

Correctional-Pedagogical Foundations of Forming Mathematical Concepts in Primary School Pupils with Intellectual Disabilities

Tag'onova Guliza Bayramaliyevna

Teacher at the Department of Special Pedagogy, ChDPU

Abstract

This article discusses the correctional-pedagogical foundations of forming mathematical concepts in primary school pupils with intellectual disabilities. The article analyzes the content of the concept of mathematical representation, its structural components, the difficulties encountered by children with intellectual disabilities in mastering mathematical knowledge, as well as ways to overcome these difficulties. In addition, the effectiveness of using visual-practical methods, didactic games, object-based practical activities, real-life situations, and an individual approach in mathematics lessons is substantiated. It is emphasized that the process of forming mathematical concepts contributes not only to the acquisition of knowledge by children with intellectual disabilities, but also to their preparation for independent life, social adaptation, and the ability to make appropriate decisions in practical activities.

Keywords: Child with intellectual disability, mathematical concept, primary education, special pedagogy, correctional education, visual method, didactic game, object-based practical activity, number and counting, quantitative representation, spatial representation.

INTRODUCTION

Today, in the system of special education, the development of cognitive activity in children with intellectual developmental disabilities, their preparation for independent life, ensuring their social adaptation, and the formation of practical skills are considered among the important pedagogical tasks. The formation of mathematical concepts at the primary school level is of particular importance. Mathematics as a subject is not limited only to learning numbers or performing calculation operations in a child's life. It helps the child orient themselves in everyday life, compare objects, understand quantity, distinguish time, use money, comprehend units of measurement, and make appropriate decisions in simple practical situations.

In children with intellectual disabilities, the underdevelopment of cognitive processes, insufficiently differentiated perception, weak memory, rapid distractibility of attention, and the concrete-practical nature of thinking cause various difficulties in mastering mathematical knowledge. Such children often face difficulties in understanding the relationship between number and quantity, matching a numeral with the number of objects, comprehending the meaning of arithmetic operations, distinguishing geometric shapes, and acquiring spatial and temporal concepts. Therefore, mathematics lessons should be organized on the basis of a special pedagogical approach, visual aids, practical actions, repetition, play, real-life situations, and individual support.

The process of forming mathematical concepts has a correctional-pedagogical content, as it develops not only the pupil's mathematical knowledge, but also their perception, thinking, speech, memory, fine motor skills, logical reasoning, and socio-practical activity. From this



point of view, mathematics lessons are considered an important correctional tool for children with intellectual disabilities.

Mathematical concepts are a system of a child's initial knowledge, skills, and practical understandings related to number, quantity, shape, space, time, measurement, comparison, and arithmetic relationships. In primary school pupils with intellectual disabilities, mathematical concepts are formed gradually, on the basis of concrete objects, visual materials, practical actions, and repeated exercises. In this process, activities in which the child directly sees, touches, counts, compares, places, and performs tasks in practice produce more effective results than abstract explanations.

In forming mathematical concepts in children with intellectual disabilities, the development of the concept of number and counting is of primary importance. A child should understand a number not only as a numerical symbol, but also as a concept expressing a certain quantity. For example, when teaching the numeral "3," it is not enough to simply write the number 3 on the board. The pupil should be shown 3 cubes, 3 pencils, and 3 apples, and be given tasks to count, separate, group, and compare them with other quantities. In this way, the child understands the relationship between numerals, numbers, and the quantity of objects through practical experience.

The formation of quantitative concepts is also one of the important directions in teaching mathematics. Concepts such as big-small, many-few, long-short, wide-narrow, high-low, and heavy-light should preferably be taught to children with intellectual disabilities through direct interaction with objects. For example, comparison exercises can be organized using ribbons of different lengths, containers of various sizes, large and small balls, and heavy and light objects. Such exercises develop children's sensory-perceptual activity and teach them to distinguish object features, classify them, and generalize them.

In the formation of geometric concepts, shapes such as circles, squares, triangles, and rectangles are initially explained by relating them to real objects. For example, a clock is associated with a circle, a window with a rectangle, a roof with a triangle, and a tabletop with a square. It is considered effective not only to name the shapes, but also to master them through tasks such as touching, drawing, coloring, cutting out, comparing them with one another, and identifying them among surrounding objects. Such an approach develops the ability of children with intellectual disabilities to perceive the shape, color, size, and location of objects.

The formation of spatial concepts is also of particular importance. This is because children with intellectual disabilities often have difficulty distinguishing concepts such as "on," "under," "in front of," "behind," "next to," "inside," "outside," "on the left," and "on the right." In teaching these concepts, the teacher can achieve results by placing objects in different positions, helping the pupil orient themselves based on their own body, pointing out objects in the classroom, and organizing movement-based games. For example, practical tasks such as "Put the cube on the table," "Place the pencil next to the notebook," and "Put the book inside the bag" help strengthen spatial concepts.

The process of forming temporal concepts is also complex for children with intellectual disabilities. Concepts such as morning, noon, evening, yesterday, today, tomorrow, before, after, days of the week, months, and seasons should be taught in connection with the child's life. For example, temporal concepts are gradually formed through real-life examples such as



“We come to school in the morning,” “We return home in the evening,” “Lessons begin on Monday,” and “It snows in winter.” Temporal concepts play an important role in helping children follow a daily routine, plan their activities, and adapt to social life.

Visual-practical methods occupy a leading place in forming mathematical concepts in children with intellectual disabilities. This is because such children have difficulty mastering abstract concepts; therefore, it is more effective for them to work with concrete objects, pictures, tables, diagrams, colored cards, geometric shapes, counting sticks, cubes, toys, and natural materials. Visual aids attract the child’s attention, clearly demonstrate the concept being studied, and connect knowledge with practical activity.

Didactic games are also of great importance in the formation of mathematical concepts. Play is a natural, interesting, and activity-motivating tool for a child with intellectual disabilities. Games such as “Count and Find,” “Which One Is More?,” “Find the Shape,” “Place the Object Corresponding to the Number,” “Shopping at the Store,” “Who Counts Faster?,” and “Sort by Color and Shape” help strengthen children’s mathematical knowledge. During the game process, the child completes tasks without strain, while interest, activity, and independent thinking are developed.

In the studies of Y.Y. Pumputis, the issue of developing interest in mathematics among pupils of special schools also occupies an important place. The researcher emphasizes that when mathematical knowledge has practical meaning for the child, that is, when the pupil can apply it in everyday life, labor activity, and practical situations, interest and motivation toward mathematics lessons increase. This idea is especially important in the education of children with intellectual disabilities. This is because seeing the practical significance of the knowledge being studied and connecting it with real life improves the quality of learning.

An individual approach is one of the important conditions for forming mathematical concepts in children with intellectual disabilities. This is because each child’s cognitive abilities, level of perception, speech development, memory capacity, attention stability, and speed of completing tasks are different. Therefore, during the lesson, the teacher should differentiate tasks according to their level of complexity, give independent tasks to stronger pupils, and provide more support, examples, and repeated exercises to pupils who experience difficulties. The important aspect of the correctional-pedagogical approach is that every piece of knowledge taught in a mathematics lesson should serve the child’s mental development. For example, counting exercises contribute not only to the development of calculation skills, but also to concentration, maintaining sequence, activating memory, developing speech, and coordinating hand movements. Exercises aimed at distinguishing shapes develop visual perception, analysis, comparison, generalization, and classification skills.

Cooperation with parents is also important in the formation of mathematical concepts. This is because when a child reinforces the concepts learned at school in the home environment, knowledge turns into a practical life skill. Parents are advised to give the child simple tasks at home, such as counting fruits, distributing spoons and plates equally, sorting clothes by color, observing time, explaining the amount of money during shopping, and verbally describing the location of objects in the room. Such cooperation ensures the continuity of education.

The formation of mathematical concepts in primary school pupils with intellectual disabilities is a complex, gradual process that requires a correctional-pedagogical approach. This process



is not limited only to teaching numbers or performing arithmetic operations. It contributes to the development of the child's perception, thinking, memory, attention, speech, fine motor skills, spatial orientation, ability to understand time, and readiness for practical life.

In order to effectively form mathematical concepts, visual-practical methods, didactic games, object-based practical exercises, real-life situations, repetition, an individual approach, and encouragement should be widely used in lessons. Connecting mathematical knowledge with the pupil's everyday life is an important factor in understanding its meaning, increasing interest, and preparing the child for independent activity. The formation of mathematical concepts in children with intellectual disabilities is one of the important areas of special pedagogy, as it serves to activate pupils' cognitive activity, strengthen their social adaptation, and develop life-practical skills. When mathematics lessons are properly organized, they become an effective pedagogical process for children with intellectual disabilities, having not only educational but also correctional-developmental and upbringing significance.

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