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FORMS AND METHODS OF CORRECTIVE AND DEVELOPMENTAL MATHEMATICS EDUCATION FOR ELEMENTARY SCHOOL STUDENTS WITH INTELLECTUAL DISABILITIES

Abstract. The current stage of the development of the national school in Ukraine is characterized by the implementation of educational reform in almost all educational fields, the search for new ways to improve the quality of primary education, the definition of inclusive education as one of the priority directions of the development of state policy in this area. Taking into account that one of the main tasks of the primary level of education is the formation of mathematical competence (identification of simple mathematical dependencies in the surrounding world, modeling of processes and situations using mathematical relations and measurements, awareness of the role of mathematical knowledge and skills in the personal and social life of a person), the problem of forming a positive motivation to study mathematics in the conditions of inclusive education is quite relevant.

The article describes the forms and methods of remedial and developmental mathematics education for elementary school students with intellectual disabilities. The peculiarities of the organization of learning in an inclusive class in mathematics lessons are characterized; the special educational needs of elementary school students with limited health opportunities on the basis of the general secondary education institution were determined, effective ways of inclusive work in mathematics lessons in a modern elementary school were investigated.

It was revealed that inclusive classes of corrective and developmental education are one of the effective forms of differentiated education, which allows students with intellectual disabilities to ensure the mastery of the main school program and creates favorable opportunities for their development. Methodological recommendations for conducting lessons and studying individual sections and topics

are analyzed, the peculiarities of the use of methods and methods of their teaching are indicated. It was established that most of the recommendations are aimed only at children with mental retardation, which are not always effective for all students in remedial and developmental classes. Planning a mathematics lesson in an inclusive classroom should include both general education tasks to meet educational needs within the state standard, and corrective and developmental tasks. A system of corrective and developmental work in mathematics with elementary school students has been developed, which takes into account the state of knowledge, peculiarities of students' learning of the material and strengthens the corrective and developmental potential of mathematics.

Keywords: inclusive environment, inclusive classes; special mathematics, children with special educational needs, corrective and developmental training; primary school students; failure; cognitive processes; mental activity; violation of intellectual development.

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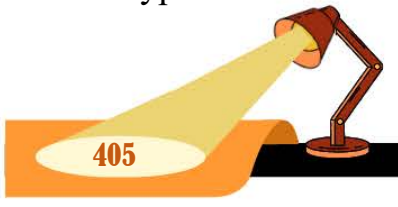
ФОРМИ ТА МЕТОДИ КОРЕКЦІЙНО-РОЗВИТКОВОГО НАВЧАННЯ МАТЕМАТИКИ УЧНІВ ПОЧАТКОВОЇ ШКОЛИ З ІНТЕЛЕКТУАЛЬНИМИ ПОРУШЕННЯМИ

Анотація. Сучасний етап розвитку національної школи в Україні характеризується впровадженням освітньої реформи практично в усі освітні галузі, пошуками нових шляхів удосконалення якості початкової освіти, визначенням інклюзивного навчання як одного з пріоритетних напрямків розвитку державної політики в цій сфері. Беручи до уваги, що одним з основних завдань початкової ланки освіти є формування математичної компетентності (виявлення простих математичних залежностей у навколишньому світі, моделювання процесів та ситуацій із застосуванням математичних відношень та вимірювань, усвідомлення ролі математичних знань та вмінь в особистому і суспільному житті людини), проблема формування позитивної мотивації до вивчення математики в умовах інклюзивного навчання є досить актуальною.

У статті розкрито проблему корекційно-розвивального навчання математики учнів початкової школи з порушенням інтелектуального розвитку. Схарактеризовано особливості організації навчання в інклюзивному класі на уроках математики; визначено особливі освітні потреби в учнів початкової освіти з обмеженими можливостями здоров'я на базі закладу загальної середньої освіти, досліджено ефективні шляхи інклюзивної роботи на уроках



математики в сучасній початковій школі. Розкрито, що інклюзивні класи корекційно-розвивального навчання є однією з ефективних форм диференційованого навчання, яка дозволяє учням з порушенням інтелектуального розвитку забезпечити засвоєння основної програми школи і створює сприятливі можливості для їх розвитку. Проаналізовано методичні рекомендації до проведення уроків та вивчення окремих розділів і тем, зазначено особливості використання методів та прийомів їх навчання. Встановлено, що більшість рекомендацій орієнтовано лише на дітей із затримкою психічного розвитку, які не завжди ефективні для всіх учнів класів корекційно-розвивального навчання. Планування уроку математики в інклюзивну класі повинно включати в себе як загальноосвітні завдання, щоб задовільнити освітні потреби в межах державного стандарту, так і корекційно-розвиваючі завдання. Розроблено систему корекційно-розвивальної роботи з математики з учнями початкової школи, яка враховує стан знань, особливості засвоєння матеріалу учнями та посилює корекційно-розвивальний потенціал математики.

Ключові слова: інклюзивне середовище**,** інклюзивні класи; корекційно-розвивальне навчання; спеціальна математика; діти з особливими освітніми потребами, учні початкової школи; неуспішність; пізнавальні процеси; розумова діяльність; порушення інтелектуального розвитку.

Introduction. The main goal of the educational institution is to create optimal conditions for the development of each child's personality in accordance with the characteristics of his mental and physical development, individual capabilities and abilities. It is possible to successfully teach children with different intellectual abilities, to create a psychologically comfortable environment for them in the conditions of complex correctional assistance. In connection with the identification of such children, inclusive classes are organized in institutions of general secondary education in which corrective and developmental classes are held, since such children are unable to learn the training program in the allotted time and to the required extent.

Analysis of recent research. The work of scientists from various fields of science is devoted to the issue of inclusive education - L. Aksyonova, V. Bondar, E. Bondarenko, M. Vedenina, M. Vlasova, O. Globa, V. Grigorenko, P. Gornostay, G. Ivashchenko, B. Puzanova , O. Institution and others. In Ukraine, certain aspects of the problem of inclusive education are highlighted in the works of A. Kolupaieva, M. Svarnyk, V. Sinyov, N. Sofiy, M. Sheremet, V. Tarasun, O. Taranchenko, A. Shevtsov, and others. Features of inclusive education in primary school are analyzed by Z. Naida, Yu. Leniv, A. Kolupaieva, A. Taranchenko. The analysis of scientific works, psychological-pedagogical and methodical literature proves that despite the presence of a wide range of research in this field, the issue of including students with intellectual disabilities in the educational process remains relevant.

Research methods to characterize the forms and methods of remedial and developmental education in mathematics lessons in an inclusive primary school class.

Results. The educational field "Mathematics" in primary grades (grades 1-4) sets the goal, first of all, of the versatile development of the child's personality and his worldview orientations by means of mathematical activities, the formation of mathematical and other key competencies necessary for life and continuing education. Quality education can only be achieved when every child (including the most vulnerable and excluded children) attends school and receives an inclusive quality education that equips them with life skills. In particular, children with disabilities face numerous forms of discrimination that lead to their exclusion from society and education. The lack of inclusive educational environments, the provision of necessary resources and information deepens the problems that children face in accessing education.

It is advisable to use various forms of teaching in mathematics lessons. Joint forms of education are appropriate, as they allow teachers to pay attention to students, better structure and present the material, and focus students' attention on it. As noted by L. Dubrovska [3], S. Myronova [7], L. Sydoriv [9], O. Titova [11], inclusive classes in general secondary education institutions for students with learning difficulties have such positive aspects:

- they create favorable conditions for working in such classes, as the teacher gets the opportunity to focus his attention on improving the learning efficiency of all students [11, p. 59];
- in these classes there is an "equalization" of poorly prepared students with peers who study successfully, thanks to the corrective work carried out by specialists (defectologist, speech therapist, psychologist, etc.) [3, p. 71];
- the relative homogeneity of students in such classes creates a permanent attitude of the teacher to work with specific methods, aims at further differentiation and the implementation of an individual approach to students. The teacher, working with a homogeneous composition of students, gets the opportunity to build the learning process and, in particular, frontal work, taking into account the rate of learning characteristic of this group of children [6, p. 94];
- due to the small number of classes (9–12 students), real prerequisites are created for the implementation of psychological and pedagogical factors: increasing the intensity of the educational process, its differentiation, increasing the individualization of all educational and educational work in the classroom. A small number of students contributes to the creation of an atmosphere of general friendliness in the classroom, leads to the fact that all students feel a state of psychological comfort, calm confidence in the ultimate success of their educational efforts. Due to the small capacity, the educational process is individualized [9, p. 129];

- these classes are organized as an extended day class-group. The teachers of the extended day group help students with their homework and additionally explain the educational material that was learned during the lesson. In the afternoon, during their free time, children attend various groups, sections, take walks, excursions that allow them to communicate freely with their peers from other classes.

A significant contribution to the study of the causes, ways of preventing and overcoming student failure was made by domestic teachers S. Zhuravlyov [4], M. Kozihor [6], N. Sirant [8] and others. They consider differentiated education as one of the ways to overcome failure, thanks to which a holistic process of preparing an individual for life is built taking into account his interests, abilities, inclinations and opportunities. The authors note positive trends in solving the problem of teaching students in inclusive classes of corrective and developmental education, but the issues of improving the forms, methods and techniques of corrective work remain relevant; further development of scientific and educational and methodological support of the educational process. The permanent unsolvedness of this problem led to the focus of our research within the complex subject of basic level in primary school – mathematics.

Mathematics as a subject is the foundation of modern education, as it contributes to the formation of general culture and is the basis for learning other subjects.

Understanding mathematics requires students to make maximum use of the potential of their cognitive processes (L. Dubrovska [3], K. Ivanova [5], N. Tarnavska [10]). The researchers note that students of inclusive classes of corrective and developmental education experience difficulties in mastering numbering, computational skills in solving arithmetic problems, and learning geometrical material.

At the current stage, remedial and developmental education is provided with special curricula, programs in mathematics, there are also methodological recommendations for conducting lessons and studying individual sections and topics, which are often quite general in nature. However, the experience of educational institutions and their own practice shows that this is not enough to implement a holistic corrective and developmental process. A system of corrective and developmental work in mathematics lessons and careful development of its content and structural components is necessary.

Mathematics is a difficult subject for most students with a violation of their intellectual development [3, p. 72]. At the same time, mathematics has significant developmental potential. In the process of learning mathematics, schoolchildren develop such necessary qualities as the ability to think, critically interpret and evaluate what is happening, defend their thoughts and ideas. Mathematics is the foundation that creates the basis for the development of intelligence and cleverness.

The study of mathematics by students with impaired intellectual development, who experience difficulties in learning, is complicated by the existing features of their mental activity and the corresponding features of learning the learning material (T. Dzhaman [2], O. Titova [11]).

In the vast majority of authors, mastery of mathematical material by students with learning difficulties due to delayed intellectual development was investigated. Such children, of course, make up the main contingent of inclusive classes correctional and developmental training, but the latest research by T. Jaman and the practice of training show that the contingent of such classes has a rather complex and ambiguous composition in each region [2, p. 118].

This circumstance creates a certain problem of teaching mathematics in inclusive classes of remedial and developmental education, since most methodical developments, focused only on students with mental retardation, however, turn out to be ineffective for students of these classes who need other approaches to learning. Due to the heterogeneity of the composition of the classes, methodical developments in differentiated teaching of mathematics are necessary.

We will analyze the current state of mathematics teaching methods in inclusive classes of remedial and developmental education.

The main task of education is to carry out correction and achieve mandatory training in the subject, which allows continuing education in general education classes. An important moment is the correction, during which the teacher must not only (and not so much) give the students certain mathematical knowledge and skills, but, and this is the most important thing, develop mental activity, speech, cognitive activity - that is, correct the shortcomings of their mental development" - notes S. Myronov [7, p. 95].

In classes of corrective and developmental education, a combined lesson is recommended as the main form of education [3, p. 73].

The researchers proposed the most effective methods and techniques in inclusive remedial and developmental education classes, including the following:

At the stage of preparation for learning new material, it is advisable to use anticipatory learning techniques, it is necessary to create a situation that arouses cognitive interest, attention and emotional mood; using the method of attention training for memory development.

At the stage of learning new material, it is advisable to use techniques: commenting, memorization and development of thinking, training of understanding and thinking, reference signals, group and individual re-explanations and teacher consultations, performing the simplest (one-step) tasks according to a sample, using algorithms, game technologies .

At the stage of consolidating the new, it is necessary to apply various tasks with algorithms and methods of their implementation, commenting; their independent solution using methods of educational activity.

At the stage of complex application of the learned, primary generalization, current control - mutual control and mutual correction, "silent survey".

At the stage of generalization of what has been learned, it is necessary to apply the techniques of repetition, memorization, reproduction, didactic game.

At the stage of final control and evaluation, use level diagnostic tests, where the performance result is evaluated according to the "composition method". At the homework stage, it is necessary to dose taking into account the reasons for the delay and to provide materials and instructions to help with its completion.

Also, in the process of teaching mathematics in inclusive classes of corrective and developmental education, it is necessary to use technological methods, for example, the method of partial division of the didactic unit; reception of geometric interpretation of arithmetic facts.

Scientist O. Titova believes that the section of mathematics "geometrical material" can become the basis of fundamental correctional work due to its universality. The main place in teaching mathematics to students with intellectual disabilities should be given to work with tables, drawings and the use of various techniques: crossing out, coloring, connecting with arrows. Practical work accessible to children helps to reduce mental fatigue, and will also help to increase visibility of the learning process [11, p. 60].

It is necessary to bring the students to the generalization of the studied material with a mandatory repetition of the main idea of the lesson [4, p. 69]. Pupils of classes of corrective and developmental education must be trained to work independently [2, p. 119].

The analysis of psychological-pedagogical and methodological-didactic literature made it possible to generalize the experience of practicing teachers, methodologists and to formulate general recommendations for teaching mathematics in inclusive classes of remedial and developmental education:

1. Propedeutic character of training: at the beginning of the academic year, it is recommended to start training with repetition, which will help students learn the material.

2. Multiple repetition of the main material and study of the material in small doses, taking into account the psychological characteristics and capabilities of these children and the gradual complication of the material, with an increase in the number of training exercises.

3. Mandatory solving of arithmetic tasks, since this type of work, developing the ability to think, analyze, draw conclusions, helps to correct the thinking activity and language of children with impaired intellectual development.

4. Practice oral arithmetic at every math lesson. For students of inclusive classes, oral assessment is given with great difficulty and, as a result, is not accepted by most students. In order to level the negative attitude towards the oral account, it is necessary to present it in a game form. The game form allows you to increase

motivation and interest in such tasks. The use of didactic games, exercises, etc. allows to reduce mental fatigue and increase the motivation of learning.

5. It is recommended to include elements of geometry in each mathematics lesson (for 10 minutes), depending on the purpose and type of a specific lesson.

6. Verbalization of all stages of work, students must be able to show and explain everything they do: decide, draw, draw, collect, etc. This contributes to the understanding of the studied material, the memorization of work stages, as well as the implementation of self-control.

7. The teacher needs to explain the unfamiliar words to the children, which met according to the conditions of the task. It is important to teach children to use mathematical vocabulary, to express their thoughts competently.

8. Creation and maintenance of a friendly atmosphere in the lesson. It is necessary to encourage students even for minor successes, for cleverness, which creates a feeling of inner comfort and additionally increases the motivation for learning, a positive attitude towards the mathematics lesson, etc. Compulsory holding of a physical education minute in mathematics lessons, which will relieve mental overstrain and help engage students in another type of activity 9. Conducting extracurricular activities that increase interest in mathematics.

10. Algorithmization of activities in the process of working with children with impaired intellectual development who experience difficulties in learning: instructions, reminders, support schemes, support tables, etc. With the help of these supports, it will be easy for students to monitor the progress of the task, the result, find the stage at which the error was made and correct it. Algorithmization of activity can be manifested in the application of a certain structure of the lesson, the presence and sequence of stages of which later becomes familiar to students. The usual sequence of stages of a mathematics lesson gives students peace of mind, an understanding of what they will do next.

11. The use of visualization during mathematics lessons is an integral requirement for the lesson, since students with intellectual disabilities who experience difficulties in learning are characterized by visual thinking, concreteness of thinking, abstraction, etc.

12. Slow pace of work in the lesson, as students need to be given time to think. But the beginning of the lesson should be dynamic, because active motivation at the beginning of the lesson allows you to avoid monotony of teaching methods and monotony of students' activities in the lesson. We recommend the following techniques for organizing the beginning of the lesson: 1) using tasks that are solved based on ingenuity, on the search for regularities well learned by students; 2) individual work of students using handouts (signal cards, etc.); 3) finding errors in solving tasks from the studied material, etc.

13. Do not overload the mathematics lesson, plan a smaller amount of material than in a regular class. In inclusive classes, there are fewer educational tasks, but each decision must be carefully considered.

14. A small amount of homework, as well as the presence of detailed instructions for it.

15. Conducting corrective and developmental work in the following ways:

1) to be carried out on the educational material directly by the teacher during lessons and in the afternoon; 2) to be carried out on extracurricular material by various teachers of additional education and specialists (educator, psychologist, defectologist, speech therapist, etc.). We consider the first form of organization of corrective and developmental work by the teacher to be the priority, due to its introduction into the structure of the lesson.

The main principles of corrective and developmental work with children with intellectual disabilities who experience difficulties in learning mathematics are: the propaedeutic character of education: the selection of tasks that prepare students for the perception of new and difficult topics; a differentiated approach to children, taking into account the knowledge, abilities and skills that have been formed, which is carried out by distinguishing the following stages of work: performing actions in a materialized form, in the linguistic aspect without visual support, in the mental aspect; the formation of the reversibility operation and the flexibility of thinking associated with it; development of general intellectual abilities and skills; activation of cognitive activity.

The presence of weak cognitive abilities in students with impaired intellectual development sets the task for teachers to develop the cognitive abilities of students on the teaching material of mathematics, the solution of which will contribute to the optimization of education as a whole.

So, there are quite a lot of studies in the psychological and pedagogical literature, devoted to the problem of failure of students with impaired intellectual development. The heterogeneity of the causes that cause learning difficulties makes it necessary to implement individual and differentiated approaches. Inclusive remedial and developmental education classes are one of the effective forms of differentiated education, which allows students with intellectual disabilities to learn the main school curriculum, which creates favorable opportunities for their development.

Special educational conditions must be created to learn mathematics. Currently, special curricula, programs, methodological recommendations for conducting lessons and studying individual sections and topics have been developed for classes of remedial and developmental education, the specifics of the use of methods and techniques are indicated. However, most of the recommendations are focused only on children with mental retardation and are not always effective for all students in remedial and developmental education classes.

Conclusions and prospects. A system of corrective and developmental work in mathematics with elementary school students in inclusive classes has been developed, which takes into account the state of knowledge, the peculiarities of

students' learning of the material and strengthens the corrective and developmental potential of mathematics, which includes: changing the structure of the content of the educational material (the presence of preparatory stages aimed at forming prerequisites for the successful learning of mathematics; a change in the sequence of learning due to the joint and simultaneous study of family sections and topics, as well as reciprocal actions); methods of consolidation of didactic units, presentation of information in a visual form, methods of comparison, generalization, induction, analogies, transformation of examples and tasks into reverse ones; author's complexes of corrective and developmental exercises on mathematical material, which allow solving educational, developmental, corrective tasks and improve the quality of knowledge, contribute to improving the cognitive activity of students.

We see prospects for further research in the disclosure of teachers' readiness for activities aimed at primary school students' mastery of educational material in mathematics in inclusive classes of remedial and developmental education.

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