



ISSN: 2617-6548

URL: www.ijirss.com



Features of modern assessment of the quality of primary education in Kazakhstan

 Nizatil Temirkulova¹,  Botagoz Baimenova^{2*},  Natalya Benesh³,  Saule Zhubakova⁴, Yelena Li⁵

^{1,2,4}L. N. Gumilyov Eurasian National University, Kazakhstan.

³Sarsen Amanzholov East Kazakhstan University, Kazakhstan.

⁵Akhmet Baitursynuly Kostanay Regional University, Kazakhstan.

Corresponding author: Botagoz Baimenova (Email: Botagoz.baymenova@mail.ru)

Abstract

The aim of the article is to analyze the specifics of modern approaches to assessing the quality of primary education in Kazakhstan, to identify key features, challenges, and prospects for their application in the context of updating the content of education and implementing national and international standards. The article presents a substantive analysis of regulatory documents governing the assessment of education quality in primary schools and the development of functional literacy among younger schoolchildren, as well as the results of monitoring the academic achievements of fourth-grade students in schools in the city of Astana. The following research methods were used: theoretical analysis of sources, comparative analysis, generalization, testing, experimentation, and methods of mathematical and statistical data processing. The author examines issues of improving the quality of primary education, the procedure, and the levels of the National System for Assessing the Quality of Education. Based on a comparative analysis of international studies on the development level of functional literacy among primary school students, the author proposes methodological recommendations for improving the curricular content of primary education. A significant difference in the levels of functional literacy development between students in Kazakhstan and Russia was also established.

Keywords: Assessment of education quality, Curricular content, Functional literacy, Primary education, Quality of education.

DOI: 10.53894/ijirss.v8i5.8814

Funding: This study received no specific financial support.

History: Received: 27 May 2025 / Revised: 1 July 2025 / Accepted: 3 July 2025 / Published: 24 July 2025

Copyright: © 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Publisher: Innovative Research Publishing

1. Introduction

Modern socio-economic conditions, the rapid development of information technologies, and the growing demands for the professional training of specialists necessitate the continuous improvement of the education system. Under these circumstances, the assessment of education quality acquires particular importance as a basis for making managerial decisions, determining the effectiveness of educational programs, increasing the competitiveness of graduates, and ensuring their successful socialization.

The relevance of this issue is also driven by the implementation of national and international quality standards, the development of independent knowledge assessment, and the strengthening of public oversight of educational organizations' activities. Today, education quality is viewed not only as compliance with established norms and standards but also as the extent to which the needs of various stakeholders, students, parents, employers, the state, and society as a whole are met.

Moreover, in the context of digitalization of education and the transition to blended and distance learning formats, there is an increasing need to develop new tools for monitoring and assessing the quality of educational outcomes. All these factors call for a scientific understanding of the approaches, criteria, and methods for evaluating education quality, emphasizing the significance and timeliness of this area of research.

An important trend in the development of the education system is the transition from a knowledge-centered paradigm to a learner- and culture-oriented one, placing at its core a creatively developed, well-educated, and independent individual with a high level of functional literacy. Referring to the results of the PISA ranking, the situation with the level of functional literacy among Kazakhstani schoolchildren is 10% below the OECD countries' average. According to the international ranking of education system quality, Kazakhstan ranks 68th out of 138 countries in the Global Innovation Index [1]. The analysis of published data and the mediocre results of assessments of functional literacy among fourth-grade students in Kazakhstani schools highlight the need for decisive measures to improve its quality.

At present, the following regulatory legal documents aimed at improving the quality of education are in force in our country: the Law of the Republic of Kazakhstan "On Education," the State Compulsory Standard of Primary Education dated October 31, 2018, and the Strategic Development Plan of the Republic of Kazakhstan until 2025, among others.

All legislative documents emphasize the need to ensure a high level of education quality, aimed at developing a high level of functional literacy among students. In this regard, it becomes highly relevant to determine the current content of the requirements for the quality of primary education, as well as the level of functional literacy development among primary school students at the present time.

To achieve this goal, we conducted a substantive analysis of regulatory legal documents and existing studies in the field of education quality assessment. Thus, we referred to the Law of the Republic of Kazakhstan on Education [2] and State Obligatory Standard of Primary Education of the Republic of Kazakhstan [3] the Strategic Development Plan of the Republic of Kazakhstan until 2025 [1].

The aim of this article is to identify the features of modern assessment of primary education quality based on a substantive analysis of regulatory legal documents governing education quality assessment and to determine the level of functional literacy development among fourth-grade students. The significance of this study lies in drawing attention to the issue of education quality, in this case, in primary schools, conducting an assessment of fourth graders, and providing recommendations for developing students' functional literacy.

2. Literature Review

The issue of assessing the quality of education has been studied by scholars since the 19th century, when state education systems began to take shape. Since then, it has remained under close attention not only of researchers but also of governments and society as a whole. Assessment is aimed at the process of obtaining and interpreting information about students' educational achievements [4] informing parents [5] and providing feedback to school principals and teachers in order to more effectively implement criteria for ensuring education quality with the goal of improving students' academic performance [6] as well as monitoring the quality of education by government authorities, independent organizations, and public councils [7].

The assessment of education quality helps to identify shortcomings, explain the current learning situation, and take remedial measures. The purpose of assessing education quality lies not only in obtaining feedback from participants but also in contributing to the improvement of teaching [8], reducing problems with students [9, 10] and modernizing education management [11, 12].

Let us turn to the scholarly and pedagogical literature that reveals the concept of "education quality." For example, Selezneva [13] defines education quality as the degree to which education meets the needs and interests of the individual and the state, and characterizes it as a system of socially significant features and parameters [13].

Shmyreva et al. [14] consider education quality to be the unity of the consumer properties of an educational service that contribute to meeting certain needs aimed at the comprehensive development of the child's personality.[14].

Kodzhaspirova and Kodzhaspirov [15] define education quality as an important level of knowledge and skills, intellectual, moral, and physical development achieved by learners in the course of education, as well as the degree of their satisfaction with the quality of the educational services provided [15]. The authors also believe that education quality is determined by parameters such as compliance with state standards, the level of funding, material and technical resources, and modern management technologies [15].

The Dictionary of Terms in General and Social Pedagogy defines the quality of education as a category that determines the state and effectiveness of the educational process in society, its compliance with the needs and expectations in the development and formation of civil, everyday, and professional competencies of the individual [16].

In the definitions considered, the concept of “education quality” is closely related to meeting the educational needs of individuals, society, and the state as a whole. Let us consider the concept of “assessment of education quality.” The Law of the Republic of Kazakhstan “On Education” contains the concept of the “national system for assessing the quality of education,” which is understood as “a set of institutional structures, procedures, forms, and methods for establishing the compliance of education quality with state compulsory education standards, as well as the needs of the individual, society, and the state” [2].

This structure (the NSAQE) began functioning on September 30, 2000, following the signing of the corresponding decree by the President of the country. The NSAQE was tasked with improving the quality of education and ensuring its competitiveness in the international labor market.

The NSAQE comprises two levels of education quality assessment: institutional assessment of quality and monitoring of students’ educational achievements in primary and lower secondary education (MSEAP).

Institutional assessment includes three procedures: licensing, attestation, and accreditation of educational institutions.

The second level of the National System for Assessing the Quality of Education, which is the focus of our study, is the Monitoring of Students’ Educational Achievements (MSEAP).

MSEAP replaced the external assessment of academic achievements in secondary education in 2021 and is aimed at organizing and implementing, collecting information, and conducting a systematic analysis of testing results. Within the framework of monitoring, methodological support and the development of recommendations for improving education quality are provided.

MSEAP is conducted in accordance with the Law of the Republic of Kazakhstan “On Education” at the primary education level and is based on the “Rules for Conducting the Monitoring of Students’ Educational Achievements” [17]. MSEAP is an independent and systematic tool for observing the quality of education and determining compliance with the State Compulsory Standard for Primary Education.

In primary school, MSEAP is implemented among fourth-grade students and aims to determine the level of functional literacy, including reading literacy, mathematical literacy, and scientific literacy, using ICT technologies. Comprehensive testing is conducted annually in April at the school selected by the authorized education body to conduct the assessment.

All fourth-grade students participate in the testing, except for those studying at home or undergoing long-term treatment in sanatorium-type healthcare institutions, as well as children who are objectively unable to attend testing (due to health reasons, the death of close relatives, or participation in competitions and Olympiads).

MSEAP is conducted based on the content of educational programs and aims to determine the functional literacy of primary school students. The term “functional literacy” was first introduced by UNESCO in 1957 and refers to a level of literacy that enables an individual to engage fully in activities within their social environment.

Let us consider the concept of “functional literacy” in the regulatory legal documents of Kazakhstan. In the Law of the Republic of Kazakhstan “On Education,” this term is not defined.

There is a separate special document, the Government Decree “On the Approval of the National Action Plan for the Development of Functional Literacy of Schoolchildren for 2012–2016.” This document describes the content and conditions of education that contribute to the development of students’ functional literacy [18]. It also includes a list of important personal qualities and functional skills, namely: initiative, the ability to think creatively and find unconventional solutions, the ability to choose a professional path, and readiness to engage in lifelong learning.

The analysis of these documents indicates that the main goal of modern education is the development of students’ functional literacy.

According to Leontiev [19], functional literacy is a person’s ability to apply acquired knowledge to solve real-life tasks in various spheres of human activity, communication, and social relationships [19].

Gorbunova and Semykina [20] define functional literacy as a person’s ability to engage with the external environment, quickly adapt, and function within it [20].

Zhaitapova [21] describes functional literacy as a factor of a person’s mobile adaptation to new conditions and challenges, which enables the individual to actively participate in different spheres of public life. She notes that functional literacy is the atomic level of knowledge, skills, and abilities that ensure the normal functioning of an individual within the system of social relations and is considered the minimum necessary for carrying out life activities within a specific cultural environment [21].

The conducted analysis shows that today, both globally and in Kazakhstan in particular, great attention is paid to the issue of education quality. The most important outcome of education is a high level of functional literacy among school graduates, which, on the one hand, determines their competitiveness and success in the future, and on the other hand, contributes to the prosperity of the country, since they are future citizens and potential specialists in various sectors of society.

However, the results of international rankings of Kazakhstan’s school education are rather discouraging. In this regard, the problem of developing a high level of functional literacy among schoolchildren is becoming a priority in improving and advancing the education system in our country.

3. Materials and Methods

The materials for our study included regulatory legal documents, scientific articles, dissertations, and monographs by scholars dedicated to the problem under investigation.

Research methods: theoretical analysis of sources, comparative analysis, synthesis, testing, experimentation, and methods of mathematical and statistical data processing.

The research methodology was based on activity-based, systemic, integrated, and process-oriented approaches. The study was conducted in three stages.

At the initial stage, the essence and structural components of functional literacy among primary school students were identified.

At the second stage, an experiment was conducted to assess the level of functional literacy among fourth-grade students, using sample PIRLS and TIMSS test materials.

At the third stage, a comparative analysis was conducted between the content of Kazakhstan's primary education curriculum and the content of international sample tests. An analysis of the experimental results was performed, and methodological recommendations were proposed to improve students' functional literacy.

To analyze the scientific literature, we used databases such as Scopus, Web of Science, RSCI, Google Scholar, eLIBRARY, KazNEB, and others, covering publications since 2015. We searched using a number of keywords, including: functional literacy, reading literacy, mathematical literacy, scientific literacy, quality of primary education, and content of primary school education.

At the initial stage, regulatory legal documents and existing studies on the research problem were reviewed. Based on critical and comparative analysis, we defined the essence of the concepts of "quality of education," "assessment of education quality," the procedure and content of quality assessment in education, and "functional literacy." As a result of this stage, the structural components of functional literacy were identified.

At the second stage, an experiment was conducted to determine the level of functional literacy among fourth-grade students in Astana. A total of 218 students participated in the experiment. The experiment was based on sample PIRLS and TIMSS tests to assess reading literacy, mathematical literacy, and scientific literacy.

At the third stage, we conducted a comparative analysis of the content of primary education in Kazakhstan and the characteristics of the international test items from PIRLS and TIMSS, analyzed the experimental results on the level of functional literacy among fourth-grade students, and proposed methodological recommendations for teachers to improve the quality of primary education.

4. Results and Discussion

The analysis of scholarly and pedagogical literature allows us to identify the main characteristics of a functionally literate person, namely: independence, a desire for knowledge, the ability to live among others, possession of certain qualities, and key competencies such as the ability to learn, search, read, think, collaborate, take initiative, and adapt quickly.

The development of functional literacy is supported by the readiness to independently seek knowledge, apply skills, evaluate them, and engage in self-development. In this regard, it is possible to identify the main reason for the low level of functional literacy development among primary school students the reproductive nature of primary education and the inability to acquire new knowledge and creatively solve emerging problems.

The following indicators of functional literacy in younger schoolchildren can be distinguished:

- The ability to effectively build interaction with a constantly changing environment and contribute to its improvement;
- The ability to productively solve emerging problems in the course of various activities;
- The ability to communicate with society and build harmonious relationships with others;
- The capacity for reflection and further self-improvement of one's personality.

The main components of functional literacy are traditionally considered to be twofold: integrative and subject-based. The integrative component includes reading, informational, communicative, and social literacy. The subject-based component includes language, literary, mathematical, and scientific literacy.

Functional literacy begins to develop in primary school, when the foundations of reading, mathematical, and scientific literacy are established.

The foundation of functional literacy is reading literacy. Reading literacy implies understanding a text, being able to reflect on its content, articulate one's thoughts, interpret, evaluate, and transform information, use written texts, and read to achieve personal goals and broaden one's horizons. Whereas in the past, the main indicator of a younger student's success was reading speed, today this is no longer sufficient; such parameters as reading quality and comprehension have come to the forefront.

A successful student is also one who knows how to work with information: to find what is needed, distinguish the essential from the secondary, verify facts, analyze, draw conclusions, and, most importantly, relate what is read to their own experience. Reading literacy is considered a condition for the successful socialization of the individual and a means of self-education and self-development.

In scholarly and pedagogical literature, two goals of reading literacy are identified: gaining aesthetic pleasure and understanding of the world through reading fiction, and searching for necessary information.

Russian researchers analyzed the reading literacy of primary school students and identified the following shortcomings: the dominance of fiction texts in curricula, inability to distinguish scientific information from fiction in popular science texts, inability to follow step-by-step instructions in instructional texts, and difficulty in understanding problem statements in mathematical texts. Based on this, they concluded that younger Russian schoolchildren have not developed the skills to work with non-fiction texts and cannot transfer the skills they use when working with fiction texts to non-fiction.

If we compare this with the curricular content of Kazakhstan's education, our textbooks contain a large number of various types of texts, as well as assignments aimed at developing skills to work with them. However, at the same time, in terms of reading literacy, Kazakhstani students significantly lag behind Russian students. This likely indicates that our students are not sufficiently skilled even in working with fiction texts. Let us consider the results of an international study assessing the functional literacy of primary school students. For comparison, Russian students ranked first among the 50 participating countries.

The reading literacy results of younger schoolchildren in Kazakhstan, according to PIRLS, are considered average. According to the 2016 study, a high level of reading literacy was achieved by 35% of fourth-grade students, an average level by 42%, and only 7% of students completed advanced-level tasks.

For comparison, among the other PIRLS participants, 82% of younger students reached the average level, 47% achieved a high level, and 10% reached the advanced level.

In 2018, the reading literacy results showed that Kazakhstani fourth-grade students scored 536 points, ranking 27th out of 50 participating countries. The 2021 results indicate that the average score of Kazakhstani students was 504 points, placing them 38th among the participating countries. As we can see, there is a decline in reading literacy.

The next component of students' functional literacy is information literacy. UNESCO notes that the concept of "information," under current conditions, is all-encompassing and serves as the basis of human life, enabling activity and communication.

Many researchers believe that in the information society, information literacy is one of the most important skills for a modern individual. Therefore, schools must teach children to independently search for new knowledge, evaluate it, interpret it, and store information using various resources.

Information literacy involves developing skills to work with information in various formats, utilizing both traditional sources—books, magazines, newspapers and modern tools computers, the Internet, and slides.

There is even an international symbol-emblem of information literacy (see Figure 1):



Figure 1.
International Emblem of Information Literacy.

Information-literate individuals are characterized by the following skills: developed critical thinking, the ability to analyze and create information, readiness to stay informed, and the capacity for self-education.

Information literacy involves the following sequence of questions:

- What information do I need?
- Where can I find the information?
- What sources will I need to solve the problem?
- Who can help me?
- Is this information reliable?
- How can I save the information?
- How can I respect the copyright of the information creators?
- How should I present the information?

The task of primary schools in developing information literacy is to teach young students how to navigate the enormous flow of information.

Communicative literacy is one of the components of functional literacy and is defined as a combination of communicative knowledge, skills, and abilities that help a person communicate effectively, build productive relationships, and avoid conflicts and misunderstandings.

In the State Compulsory Standard of Primary Education, one of the educational goals is the development of skills such as using various means of communication, including language skills, as well as the ability to conduct dialogues in different areas of activity [3]. All the content of primary education, especially the subjects within the “Language and Literature” educational area, is aimed at achieving these goals and objectives.

The basis of communicative literacy is competent speech, which guarantees that the interlocutor correctly understands what is said, thereby increasing the impact and effectiveness of communication.

The final component of the integrative part of functional literacy is social literacy, which is the ability to interact effectively with others, to navigate and adapt quickly to social situations, and to possess knowledge of cultural norms, customs, traditions, national characteristics of people, and etiquette.

The development of social literacy is becoming especially relevant for our multinational country and is among the goals defined in the State Compulsory Standard of Primary Education, such as the ability to work both in a group and individually, and the formation of a multilingual personality who values their own culture and understands and respects the cultures of other people’s [3].

Let us consider the subject-based component of functional literacy. In a general sense, language literacy is the ability to solve communication tasks through language and to master speech culture.

Language literacy in younger schoolchildren manifests itself in the following skills and abilities: an orientation toward developing a sense of language (that is, understanding and using lexical and stylistic constructions before fully mastering the language), selecting linguistic means for constructing both oral and written speech, and awareness of the conceptual characteristics of language systems.

Language literacy among younger schoolchildren is developed through trilingual education during lessons in Kazakh, Russian, and English.

Language literacy is closely linked to literary literacy. Literacy in primary school students is characterized by a high motivation for independent reading, an understanding of the role of reading in successful learning and in life, comprehension of the meaning of texts, the ability to distinguish between various literary genres, as well as engagement in creative activities related to reading.

International studies of students’ functional literacy are conducted in three areas: reading literacy, mathematical literacy, and scientific literacy. We described the reading literacy results above, which were average.

Using sample PIRLS test materials, we present the results of testing to determine the level of reading literacy among fourth-grade students. A total of 218 students from one school in Astana participated in the experiment. The maximum score was 12. According to criterion-based assessment, we used the following grading scale: “excellent” 11–12 points, “good” 8–10 points, “satisfactory” 6–7 points, and “unsatisfactory” 0–5 points. The results are shown in the table below.

Table 1.
Reading Literacy Results of Fourth-Grade Students.

Classes (Number of students) / Grades	Excellent (Number)	Good (Number)	Satisfactorily (Number)	Unsatisfactorily (Number)
4B (20)	0	3	7	9
4C (19)	0	7	7	5
4D (31)	0	6	14	11
4E (28)	0	2	17	10
4F (32)	0	2	11	19
4G (32)	0	4	10	18
4H (24)	0	1	10	13
4I (32)	0	11	7	14
Total	0	36 – 16.5%	83 – 38.1%	99 – 45.4%

As we can see from the table, not a single student received an “excellent” grade. Thirty-six students received a “good” grade, which accounted for 16.5%; eighty-three students received a “satisfactory” grade, 38.1%; and ninety-nine students received an “unsatisfactory” grade, 45.4%.

For clearer visualization, we present a chart (see Figure 2).

Reading Literacy Results of Fourth-Grade Students

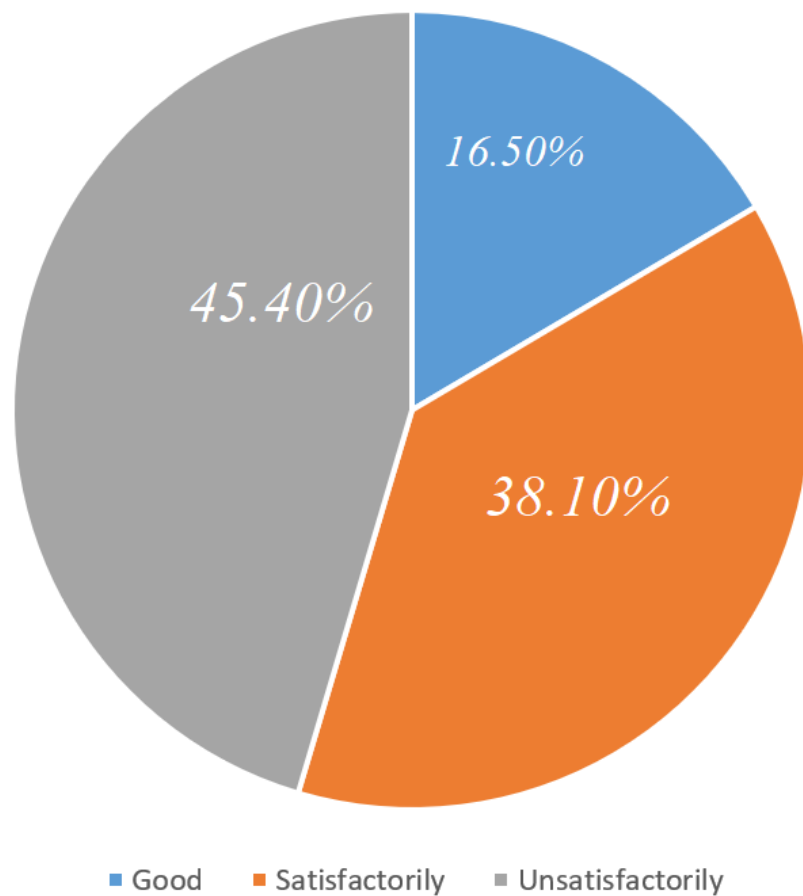


Figure 2.
Overall Reading Literacy Results of Fourth-Grade Students.

According to experts, in order for students to achieve a high level of reading literacy, they must understand the meaning of words [22] the purpose of the message [23] possess reading skills [24, 25] know text structure [26] have motivation [27] good memory [28] and cognitive abilities [29].

The next type of functional literacy is mathematical literacy. According to the results of TIMSS in 2011, fourth-grade students ranked 27th (537 points out of 1,000) in mathematical literacy. In 2019, the average mathematics score was 544 points, placing them 8th among 39 participants. In 2023, the average score of Kazakhstani fourth-graders was 487 points, ranking 41st out of 58 participants. As we can see, the indicators are also declining.

Mathematical literacy of an individual relates to understanding the role of mathematics in a person's life, the ability to use mathematics to meet their needs, and performing calculations.

Mathematical literacy of a younger schoolchild is the awareness of the importance of mathematical knowledge for learning and life, the ability to distinguish mathematical concepts, establish relationships and dependencies, make comparisons, and apply mathematics in various situations.

Mathematical literacy in primary school students is developed through mathematics lessons within the educational area "Mathematics and Informatics." Studying this educational area enables students to acquire basic mathematical knowledge for describing various objects and phenomena of the surrounding world; master oral and written computational algorithms; develop general problem-solving strategies and the ability to build logical reasoning based on measurement and calculation skills; form skills in using basic information and communication technology tools, the ability to search, select, and transmit information, design objects and processes, and apply simple methods of working with tables, diagrams, charts, and graphs for analyzing, interpreting, and presenting data [3].

Below are the results of mathematical literacy among fourth-grade students, obtained using sample test materials based on TIMSS, with the same students who participated in the reading literacy assessment.

Table 2.
Mathematical Literacy Results of Fourth-Grade Students.

Classes (Number of students) / Grades	Excellent (Number)	Good (number)	Satisfactorily (number)	Unsatisfactorily (number)
4B (20)	1	6	5	8
4C(19)	3	13	3	0
4D (31)	1	12	10	8
4E (28)	3	7	6	12
4F (32)	0	1	7	24
4G (32)	2	9	9	12
4H (24)	0	4	7	13
4I (32)	0	9	8	15
Total	10 -4.6%	61 – 27.9%	55 -25.2%	92 -42.3%

From the table, it can be seen that 10 students received an “excellent” grade, which accounts for 4.6%; 61 students received a “good” grade, 27.7%; 55 students received a “satisfactory” grade, 25.3%; and 92 students received an “unsatisfactory” grade, 42.4%.

For clearer visualization, we present a chart (see Figure 3).

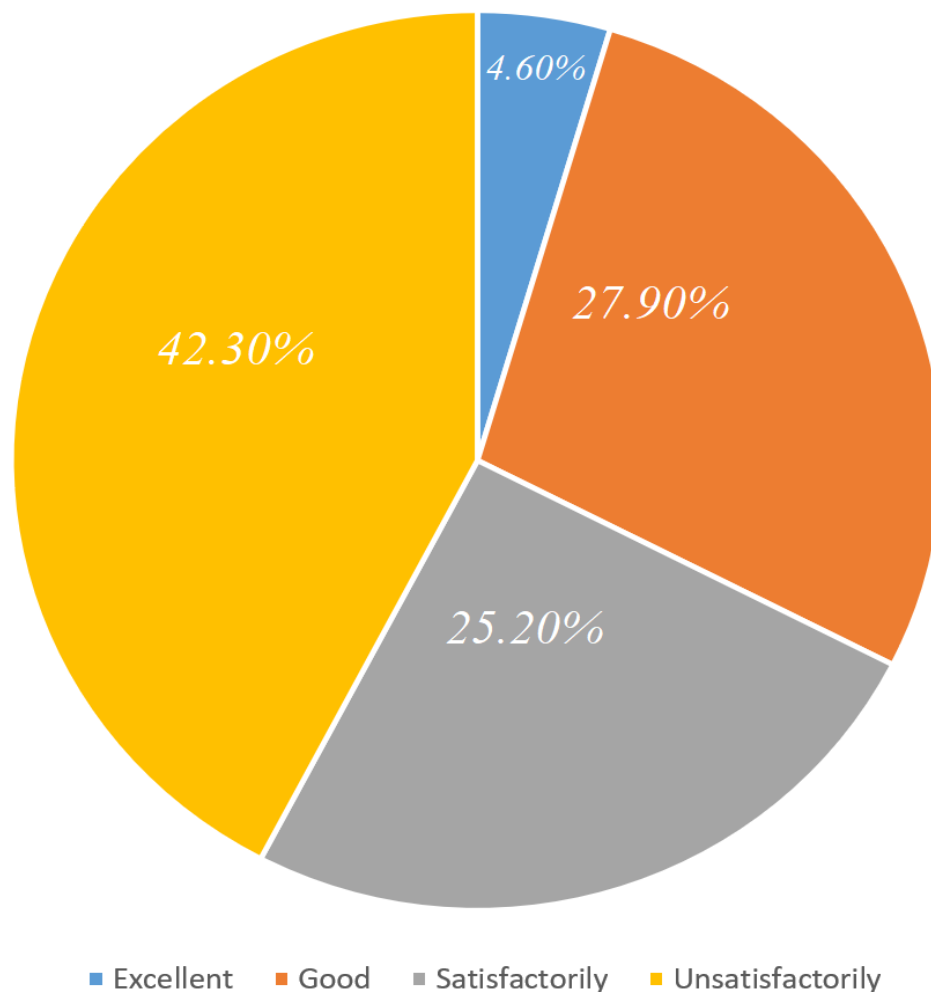


Figure 3.
Mathematical Literacy Results of Fourth-Grade Students.

In order to improve mathematical literacy, researchers Khaesarani and Ananda [30] suggest relying on blended learning technology, while Putriyani and Djafar [31] recommend using practice-oriented tasks Putriyani and Djafar [31]. Taqiya and Juandi [32] conducted a study employing the Realistic Mathematics Education (RME) approach, through which they achieved high results in students' mathematical literacy [32].

The final component of subject-related functional literacy is scientific literacy. According to the results of TIMSS in 2011, fourth-grade students ranked 32nd among 50 participants. In 2019, the average score in scientific literacy was 550 points, placing them 11th.

According to the PISA definition, scientific literacy determines a person's ability to take an active civic position on socially significant issues related to the natural sciences and their willingness to be interested in scientific ideas [33].

According to Vinogradova [34], scientific literacy among younger schoolchildren consists of the following key components [34]:

1. Readiness to acquire and use knowledge about nature;
2. Awareness of the value and importance of scientific knowledge about nature;
3. Mastery of methods for studying natural phenomena;
4. The ability to engage in reflective actions.

The first component pertains to the skills of applying scientific knowledge about nature in everyday life, describing and explaining natural phenomena from a scientific perspective.

The second component includes knowledge of the laws of nature and their impact on societal development, as well as the ability to independently acquire scientific knowledge from various sources.

The third component involves developing skills in conducting observations, experiments, research, and measurements of natural phenomena and processes, as well as establishing cause-and-effect and temporal relationships.

The last component of scientific literacy concerns the ability to evaluate facts, demonstrating humans' negative attitudes toward nature and fostering a desire to protect and care for it.

A person with scientific literacy can confidently participate in discussions about environmental issues, recognize the leading role of science in explaining nature's mysteries, use scientific terms, understand the specifics of scientific research, and employ facts and scientific evidence in arguments.

Therefore, to develop scientific literacy among younger schoolchildren, it is necessary to cultivate their ability to apply scientific knowledge to solve real-life problems, acquire new knowledge, explain natural phenomena and processes, formulate conclusions based on scientific facts and laws, and understand the role of science and technology in improving all areas of society, addressing economic, social, and environmental challenges, and enhancing the conditions for people's comprehensive physical and spiritual development.

In Kazakhstan, the development of scientific literacy among younger schoolchildren is implemented through the educational areas "Natural Science" and "Man and Society," within the subjects "Natural Science" and "Cognition of the World."

According to the State Compulsory Standard of Primary Education, the subject "Natural Science" provides an elementary level of scientific knowledge in the field of "Man and Nature." The purpose of the subject is to develop younger students' natural curiosity, research skills, and scientific understanding and perception of the surrounding world. The content of the "Natural Science" course helps reveal cause-and-effect relationships in the living and non-living world, promotes the development of ideas among students about the diversity and complexity of their environment, and broadens their scientific horizons.

The content of the "Cognition of the World" course is aimed at studying social phenomena and processes of the past and present, their interconnections, relationships between people in society, and fostering a humane attitude toward other people and the environment.

When comparing the content of the standard curricula for "Natural Science" [35] and "Cognition of the World" [36] with the materials of the international TIMSS study on the quality of mathematics and science education, the TIMSS tasks are more practice-oriented and closely related to students' personal experiences.

Below are the results of the study of scientific literacy among students.

Table 3.
Scientific Literacy Results of Fourth-Grade Students.

Classes (Number of students) / Grades	Excellent (number)	Good (number)	Satisfactorily (number)	Unsatisfactorily (number)
4B (20)	0	2	7	11
4C(19)	0	2	11	6
4D (31)	0	2	13	16
4E (28)	0	3	9	16
4F (32)	0	0	11	21
4G (32)	0	4	15	13
4H (24)	0	0	11	13
4I (32)	0	5	10	17
Total	0	18 – 8.3%	87 – 39.9%	113 – 52.8%

The monitoring results of students' scientific literacy appear significantly weaker compared to reading and mathematical literacy. 52.8% of students received an "unsatisfactory" grade, 39.9% a "satisfactory" grade, and only 7.3% a "good" grade, with no students achieving an "excellent" grade.

The results are shown in the figure below (see Figure 4).

Results of Scientific Literacy among 4th Grade Students Classes

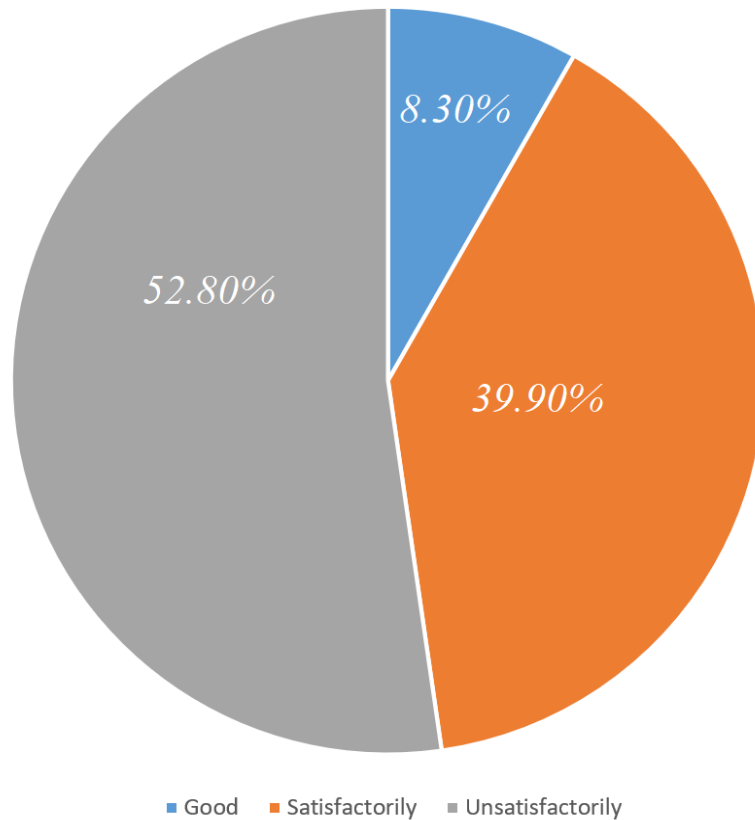


Figure 4.
Overall Results of Scientific Literacy Among 4th Grade Students.

To improve scientific literacy, experts recommend several approaches. For example, Khassenova et al. [37] suggest using the case study method, since in her view it positively influences the development of subject-specific and personal skills. Khassenova et al. [37]. Nuryanti et al. [38] discusses digital learning materials that enhance students' scientific literacy Nuryanti et al. [38]. Saraswati et al. [39] look for a path through the development of critical and creative thinking [39].

Let us now present the overall results for all three types of functional literacy (see Figure 5).

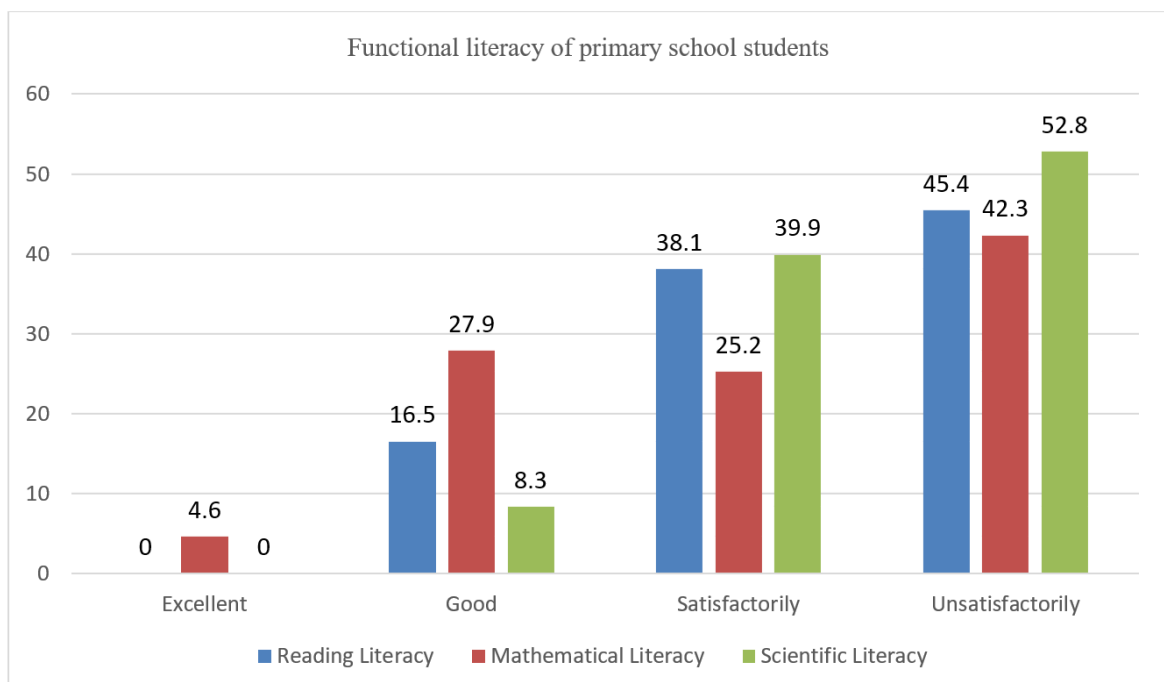


Figure 5.
Results of Functional Literacy Among 4th Grade Students.

As we can see, only 4.6% of students received an “excellent” grade in mathematical literacy, and no student received an “excellent” grade in reading literacy or scientific literacy. A “good” grade was awarded to 16.5% of students in reading literacy, 27.9% in mathematical literacy, and 8.3% in scientific literacy. A “satisfactory” grade was given to 38.1% of students in reading literacy, 25.2% in mathematical literacy, and 39.9% in scientific literacy. Nearly 50% of students received an “unsatisfactory” grade: 45.4% in reading literacy, 42.3% in mathematical literacy, and 52.8% in scientific literacy.

5. Conclusions

The distinctive features of the modern assessment of the quality of primary education in Kazakhstan are its structured approach and its focus on the development of students’ functional literacy as the main criterion of quality education. However, the relatively low achievement results among primary school students, as revealed by both international and national studies, clearly highlight the problem of developing functional literacy, particularly reading and scientific literacy.

It is necessary to include this concept in the main Law on Education, to define its content, and to introduce substantial changes into the content of the standards and curricula.

To achieve high results in developing students’ functional literacy, including that of primary school children, it is essential to use the formula for success:

Mastery = Assimilation + Application of Knowledge in Practice.

References

- [1] Strategic Development Plan of the Republic of Kazakhstan, "Republic of Kazakhstan," 2018. <https://policy.thinkbluedata.com/sites/default/files/Strategic%20Development%20Plan%20until%202025%20%28RU%29.pdf>
- [2] Law of the Republic of Kazakhstan on Education, "No. 319-III ZRK," 2007. https://online.zakon.kz/Document/?doc_id=30118747
- [3] State Obligatory Standard of Primary Education of the Republic of Kazakhstan, "Order No. 604 of the minister of education and science of the Republic of Kazakhstan," 2018. <https://adilet.zan.kz/rus/docs/V1800017669>
- [4] B. Petkovska, D. Koceva, T. Ulanska, and S. S. Kirova, "Primary school education: Standards for student's assessment in primary school," *Procedia - Social and Behavioral Sciences*, vol. 2, no. 2, pp. 2366-2370, 2010. <https://doi.org/10.1016/j.sbspro.2010.03.338>
- [5] M. Skutil, "Assessment in primary education from the parents' point of view," *Psychology and Education*, vol. 58, no. 2, pp. 2905–2913, 2021.
- [6] R. Makiya, C. Mnyanyi, and C. Ngirwa, "Examining school quality assurance criteria for enhancing learning achievements in public primary schools in Arusha Region, Tanzania," *Asian Research Journal of Arts & Social Sciences*, vol. 20, no. 2, pp. 1-13, 2023. <https://doi.org/10.9734/arjass/2023/v20i2442>
- [7] H. K. Kinesti, "The implementation of primary and secondary education quality assurance systems," in *Conference: Proceedings of the 3rd International Conference on Education Innovation (ICEI 2019)*, 2019.
- [8] L. Chen and M. Mohamed Mokhtar, "Education on quality assurance and assessment in teaching quality of high school instructors," *Journal of Big Data*, vol. 10, no. 1, p. 142, 2023. <https://doi.org/10.1186/s40537-023-00811-7>
- [9] J. Duan and R. Gao, "Research on college English teaching based on data mining technology," *EURASIP Journal on Wireless Communications and Networking*, vol. 2021, no. 1, p. 192, 2021. <https://doi.org/10.1186/s13638-021-02071-6>
- [10] J. Xu, "Research on multidimensional teaching mode of college English based on data mining," in *2020 International Conference on Big Data and Social Sciences (ICBDSS)*, 2020.
- [11] B. Afriadi *et al.*, "Systematic review of education quality assurance management in schools method matching," *International Education Trend Issues*, vol. 1, no. 2, pp. 58 - 67, 2023. <https://doi.org/10.56442/ieti.v1i2.146>
- [12] G. Kaplani and K. Zafiroopoulos, "A model of quality assurance in primary education management. The case of Greece," *Cogent Business & Management*, vol. 9, no. 1, p. 2016555, 2022. <https://doi.org/10.1080/23311975.2021.2016555>
- [13] N. A. Selezneva, "Dictionary of harmonized terms and definitions in the field of education of the CIS member states," 2012. <https://aot.tj/>
- [14] N. A. Shmyreva, M. I. Gubanov, and Z. V. Kretsan, *Pedagogical systems: Scientific foundations, management, development prospects*. Kemerovo, Russia: Kemerovo State University Publishing House, 2002.
- [15] G. M. Kodzhaspirova and A. Y. Kodzhaspirov, *Pedagogical dictionary*. Moscow: Academy, 2005.
- [16] A. S. Voronin, *Dictionary of terms on general and social pedagogy*. Ekaterinburg: GOU VPO UGTU-UIPI, 2006.
- [17] Rules for Monitoring, "Rules for monitoring the educational achievements of students," 2021. <https://adilet.zan.kz/rus/docs/V2100022711>. [Accessed May 5, 2021]
- [18] Government Decision, "On approval of the national action plan for the development of functional literacy of schoolchildren for 2012-2016," 2012. <https://adilet.zan.kz/rus/docs/P1200000832>
- [19] A. A. Leontiev, *Pedagogy of common sense*. Moscow: Meaning, 2016.
- [20] J. A. Gorbunova and I. V. Semykina, *Functional literacy - a key reference point for improving the quality of education in the Republic of Kazakhstan*. Kazakhstan: Bulletin of Manash Kozybaev North Kazakhstan University, 2016.
- [21] A. A. Zhaitapova, "Functional literacy in the educational space of globalization," in *Proceedings of the International Scientific and Practical Conference: Functional Literacy and Education: Innovative Directions and Methods of Pedagogical Practice*, 2017.
- [22] B. Güldenöglü, T. Kargin, and P. Miller, "Examining sentence comprehension skills of students with and without reading difficulties," *Türk Psikoloji Dergisi*, vol. 30, no. 76, p. 82, 2013.
- [23] T. Firat, "Effects of the TWA strategy instruction on reading comprehension of students with learning disabilities," *Educational Research Quarterly*, vol. 43, no. 2, pp. 24-54, 2019.
- [24] C. Hulme, H. M. Nash, D. Gooch, A. Lervåg, and M. J. Snowling, "The foundations of literacy development in children at familial risk of Dyslexia," *Psychological Science*, vol. 26, no. 12, pp. 1877-1886, 2015. <https://doi.org/10.1177/0956797615603702>

- [25] S. Suggate, E. Schaughency, H. McAnally, and E. Reese, "From infancy to adolescence: The longitudinal links between vocabulary, early literacy skills, oral narrative, and reading comprehension," *Cognitive Development*, vol. 47, pp. 82-95, 2018. <https://doi.org/10.1016/j.cogdev.2018.04.005>
- [26] N. Pyle *et al.*, "Effects of expository text structure interventions on comprehension: A meta-analysis," *Reading Research Quarterly*, vol. 52, no. 4, pp. 469-501, 2017. <https://doi.org/10.1002/rrq.179>
- [27] M. Troyer, J. S. Kim, E. Hale, K. A. Wantchekon, and C. Armstrong, "Relations among intrinsic and extrinsic reading motivation, reading amount, and comprehension: A conceptual replication," *Reading and Writing*, vol. 32, no. 5, pp. 1197-1218, 2019. <https://doi.org/10.1007/s11145-018-9907-9>
- [28] V. Johann, T. Könen, and J. Karbach, "The unique contribution of working memory, inhibition, cognitive flexibility, and intelligence to reading comprehension and reading speed," *Child Neuropsychology*, vol. 26, no. 3, pp. 324-344, 2020. <https://doi.org/10.1080/09297049.2019.1649381>
- [29] C. Soto, A. P. Gutiérrez de Blume, M. Jacovina, D. McNamara, N. Benson, and B. Riffo, "Reading comprehension and metacognition: The importance of inferential skills," *Cogent Education*, vol. 6, no. 1, p. 1565067, 2019. <https://doi.org/10.1080/2331186X.2019.1565067>
- [30] I. R. Khaesarani and R. Ananda, "Students' mathematical literacy skills in solving higher-order thinking skills problems," *Al-Jabar : Jurnal Pendidikan Matematika*, vol. 13, no. 1, pp. 81 - 99, 2022. <https://doi.org/10.24042/ajpm.v13i1.11499>
- [31] S. Putriyani and S. Djafar, "Analysis of students' mathematical literacy and thinking skills in terms of their mathematical ability levels in PISA," *Edumaspul: Jurnal Pendidikan*, vol. 2, no. 2, pp. 38-49, 2018.
- [32] F. A. Taqiya and D. Juandi, "Students' mathematical literacy with realistic mathematics education (RME) approach: Systematic literature review," *Mathematics Education Journal*, vol. 7, no. 1, pp. 60-72, 2023. <https://doi.org/10.22219/mej.v7i1.24103>
- [33] A. Pentin, G. Kovaleva, E. Davydova, and E. Smirnova, "Science education in Russian schools as assessed by TIMSS and PISA," *Voprosy obrazovaniya = Education Issues*, vol. 1, pp. 79-109, 2018.
- [34] N. F. Vinogradova, *Functional literacy of junior schoolchild*. Moscow: Ventana-Graf, 2018.
- [35] Model Curriculum for the Subject, "'Natural science" 1-4 grade," 2020. <https://adilet.zan.kz/rus/docs/V1300008424>
- [36] Model Curriculum for the Subject, "Cognition of the world, Grade 1-4," 2020. <https://adilet.zan.kz/rus/docs/V1300008424>. [Accessed February 5, 2020]
- [37] M. Khassenova, A. Tapalova, G. Saudabayeva, G. Abyzbekova, Z. Zholdasbayeva, and S. Bandaev, "Development of natural science literacy of students through the use of case technology in chemistry classes," *Scientific Herald of Uzhhorod University. Series "Physics"*, vol. 55, pp. 2025-2033, 2024. <https://doi.org/10.54919/physics/55.2024.202it5>
- [38] T. Nuryanti, I. D. Pursitasari, and B. Rubini, "Science literacy profile of junior high school students on climate change material," *Jurnal Penelitian Pendidikan IPA*, vol. 9, no. 10, pp. 8390-8395, 2023. <https://doi.org/10.29303/jppipa.v9i10.5218>
- [39] Y. Saraswati, I. Sifak, and S. Elok, "Science literacy profile of junior high school students based on knowledge, competence, cognitive, and context aspects," *IJORE : International Journal of Recent Educational Research*, vol. 2, no. 3, pp. 329-341, 2021. <https://doi.org/10.46245/ijorer.v2i3.118>