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Practical Case Of Developing Students' Creative Abilities Through Logical Problems In Teaching Mathematics (In The Case Of Blind Students)

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Abstract: This article highlights the pedagogical importance of using logical problems in engaging blind students in mathematics and developing their creative thinking skills. The methods used in practical situations, students' reactions to problem situations, and the formation of skills such as independent thinking and problem solving in them are analyzed. Didactic tools and interactive approaches adapted for blind students are also considered.

Keywords: Logical problems, creative thinking, blind students, mathematics, didactic approach, special pedagogy.

Introduction: In the modern educational process, one of the main tasks is to identify and develop the individual abilities of each student. Especially when working with children with disabilities, in particular, blind students, there is a need to change, adapt teaching methods and apply innovative approaches. There is an opportunity to form students' creative thinking through the use of logical problems in teaching mathematics.

One of the main tasks of the education system in the 21st century is to fully realize the intellectual potential of each student, taking into account their individual characteristics. The organization of mathematical education for students with special needs, in particular,

blind children, requires special attention. Mathematics, by its nature, is one of the main disciplines that develops logical thinking and forms abstract thinking.

The use of logical problems in the mathematical education of blind students creates great opportunities for the development of their creative abilities. These problems teach students to think independently, find different solutions, and apply mathematical knowledge in practical life.

The concept of inclusive education is built on the theoretical foundations created by such famous psychologists as L.S. Vygotsky, A.R. Luria, S.Ya. Rubinstein. The theory of the "zone of proximal development" developed by Vygotsky is of great importance in the development of mathematical abilities of visually impaired students.

Modern researchers (Tomlinson, 2014; Villa & Thousand, 2016) consider the following principles to be the main ones in inclusive mathematics education:

Providing an individual approach

Teaching through multiple senses

Creating a flexible learning environment

Providing social integration

Currently, the development of the intellectual and creative potential of each student is a priority in the education system. In particular, the social integration of children with disabilities and their effective involvement in the educational process are one of the pressing issues. The role of logical problems in attracting blind students to mathematics, developing their independent thinking and logical reasoning skills is of particular importance.

Logical problems take the student beyond the simple calculation process and encourage him to analyze, compare, and identify cause-and-effect relationships. In this regard, they are an effective means of developing creative abilities.

Logical problems are tasks that require analysis, comparison, generalization, and conclusion in the solution process, which serve to form logical structures of thinking in students.

As noted in the pedagogical and psychological literature, logical problems have the following theoretical characteristics:

Based on the mechanisms of logical thinking.

The process of solving logical problems is based on the principles of Aristotelian logic - the laws of identity, non-contradiction, exclusion of the third case, and sufficient grounds. When analyzing the conditions of the problem, the law of identity requires strict preservation of the data of the problem, and the law of non-contradiction requires the simultaneous non-acceptance of contradictory solutions.

Development of mental operations.

Solving logical problems requires such mental processes as analysis (dividing the condition of the problem into parts), synthesis (bringing elements into a whole system), comparison (identifying similar and different aspects), generalization, and abstraction. These operations form higher-level forms of thinking.

Motivation to apply knowledge in new conditions.

Logical problems require students to independently apply existing knowledge in new conditions, not a ready-made formula or algorithm. In this regard, they are considered “creative problems”.

Basis of a problem situation.

In the condition of a logical problem, there is usually a partial, rather than a complete, connection between known and unknown information. In the process of solving this problem situation, the student thinks, makes assumptions and checks them.

Structural features.

The general structure of logical problems includes:

condition (given information),

question (element to be found),

solution (logically consistent analysis and conclusion).

The condition is often given in textual form, and the solution is formed through consistent thinking.

Psychological foundations.

Studies by scientists such as Piaget and Vygotsky emphasize that logical thinking is formed in children gradually: first on the basis of objective-practical activity, and then at the abstract-logical level. Therefore, logical problems are considered an important tool for moving students from objective perception to abstract thinking.

Stimulation of creative thinking.

Logical problems often include several solution options or require an unconventional approach to finding a solution. This develops divergent thinking in students, that is, the ability to search for alternative paths.

Thus, logical problems are theoretically a complex tool that activates the intellectual activity of the student, standing at the intersection of the disciplines of logic, psychology and didactics. With their help, students not only consolidate their knowledge, but also learn to apply it in new conditions, which is the basis for the development of creative abilities.

Classification of logical problems

There are several bases for classifying logical problems in scientific and didactic sources. They can be summarized as follows:

According to the content:	Combinatorial problems – related to order, placement, selection, counting possibilities. Riddle problems – based on figurative or implicit logical connections. Strategic problems – require decision-making, choosing the optimal path. Algebraic-logical problems – lead to a logical conclusion using numerical or symbolic relationships.
According to the solution:	Direct inference problems – solved by drawing consistent conclusions from the data. Inductive problems – encourage finding a general rule based on examples. Deductive problems – based on determining a specific case based on a general rule. Analytical-synthetic problems – solved by making a guess and checking it.
According to the form:	Text-based logic problems - are given based on a narrative or situational text. Table-based problems - are solved by arranging interrelated information. Diagrammatic and graphical problems - are presented in relief or pictorial form (in a form specially adapted for visually impaired students).
According to its function in the educational process:	Developing questions - expand creative and logical thinking. Control questions - serve to test knowledge and skills. Motivational questions - increase interest and

	involvement in the lesson.

Teaching mathematics to blind students requires specific methodological approaches. Because they lack visual perception, they acquire knowledge through hearing, feeling, and imagining. Therefore, when organizing mathematics lessons, the teacher must take into account the following features:

Reliance on sensory capabilities.

Blind students acquire knowledge mainly through hearing, touch, and spatial imagination. Therefore, sound explanations, tactile materials (relief drawings, Braille writing), and real object models are widely used in the lesson process.

Alternative forms of visualization.

Instead of visual aids used in regular schools, relief graphics, models that replace vision, and teaching aids that allow you to feel the shape of objects with your hands are used.

Strengthening verbal explanations and descriptions.

Each concept and condition of the problem should be explained to students in detail, clearly, and consistently verbally. Students themselves are also encouraged to explain the solution process out loud.

Step-by-step presentation of educational material.

The complexity of the problem or topic is gradually increased. First, an understanding is formed through simple examples, and then generalizations and independent conclusions are made.

The use of special technologies.

Audio textbooks, computer programs, screen-reading technologies, Braille printers allow students to independently master mathematical information.

Development of spatial imagination.

Geometric shapes, drawings and graphic concepts are formed for blind students through intuition and imagination. For this, relief geometric figures, demonstration models and special didactic games are used.

Stimulation of creative and independent thinking.

It is important to involve blind students not only in computational operations, but also in logical, problematic and creative issues. This ensures the development of their thinking and social adaptation.

The priority of an individual approach.

Each blind student may have a different speed of perception, hearing ability, and spatial perception. Therefore, an individual approach and differential methods must be used in the lesson.

Recessed (凸-shaped) calculation tables are a very convenient tool for teaching arithmetic operations to blind students. In these tables:

The numbers are given in Braille or raised dots, so the student can read them by feeling them with his hand.

The rows and columns of the table are separated by relief lines, which helps to understand the order of the arithmetic operation.

For example, in the addition or multiplication table, the student moves through one column and one row with his hand and finds the result at the intersection.

With the help of such a table, the student:

reinforces the operations of addition, subtraction, multiplication, and division;

feels the relationship between numbers through spatial imagination;

increases calculation speed and independence.

Special models in teaching geometric shapes

Relief or three-dimensional models are used to form geometric concepts in blind students. With their help, the student holds geometric figures with his hands and learns their shapes and properties through intuition. For example:

Flat shapes (square, triangle, circle): are made with raised lines on relief plates. The student traces the boundaries of the shape with his finger and determines its sides and angles.

Three-dimensional objects (cube, sphere, prism, cylinder): are taught using models made of wood, plastic or rubber. The student rotates them in his hand and imagines the surface, edges and angles.

Measuring practice: relief rulers are used to study length, a special tactile protractor is used to study angles, and relief square centimeter cells are used to study surface.

With the help of such models, the student:

perceives shapes and can distinguish them from each other;

understands geometric terms (side, angle, edge, face) through practical intuition;

expands spatial imagination and connects abstract knowledge with concrete sensations.

These examples show that relief tables and special models serve as an important tool for visually impaired students to more clearly perceive mathematical

concepts and consciously master them.

1. Exercise based on a relief calculation table

Topic: Addition

Exercise:

The student uses a relief table.

The teacher asks the question: “What will be the result if you add 3 and 4?”

The student finds the number “3” in the left column of the table and the number “4” in the top row with his finger.

Finding the relief number at the intersection of the column and row, he says the result: “7”.

Result: The student performs the addition operation through tactile perception and studies the relationship between numbers using spatial imagination.

2. Exercise based on geometric models

Topic: Properties of a cube

Exercise:

The student is given a wooden or plastic cube model.

The teacher asks:

“How many edges does a cube have? Count them with your hand.”

“How many faces does a cube have? Feel each face with your finger and say.”

“How many corners does a cube have?”

The student holds the models with his hand and counts the edges, faces, and corners.

Result: The student understands the basic elements of a cube (edge, face, corner) through practical intuition and consciously assimilates geometric concepts.

3. Spatial imagination exercise

Topic: Differentiating between a triangle and a rectangle

Exercise:

The student is given a triangle and a rectangle drawn on a relief plate.

The teacher asks: “Which shape has three sides, and which has four?”

The student counts their sides by tracing the boundaries of the shape with his hand and determines the difference.Natija: O‘quvchi shakllarni taqqoslash va tasniflash ko‘nikmasiga ega bo‘ladi.

☞ Such exercises not only teach blind students mathematical concepts, but also develop independent thinking and spatial perception.

CONCLUSION

The use of relief calculation tables, geometric models and special didactic tools in teaching mathematics to blind students increases the effectiveness of education. This approach helps students consciously master arithmetic operations, intuitively understand geometric concepts and expand their spatial imagination. Also, creative thinking and independent thinking skills are developed through logical problems. When a special pedagogical approach and adapted educational materials are used, blind students can effectively integrate into social life while mastering mathematical knowledge.

REFERENCES

1. Vygotskiy L.S. Pedagogik psixologiya. – Moskva: Pedagogika, 1991.
2. Piaget J. Rebenok i realnost. – Moskva: Progress, 1994.
3. Ziyomuhamedov B., To‘raqulov U. Pedagogika nazariyasi. – Toshkent: O‘zbekiston, 2010.
4. G‘ulomov S., Xolmatov I. Maxsus pedagogika. – Toshkent: Fan va texnologiya, 2015.
5. Karimov M. Matematika o‘qitish metodikasi. – Toshkent: O‘qituvchi, 2018.
6. Murodova M. Inkluziv ta’lim: nazariya va amaliyot. – Toshkent: Ilm Ziyo, 2020.
7. UNESCO. Inclusive Education: Teaching Children with Visual Impairments. – Paris, 2017.