INTERNATIONAL CONFERENCE

PROCESS MANAGEMENT AND SCIENTIFIC DEVELOPMENTS

Birmingham
United Kingdom
International Conference
“Process Management and Scientific Developments”

Birmingham, United Kingdom
(Novotel Birmingham Centre, February 6, 2020)
Materials of the International Conference
“Process Management and Scientific Developments”
(Birmingham, United Kingdom, February 6, 2020)

M67

ISBN 978-5-905695-83-4

These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examine technical and sociological issues of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

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UDC 330

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FORMATION OF LOGICAL SKILLS OF YOUNGER STUDENTS WITH MENTAL RETARDATION IN TEACHING MATHEMATICS: THEORETICAL AND PRACTICAL ASPECTS

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Abstract. The article discusses the problem of the formation of logical skills in elementary school students with mental retardation in teaching mathematics, identifies the main contradictions, principles and pedagogical conditions that a teacher should take into account when organizing work. When characterizing the program for the formation of logical skills, the authors reveal a brief summary of its modules, as well as give examples of its practical implementation.

Keywords: younger schoolchild, disabilities, mental retardation, logical skills, developmental work program.

A modern primary school student must be able to complete tasks related to the use of scientific methods of observation, logical techniques of mental actions (comparison, classification, etc.), formulating hypotheses and conclusions, planning and conducting research, interpreting data, which is possible if the student has logical skills. The implementation of the Federal State Educational Standards for Children with Disabilities allows you to build a primary education system regardless of the characteristics of the psychophysical development and health status of the student. The search for ways of the effectiveness of correctional development work in mathematics made it possible to actualize the problem of the formation of the logical skills of elementary school students with disabilities. This problem acquires particular importance in working with students with mental
retardation (MR), the number of which, according to various sources, is more than 50% of the total number of children with disabilities involved in inclusive practice.

Logical skills are skills necessary in any intellectual activity. According to N.V. Fetisova “basic general logical skills include mastery of the actions of distinguishing features of mathematical objects, comparison, classification, definition of concepts, conclusions (inductive, deductive, by analogy)” [1].

In our opinion, special purposeful work on the formation of the logical skills of elementary schoolchildren with MR will help to improve the quality of their mathematical education.

In the practice of teaching younger students with MR there is a contradiction between the need to form logical skills in this category of students in teaching mathematics and the insufficient development of the methodological foundations of this process in practice.

For their optimal overcoming of this contradiction, teachers must set and solve the following tasks:

- identify the psychological and pedagogical conditions for the formation of logical skills of primary schoolchildren with MR in teaching mathematics;

- develop and introduce into the educational process a program for the formation of logical skills of elementary schoolchildren with MR in teaching mathematics.

The organization of the teacher’s activities in this direction is based on the following principles: systematic and focused work on the formation of logical skills of younger students with a mental retardation in the process of teaching mathematics; unity of diagnostic and correctional development work; integration of the efforts of the immediate social environment in the process of correctional and developmental work, which allows us to achieve that each generated logical action is brought up to the level of consistency in the consciousness of students. This becomes possible only by identifying the current level of formation of the logical skills of each student, determining what difficulties in teaching mathematics are based on the deficiency of specific logical skills and designing, on this basis, a program of correctional development work carried out by the teacher together with other participants in the educational process.

The pedagogical principles underlying the formation of the logical skills of elementary schoolchildren with MR have revealed a number of psychological and pedagogical conditions.

In our opinion, the optimal psychological and pedagogical conditions for the formation of the logical skills of primary schoolchildren with MR will be:
taking into account the age, individual characteristics of students and their somatic health; educational and extracurricular nature of correctional work; orientation to the zone of the nearest development of students.

It is important to define the category of “age”, because psychological age may not coincide with the chronological. L.S. Vygotsky considers psychological age as “a qualitatively peculiar period of mental development, characterized primarily by the appearance of a neoplasm, which was prepared by the whole course of the previous development” [2]. In children with MR, as a rule, the psychological age is lower than the chronological age, their mental functions, social development situation, and leading activities do not correspond to the “norm of development”. Therefore, the tasks offered by the teacher should be of moderate difficulty, selected taking into account the "zone of proximal development."

For the student with MR, a special spatial and temporal organization of the educational environment is provided taking into account the functional state of the central nervous system and the neurodynamics of mental processes (fast exhaustion, low working capacity, reduced general tone, etc.).

Creating the conditions under which correctional and developmental work is of an educational and extracurricular nature involves the implementation of the principle of integration of efforts of the immediate social environment. Therefore, tasks on the formation of logical skills are offered both directly on mathematics lessons, and in classes for extracurricular activities and in the process of independent work at home.

In the lessons of mathematics, the reserves of educational and methodological kits are used to the maximum, tasks are modified, and as a result they acquire a developing orientation. For example, for the formation of the logical skill “choosing the basis for classification”, students are invited not only to find the values of the expressions proposed in the textbook, but to divide them into groups, to explain the grounds for separation. After finding the meaning of the expressions, they can divide the answers obtained into two groups, circle the answers of the first group with a red pencil, the answers of the second group with a blue pencil, and the basis for classification is selected independently or during a joint discussion.

A sufficiently complex logical skill is the formation of inference by analogy. For its development, the following modification of the task is proposed. Perform arithmetic with numbers and quantities.

Find a pattern.

\[
\begin{align*}
74 &+ 12 \quad 74 \text{mm} + 12 \text{mm} \\
98 &- 32 \quad \ldots \quad 98 \text{g} - 32 \text{g} \\
56 &+ 44 \quad \ldots \quad 56 \text{c} + 44 \text{c}
\end{align*}
\]
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Students are asked: “How to correctly perform arithmetic operations with quantities? Is there an analogy with the addition and subtraction of numbers?" By analyzing the lines, students see that the addition and subtraction of named numbers follows the same rules as the addition and subtraction of ordinary numbers. It is important to follow the vocabulary of students, to help them correctly formulate conclusions. If independent formulations cannot be obtained, students need to repeat the formulated answer. It is advisable to propose that a similar task be performed on the field of small numbers, thereby achieving concentration on the formulation of the conclusion. Organizing such work, it is necessary to focus on the fact that only homogeneous quantities are added and subtracted.

If students make mistakes, for example, add up kilograms and kilometers, millimeters and kilograms, during extracurricular activities you can offer such a comic practical task. Offer to measure a strip of paper (6 cm) and a packet of salt, on which the weight (1 kg) is indicated, then find out from the guys if it is possible to fold 6 cm and 1 kg, suggest they practically complete the task. Ensure that students come to the correct conclusion - "centimeters and kilograms must not be added." Then, every time you try to perform actions with heterogeneous quantities, remind them of this example.

In the process of extracurricular activities, tasks may be offered whose contents are indirectly related to mathematics, but they contribute to the development of cognitive activity, induce keen interest among students and a desire to fulfill them. So, for the formation of a logical ability to compare concepts, a learner is offered a couple of words (for example: morning - evening; apple - cherry; cow - horse; ski - skates; tram - bus, etc.), which he must compare and answer questions about their similarities and differences.

For home independent work, it is assumed that the student receives specially designed cards with tasks that he performs under the control of his parents. In this case, the teacher, together with the psychologist, should conduct a training seminar where to explain to parents the goals of organizing this work, the role of each of the subjects of the educational process, the degree of their participation in the process of completing assignments, especially the presentation of assignments and monitoring their implementation. This will allow parents not only to receive information on the dynamics of the child’s mental development, but also to realize the school’s interest in solving problems. The tasks offered to students are usually of a playful and entertaining nature, using illustrative material.
In realizing the tasks of forming logical skills, it is necessary to focus on the zone of the nearest development of students, which is a discrepancy between the level of actual development (it is determined by the degree of difficulty of the tasks that the child solves independently) and the level of potential development (which the child can achieve by solving problems under the guidance of an adult and in cooperation with peers), which indicates the leading role of learning in the mental development of children [2].

Note that in the practice of teaching younger students with MR one can hear an opinion on the effectiveness of the massive use of game learning techniques. This opinion is erroneous, because this type of training, of course, leads to the achievement of some intermediate results, but does not fully contribute to the development of mental processes in primary school students.

The above principles and psychological and pedagogical conditions are the basis for a teacher designing a program for the formation of logical skills of elementary students with MR in teaching mathematics, which consists of several blocks that reflect the content and technology of work.

The following modules are distinguished in the structure of the program: conceptual, diagnostic, educational, organizational, pedagogical.

The conceptual module reveals the essence of the formation of logical skills in elementary schoolchildren with MR in teaching mathematics, goals, objectives, content and forms of organization of work.

The diagnostic module includes a program for studying the level of formation of logical skills in elementary students with MR at various stages of the program, comparing the results of the final control with the planned results of the program.

An educational and developmental module based on diagnostic data provides the creation of pedagogical conditions for the formation of logical skills in primary school children with MR.

The content of the program is calculated for one academic year and includes several sections.

1. Initial control (1, 2 lessons).
2. The formation of the ability to compare, produce analytical and synthetic activity (3 - 10 lessons).
3. The formation of the ability to classify (11 - 20 lessons).
4. The formation of the ability to build definitions (21 - 26 lessons).
5. The formation of the ability to make conclusions and evidence (27 - 32 lessons).
6. Final control (33, 34 lessons).
Activities during the lessons are aimed at using the reserves of the teaching materials, modifying tasks, and providing special individual tasks. Homework involves students performing specially designed entertaining, gaming tasks.

So, the set of tasks presented in the program will be implemented in all forms of teaching mathematics: directly in mathematics lessons, in extracurricular activities in mathematics, in the process of homework.

The organizational and pedagogical module is aimed at describing the necessary material and personnel conditions for the implementation of the program. This section includes a list of teaching textbooks and materials for students, methodical literature for teachers, Internet resources. Personnel support - a characteristic of the necessary qualifications of teachers, as well as personnel providing medical and psychological support to students with MR in the school system, with the appropriate qualifications, confirmed by a document of a standard form (diploma, certificate) [3].

When forming the logical skills of primary schoolchildren with mental retardation, teachers should consider that the organization of the learning process and interaction in the teacher-student system is due to the specific features of the mental development of students with MR. In the process of implementing the program, the formation of logical skills is not a subject of special assimilation, but is presented in organic connection with other material in the course of mathematics. It is important for the teacher to see the reserves of the formation of logical skills in the tasks and transform them. For teaching younger students with MR, various methods and techniques are used, the emphasis is on the methods of advanced learning, the development of mental activity, highlighting the main elements, etc.

Thus, in the process of forming logical skills that form the content of holistic logical thinking, younger students with MR begin to apply the acquired knowledge and skills in new conditions, find more rational ways to solve tasks, be creative in their educational activities, and actively and with interest participate in educational process, which significantly affects the quality of their mathematical education as a whole.

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