

**A. Rakhimbekova\***, PhD, assoc. professor<sup>1</sup>

**Ye. Amirbekuly**, d.e.s., professor<sup>2</sup>

**G. Ukubassova**, PhD, professor<sup>1</sup>

**B. Omarov**, PhD student<sup>3</sup>

*Esil University, Astana, Kazakhstan<sup>1</sup>*

*Arkalyk State Pedagogical Institute*

*named after I. Altynsarin, Arkalyk, Kazakhstan<sup>2</sup>*

*Astana International University, Astana, Kazakhstan<sup>3</sup>*

\* – main author (author for correspondence)

e-mail: rahim\_asel@mail.ru

## MANAGEMENT OF PEDAGOGICAL MEASUREMENT OF EDUCATION QUALITY

*The quality of education is not only a fundamental driver of societal progress but also a key determinant of economic growth and development. In recent years, pedagogical measuring has emerged as a powerful tool to evaluate and enhance education quality. The article highlights the problem of testing the assessment of functional literacy of students as one of the most relevant aspects of quality control management of teaching and evaluation tools in pedagogical diagnostics. It highlights key indicators for assessing education quality, such as student engagement, learning outcomes, teacher effectiveness, curriculum alignment, and learning environment. The article discusses effective approaches for enhancing education quality, including continuous professional development, student-centered approaches, data-informed decision-making, and technology integration. A comparative analysis of students by the percentage of completion of tasks in the context of 6 levels, the average percentage of completion of tasks, skills requiring development, and examples of tasks with recommendations for their implementation. According to the results of the testing, the results of schools are compared. The author emphasizes the importance of data analysis, research, and evaluation in informing evidence-based practices. This article serves as a valuable resource for educators, policymakers, and researchers seeking to enhance education quality through a comprehensive pedagogical measuring framework.*

**Keywords:** pedagogical measurements, quality of education, assessment methods, quality measurement, functional literacy, external assessment, concept of education, PISA, summative assessment, mathematical literacy, reading literacy, natural science literacy.

**Кілт сөздер:** педагогикалық өлшемдер, білім сапасы, бағалау әдістері, сапаны өлшеу, функционалдық сауаттылық, сыртқы бағалау, білім беру тұжырымдамасы, PISA, жиынтық бағалау, математикалық сауаттылық, оқу сауаттылығы, жаратылыстану сауаттылығы.

**Ключевые слова:** педагогические измерения, качество образования, методы оценивания, измерение качества, функциональная грамотность, внешнее оценивание, концепция образования, PISA, суммативное оценивание, математическая грамотность, читательская грамотность, естественно-научная грамотность.

**JEL classification:** D7

**Introduction.** At present, a crucial objective in education is the creation of unbiased, truth-based, and practical assessment tools to measure educational quality. These tools need to adapt to evolving educational concepts, methods, and individual learners' needs. The 21st century's socio-economic changes have underscored the importance of pedagogical measurements for enhancing educational standards, aligning modern educational systems with national economic requirements and societal evolution. Key changes in education include integrating into the global educational arena, updating educational content, refining state educational standards, guaranteeing equal access to quality education, developing innovative teaching methods centered on the individual, and embracing new information technologies and other educational innovations. Therefore, pedagogical measurements are vital innovations in the education system. Proper application of these measurements should concentrate on developing a specific theory and applying existing practical methods. A fundamental aspect of pedagogical measurement involves justifying the methods and results according to set analysis rules. It's essential to consider the various stages of pedagogical measurements utilized in educational systems. The concept of pedagogical measurements, or educational measurement, emerged in the early 20th century. This period marked the recognition of the inadequacy in assessing educational outcomes, leading to the introduction of pedagogical measurements in education.

Initially, pedagogical measurement, in the form of tests, was reflected in the early educational systems in Europe, influenced by the works of Komensky, Ushinsky, Herbart, Pestalotszi, and others [1].

Education significantly influences individuals and societies, making it vital to assess its quality to ensure effective learning outcomes. Using diverse assessment tools, evaluating student performance, and considering overarching educational objectives, pedagogical measurement offers critical insights for improving educational methods. This article aims to discuss the importance of pedagogical measurement and the various approaches used in evaluating the quality of education.

Investment in the educational system can enhance the quality of education, widen educational access, and make it more inclusive. This could involve funding teacher training, upgrading educational infrastructure, innovating educational technologies and methodologies, and designing modern training programs.

One primary method of pedagogical measurement to assess educational quality is the internationally standardized PISA exam. It serves as a uniform platform for evaluating student performance and comparing educational outcomes across regions and nations. Such measurements are instrumental in identifying learning gaps and forming the basis for decision-making in education. Besides PISA, different countries employ various tools to assess educational quality [2].

To dynamically track and develop students' functional literacy, a methodology for testing 14-year-olds is based on the PISA framework. This assessment focuses on three key areas: reading, mathematics, and natural science literacy. The test for assessing functional literacy helps in enhancing the quality of teaching and learning, selecting the most effective teaching methods, and providing focused pedagogical support for students.

**Literature review.** Pedagogical measurement involves systematic evaluation and measurement of educational processes and results. It aims to determine the effectiveness of teaching methods, curriculum design, and student learning experiences. The goal of pedagogical measurement extends beyond merely assessing knowledge levels; it includes evaluating the development of critical thinking, problem-solving skills, and other relevant competencies. This method goes beyond conventional tests and exams by focusing on the comprehensive growth of learners.

Pedagogical measurement, known as 'Educational measurement' in English, emerged as a scientific field in the early 20th century. This period marked a realization of the inadequacies in teacher evaluation methods. Testing in Europe by educators like Comenius, Ushinsky, Herbart, and Pestalozzi followed the establishment of the initial pedagogical systems. Although these early systems didn't include tests, testing became prevalent in the 1930s. In the USSR, a pedagogical system developed during this time, focusing on education aligned with popular ideology and reverence for prominent figures. [3].

Contribution of many scientists, the development of pedagogical standards has achieved some success. Educational Measurement - foreign scientists who contributed to the development of pedagogical measurement and many other scientists [3-10]. In Western countries, especially in the USA, a wide range of theoretical and consistent material has been accumulated. Every year, monographs, special scientific journals, educational materials are published in the field of pedagogical standards. The desire to develop the theory and methodology of pedagogical measurements and the desire to compile tests on this basis was made several times in the USSR and Russia. The first attempts to develop a test were made in the early 20s; they are related to the authors of testological works: P.P. Blonsky, A.A. Boltunov, M.S. Bernshtein, N.A. Buchholts, S.G. Gellershtein, E.V. Guryanov, A.B. Zalkind, M.I. Zaretskyi, S.M. Rives, A.M. Mandryka, A.A. Smirnov, M.V. Sokolov, A.A. Tolchinsky, N.K. Udovichenko, B.A. Shevyrev, A.M. Shubert, T.A. Ern and many other scientists [10-11]. These authors gave the first inaccurate definitions of the test, studied the forms of the tasks, the quality criteria of the tests, made the tests practical.

There are reasonable concerns about how appropriate it is to use tests to measure the quality of education, that is, to what extent absolute learning outcomes reflect educational processes and factors affecting overall academic achievement. In addition to the PISA data, which are valuable for their comparative nature in the context of countries, each country uses its assessments of the quality of education.

The formation of a successful educational system in Kazakhstan should be based on a political decision to use education as the main tool for economic development.

**The main part.** Methodology. In this study, a qualitative approach was utilized for primary data collection, supplemented by quantitative analysis based on tests assessing the functional literacy of 14-year-olds.

The study's data underwent both correlation and regression analyses to identify school and environmental factors influencing student educational performance.

Key Approaches to Pedagogical Measuring

There are many different valuation methods, each with its own characteristics and advantages. Some evaluation methods are based on subjective assessments and opinions, while others are based on objective data and statistics. It is important to consider the context and purpose of the assessment to select the most appropriate method.

Several main types of assessment is using in learning processes:

- Formative Assessment
- Summative Assessment [11].
- Peer and Self-Assessment
- Qualitative Measures [12].
- Stakeholder Feedback [13].

In 2023, a test was conducted to assess the functional literacy levels in mathematics, reading, and natural sciences among 14-year-old students (born in 2008). The test aimed to evaluate their proficiency in these disciplines.

The results indicated a generally low completion rate across all literacy categories. The average completion rates were 26.6% in mathematical literacy, 37.8% in reading literacy, and 39.1% in natural science literacy. It was also observed that students instructed in Russian exhibited higher performance levels. (table 1).

Table 1

**Average percentage of completion, %\***

	<b>Mathematical literacy</b>	<b>Reading literacy</b>	<b>Natural science literacy</b>
with the Kazakh language training,%	26	36,5	38,2
with the Russian language training,%	30,9	46,1	45,2
Average percentage of completion, %	26,6	37,8	39,1

\* Compiled by the authors

As in PISA, the test is divided into six levels of functional literacy: the lowest is 1, the highest is 6 (table 2).

Table 2

**Percentage of completion of tasks in the context of six levels of functional literacy\***

<b>Level</b>	<b>Average, %</b>		
	<b>Mathematical literacy</b>	<b>Reading literacy</b>	<b>Natural science literacy</b>
6	3,6	20,3	12,6
5	11,9	29,7	32,1
4	11,6	24,2	38,6
3	25,8	41,7	47,5
2	53,8	48,7	51,3
1	56,2	69,1	53,7

\* Compiled by the authors

#### Mathematical literacy

Mathematical literacy refers to an individual's capacity to engage in mathematical reasoning, to formulate, employ, and interpret mathematics in solving problems across diverse real-world situations.

Upon examining the outcomes within the school context, it is important to highlight a substantial disparity in the performance between schools recording the highest and those with the lowest percentages of task completion. More than 56.2% of 14-year-olds showed a basic level of mathematical knowledge. 11.9% and 3.6% of students, respectively, coped with the tasks of the 5th and 6th level of complexity of mathematical literacy.

In addition, the test checks the level of competence of students in the context of four types of cognitive processes (table 3):

- mathematical justification;
- formulation of situations in the language of mathematics;
- application of mathematical concepts, facts, procedures and justifications;
- interpretation, application and evaluation of mathematical results.

Table 3

**Percentage of task completion by 4 types of cognitive processes\***

Types of cognitive processes	Average, %
Interpretation	19,5
Application	34,3
Formulation	25
Justification	27,7

\* Compiled by the authors

The data show that the largest number of students (34.3%) of students coped with tasks involving the use of mathematical knowledge, concepts and tools to solve problems. Whereas the least number of students coped with the tasks involving reflection on the choice, rationality, expediency of a mathematical solution and reasoning in relation to a specific task.

In order to compare the results, the results of testing, current assessment (results of the 2nd quarter) and monitoring of students' academic achievements were compared. Thus, the results indicate a gap in the results of the current assessment and testing. In particular, students demonstrate high results in the current assessment, where the average percentage of completion of tasks is 64.8%, while the test results are significantly lower – 26.6%. The gap between the indicators is 38.2%.

**Reading literacy**

Reading literacy is a person's ability to understand and use written texts, reflect on them and engage in reading in order to achieve their goals, expand knowledge and opportunities, and participate in the life of society.

The results of the conducted testing demonstrate a different level of reading literacy among schools, so the gap between the highest and lowest indicator was 33%.

69.1% of students showed the first level of reading competence. 29.7% and 20.3% of students, respectively, coped with the tasks of the 5th and 6th level of difficulty of reading literacy.

The test tasks cover 5 types of reading (table 4):

- learning reading;
- introductory reading;
- viewing reading;
- search reading;
- analytical reading.

Table 4

**Percentage of completion of tasks in the context of 5 types of reading literacy\***

Types of reading literacy	Average, %
learning reading	34,1
introductory reading	36,4
viewing reading	65,1
search reading	42,9
analytical reading	27,2

\* Compiled by the authors

14-year-old students (65.1%) successfully complete tasks to determine the skills of fluent reading with general text viewing, noting interesting / uninteresting, valuable / unnecessary.

An analysis of the current assessment and testing revealed a significant gap in the results. Students demonstrate high results in the current assessment, where the average percentage of completion of tasks is 67.9%, and at the same time relatively low results in testing – 37.8%. The gap between the indicators is 30.2%.

**Natural science literacy**

Natural science literacy is a person's ability to take an active civic position on issues related to the natural sciences, and his willingness to be interested in natural science ideas.

The results of the conducted testing demonstrate a different level of reading literacy among schools, so the gap between the highest and lowest indicator was 30%.

The natural science literacy test includes 6 levels, which are distributed according to tasks from the easiest (level 1) to the most difficult (levels 5 and 6), requiring high student competencies.

According to the table, 53.7% of students coped with the tasks of the 1st level of natural science literacy. 32.1% and 12.6% of students, respectively, coped with the tasks of the 5th and 6th level of complexity.

The test checks the level of competence of students in the context of three types of cognitive processes (table 5):

- scientific explanation of the phenomenon;
- formulation of scientific questions;
- scientific interpretation of data and evidence.

Table 5

**Percentage of completion of tasks in the context of 3 competencies of natural science literacy\***

Types of cognitive processes	Average, %
scientific explanation of the phenomenon	38,9
formulation of scientific questions	27,7
scientific interpretation of data and evidence	42,9

\* Compiled by the authors

According to the results, school students (42.9%) successfully complete tasks that determine the ability to analyze scientific data, statements and arguments in various representations.

The analysis of current assessments and test results reveals a notable difference in performance. Specifically, students show higher achievements in regular assessments, with an average task completion rate of 65.7%, compared to only 39.1% successfully handling test tasks, marking a 26.6% disparity between the two indicators.

Based on these findings, it's evident that in shaping functional literacy within an educational institution, each key stakeholder – subject teachers, school administration, and educational management – makes decisions aligned with their respective objectives.

An external, independent evaluation of educational quality can provide the most objective data on the state and evolving trends of the education system at various levels. Such an assessment significantly influences the development of educational institutions. It also enhances the competitiveness of educational programs in the market and bolsters the reputation among consumers of educational services [14].

**Conclusion.** The practice of pedagogical measurement in assessing education quality is an essential tool for educators, policymakers, and stakeholders in improving teaching and learning effectiveness. A balanced approach, incorporating formative and summative assessments, peer and self-assessment, qualitative measures, and stakeholder feedback, leads to a comprehensive understanding of educational quality. This holistic strategy extends beyond mere test scores, encompassing the development of crucial skills and competencies. Continuous evaluation and refinement of educational practices are key to fostering a high-quality education system, equipping learners for success in a constantly changing world.

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**Рахымбекова Ә.Е., Әмірбекұлы Е., Үкібасова Ғ.С., Омаров Б.Ш.**

### **БІЛІМ САПАСЫНЫҢ ПЕДАГОГИКАЛЫҚ ӨЛШЕМДЕРІН БАСҚАРУ**

#### **Андатпа**

Білім беру сапасы қоғамдық прогрестің іргелі қозғаушы күші ғана емес, сонымен қатар экономикалық өсу мен дамуды айқындайтын негізгі фактор болып табылады. Соңғы жылдары педагогикалық өлшеулер білім сапасын бағалау мен арттырудың қуатты құралына айналды. Мақалада оқу құралдарының сапасын басқарудың және педагогикалық диагностикадағы бағалаудың ең өзекті аспектілерінің бірі ретінде оқушылардың функционалдық сауаттылығын бағалауды тестілеу проблемасы қамтылған. Онда оқушылардың қатысуы, оқу нәтижелері, мұғалімдердің тиімділігі, оқу бағдарламаларының келісімділігі және оқыту ортасы сияқты білім беру сапасын бағалау үшін негізгі көрсеткіштер көрсетілген. Мақалада үздіксіз кәсіби дамуды, тұлғаға бағдарланған тәсілдерді, деректер негізінде шешімдер қабылдауды және технологияларды интеграциялауды қоса алғанда, білім беру сапасын арттырудың тиімді тәсілдері талқыланады. Оқушыларға салыстырмалы талдау жүргізілді

**Рахымбекова А.Е., Әмірбекұлы Е., Укубасова Ғ.С., Омаров Б.Ш.**

### **УПРАВЛЕНИЕ ПЕДАГОГИЧЕСКИМИ ИЗМЕРЕНИЯМИ КАЧЕСТВА ОБРАЗОВАНИЯ**

#### **Аннотация**

Качество образования является не только фундаментальной движущей силой общественного прогресса, но и ключевым фактором, определяющим экономический рост и развитие. В последние годы педагогические измерения стали мощным инструментом оценки и повышения качества образования. В статье освещена проблема тестирования оценки функциональной грамотности учащихся как одного из наиболее актуальных аспектов управления качеством средств обучения и оценки в педагогической диагностике. В нем выделены ключевые показатели для оценки качества образования, такие как вовлеченность учащихся, результаты обучения, эффективность учителей, согласованность учебных программ и среда обучения. В статье обсуждаются эффективные подходы к повышению качества образования, включая непрерывное профессиональное развитие, личностно-ориентированные подходы, принятие решений на основе данных и интеграцию технологий. Проведен сравнительный анализ учащихся по проценту выполнения заданий в разрезе 6 уровней, средний процент выполнения заданий, навыки, требующие развития, а также примеры заданий с рекомендациями по их выполнению. По результатам тестирования сравниваются результаты школ. Автор подчеркивает важность анализа данных, исследований и оценок для обоснования научно обоснованной практики. Эта статья служит ценным ресурсом для педагогов, политиков и исследователей, стремящихся повысить качество образования с помощью комплексной педагогической системы измерения.

