

FEATURES OF THE METHODOLOGY FOR SOLVING TEXT PROBLEMS USING EQUATIONS

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Abstract

The article describes the features of the method for solving text problems by constructing equations in grades 5-6. A text report is a description of certain situations (situations) in a natural language, a representation of a quantitative characteristic of a component of this case, and a determination of the presence or absence of certain relationships between its components. In this article, the role of text problems in teaching mathematics was defined on the one hand, in connection with the development of methods for solving a certain system of mathematical problems by students. On the other hand, it shows that the full achievement of educational goals is possible only by solving the system of educational and mathematical problems by students. Thus, it is shown that the solution of text problems in teaching mathematics is both a goal and a means of learning.

The purpose of this article is to consider the method of solving problems made by the method of constructing equations and to give students recommendations on how to solve problems by constructing equations.

Learning to solve text problems is a specially organized interaction between teachers and students, which aims to develop students' ability to solve mathematical problems. Thus, when learning to solve text problems, the goal of specially organized interaction between the teacher and students is determined – the formation of students' ability to solve these problems.

Keywords: text problem, student, equations, mathematical education, training, lesson, method, theory, thinking.

Introduction

The relevance of the article is determined by the following circumstances. Mathematics has become the language of science and technology, is now increasingly being introduced into everyday life and everyday language, and is traditionally being introduced into areas remote from it. Intensive mathematics of various spheres of human activity has been especially intensified by the introduction of modern information technologies that require mathematical literacy of a person at every workplace. This presupposes specific mathematical knowledge and a certain style of thinking that can be created with the help of mathematics.

Mathematics has penetrated into all spheres of human activity and has positively influenced the growth rate of scientific and technological progress. In this regard, improving the mathematical training of the younger generation has become vital.

The solution of text problems occupies a large place in mathematical education. The ability to solve general mathematical problems is one of the main indicators of the level of mathematical development of the student, the depth of assimilation of educational material.

With the conscious assimilation of mathematical knowledge, students use the basic operations of thinking in an accessible form for them: analysis and synthesis, comparison, abstraction and clarification, generalization; students make inductive conclusions, make deductive judgments. Students' conscious assimilation of mathematical knowledge develops students' mathematical thinking. Mastering mental operations, in turn, helps students to successfully assimilate new knowledge.

An important type of educational activity in which the system of mathematical knowledge, skills and abilities is mastered is the solution of given mathematical problems. These tasks are a tool that stimulates and guides the educational and cognitive activity of students.

In the process of performing any actions that really occur in our lives, it will be necessary to solve simple mathematical problems. An important type of educational activity, mastering the general mathematical theory, developing creative and logical thinking of students, is the solution of mathematical problems. And the effectiveness of basic training, a rational place, largely depends on the methodology of organizing training, learning to solve problems.

And mathematical problems, including text ones, are concrete, necessary material that forms new knowledge of students and is worked out in the process of applying previously acquired knowledge. Allows you to correlate theory with practice, learning with real life. The solution of text tasks forms practical skills necessary for each student in his daily real life. Solving text tasks, students get acquainted with important cognitive and creative, logical data. Text problems play a special role in the study of mathematics. Text cheat sheets develop a knowledge system, form students' creative thinking, contribute to overall mental development and play a cognitive role in learning.

Teachers and methodologists determine that problem solving is an important means of forming a system of basic mathematical knowledge, skills and abilities of students, the leading form of activity of students in the process of teaching mathematics, one of the main means of developing their knowledge of mathematical orientation.

In recent years, there has been a decrease in students' interest in solving text problems in mathematics lessons. About half of the students in the class do not start solving text problems even on a test or exam.

Why is this happening? Questions about how to teach students to solve text problems and other similar issues are now increasingly arising in school. Therefore, this issue is one of the most urgent today.

In the process of solving text tasks, students practice self-preparation of tasks using various examples shown by the teacher. Quantitative and plot material for drawing up tasks is extracted from the surrounding reality, using the features of the area where schoolchildren live. Drawing up and solving such tasks contributes not only to a better understanding of the structure and features of the way to solve various text tasks, but also to the development of creative independence of students, expanding their horizons, strengthening the connection of learning with life.

Literature review

The concept of "development of secondary education" of the Republic of Kazakhstan defines: "the ultimate goal of education is to help every child to strive deeper for knowledge by revealing his personal qualities, the manifestation of his capabilities, the meaning of life, as well as the search, inclinations, to create conditions and give him new spiritual strength for life " [1].

Scientists Yu.M. Kolyagin and V.V. Pikan [2], D. Poya [3], M.A. Bantova [4], A. E. Zakharova [5] and others were engaged in the development of teaching methods for solving text problems.

According to many research scientists, tasks are the main means of organizing mathematics education and managing educational and cognitive activities. It should be noted that psychological and pedagogical literature considers various aspects of the use of tasks in education and upbringing. Thus, in the studies of famous methodologists A.E. Abylkasymova [6], B.B. Baymukhanov [7], M.E. Esmukhan [8], A.K. Kagazbaeva [9], A.M. Mubarakov [10], L.D. Zhumalieva, J.S. Muratalieva [11] reveal the concept of a task as a goal of mental activity, comprehensively consider the essence and functions of the task in the educational process, identify the main patterns of the problem solving process.

L.M. Friedman offers a formal definition of a textual task. According to his approach, each report consists of the following 4 parts:

1. subject area-a set of objects referred to in this report;
2. relations connecting objects in the subject area;
3. requirements are an indication of the purpose of solving the problem (what needs to be indicated as a result of the solution);
4. operator-a set of actions performed by the conditions of the report to fulfill its requirements [12].

G. V. Dorofeev divides text tasks into two types:

- a) text reports on some real, life situation provided with the help of real data;
- b) tasks of a potential nature that require design, modeling of a life situation, identification of realized situations [13].

Results and discussion

The task of school teachers is to comprehensively disclose the subtleties of mathematical knowledge provided to schoolchildren, increase their mathematical abilities, as well as teach them free behavior in any environment, create conditions for self-education of students. That is why the development of students' thinking, the level of acquired knowledge is an important activity.

The spiritual and social level of our independent state is determined by the current level of education. For the upbringing and education of modern youth in accordance with such requirements, the school teacher needs to constantly improve his educational methods

The mathematics course in general secondary schools stimulates students' interest in the subject of mathematics, develops their logical thinking, and also increases creative activity. In this case, each student is greatly influenced by their age characteristics and thinking, the environment and the environment.

In the process of teaching, it is necessary to identify the age abilities of schoolchildren, to identify the main, basic personality qualities, to develop the thinking of each student, not only on the basis of scientific knowledge, to determine the level of acquired knowledge, to educate a good specialist in the future.

Physiological and psychological features inherent in certain periods of a person's life are called general age characteristics. That is why the development of consciousness, body at every age depends on the age characteristics of people. With the age of the child, their mind begins to develop, as well as knowledge deepens. Taking into account the age characteristics of students in general education schools is one of the basic principles in the system of education and upbringing.

Speaking about the psychological characteristics of students aged 10-12, for grades 5-6, "adult feeling" is a special type of self-consciousness that arises during the transition period and determines the main relationships of younger adolescents with the world. The "feeling of adulthood" arises from the need for equality, respect and independence, the need for serious, trusting relationships on the part of adults. Ignoring these requirements, dissatisfaction with this need further aggravate the negative aspects of the adolescent crisis.

Most teachers who teach in grades 5-6, that is, everyone, since they learn to work in high school, the requirements for teenagers become more complicated. This, of course, should not be allowed, at least for the three reasons given below:

1. the content of the mathematics course in the primary school is built systematically, which implies a good development of theoretical thinking among adolescents. However, such thinking exists only at the initial stage of its development at this age, and to this day the student has worked only with individual single concepts and some conceptual connections. Therefore, the perception of new concepts by fifth and sixth graders is a complex trend. New scientific terms and concepts should be gradually assimilated by

students in the course of various practical actions, as well as on the basis of existing concepts and general guidelines.

2. despite the fact that the main school pays great attention to the independence, responsibility of students and the conditions of free choice of individual learning trajectories, the age characteristics of schoolchildren are not taken into account, such a situation threatens the emotional well-being of most students. Therefore, it is very important to work with students "in the zone of their immediate development", which implies the help and support of the teacher in situations when he cannot solve this educational task on his own. Such assistance from the teacher gradually passes indirectly, which allows the student to independently solve the tasks set or independently complete the task. This provides a developing learning effect.

3. School teachers expect students to be able to understand other people and live with them on the principles of equality and tolerance. In younger schoolchildren, it is just being formed, and now, in adolescence, with the skillful construction of an educational dialogue, it gives an opportunity for self-education [14].

That is why the development of students' thinking is the main task. During the learning process, the student acts both with academic subjects and with symbols related to the subjects. Operations with such elements are carried out mentally.

A system of symbols that perceive the student's world develops in consciousness. In order for the student to learn some mathematical concepts, it is necessary to translate them into the language of these internal structures.

Thinking makes it possible to identify in the conscious objects of students not only their personal qualities, but also the relationships and patterns between these qualities. Based on this, students use thinking to recognize the general properties and relationships of objects, and also an important, main issue is that they determine the nature of objects. This allows the student to predict the results of events, phenomena and their own actions, which in the future will be verified by experiment or observation.

At the same time, the research activity of students increases, its breadth and versatility, their ability to independently ask questions as a means of thinking develops. Such work is carried out with the help of mental operations, such as: comparison, analysis and synthesis, abstraction, accumulation and refinement [15].

Mathematical thinking is a very abstract, theoretical thinking, the objects of which can be interpreted arbitrarily so that only given relationships are preserved between any objects. When solving text problems, it is necessary to pay attention to the perception of the relations in time and space indicated in it. All this suggests that if the student's attention is formed, directed in accordance with the goals and objectives, then the task set for the lesson is successfully implemented, i.e. the student's attention is increased. This is control over the actions performed.

Initially, the student will have a figurative memory, but its value (figurative memory) will gradually decrease. The student's ability to memorize is usually higher when using visual material in the lesson.

Abstract - theoretical, visual - effective and visual - imaginative types of thinking develop in the learning process, while they develop in close interaction with each other. Taking into account their interaction, the principle of visibility is used, which has long been considered one of the basic principles of teaching, according to which students directly perceive real images in the learning process. Considering the question of the psychological function of visual material included in the educational process, A.N.Leontiev expresses the opinion that "it (visual material) serves as an external support for internal actions performed by a child under the guidance of a teacher in the process of acquiring knowledge" [16].

A.N. Leontiev in the study of the problem of visibility in the learning process made a general conclusion on the place and role of visual material [16]. The activity that makes up the essence of the learning process is determined by the attitude of students to activities containing visual material.

This means that the expediency of using any means of visibility depends on whether other knowledge acquisition activities, in which these means of visibility are used for the assimilation of the activity by students, which is the mastery of this visibility, will contribute to (the main one). If these two actions are unrelated, the visual material is useless, and sometimes can even play the role of a distraction.

And in order for the training of students to be successful, it is necessary to take into account the psychological characteristics of their cognitive processes.

Students really try to solve some text tasks on their own, quickly, but they cannot solve such tasks right away. In most cases, text tasks represent a real-life situation and can figuratively represent the data presented in the report in the mind of the student himself, acting on his result. Such thinking, in which the solution of such textual tasks occurs as a result of internal actions, is called visual - figurative. Of course, students can think logically, but it is worth remembering that at this age they are inclined to learn, relying on visibility. Then the student begins to acquire great importance of theoretical thinking, the ability to establish the greatest semantic connections in the surrounding world. At the age of 11-12, a teenager develops formal thinking. At this time, they can reason following logic [17].

The freedom of the cognitive process in students of the 5th or 6th grade occurs only at the peak of the will. In the process of growing up, the ability of attention, attention, and memory management changes. The student can dispose of them at his discretion.

The cognitive activity of the student will be directed to the study of the environment. It will not be easy to organize attracting their attention to the objects under study for a very long time. Because it will be difficult for students to focus on less attractive and monotonous, that is, similar to each other activities or interesting, but requiring mental stabilization activities. That is why students should make efforts to solve text problems [18].

A teenager can control his thoughts, thinking, he knows how to persevere in performing necessary, important actions for him. And in order for the teenager's attention to stop at the lesson, support from the teacher will be required.

The student can consciously use memorization techniques. He repeats repeatedly what he needs to memorize, tries to think about him, feel his ability to memorize in a given sequence. However, involuntary memory is productive.

Memory in the process of learning activities should be arbitrary. This is possible if the student understands that he needs to memorize this material. During the learning process, the student forces himself to work on memorizing the necessary material. In adolescence, the student can control his arbitrary attention. Memory is being rebuilt and rebuilt from mechanical memorization to meaning. At the same time, semantic memory itself is rebuilt – it acquires a logical character, to which thinking is necessarily added. Abstract material is easy to remember, becomes accessible.

The desire to be authoritative among your classmates and recognize this is an important incentive to learn. In this case, education takes on special importance for students.

Teaching students to solve text problems is considered as one of the main methods of teaching mathematics.

The process of solving textual problems, as well as a complex analytical and synthetic process, will be closely connected with the formation of such ways of thinking as analysis, synthesis, generalization, abstraction, etc. Educates the will of students, teaches them systematic mental work, self-control, develops intelligence. In the process of solving text problems, students develop skills and abilities to model specific objects and phenomena.

The solution of text tasks forms students' general academic skills such as the ability to plan their activities, carefully perceive educational information, motivate each step of activity, effectively formalize the result of their activities, exercise self-control.

In general, text tasks play a huge role in teaching mathematics.

Solving text problems, students gain new mathematical knowledge, prepare for practical activities. Text tasks contribute to the development of their logical thinking. The solution of text tasks is also of great importance in the education of the personality of students. Therefore, it is important that the teacher has a deep understanding of the text problem, its structure, and is able to solve such text problems in various ways.

"A text problem is a question formulated in words, the answer to which can be obtained using arithmetic operations" (M. I. Moro and A.M. Pyshkalo) [19].

Structure of any report:

1. data with certain properties;
2. relationships between data;
3. search data and its properties;
4. the relationship between data and variables.
5. find the desired variable.

The properties of the transmitted data, the relationship between them, as well as the relationship between the data and the search are called the task condition. The search and indication of the need to find it will be called a requirement for the report.

Thus, the report is a data system and is a system in which their properties and relationships and the need to find a variable are indicated. If the data and the desired variable, as well as the relationship between them, are expressed in mathematical language, then we call such a problem a mathematical problem.

The task condition is part of its concept, which reflects the elements of the subject area and the relationship between them.

The elements of the subject area and the relations between them can be divided into known (their values in the case of a clear representation of the tasks) and unknown (search (it is necessary to find values) and auxiliary).

Now let's look at the question of what is the essence of solving a text problem, what is the structure of the solution process, what are the features of the individual stages of this process.

The term "text problem solving" means the following concepts:

- 1) calls the result the solution of text problems, i.e. meets the requirements of the task;
- 2) the decision of the text of the task is the process of finding this result, the process involves double:
 - first, as a way of finding the result,
 - secondly, as a sequence of actions that perform crucial techniques with the use of a method (i.e., under the decision of the text of the task in this case refers to the human activity that solves this problem).

Solving a mathematical problem is finding a sequence of general mathematical propositions (definitions, axioms, theorems, rules, laws, formulas), applying them to the conditions of the problem or their consequences (intermediate results of the solution), is its answer.

If the process of solving textual problems should be understood as a process that begins from the moment the task is received until its complete completion, then this process consists not only of presenting the solution found, but also of a number of stages, one of which is the presentation of the solution.

What stages does the process of solving a text problem consist of? Of course, after receiving the task, the first thing to do is to understand what needs to be done for this text report, what its conditions are, what its requirements consist of, that is, to conduct a full analysis of this text report. This analysis is the first stage of the process of solving a text problem.

In some cases, this analysis must be formalized, recorded. To do this, various schematic tasks are used, the construction of which is the second stage of the process of solving a given text problem.

To analyze the problem and build its schematic record, it will be necessary, first of all, to find a way to solve the given problem. The search for a solution to a given text problem is the third stage of the process of solving a text problem.

If a method of solving a given text problem is found, it is necessary to implement it-this will be the fourth stage of the process of solving a text problem-the stage of implementing (presenting) the solution of a text problem.

After completing and presenting the process of solving the problem (written or oral), it is necessary to make sure that the answer received is correct. To do this, they check the method of solving the problem, which is the fifth stage of the process of solving a text problem.

When solving many text problems, in addition to checking, it is necessary to conduct a study of the text problem, namely:

- clarification in which case the task exists in each individual case;
- determine how many different solutions he has;
- it is necessary to determine in which cases this task is not solved at all.

Having made sure of the correctness of the solution of the problem, i.e. its answer, and, if necessary, after conducting a study of this problem, it is necessary to clearly formulate its received answer, this will be the seventh stage of the process of solving a text problem.

Finally, for educational and cognitive purposes, it is necessary to analyze the ways, methods and techniques of solving the completed text task, for example, it will be partially useful to determine whether there is no other, more effective way to solve a text task, what conclusions can be drawn from this solution, etc. All this is the last, of course, optional, Eighth stage.

Thus, the process of solving a text problem can be divided into eight stages:

Stage 1-Text task analysis;

Stage 2-schematic recording of a text report;

Stage 3-finding a way to solve a text problem;

Stage 4-implementation of the solution of text tasks;

Stage 5-checking the solution of the problem;

Stage 6-Learning the task;

Stage 7-forming the answer to the task;

The 8th stage is the analysis of the solution of a text problem.

Thus, the structure of the process of solving a text problem primarily depends on the nature of the task and, first of all, on the knowledge and skills possessed by the student solving it.

Five of these eight stages are mandatory and are in the process of solving any text problem (even if given in one form or another). These are the stages of analyzing a text problem, finding a way to solve it, implementing a planned solution, checking the received answer and formulating the answer. The remaining three stages (schematic writing of the report, studying the report and analyzing the results of solving the problem) are optional and do not occur in the process of solving many problems.

These classifications allow us to consider the problems associated with the methodology of teaching students to solve text problems. We conclude that teaching general methods of work on the formation of the ability of students of grades 5-6 to solve text problems, and also directs them to solve text problems by composing equations.

Conclusion

The ability to solve text problems is one of the main indicators of the level of development of mathematical knowledge of students, the depth of assimilation of educational material. Therefore, any exam conducted in mathematics, a test of mathematical knowledge involves solving problems as the main and most difficult section.

While studying at school, a student solves many problems, as a result, some students master the general skills of solving problems, and many do not know the ways or methods of solving them at the proper level, therefore they do not know.

One of the reasons for this situation is that at first the student gets used to the process of solving given tasks, tries to understand what methods and techniques of completing tasks he uses or uses. And in the second case, the student does not think about it, but only tries to solve the tasks faster. These students do not analyze the tasks being solved properly and do not distinguish common approaches and approaches from the solution. Tasks are often solved just to get answers.

In modern conditions, the practical value of teaching students to solve text problems in various ways lies not only in their use in the process of further education, but also in the fact that text tasks enrich the experience of students' mental activity. The fact is that a certain way of solving text problems is not just assimilated, it increases and develops the knowledge acquired by students every time. For the development of quality in the learning process, a special organization of the learning process itself is necessary.

When solving text problems by 5th grade students, the following difficulties arose:

- 1) difficulties associated with breaking the situation into logical components;
- 2) difficulties in choosing a schematic record, its design for a specific given text report;
- 3) when choosing the value necessary to designate the variable "x".

Because all these difficulties:

- 1) students misunderstood the terms of the assignment;
- 2) could not identify the processes described in the report.

In the 6th grade , the following difficulties arose:

- 1) in establishing the type of dependence;
- 2) in solving proportions.

The first difficulty that arose was due to the fact that the students did not try to analyze the patterns they encounter in life. They have not seen such patterns.

The second difficulty was associated with poor assimilation by students of the ability to use the property of proportion, which, in turn, led to erroneous results in calculations.

From the above, we draw the following conclusions:

1. effectively conduct frontal work in the classroom or with the class, or give tasks to students in cards for individual work.
2. it is necessary to conduct individual consultations with students with knowledge impairments, where, in addition to these tasks, they are invited to independently solve tasks scattered in the lesson. Since problems have to be solved in the learning process, it is necessary to explain to them the need to solve problems by composing equations.

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