

RESEARCH
ARTICLE

Methods of teaching mathematics based on Students' cognitive abilities

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Abstract

This article examines the impact of students' cognitive abilities on the teaching of mathematics and presents approaches that support students' intellectual development through the application of various teaching methods. The article emphasizes the importance of designing teaching methods based on the individual cognitive characteristics of students. Attention is paid to the issue of ensuring more effective learning of students through various pedagogical methods used in teaching mathematics, especially individual approaches.

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Introduction

Mathematics teaching is an important area for developing students' intellectual abilities. Success in teaching mathematics is possible not only by delivering the right information, but also by applying appropriate methods that take into account the student's cognitive activity. Cognitive ability may be different for each student, which requires individualization of teaching methods.

Students' cognitive abilities affect their learning speed, information processing skills, and problem-solving skills. Therefore, it is appropriate to use different teaching methods for students with different cognitive levels.

The learning activities may vary depending on the method used. Each of these activities develops students' skills such as activity and independent search. For

example, let's consider different ways of performing the division operation outside the table for the case of $57:3$.

First option . The teacher explains: "To divide 57 by 3, you need to replace 57 with the sum of two numbers such that each of the numbers added is divisible by 3. To simplify the calculation, 57 can be represented as the sum of $30+27$. Indeed, if we divide 30 by 3, we get 10, and if we divide 27 by 3, we get 9.

$$57:3 = (30+27):3 = 30:3+27:3 = 10+9 = 19$$

After the explanation, the teacher asks a student to repeat the reasoning. They usually explain the explanation using new examples.

The second option. You are already familiar with the case of dividing a two-digit number by a single-digit number. Each exponent of the dividend is divided by the divisor. Based on this, you can divide 48 by 3. For this purpose, we represent 48 as $(39+9)$, replace it with

the sum, and then find the answer based on the rule of dividing the sum by the number:

$$48:3=(39+9):3=39:3+9:3=13+3=16$$

Now let's consider some examples of difficult examples. Suppose we need to divide 54 by 3. First, let's apply the method known to us: $54:3$. However, neither the tens nor the ones are divisible by 3. It turns out that the previously taught method is not suitable for this example. At this time, ask the students to think about the following question. Maybe the number 54 is not divisible by 3? Let's apply another method to find the quotient. Let's divide the number 54 into ones and tens with the help of sticks. 3 tens out of 5 tens are exactly divisible by 3. In this case, let's divide 3 tens and 2 tens and 4 ones from 54. It is possible to divide 3 tens by 3. The division factor is 1 ten for each part. If we divide 24 sticks into 3 equal parts, each part will have 8 sticks. At this time, such an interesting question arises. But how can we divide 54 by 3? We need to extract such tens from 54 that their number is divisible by 3. Then we divide the remaining number by 3. In this case, we can replace the sum with the dividend and apply the rule of dividing the sum by the number. Since the exponents are not exactly divisible by 3, we express the dividend as the sum of the numbers divisible by 3:

$$54:3=(30+24):3=30:3+24:3=10+8=18$$

Third option . It is solved by a similar rule to the second option. However, unlike it, here we need to represent the number 54 as the sum of two numbers such that one of the added numbers is equal to the multiple of 3, which is familiar to children from the multiplication table. Applying what has been said, =let's take 3×6 18 from the multiplication table. If one of the added numbers is 18, then the other added number will be $54 - 18 = 36$. Since the number 36 is divisible by 3, it is possible to replace the number 54 with the sum of the numbers 18 and 36:

$$54:3=(18+36):3=18:3+36:3=6+12=18.$$

It is also possible to replace the 18-digit number with other numbers (15, 24, 27, etc.). Then, using these new numbers each time, we can divide the number 54 by 3 into two digits as above. In this case, we need to choose such numbers that the calculation is more convenient and easier.

It is very interesting to compare the different interpretation methods given for finding the destiny. In the first case, the teacher gives the new knowledge that needs to be taught in a ready-made form, and the students only have to understand and remember that

knowledge. In the second case, the interpretation can be given in such a way that in this process the teacher shows the students that the known methods are not suitable for solving the new problem. In this way, the students look for new ways to solve the problem.

Giving an explanation in the third method serves to increase the thinking activity of students. In fact, the teacher does not stop at showing the students that the problem he presents cannot be solved by known methods. At the same time, he also demonstrates research in various directions for solving the problem. When explaining the various methods envisaged, the teacher instructs the students to choose the most convenient one - the one whose calculation is fast and easy to perform. The teacher answers the questions that arise during the research. At this time, by following the teacher's explanation, the students become familiar not only with new calculation methods, but also with questions that arise when solving similar problems. In this way, the knowledge that the teacher teaches to the students is enriched and is assimilated by the students.

In all three cases, the students' efforts are focused on what the teacher says and shows.

When applying the learning methods we have considered, students' activity can be both reproductive and productive. Students' activity can consist either of assimilating, memorizing and repeating the acquired knowledge, or of solving a number of new problems.

The analysis of teaching methods in didactic literature is given more attention in this direction. MN Skatkin and I.Y. Lerner classify teaching methods as follows:

1. Explanation-illustrative method. The essence of this method is that the teacher conveys new information to students, who then perceive, understand, and ultimately remember that knowledge.

2. Reproductive method . The main feature of this method is that the teacher questions previous knowledge. Repetition of knowledge during the questioning ensures a more memorable and accurate perception of this knowledge.

3. Problematic explanation method. The difference between this method and other methods is that in this case, the teacher asks students questions about a new topic and creates a problematic situation. A problematic situation can be created with an example or issue. Students put forward ideas to solve this problem. After listening to each of their explanations, the teacher. Gives an explanation of the new topic. This

tool explains the obstacles encountered while solving the problem and the shortcomings of the explanation.

The problem-based learning method has a special place in order to develop students' independent thinking and creative thinking. The main importance of using the problem-based learning method in the lesson is that at this time, students are formed as "researchers", "first inventors". Putting new knowledge to be learned in the form of a problem requires a thinking process. Each of the concepts of problem and situation has its own meaning. However, even so, they form a close unity with each other. Thus, the situation creates conditions for solving the problem. The situation creates a debate to clarify the problem and becomes the object of analysis. Without the situation, the problem remains a problem and thus the problem cannot find a solution on its own.

The Greek word for problem means task, assignment. The terminological meaning of the problem, which is an issue that requires a practical or theoretical solution, is of great importance in the teaching method.

The situation is a process. The essence of this process is the systematization of knowledge and the formation of concepts through scientific debate.

The basis of problem-based learning is a problem situation. As a result of psychological research, it has been determined that thinking is formed from a question. The formulation of a problem and the creation of a problem situation in the educational process require great pedagogical skill. The problem is expressed in a question. If that question creates difficulty and the idea of answering that question requires activity, then a problem situation arises.

During a problematic situation, the questions the teacher asks students develop their understanding and, most importantly, activate their attention.

As is known, the problem is of two types:

1. Scientific
2. Training

The relationships between the problems are interpreted as follows:

1. Solving a scientific problem brings innovation to science, while solving a teaching problem, on the contrary, does not bring innovation.

2. A scientific problem resolves all contradictions, while a teaching problem, on the contrary, is consciously created and serves to develop students' thinking skills.

3. Solving a scientific problem requires a long time. An educational problem is created during the lesson process and solved in a short time.

It is not correct to call question-and-answer sessions and interviews in class a problematic situation.

It is true that when a problem situation is created, questions are asked and answered. Comparisons and generalizations are made. Finally, a conclusion is drawn. However, the questions asked during a problem situation are not the same as other questions. These questions require a lot of thinking and remembering. In order to further clarify what has been said, let's compare the two types of questions.

1. Which figure is called a triangle?
2. Why is a triangle called a triangle?

The students easily answer the first question by recalling the knowledge they have acquired before thinking too much. There is no discussion about the answer to the question. Because the question is a theoretical question and they answer it by recalling the answer theoretically.

The second question, unlike the first, is completely different when answering. When solving the problem, students must recall their knowledge acquired not only on one topic, but on several topics.

For example, in a first-grade math class, when students are solving addition and subtraction problems (up to 10), the teacher gives the students various examples. Since the students know the operations of addition and subtraction, they easily solve the problem. Later, when solving equations, to find the unknown, the students easily determine the unknown because they have performed the operations of addition and subtraction.

Let's look at the following example for explanation:

$$x + 3 = 9$$

The solution to this example cannot be solved based on previous knowledge. In the created problematic situation, students are unable to come up with an independent idea. At this point, the teacher addresses the class and asks the question, "What is unknown?"

Some of the students say that it is unknown who gathered first.

It is clear that the student himself states the problem and then puts forward various hypotheses for solving this problem. The various ideas put forward are as follows:

1. To find the missing number, you need to add 9 and 3.
2. The unknown is 3.
3. The unknown is the difference between the added 9 and 3.

As you can see, the first and second answers are wrong.

The third answer is both correct and justifies its correctness.

$$9 - 3 = 6, 6 + 3 = 9.$$

One of the main elements of problem-based learning is problem interpretation. The advantage of problem interpretation is that, on the one hand, such interpretation shows students an example of scientific research, and on the other hand, since problem interpretation is always emotional, it increases students' interest. During problem interpretation, students do not perform any independent work, therefore it is difficult to say about their cognitive independence. Problem interpretation goes through the following stages of cognitive activity:

1. Creating a problematic situation.
2. Analyze the problematic situation.
3. Assumptions
4. Justification of assumptions.
5. Analyzing hypotheses.
6. Problem solving.

Students' cognitive activity is considered independent if they participate independently in at least one of these stages.

Sometimes, after understanding the problem, students engage in independent research, put forward hypotheses, think of new methods to test them, and draw conclusions. Since the cognitive activity of students in this teaching method resembles the activity

of a scientist discovering new scientific truths, this method is called the research method. With this method, new knowledge is acquired entirely through the independent work of students.

Problem-based learning is a methodological system. It cannot be called either a method or a technique. Problem-based learning is a methodological system in which various methods and techniques alternate. During the implementation of the process, interviews, teacher commentary, analysis and generalization, independent work, and the use of visual aids replace each other.

Problem-based learning is applied depending on the purpose of the lesson and the teaching methods to be taught. Therefore, it is not correct to universalize problem-based learning like other methods.

The teaching problems that occur at different stages of the lesson can be explained as follows:

1. Problems that arise at the beginning of the topic explanation.
2. Problems that arise during the mastery of the topic.
3. Problems that arise during the consolidation of the topic.
4. Problems that arise during repetition and generalization.
5. Problems that arise when checking the level of knowledge acquisition.

Depending on how problems are organized and presented to students, and most importantly, their solution:

1. frontal
2. in a group
3. individual

The place and possibilities of problem-based learning in mathematics teaching.

The topics included in the mathematics course for grades III and IV of primary school are designed based on the principles of didactics from easy to difficult and from simple to complex. It is appropriate to use the training nature of tasks and exercises that allow the transformation of theoretical material into practical skills and habits by setting various types of problems in

the mathematics course. There is a wider opportunity to create problem situations through problem solving in mental development and the formation of logical thinking. In the process of problem solving, problem situations in students:

1. Thinking coherently and consistently
2. To conduct a trial
3. It teaches them to justify their own independent opinions.

Problems solved in this way develop students' attention and memory, as well as their thinking, and increase their activity.

The following factors influence the occurrence of problematic situations during mathematics teaching:

1. The internal logic of the subject and its topics should be thematically concentrated.
2. Enabling students to apply various intellectual and practical activities.
3. Integration of mathematics with technical and natural phenomena.
4. Applying acquired theoretical knowledge to real life.
6. Using different algorithms when solving examples and problems.
7. Giving questions consisting of both qualitative and quantitative work and assignments.

The level of problem-solving differs significantly from one another depending on the problem posed and the degree of activity in solving it, as well as the nature of cognitive activity and the application of knowledge. This distinction is divided into three levels.

First level . After stating the problem in the explanation of the material, the teacher himself takes on all the difficulties related to its solution, while the students observe the process of solving the problem. At this time, the teacher directs the students' thoughts in parallel with his own.

Second level . The teacher involves students in the formulation and formulation of the problem, and in its solution to the extent of their ability. Therefore, students become participants in the searches and results obtained related to the solution of the problem.

Level Three : Students formulate the problem themselves and solve it independently from beginning to end using their own resources. The results of the solution and application are at a much higher level.

Levels of difficulty are a stimulus that stimulates the development of students' intellectual activity and creative abilities. A teacher who understands these applies what is necessary from one level or another as appropriate so that students can master mathematical knowledge deeply and firmly.

4. Partial search or heuristic method. The essence of this method is that the teacher formulates the task, then divides it into auxiliary parts, and the students perform the search part.

Heuristics - the meaning of the word "eureka" - is related to finding and has a pedagogical nature. It can be found in several meanings in pedagogical literature. For example, heuristic method , heuristic approach, etc.

the cognitive activity of students , there are various methods and approaches in pedagogical literature. Both the heuristic method and the heuristic approach essentially consist of the student "discovering" new knowledge by referring to previous knowledge. Modern learning refers to developmental learning [5 76]. To achieve this, traditional learning methods, as well as new technologies and approaches, are used. The main goal is to teach students how to learn and discover. This constitutes the initial stage. In the next stage, the student tries to acquire the knowledge he receives from the teacher with the necessary instructions. At this time, thinking operations come to his aid [12, 82]. Trying to discover new patterns based on known knowledge and experience using thinking operations, the student observes , compares , measures , generalizes, abstracts, and concretizes. A student's individual scientific knowledge and potential increase when a correct and clear action plan is prepared by the teacher. This includes the following :

- 1) the effectiveness of the individual progress plan;
- 2) the goal set and the selection of ways and means to achieve this goal;
- 3) the optimal organization of the training and the importance of applying the presented task ;
- 4) protection by taking into account differentiation .

Such heuristic activity of students ensures the realization of their creative activity.

, interpretation forms such as monologue and dialogue are selected and applied depending on the nature of the topic. Individual-heuristic and individual approach to activity play an important role in developing students' creative abilities .

becomes effective when a dialogue is established between the student's external educational environment and his/her creative activity.

In this case, the dialogue process does not act as a pedagogical method or form of training. Dialogue acts as one of the most important principles of education.

Heuristic dialogue defines the leading role of the student during educational activities. does. What is meant by heuristic dialogue ? Any issue or problem put forward by the student is directly addressed to the external educational environment. The features of each stage of the student's educational activity , as well as in determining the goal, choosing forms and methods, should be taken into account. In order to strengthen the dialogic aspect, a number of cosmetic changes are made to various structural stages of the current education system. For example, if we look at the developmental education system, dialogue is noted as a certain addition to the reproductive method of training. Students should be guided in such a way that the knowledge and skills they acquire on the basis of theoretical generalization and abstraction lead them to new concepts.

Dialogue helps the student develop as a person in his/her educational activity. However, it cannot determine his/her future education. The pedagogical nature of dialogue can be explained only when the student determines his/her own individual educational trajectory .

As with teaching methods, dialogue also has a philosophical - methodological basis. According to the definition of heuristic teaching, the student understands the reality of the area he is studying in his primary educational activity, that is, in his primary educational activity . The main advantage of this is that often, instead of teaching reality , knowledge or information about it is taught. For example, real educational objects:

- 1) Natural objects . Examples of these include water, soil, air, etc.
- 2) Cultural objects. Examples of these include paintings, architecture, written texts, etc.
- 3) include computers, telephones, televisions, etc.

What we have mentioned above is called the first stage of the student's activity.

The second stage consists of the following: The product of the student's activity obtained at the initial stage , for example, a hypothesis, an image, symbols, etc., is compared with its cultural-historical analogue with the support of the teacher. It is this product that is reflected in the teaching subjects, as well as in the fields of education. It consists of the foundations of the sciences inherent in society .

In the third stage of the student's activity, this product is refined and put into a certain system . For this stage, the student's knowledge, experience and personal abilities play a special role.

The student's sequential heuristic activity, consisting of these three stages, is reflected in the answers to the following three questions: What to learn? How to learn? Why to learn?

The methodology for understanding any object requires:

- 1) distinguishing the studied object from other objects .
- 2) external inspection of the object.
- 3) determining whether the object is suitable for live observation.

The identification of the external features of the object under study and the answer to the question "What ? " is realized at the second stage of the study. Describing the properties of the object , dividing it into parts and studying them separately , comparing them with each other and, as a result, revealing the regularity is relevant for this stage. In accordance with this stage of the study , the question " How ?" is posed. In order to justify the work done above, in the third stage , various properties and aspects of the object under study, that is, the object being understood, are qualitatively synthesized and reflected in the question "Why?"

It has been observed that in primary grades, the "question-answer" dialogue is more interesting to students. As a result of experience, it has been determined that they are not always able to succeed. Because they do not possess all of the above qualities . However, this work should be carried out systematically, not episodically. When a student asks a question, he or she either wants to know the answer to it, or wants to compare the possible answer with his or her own. This factor directly serves the formation of the student's creative abilities. The question - being

attributed to the student's visual and figurative thinking, can be unconsciously and in some way connected with the emotional beginning .

opinion about his abilities, judgment, etc. However, based on the student's answer to the given question, little information can be obtained about his abilities. As Aristotle, F. Bacon, Y. Xintikka and other scientists noted, there are opportunities for the realization of cognitive activity in the question, which is a creative product . In mathematics lessons for younger schoolchildren, asking and giving questions , and most importantly, conducting heuristic dialogue - parallel to the educational task, also reflects its solution. That is, the educational problem of education is also solved at this time. The main moral qualities that form the basis of personality tolerance are formed .

Based on the question asked by the student, it is possible to form an opinion about his cognitive activity, then such a question arises.

It is also a well-known fact that the creative activity of a student can be assessed as knowledge and activity. Indeed, in the question asked by the student, his attitude to that object or event, his ideas about it are reflected. It is precisely on the basis of these qualities that it is possible to assess the student. It can be said that the formed knowledge already constitutes the most important component of the student's creative activity. This is considered the first.

The second is that the issue under consideration is related to the category of “ unity of opposites ” of dialectics , and is the student's transition from knowledge to ignorance (asking a question), that is, from old knowledge to new knowledge . It expresses his creative activity. The wise considered a wise question to be half of knowledge. Indeed, when a student acquires certain knowledge and information about any subject, process or event, he expresses some part of it that he does not know in the form of a question. In fact, he tries to complete his knowledge . In this form, the student's question has two functions . These functions manifest themselves as knowledge and as creative activity . Such activity allows us to accept the answer to that question as a pedagogical form and model.

The questions asked by the student in heuristic activity can be classified as follows :

a) intensive (cognitive) questions aimed at deeper assimilation of newly taught material;

b) extensive questions related to intra- and interdisciplinary integration;

c) creative questions that serve to deepen and integrate interdisciplinary knowledge .

the sequence of questions designed to assess the student's creative activity more effectively.

It is possible to assess student knowledge, which reveals a similar aspect of these types of problems, from two perspectives: visual-figurative and logical-thinking.

In heuristic problems, the question "what?" is usually asked in relation to the unknown .

The question "How?" serves to determine the quantitative relationships between the given quantities in the problem.

The question "Why?" is aimed at determining the most appropriate way to begin solving the problem.

As a result of the experiments, it was determined that the problem-solving and, most importantly, the analysis phase of this problem, since it is structured in the form of a dialogue, also leads to the development of emotional qualities in students.

Currently, the concept of "educational growth in students" is often found in pedagogical literature. Educational growth can be determined by the following qualities for younger schoolchildren:

1) In mathematics lessons, the ability to justify any proposition is required (the sum of even numbers of odd numbers is even, the sum of odd numbers of odd numbers is odd),

2) acquiring knowledge related to the subject and increasing this knowledge ,

3) further increase in the quality of reflexive judgments .

On the basis of what qualities and indicators does the dynamics of “educational growth” in students take place? In our opinion, various analyzers of students participate in mathematics lessons, and based on this, ideas are formed. The formed idea manifests itself in the form of speech. For this reason, lessons or exercises of a heuristic nature primarily develop students' thinking, as well as memory and, most importantly, speech . This in itself is a manifestation of the effectiveness of the lesson.

There are enough methods and tools to activate the activity of primary school students in the process of teaching mathematics. The application of the heuristic dialogue method among these methods gives impetus to the acceleration of the dynamics of their educational growth.

on pedagogical and advanced school experience, the following proposal can be put forward: it is necessary to take into account the components of heuristic dialogue in educational normative documents and teaching aids. Heuristic dialogue is a tool that implements developmental training.

5. Research method. The main essence of this method is the method of organizing the search or creative activity of students to solve any problems that are new to them. According to the authors, in the real learning process, most of the research tasks should consist of not very large search problems. However, such problems should require application to all or many stages of the research.

Developing students' research skills is one of the tasks facing primary education. Mathematics has a special role in its fulfillment.

The active (interactive) learning method in the process of solving problems in mathematics implies training based on the active and cognitive activity of students and carried out in cooperation with each other. Active (interactive) learning is a set of methods for organizing and managing teaching and cognitive activity. The following aspects are characteristic of the use of active (interactive) learning methods in the process of solving problems:

- conscious creation of a cognitive problem situation by the teacher;

- students' active research position in the problem-solving process;

- creating conditions for students to solve the problem and master it.

The main essence of this approach is that the problem being solved is aimed not only at enriching the students' memory with new scientific and practical knowledge, not only at perceiving the solution in a "ready-made" form, but also at obtaining and mastering an independent solution to the problem based on the systematic development of thinking. In this case, students will acquire the following skills in the process of solving a specially selected, easy-to-understand and memorable problem under the guidance of the teacher.

1. To discover cause-and-effect relationships between facts and events.

2. To draw a conclusion.

3. Making important and profound generalizations

If a student achieves successful results in the problem-solving process, he or she will approach other easy and difficult problems with creativity and interest.

Active or interactive learning creates conditions for independent acquisition of knowledge, referring to the principle of teaching learning, which is one of the main tasks of modern education. As a result of active learning in the learning process, students already perceive and assimilate knowledge independently. When solving a problem, students' logical, critical, and creative thinking are developed. Also, when solving problems, they develop the skills of making final decisions, understanding theoretical and practical issues in a coherent manner, scientific research skills, and, in addition, a broad worldview. Mutual respect and cooperation skills are instilled between student-teacher and student-student.

Along with the advantages of active (interactive) learning, the teacher should not completely abandon the use of traditional teaching methods (explanatory-illustrative and reproductive), but should make his choice depending on the content and purpose of the given problem, as well as the students' preparation [17, 91]. For example, in order to form skills and habits through problem solving, the teacher may prefer a more reproductive method. If the given problem is quite complex, requires more new concepts and information, then the traditional method may be more effective. Let's consider the application of interactive work forms to problem solving.

Organizing pair work in the problem-solving process. In this form of work, students work on the problem in pairs. The reasons for this are as follows.

1. So that they can help each other when solving the problem.

2. Have them share their thoughts about the problem they solved.

3. They can organize mutual inspections.

The organization of training in a group form is one of the main forms of work in an active learning environment. In the process of solving a problem in a group, it implies the rejection of the "teacher-student"

dialogue and the predominance of feedback between “teacher - group - student”. Joint solution of the problem by students teaches cooperation and also joint solving of various problems. In addition, it reflects the following:

1) Problem solving ensures that each student is involved in the cognitive process;

2) Problem solving gives each student the opportunity to express their opinion and listen to others;

3) Problem solving shows the existence of different perspectives, different approaches to the problem, and different solution methods.

This, in turn, allows the student to demonstrate their skills while solving the problem, while also increasing their self-confidence.

Working with the whole class. This form of work is also very necessary in active (interactive) learning. It differs from the traditional frontal inquiry in that it is not limited to solving the problems solved, but also makes extensive use of the information obtained and applies it by searching for new solutions [18].

In elementary mathematics education, changing the wording of problems based on given requirements or making changes to the texts based on given solutions encourages students to conduct research.

To correctly select the teaching method to be applied, it is necessary to consider the characteristics of the teaching material. In this case, much depends on the preparation of the students, as well as the novelty of the material.

In order to derive a general rule, it is important to apply the rules that apply to each situation. For this reason, training activities are carried out in the knowledge consolidation phase. This helps the student to develop the ability to apply the rule he has learned in similar examples of this type that he encounters later.

The fact that each subsequent topic in the elementary mathematics course is related to the previous one creates ample opportunities for students' heuristic activities.

When giving students independent work, the questions formulated should be prepared in such a way that they repeat old knowledge and at the same time help them master new material. It is also necessary to choose the questions in such a way that it is more

expedient to use leading questions. This can be considered the beginning of the students' productive, searching, creative work.

In mathematics teaching, the corresponding work is carried out in the form of oral heuristic conversations or independent execution of tasks given in the textbook. In this case, some programmed training elements can be used. The exercises consisting of such materials are selected in such a way that the student who consistently performs them can easily solve the problem posed when answering the questions given. The correct selection and formulation of tasks and questions is also very important for the assimilation of new material. In this case, the textbook partially replaces the teacher who conducts heuristic conversations [4; 8; 11].

The presentation of knowledge by the teacher in a ready-made form, that is, traditional teaching methods, can never lose their importance, because these teaching methods develop the actual knowledge, skills and habits of students. Without them, creative independent work is impossible.

However, giving preference to these teaching methods that direct students to quickly master ready-made knowledge can artificially slow down their cognitive development. Therefore, it is necessary to look for teaching materials to develop students' creative skills, as well as suitable ways and approaches for conducting independent work in all cases that allow students to prepare.

In mathematics teaching in primary grades, such teaching methods and approaches should be applied that encourage students to systematically search for solutions to not very difficult problems. Problems naturally arise in mathematics teaching. Indeed, not only in textual problems, but also in many of the exercises given in textbooks and didactic materials, there is a specific “problem”. The student must think and make appropriate transformations to solve the example. Teachers often teach students in advance the method of solving a certain type of problem in order to achieve a successful learning result. For this, they give many exercises of the same type. This sometimes leads to a waste of time. However, this does not mean that there is a reason to reduce the role of training exercises. On the contrary, a wide place should be given to exercises that serve to form habits. An example of this is the achievement of a successful learning result by solving simple problems of the same type that serve to form appropriate ideas about arithmetic operations.

However, exercises designed to compare complex textual problems and expressions require students to apply known regularities and relationships in new situations. Problems with mainly geometric content require memorization and recall of previous knowledge. For this reason, the use of such exercises is very necessary when giving students thought-provoking problems. In this case, mathematics teaching fulfills not only an educational task, but also an educational task. This approach can be considered useful when the tasks selected by the teacher are appropriate for the level of preparation of the students. In order to develop the research ability of students, it is necessary to pay special attention to the tasks used in the learning process in the lower grades. Let us give an example of selected tasks related to the application of the research approach. Suppose the teacher draws the attention of first-grade students to a figure with several triangles and quadrilaterals on it. The given figures are not grouped, triangles are red, and quadrilaterals are green [10, 71]. The teacher tells the students that they will call the red figures triangles, and the green figures quadrilaterals. Then he asks the class why they would call the red shapes triangular and the green shapes quadrilateral. This question poses a difficult problem for some students. To answer this, students must observe and compare. First, they must compare the terms triangle and quadrilateral. When analyzing the words, they must distinguish the words three, four, and angle that they have learned. These, in turn, are the words that form new terms. Such analysis and comparison directs the students' thinking in a certain direction. As a result of the observation, comparison, and analysis, they

come to the conclusion that indeed, each of the red shapes has three angles and each of the green shapes has four angles.

Solving any complex text problems requires the implementation of all elements of productive thinking that are characteristic of a research approach. These elements include studying observation factors, analyzing the condition, distinguishing data, first of all, correctly understanding the question, identifying intermediate unknowns, and finally, drawing up a solution plan for the problem. After that, the answer is written and the solution is checked. All this shows that setting problems during the teaching of mathematics in primary grades is not the first time for the teacher. The main issue here is the correct use of the opportunities and tools that are secretly available.

Conclusion.

Students' cognitive abilities play a key role in teaching mathematics. Adapting mathematics teaching methods to the individual characteristics of students ensures their more effective learning and development. The application of various teaching methods increases students' analytical thinking skills, allows them to solve problems better, and increases their interest in mathematics. This approach allows for the application of more modern and individual approaches at all levels of the education system, which ultimately allows students to achieve better results during their education.

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