earth's shell (lithosphere, atmosphere, hydrosphere)		
energy in Earth systems (energy sources, global climate) parn.effect		
of changes in Earth systems (plate tectonics, geochemical cycles, creative and destructive forces		
history of the Earth (fossils, origin and evolution)		
Earth in the universe (gravity, solar system)		
Technological systems		
the role of high-tech technologies (solving technological problems, helping people, planning and conducting research)	20	3,8
the relationship between science and technology (technological support for the development of science)	16	3
concepts (optimization, compromise, risks, profit)	10	2
important aspects (invention, problem solving)	3	0,6
Total	**133**	**25**
CATEGORIES OF KNOWLEDGE ABOUT SCIENCE		
Natural science research		

the emergence of scientific research (due to curiosity, the emergence of scientific problems)	8	1,5
Goals (to obtain the data necessary to answer the problem, to put forward an idea /model/theory)	13	2,5
observations and experiments (studies of various problems involve the organization of scientific research) *practical work and laboratory experiments*	13	2,5
Data (quantitative measurements, qualitative observations) *tasks*	90	17
Measurements (inherent uncertainty, reproducibility, variations, accuracy when working with equipment, accuracy in measurement procedures)	6	1,1
research results (empirical, preliminary, easily verifiable, falsifiable, self-correcting)	4	0,75
Natural science explanations		
types (hypothesis, regularity/law, theory, model)	11	2
formation of explanations (existing knowledge and new data, creativity and imagination, logic) abstract.	49	9,2
rules (logical validity, based on historical and modern knowledge)	37	7
results (new knowledge, methods, technologies and research)	29	5,5
Total	**260**	**49**

In general, the analysis of textbooks in chemistry and biology showed that, due to the extreme inadequacy of tasks aimed at the formation of natural science literacy, and tasks aimed at the meaningful integration of school subjects, they do not fully contribute to the successful and effective preparation for Kazakhstan's participation in international comparative *PISA* research

If science literacy involves 4 dimensions (“context”, “knowledge”, “competencies” and “attitudes”), then mathematical literacy involves “fundamental mathematical ideas” and “mathematical competence”. The first principle assumes a group of interrelated general mathematical concepts related to reality. The second is a combination of mathematical knowledge, skills, experience and human abilities that ensure the successful solution of various problems and require the use of knowledge from the field of mathematics in everyday life [7].

In accordance with this, an analysis of textbooks in mathematics was carried out. Here, the range between the extremes ranges from 33% to 61% (Figure 5), in contrast to textbooks in the natural sciences (from 15% to 26%). Of course, this is largely due to the objective characteristics of the subject areas, which indicate a greater structured educational material in mathematical disciplines.

In addition, during meetings with subject teachers on the issues of examination of the above-mentioned textbooks, it became increasingly clear that there was not a complete understanding of the essence of the learning tasks used in international comparative studies. Therefore, the results of the analysis have certain

errors, but nevertheless, in order to objectify subjective opinions, the procedures for collegial discussion were strictly observed during the analysis.

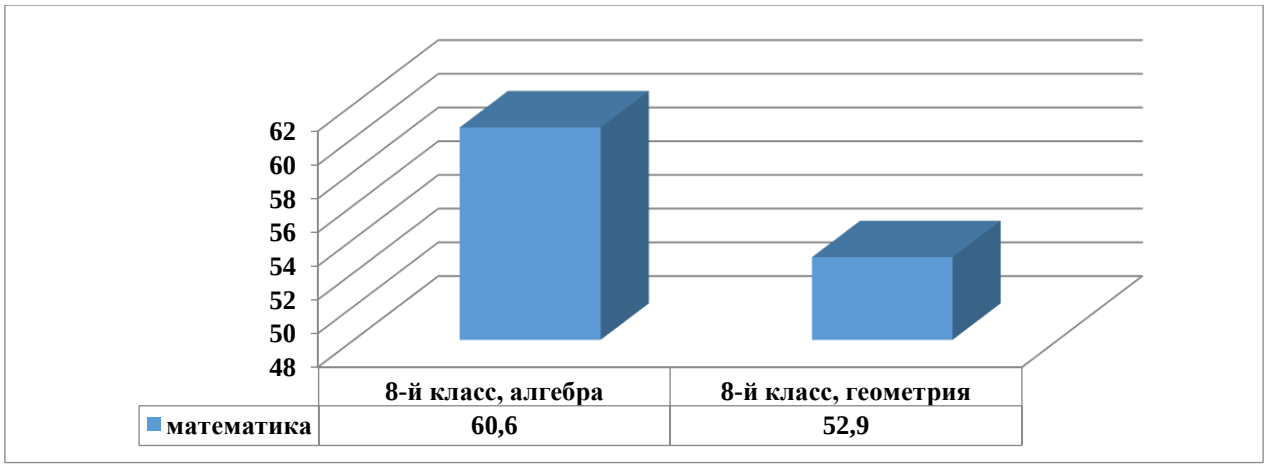


Figure 5 - The share of tasks by type *PISA* in mathematics textbooks (in %)

These technological maps were developed based on the understanding of mathematical literacy as a set of thinking, the use of conclusions, evidence and assumptions.

In PISA studies, it is measured in two such indicators "Fundamental mathematical ideas" and "Mathematical competence". Therefore, mathematics textbooks for grades 9-11 were analyzed from the standpoint of identifying the presence of *PISA*-type learning tasks in them, where “changes and relationships”, “space and form”, “uncertainty” and “quantity” were proposed as fundamental mathematical ideas, and mathematical competence - "reproduction", "establishment of connections", "reasoning".

The value of a full-fledged mathematical preparation of each student is beyond doubt. Today, with the increase in the technogenic component in the life and professional activity of each person and the goals of teaching mathematics change.

In the context of practice-oriented learning, the predominant importance is given to the functional (utilitarian) aspect. The utilitarian goals in teaching mathematics are to master the material of a pragmatic nature necessary for practical life (the necessary knowledge related to calculation, geometric representations, formulas, functions, graphs, diagrams, tables).

Another goal of teaching mathematics at school is to prepare for the subsequent study of scientific and technical disciplines in which the role of mathematics is constantly increasing, i.e. the school students must be "armed" with the information necessary to confidently continue learning at subsequent stages.

However, the extremely insufficient share of *PISA*-type learning tasks in all textbooks analyzed by us largely determines the results of these monitoring studies on reading literacy: the level of reading literacy of Kazakhstani schoolchildren significantly lags behind the average score and is in the bottom third of the list of countries participating in *PISA*-2012 [8].

Conclusion

In conclusion, we would like to note that after analyzing various sources on this topic, we came to the conclusion that functional literacy is defined as the ability of an individual, based on knowledge, skills and abilities, to function normally in the system of social relations, to adapt as quickly as possible in a certain cultural environment [9]. The papers we have studied also show that an important (if not leading) role in the growing interest in the term functional literacy has been played and continues to be played by ongoing international studies of PISA - *Programmer for International Student Assessment* [10].

In general, we believe that the above capabilities can be expanded when setting and solving the following tasks:

1) Strengthen the content of natural science educational programs in primary and secondary schools.

2) Start work on the development of training tasks, taking into account real life situations, increase the number of tasks simulating specific practical situations.

3) Implement measures to increase the prestige of pedagogical education by improving the qualifications of teachers, appropriate training of students in pedagogical universities, increasing the average salary.

4) It is necessary to provide a wide variety of educational programs for providing school students with a wide choice of educational trajectories.

5) Strengthening the material base of schools, equipping classrooms, laboratories.

6) Ensuring sufficient freedom of action to implement their own approaches within the national system, mandatory use of IT technology in the educational process.

7) Making changes to the content of textbooks by adding a variety of practical tasks, test tasks of various formats, tasks for applying knowledge in non-standard situations.

8) Conducting training seminars for regional coordinators and persons conducting testing.

9) Widely informing the public, parents and school students about the importance and specifics of conducting international comparative studies.

10) Development and publication of guidelines on the use of recommendations of international comparative studies, collections of assignments.

11) The need to use the task to check the functional literacy of schoolchildren in the framework of the final certification of students of the 9th and 11th grades

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PISA ХАЛЫҚАРАЛЫҚ ЗЕРТТЕУ ТАЛАПТАРЫН ЕСКЕРУМЕН БІЛІМ БЕРУДІҢ МОНИТОРИНГІСІ: ҚҰРЫЛЫМЫ, ТЕХНОЛОГИЯЛЫҚ КАРТАЛАРЫ, НӘТИЖЕЛЕРІ

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Аңдатпа. Мақалада Қазақстанның PISA халықаралық салыстырмалы зерттеулеріне қатысуы жөніндегі жұмыстың нәтижелеріне, қазақстандық мектептерінде

жүргізілген мониторинг қорытындыларға талдау жасалады, сондай-ақ халықаралық салыстырмалы зерттеулердің талаптарын ескере отырып, Қазақстан Республикасының Білім беру ұйымдарында білім беру үдерісінің сапасын жақсарту бойынша ұсыныстар беріледі. Білім беру сапасы дәл осы мағынада PISA халықаралық салыстырмалы зерттеулері сияқты білім алушылардың танымдық дамуын бақылаудың халықаралық танылған құралдарын қарастырады. Біздің жұмысымыздың мақсаты оқушылардың оқу, математикалық және жаратылыстану сауаттылығының қалыптасу деңгейін бақылауға мүмкіндік беретін әртүрлі зерттеулердің деректерін талдау. Зерттеу негізгі орта білім беру мазмұнының ерекшеліктерін, оқу үдерісін ұйымдастыруды, сондай-ақ білім беру ұйымының, мұғалімдердің, оқушылардың және олардың отбасыларының сипаттамаларына байланысты факторларды зерттейді. Білім беру жетістіктерін бағалау үшін оқушыларды тестілеу, ал оқу нәтижелеріне әсер ететін факторлар туралы ақпарат алу үшін зерттеуге қатысқан оқушылардың, мұғалімдердің және мектеп әкімшілігінің сауалнамасы жүргізіледі. Біз PISA халықаралық зерттеулерінің нәтижелері білім сапасын арттырудың маңызды факторларының бірі болып табылатынын көреміз. Әр түрлі елдердің салыстырмалы зерттеулерін ескере отырып, білім беруді жаңарту стратегияларын әзірлеу өзекті және орынды болып көрінеді, өйткені интеграция жағдайында елдер өздерінің жетістіктерін бір-бірімен салыстырмай дами алмайды, әлеуметтік-экономикалық дамудың маңызды мәселелерінде дамудың жалпы тәсілдері қажет. Әрбір қатысушы ел орта білім беру мазмұнының жай-күйі және оның әлемдегі даму перспективалары туралы бай талдамалық материал алуға мүмкіндігі бар. Бұл жоба білім беру ұйымдарының басшылары мен қызметкерлеріне, білім беру бөлімдерінің меңгерушілері мен әдіскерлеріне ұсынылады.

Тірек сөздер: PISA, мониторинг, технологиялық карталар, зерттеулер, контекст, құзыреттер, жаратылыстану білімі, ғылым туралы білім категориялары

МОНИТОРИНГ КАЧЕСТВА ОБРАЗОВАТЕЛЬНОГО ПРОЦЕССА С УЧЕТОМ ТРЕБОВАНИЙ МЕЖДУНАРОДНЫХ ИССЛЕДОВАНИЙ *PISA*: СТРУКТУРА, ТЕХНОЛОГИЧЕСКИЕ КАРТЫ, РЕЗУЛЬТАТЫ

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Аннотация. В статье дается анализ результатам работы по участию Казахстана в международных сравнительных исследований *PISA,* итоги проведенного в казахстанских школах мониторинга, а также даны рекомендации по улучшению качества образовательного процесса в организациях образования Республики Казахстан с учетом требований международных сравнительных исследований. Качество образования, именно в таком понимании, рассматривают такие всемирно признанные средства мониторинга познавательного развития обучающихся, как международные сравнительные исследования *PISA.* Цель нашей работы проанализировать данные исследований, что позволяют отслеживать уровень сформированности читательской, математической и естественнонаучной грамотности учащихся. В исследовании изучаются особенности содержания основного среднего образования, организации учебного процесса, а также

факторы, связанные с характеристиками организации образования, учителей, учащихся и их семей. В рассмотренных работах приводятся оценки образовательных достижений, проверенных с помощью тестирования учащихся, а для получения информации о факторах, влияющих на результаты обучения – анкетирование учащихся, учителей и администрации школ, участвовавших в исследовании. Мы видим, что результаты международных исследований *PISA*, представляют собой важный фактор повышения качества образования. Выработка стратегий обновления образования с учетом международных сравнительных исследований представляется весьма актуальной и целесообразной, поскольку в условиях глобализации страны всего мира не могут развиваться, не вырабатывая общие подходы в наиболее важных вопросах социально-экономического развития, не соотнося свои достижения друг с другом. Каждая страна-участница получает богатый аналитический материал о состоянии содержания среднего образования, перспективах его развития в мире, с которым необходимо работать. Данный проект рекомендован руководителям и работникам организаций образования, начальникам и методистам управлений образования.

Ключевые слова: PISA, мониторинг, технологические карты, исследований, контекст, компетенции, естественно научные знания, категории знаний о науке

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