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Methodological and theoretical foundations for assessing the functional literacy of students in mathematics

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Abstract

Relevance. Currently, one of the most important skills that a modern citizen should have, both in Kazakhstan and around the world, is the ability to adapt to change. In this case, in educational institutions, approaches aimed at a comprehensively developed personality, ready to independently overcome difficulties, based on the information received during training, are becoming increasingly relevant.

Purpose. The purpose of the study was to determine the ways of assessing the level of functional literacy acquired by a student in the course of studying mathematics.

Methodology. The method of analysis, synthesis, comparison, deduction was used in the article.

Results. The study identified challenges in Kazakhstan's education system, stemming from external factors like digitalization and internal factors such as adolescent development. It established that students need both theoretical knowledge and practical application skills for Kazakhstan's future growth. The research emphasized preparing and evaluating functionally literate individuals, focusing on mathematical functional literacy as a key indicator of students' ability to apply skills in real-life situations.

Conclusions. In the course of selecting or developing tasks for conducting control activities, the teacher must combine two aspects at once, both theoretical and practical. The practical value of the study is that its results can be used to prepare educational and methodological materials for educational workers of various levels in the Republic of Kazakhstan.

Keywords: education; digitalization; teacher; functional literacy; practical skills.

Introduction

In today's conditions, namely the rapid development of social relations, the spread of digital and information and communication technologies, a number of changes are taking place in established areas of life. Thus, globalization affects economic, social, political, and cultural ties that require the formation of new important skills in people, namely, rapid adaptation and response to the deformation of various social spheres [1]. Humanity faces new challenges and problems, for the solution of which it is necessary to be able to independently find, analyse, and apply information. The described trend is also reflected in the educational environment, resulting in a change in the main goals and vectors of modern educational institutions for the formation of functionally literate people [2]. At the

same time, such literacy should be systemic and imagined in various activities of students. Proceeding from this, functional literacy acts in the context of a student's meta-subject educational result. This is a natural phenomenon, since the level of education of a modern person implies not only the amount of theoretical knowledge he has received, but also the ability to use it to solve problems in real life [3;4].

In addition, the relevance of studying the functional literacy of students is due to the difficulties that the current generation of adolescents face when choosing vocational education programs. This is due to the fact that an applicant who has a highly developed functional literacy is able to independently make decisions and be aware of their impact on his future life [5]. The modern society is informational,

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therefore, it involves the constant exchange of materials and data between people. This condition also describes the need for the formation of functional literacy among schoolchildren so that they can successfully interact with other representatives of society, independently perform their duties, and most importantly, be responsible for their actions. Thus, the level of development of such literacy in a person makes it possible to determine his readiness for the proper performance of various social roles, for example, voter, consumer, or member [6].

A special place in modern society is occupied by mathematical operations that a person encounters every day in the course of his every day and professional life. In this case, the level of their complexity may differ, but the main condition is the use of knowledge in mathematics acquired during training in real life. To assess such a skill, the teacher must independently determine the essence of the mathematical literacy of students as their ability to determine the role of mathematics in the world. This approach distorts the educational environment, expanding the scope of requirements for student results after studying mathematics. This is explained by the fact that, in addition to the perfect mastery of subject knowledge, they also include the ability to implement them in everyday life, to solve difficulties or problems. Accordingly, this also changes the requirements for the competence of the teacher, who must assess not only the level of theoretical knowledge of students, but also their ability to implement such skills in practice. Given this, not only the issue of developing the functional literacy of students in mathematics, but also their assessment is of particular relevance in modern society [7].

The problem of functional literacy of students is actively discussed in the scientific pedagogical doctrine. Accordingly, D.N. Bayanova [8] and B.S. Karimova et al. [9] compared two categories, namely “academic” and “functional” literacy. They found that the main difference between them is that the tasks of the first category are to solve a scientific problem, while the tasks of the second category are to simulate real conditions and life situations for the development of educational and cognitive activity of students. A.S. Sergaliev and A.Zh. Zhunusova [10] analysed the features of the activities of the main organizations aimed at assessing the level of functional literacy of students in more than 65 countries around the world. Based on this, they concluded that the Progress in International Reading Literacy Study (PIRLS) and Trends in Mathematics and Science Study (TIMSS) research works study the degree of development of academic literacy of schoolchildren in the field of reading, mathematics and science, while in Programme for International Student Assessment (PISA) studies the level of formation of functional literacy, namely mathematical, reading, financial. Unlike previous researchers, N. Hunley et al. [11] paid special attention to the types of tasks aimed at assessing the mathematical functional literacy of schoolchildren in Kazakhstan. Accordingly, the authors suggested using mathematical tricks, tasks related to pouring liquids or weighing objects, tasks using a clock face, as well as commodity-money ones. They allow deepening the level of theoretical knowledge of students in mathematics, and are also focused on the development of their logical thinking.

Based on the foregoing, the goal was formed in the article, which was to highlight the basic principles and approaches to assessing the functional literacy of students in the process of studying mathematics. Thus, several tasks were formed, namely:

1. To reveal the process of formation of functional literacy among schoolchildren.
2. To determine the role of mathematical functional literacy in modern society.
3. To analyse the main approaches to increasing the level of such literacy among children.
4. Consider and suggest ways to assess the functional literacy of students.

Materials and Methods

In the course of the study, the article used various materials related to the development of functional literacy of students in Kazakhstan. In particular, in the Collection, it is given for the lessons of the history of the formation of functional literacy of students, prepared by a teacher of KSU “Secondary School No. 8 named after Shokan Ualikhanov of the city of the Stepnogorsk department of education in the city of the Stepnogorsk department of education of the Akmola region” I.N. Kulagina [12], the main types of tasks that use interaction with students and increase the level of their practical skills were studied. In addition, the National Report developed by the Information and Analytical Center in Astana under the title “International study of teaching and learning TALIS-2018: First results of Kazakhstan” [13], which made it possible to express the main vectors of development of the educational system in Kazakhstan. to the processes of globalization. The article also considered the Report on the functional literacy of students in the framework of PISA, held from April 4 to May 24, 2022, on the basis of which the current state of the development of functional literacy of students in Kazakhstan was expressed [14].

The method of analysis in the article was used to study the category of “functional literacy”. Based on it, the stages of its development, structure, and content were expressed in the work. After establishing the essence of functional literacy, it was divided into several types, reading, mathematical, natural and financial. The analysis included the disclosure of their distinctive features and attention to specific features of mathematical functional literacy. Synthesis methods in the work were used in expressing a common understanding and concept of functional literacy. On its basis, the general features of this category, the role in modern society and the impact on the educational environment were expressed. The synthesis provided for a combination of rare types of literacy to express the properties and nature of a single component of functional literacy.

The method of comparison in the article was applied in establishing the influence of external and internal factors on the educational process in modern society. In addition, on its basis, the basic skills that a modern person should have, including functional literacy, were revealed. The comparison involved comparing a student with developed literacy and a high level of only theoretical knowledge. Such an approach was necessary to express the practical value of acquiring functional literacy by students, including in the study of mathematics. On the basis of this

method, there were relatively different types of training sessions and tasks in the work, which are aimed at developing and testing the ability of schoolchildren to implement the acquired knowledge in life situations.

The deduction method in this study was used to express functional literacy in modern conditions of the development of society. Based on it, the paper presented the main advantages of acquiring this system of skills by students based on a general understanding of the course of socio-cultural processes at the moment. Thus, the role of functional literacy in the daily and educational activities of the student was singled out, and the methods for evaluating the development of such skills in students by the teacher were revealed.

Results

The study of approaches and tools for assessing students involves taking into account the peculiarities of the formation of their different skills. Given this, for an effective analysis of the methodological and theoretical foundations for assessing the functional literacy of schoolchildren studying mathematics, it is advisable firstly to study the process of acquiring such competence by them. In this context, the content of the concept of “functional literacy” should be defined. Its historical development began in 1954, when it was first formed and proclaimed at the World Congress of Ministers of Education in Tehran [15]. This event significantly affected the meaning of literacy in society, since after it in 1957 United Nations Educational, Scientific and Cultural Organization (UNESCO) has formed and consolidated the definition of this category.

Accordingly, functional literacy should be understood as a system of reading and writing skills that are fundamental in the daily activities of citizens and play an important role in the process of meeting their life problems. The next stage in the development of the system of functional skills should be considered the beginning of 1978, when UNESCO reformed the foundations of international standardization of statistical data in the educational environment. Thus, functionally literate persons should include those who can perform tasks in various fields of activity, using literacy to ensure the effective functioning of the chosen field. Thus, this category covers the ability of a person to use reading, writing, and counting necessary for the realization of their own and social development.

Examining the further development of functional literacy among the population, it should be noted that technological changes and digital developments had a significant impact on this process. As a result, the level of education in society must constantly increase in order to ensure a successful life for the individual in modern society. In view of this, the educational systems of different countries face a number of challenges related to providing the population with the appropriate skills and knowledge about the existence and development in the new conditions. Given the dynamism of social relations, it should be pointed out that, at the moment, educational institutions cannot provide students with the absolute amount of information and knowledge necessary for their future life. Accordingly, it is impossible to provide society with long-term work in a specific environment, since the

chosen type of professional employment may lose its relevance, for example, due to its scientific and technical modernization.

Based on the conditions described above, the global approach to the educational environment and education in general was changed, namely, the vector of their development was changed to teach students the ability to adapt to constant social changes and quickly respond to the challenges of a globalized society. Thus, now it is appropriate to understand functional literacy not as a specific level of knowledge and skills of an individual, but as his skills in relation to its constant improvement, taking into account the development and deformation of society. At the same time, this category certainly includes steel, mandatory skills, namely reading and writing, which are fundamental in the course of active participation in various types of employment. Outlining functional literacy in the understanding of a modern person, one should point to the skills of effectively solving problems of a practice-oriented nature, with the help of various subject knowledge. Given this, functional literacy can be divided into four components, namely reading, mathematical, science and financial. The selection of the mathematical category is due to a gradual increase in practical tasks in the process of teaching mathematics, as well as a significant expansion of the volume of educational tools, which began to include digital technologies.

Analysing the features of functional literacy among students studying mathematics, it should be noted that it has a high practical value. This is due to the fact that mathematical knowledge is constantly used by a person in every day as well as professional life. For example, the accrual of interest on a loan, the payment of housing and communal services, the purchase of goods and other commodity-money relations. In such situations, basic knowledge of common calculation techniques and operations with mathematical expressions is used. However, in certain professional areas, a person may be required to have more in-depth knowledge in the field of mathematics, for example, in accounting, designing engineering structures, and construction. In this case, she must combine theoretical knowledge with mathematical functional literacy in order to integrate knowledge of different types of activities to complete the task. In addition to numerical operations in everyday life, people often face the need to use knowledge of geometry directly related to the calculation of lengths and areas (for example, when measuring objects), determining the shape of such an object and its characteristics.

Given the conditions, as well as the high priority of developing functional literacy among citizens, it should be noted that the most important task of modern educational institutions in Kazakhstan is the development of a socially active, autonomous, intelligent, creative personality. Thus, the process of forming social, personal and communicative competencies is of particular relevance, since it is on their basis that a system of functional skills is formed. As a result of the implementation of this approach, it is possible to provide students with the ability to quickly solve various problems both in everyday life and in professional activities. In addition to traditional teaching tools, namely textbooks, methodological materials, notes, the use of gaming technology occupies an important place in the

process of developing functional mathematical literacy. This approach is not new in the educational environment, but its advantage is that it can be constantly updated, in parallel with the emergence of new challenges in society. That is why the gaming technology allows simultaneously combining the development of theoretical basic knowledge and functional literacy skills in students. Thus, when implementing this approach, the social development of the student takes place, which is an important condition in the formation of his personality.

Given the above, it is advisable to consider ways of developing mathematical functional literacy among students based on gaming techniques. The study of this algorithm is necessary to understand the main aspects that should be identified by the teacher when assessing the level of knowledge of students and their functional competence. Firstly, it is advisable to focus on the advantages of using such an approach, which allows not only to achieve the set educational goals, but also to increase the level of internal motivation for the educational process, to consolidate a sustainable interest in academic disciplines, in particular mathematics. Accordingly, when studying mathematics, schoolchildren may encounter the formation of psychological barriers due to the complexity of tasks, so the use of gaming technologies will allow them to be overcome and make learning activities accessible.

Particular attention should be paid to the fact that an important role in the development of functional mathematical literacy among students is played by the subject knowledge of mathematics, on the basis of which the direct solution of practical problems takes place. Thus, the main type of exercises that schoolchildren perform to develop functional literacy are practice-oriented, aimed at covering several educational topics at once, due to which it becomes more difficult to understand their conditions and fulfil them. To mitigate these difficulties and speed up the educational process, it is advisable to use a didactic game, on the basis of which it is possible to identify the content of a practical problem visually, as well as to determine the necessary teachings among students for their successful solution of a learning task. Accordingly, a didactic game can be used not only to organize the presentation of educational information, but also to check the level of its assimilation by students. That is why such a tool can arise in various interpretations, in particular, as a method of organizing a training session and controlling activities. Its essence is to provide game conditions in which a student can more quickly and deeply delve into the content of a task or a new educational topic, while not losing cognitive interest in educational activities in general.

As mentioned above in the work, functional literacy implies the ability of the individual to adapt to constant changes in the environment and the type of tasks, which is why the student must develop these abilities already at the stage of education, including mastering mathematics. In this case, didactic games based on information and communication technologies make it possible to make the learning environment flexible by changing its conditions. For example, a teacher can divide students into small and large groups during a maths lesson so that they can change each other's roles and show leadership qualities and be responsible for the team. Despite the fact that mathematics

is an exact science in the process of teaching and assessing students, it is advisable to use digital animations, QR codes, as well as virtual reality objects. Thus, didactic games can also be implemented using online services, for example, to create quests, crossword puzzles, quizzes, or puzzles. To do this, it is advisable to use tools such as Learnis, Learning Apps, Quizlet, Class Tools. In the context of the study of mathematical functional literacy of students, it is advisable to pay special attention to such means as quest books, story games and dialogue [16].

Special attention should be paid to their essence, since on its basis, it is possible to understand promising areas for application. In particular, under the category of a quest book, it is advisable to understand an interactive game that has a storyline that allows the student to independently determine the actions of the main character by choosing one answer from the proposed list. Thus, it is possible to work with new educational material, as well as to assess the knowledge of schoolchildren in mathematics. As for the relationship between this approach and functional literacy, it consists in the fact that the applicant for education, in the course of making a mistake, must independently detect it and quickly respond to the specified problem. In turn, a story game is a short story game, which is a subtype of a quest book, but differs significantly in volume, since it is smaller. It should include a short interactive story, with the help of which the student can independently determine their own strengths and weaknesses, as well as be responsible for the mistakes made.

In addition, it is necessary to consider the dialogue, which provides for the replicas of the characters in the course of the plot, which can be implemented live or virtually. Thus, students can collide with other students or the teacher, but at the same time apply knowledge of mathematics. In this case, it is advisable to differentiate the topics and tools for dialogues according to different levels of complexity, branching, and duration. The direction of the lesson and the choice of skills that students should develop also depend on these properties. Based on this, the construction and provision of the storyline fully depends on the students' choice of methods and tools for solving problems. Thus, in artificially designed conditions, they face difficulties that require the use of knowledge in mathematics for their effective and efficient solution. Based on the analysis, it can be established that one of the most effective approaches for organizing electronic interactive tasks aimed at developing mathematical literacy among students is quest books and story games. Their significant prevalence is due to the fact that they meet the current conditions for the development of society, namely the era of digitalization. Thus, it should be pointed out that they are not permanent, since social relations are undergoing changes, but at the moment they make it possible to ensure the educational interests of applicants for education.

Based on the foregoing, it should be established that the process of forming functional mathematical literacy is important for modern society and is quite laborious. It has a significant impact on the stage of assessing the results of students, since the level of development of students' skills depends on the tools chosen by the teacher. Therefore, it is advisable to point out that in order to form the necessary

competence among students, it is necessary to improve the system of educational tasks, as well as tools for their implementation. They should be practical in nature, namely, they should be aimed at attracting various skills of schoolchildren, in particular in the field of mathematics to solve everyday problems. At the same time, based on the analysis carried out in the study, it is information and communication technologies that occupy a leading place in the modern system of educational materials and allow increasing their practical value through interpretation in a game form.

With regard to directly assessing the degree of development of students' functional literacy in mathematics, it should be noted that in order to implement this process, the teacher must necessarily involve practical exercises in the educational process aimed specifically at the formation, consolidation, and improvement of students' skills to apply the theoretical mathematical knowledge they have acquired in everyday or professional life situations. Based on this, the assessment process involves the performance by students of atypical tasks, the content of which relates to specific problems of real life. Accordingly, it is impossible to determine a specific system of methodological recommendations that regulate the process and criteria for assessing an education applicant by a teacher, since tasks can be of different forms.

The main requirement in this process is to check the development of the student's skills regarding the implementation of the received educational information in mathematics lessons in the course of solving problems and difficulties in everyday life. As an example, it is advisable to cite several types of tasks aimed at using basic mathematics skills by schoolchildren. There are 8 light bulbs in the classroom, all of them were turned on in the classroom, later the students left the classroom and forgot to turn off the light. Accordingly, the light bulbs completed their work only after 20 minutes, as a result of which the school overpaid 100 tenge for the supply of electricity. In this case, schoolchildren must calculate the overexpenditure for the month, if the total number of light bulbs in the educational institution is 125 pieces, and each will work daily without need for 10 minutes.

Also, the teacher, in order to assess the level of mathematical functional literacy of schoolchildren, can offer them to perform tasks of the following type. From 5 kg of pears worth 140 tenge and 10 kg of granulated sugar worth 48 tenge per 1 kg, syrup was cooked. Find the cost of 1 kg of syrup, provided that its weight is 75% of the weight of sand and peeled pears. At the same time, during the processing of pears, weight loss is 12%. The next example of the problem is: to cover the floors with parquet in the assembly hall, 7900 rectangular tiles 25 cm long and 10 cm wide are needed. The store only had tiles measuring 35 cm long and 8 cm wide. How many of these tiles will need to be added to cover the floor in the assembly hall. The solution of the above types of problems does not have an established algorithm, except for the order in which mathematical operations are performed. In this case, the teacher should pay attention to the approach and logic of the student in solving the given problems, as well as to the correctness of the final result. At the same time, the teacher can use both ready-made tasks, and independently develop

them before conducting control measures. In this case, it is advisable to propose an algorithm for the formation of high-quality practice-oriented tasks that allow assessing the level of functional literacy of students in mathematics (Figure 1).

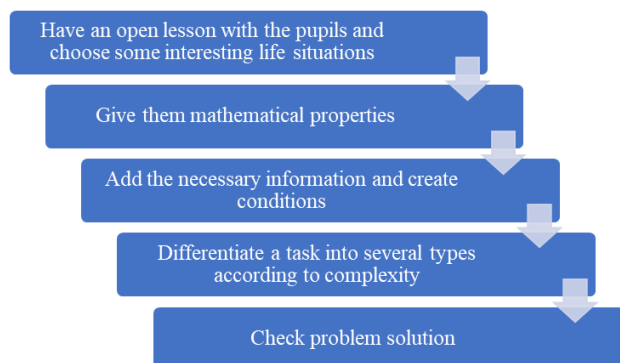


Figure 1. Stages of developing a task for assessing the functional literacy of students in mathematics

Thus, practice-oriented tasks are the key not only to the development of mathematical literacy of students, but also to their assessment. This is explained by the fact that they are aimed at creating conditions similar to the real everyday life of social life, in which a teenager finds himself virtually every day. Accordingly, this type of task aims to teach them to apply mathematical knowledge during daily or professional activities. Based on this, the teacher can determine the level of practical value of the educational information presented, as well as determine the vectors for the future development of the educational environment.

Discussion

The question of the formation, improvement, and assessment of the level of functional literacy of students is striking in the pedagogical doctrine in different contexts. Accordingly, the work of researchers differs depending on the subjects studied, the characteristics of academic subjects and the stage of development of society. Accordingly, W. Daher [17] and also A.L. Madrazo and R.V. Dio [18] focused on the functional literacy of geometry learners. In their opinion, this process is complex, since it involves the study of a large amount of theoretical information. W. Daher [17] points out that the use of such material by students in the course of completing tasks is not always obvious and consistent. In addition, in order to successfully solve problems in geometry, a student must have developed spatial thinking, which is one of the foundations of functional literacy.

A.L. Madrazo and R.V. Dio [18] conducted an analysis of school textbooks in mathematics, in particular geometry, and found that the largest part of practice-oriented tasks is found in textbooks for students in grades 6 and 7. In their opinion, this percentage subsequently decreases in methodological materials, and then appears only in control tasks and test papers. Thus, they found that the 9th grade geometry course contains the least number of practice-oriented tasks, so they believe that students are not provided with the opportunity to learn the practical value of this industry, namely the expediency of its application in real life. At the same time, based on the data obtained,

the authors note that it is the 8th grade curriculum that is most focused on the practical development of students and their functional literacy. In particular, during this period there is a study of such as quadrangles, area, similar triangles, circle. Based on the results obtained by the researchers, it should be noted that they should be accepted. This is due to the fact that the researchers correctly pointed out the lack of proportion between the theoretical material studied by students, as well as the number of tasks aimed at improving practical skills. This position has general conclusions based on the results of this study, since it determines the foundations and features of the formation of functional literacy among schoolchildren in mathematics.

Particular attention should be paid to the works of K. Taskynbayeva and K. Ybyrayeva [19] and also A.Ye. Sagimbaeva et al. [20], who studied the psychological characteristics of students in the context of the development of functional literacy. In their opinion, an important place in the educational process is occupied not only by subject properties, but also by personalities that reflect on the state of schoolchildren. K. Taskynbayeva and K. Ybyrayeva [19] note that at the age of 13-14 years, when students are in grades 7-8, they undergo a reform of the system of values, as well as interests. Based on this, such a transformation can devalue certain skills or knowledge, affect the formation of new relationships with adults and deform the attitude towards the educational process. In the latter case, an important place is occupied by the level of development of the functional literacy of the student, which should be formed at the beginning of the 7th grade. This is due to the fact that with a correct understanding of the value of the student's knowledge, as well as possible options for their application in everyday life, he will be able to easily go through the transitional age, directing his learning activities in the right direction.

A.Y. Sagimbaeva et al. [20] agree with this position, as they also point out that in adolescence, schoolchildren have to face a number of social and psychological challenges, so the educational process may lose its promise. Accordingly, when such interests change, the student begins to change the direction of his own employment, as well as goals in life. This process is also influenced by the development of information and communication technologies that need to be reformed in the educational environment. In the absence of changes in it, most teaching tools lose their relevance and value for applicants for education. In view of this, the authors indicate that one of the most effective ways to prevent the formation of such a psychological state in a schoolchild is the preliminary development of his functional literacy. Based on the acquired knowledge and skills, he will be able to deal with difficulties, exercising self-control over his own activities and without changing the final goals. The researchers also point to the prospect of introducing information and communication technologies into this process to attract the attention of students studying mathematics. On the basis of this approach, it will be possible to impart a mediated character to the reasonable abilities of the student through the development of conceptual, verbal-logical and abstract thinking.

Separately, K. Taskynbayeva and K. Ybyrayeva [19] indicate that it is quite difficult for schoolchildren in grades

7-8 to manage their own personality. Based on this, a teenager is faced with problems regarding the search for "themselves", as well as determining the level of their abilities and knowledge. Such a psychological feature of human development complicates the educational process, including the study and mastery of the exact sciences. That is why, to facilitate it, A.Y. Sagimbaeva et al. [20] suggest giving students such tasks aimed at developing subject knowledge, as well as revealing the student's personality. K. Taskynbayeva and K. Ybyrayeva [19] note that the period of adaptation of students to perform monotonous tasks is 7-11 minutes. After passing this interval, the speed of the student's learning activity decreases and, accordingly, the proportion of errors increases. That is why the researchers point out that monotonous work has no practical value for schoolchildren, which is provoked by turning off their attention.

From the conclusions described, it should be noted that functional literacy allows not only to increase the level of subject knowledge of students, but also involves the development of their personal values and overcoming psychological difficulties. Taking this into account, it is advisable to agree with the positions disclosed, namely, the need to form a strong-willed effort and direct interest in the educational object among schoolchildren. Common in the work of researchers was the introduction of didactic games based on information and communication technologies, which are an effective tool in the process of keeping the attention of students during the educational process and ensuring their personal development.

In turn, T. Feraco et al. [21] and S. Suparman et al. [22] revealed the foundations on the basis of which the assessment of the level of functional literacy of students should take place. According to T. Feraco et al. [21], control activities should be aimed not only at assessing academic literacy, but also its development through solving real-life situations. They indicate that these types of tasks are integrative in nature, therefore, they are focused immediately on testing the system of skills and theoretical knowledge of students. S. Suparman et al. [22] in the study emphasize that the most effective method for assessing the functional literacy of schoolchildren is precisely the written form of control. Thus, they are supporters of complex tasks that can be differentiated according to different criteria. For example, a task with multiple answers or with one open answer.

T. Feraco et al. [21] separately emphasize that the teacher's understanding of the purpose of functional literacy plays a role in this process. It is important to be aware that such assessment tasks are aimed precisely at expressing the level of perception of educational material by schoolchildren and the possibility of reproducing them in real life. With this in mind, the authors have developed the principles and structure of tasks designed to assess the functional literacy of applicants for education. Such tasks must necessarily be characterized by a complex character. This is because this approach allows students to perform a whole system of interrelated tasks that require the simultaneous use of various information tools. This approach experiences many difficulties, but it allows the development and consolidation of the necessary practical skills in schoolchildren. The researchers also point out that assessment tasks should be competently oriented. As a

result, the subject knowledge previously obtained by them will be the basis for solving problems in life situations. The authors note that the tasks should be contextual, namely, describe the real difficulties that people face in everyday life. It is worth agreeing with the positions of the authors disclosed, since they characterize the features of assessing the functional literacy of students. An important feature that is common to both works is the concept orientation, which consists in the construction of control tasks based on principles, including with the help of the deductive method. Thus, these conclusions have common ideas with the results of this study, in particular, they can be combined to develop methodological recommendations for the preparation of assessment materials for teachers.

Based on the positions disclosed above, it should be established that functional literacy is an integral part of the modern educational environment, allowing it to be updated. Accordingly, the level of development of this system of skills in a schoolchild depends on the degree of practical significance of the subject knowledge he has received. It is expedient to use the findings obtained as a result of a wired study to develop materials for training or advanced training of mathematics teachers, as well as heads of educational institutions. In addition, they can be used by methodologists in the process of preparing curricula and programs for teaching mathematics in schools in Kazakhstan. Also, the results of this work can be presented to a wide range of the pedagogical community in order to form reforms in the educational environment of Kazakhstan.

Conclusions

Based on the study, it should be established that modern society is constantly changing, which affects the reorientation of tools for the formation and maintenance of the education system. Thus, today the development of functional literacy of students is one of the main goals of educational institutions, so that children have high adaptation and self-realization skills. The work analysed the stages of development of functional literacy in the educational environment, on the basis of which it can be established that traditional education has undergone reform due to the influence of competence-based approaches. Based on this, the turnover of skills and knowledge that previously belonged to a narrow type of activity is expanding, and now they are becoming an integral tool for the everyday life of a modern person, for example, digital literacy skills. Thus, it can be established that in the current educational field, academic and functional literacy have experienced a combination and exist in interconnection with each other. This is explained by the fact that the first depends on the level of

development of the second, and therefore they require simultaneous formation and improvement.

Special attention in the study was paid to mathematical functional literacy, the structure of which includes both theoretical knowledge in the field of mathematics and the competence of their implementation in solving problems. Accordingly, a feature of the modern learning environment is the interweaving of functional literacy in the process of mastering subject knowledge by the student. To study the features of assessing such literacy among schoolchildren, the paper analyses the process of its formation, based on modern educational tools, in particular information and communication technologies, as well as didactic games. It has been established that on the basis of the implementation of a competency-based approach to conducting training sessions, the teacher manages to ensure the development of various types of literacy among students. Additionally, in the context of improving functional literacy, it is advisable to apply a personal approach that defines special guidelines for the selection of assessment materials based on the life experience of students. Thus, the use of a personal approach by the teacher contributes to the formation of special conditions close to everyday activities in which students can use their knowledge of mathematics.

The process disclosed in the work describes the features of reforming educational vectors in accordance with the current requirements of the digital and information society. As a result, there is a transition from educational and cognitive tasks to complex exercises that describe real life situations. Given that the tasks aimed at developing and assessing the functional literacy of students differ significantly from traditional academic tasks at work, an algorithm for preparing assessment materials by the teacher was formed. With the help of its phased implementation, teachers will be able to independently develop tasks aimed not only at the formation, but also at assessing the functional literacy of students in mathematics. Thus, the article described the principles on the basis of which the teacher should organize control activities in the context of assessing the level of practical skills of applicants for education. In future scientific works, it is advisable to focus on the features of using virtual reality tools while increasing the level of functional literacy of schoolchildren in grades 9-11.

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Conflict of Interest

N/A.

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Методологічні та теоретичні засади оцінювання функціональної грамотності учнів з математики

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Анотація

Актуальність. У даний час однією з найважливіших навичок, якою повинен володіти сучасний громадянин, як в Казахстані, так і в усьому світі, є вміння адаптуватися до змін. При цьому в освітніх установах все більшої актуальності набувають підходи, спрямовані на всебічно розвинену особистість, готову самостійно долати труднощі, спираючись на інформацію, отриману під час навчання.

Мета. Метою дослідження було визначення способів оцінювання рівня функціональної грамотності, набутої учнем у процесі вивчення математики.

Методологія. У статті використано методи аналізу, синтезу, порівняння, дедукції.

Результати. Дослідження виявило виклики в системі освіти Казахстану, зумовлені зовнішніми факторами, такими як діджиталізація, та внутрішніми факторами, такими як розвиток підлітків. Воно показало, що для майбутнього зростання Казахстану учням потрібні як теоретичні знання, так і практичні навички їх застосування. У дослідженні наголошувалося на підготовці та оцінюванні функціонально грамотних людей, з акцентом на математичній функціональній грамотності як ключовому показнику здатності учнів застосовувати навички в реальних життєвих ситуаціях.

Висновки. У процесі підбору або розробки завдань для проведення контрольних робіт викладач повинен поєднувати відразу два аспекти - теоретичний і практичний. Практична цінність дослідження полягає в тому, що його результати можуть бути використані для підготовки навчально-методичних матеріалів для працівників освіти різних рівнів в Республіці Казахстан.

Ключові слова: освіта; діджиталізація; вчитель; функціональна грамотність; практичні навички.