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Experience in the Organization of the Neuropsychological Support of Children with Mental Retardation in Comprehensive Secondary Schools

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Abstract

Over the years, the neuropsychological approach has proven its validity and effectiveness as a differential-diagnostic, prognostic, preventive and corrective tool for working with different groups of children. But it has not yet entered the wide practice of teachers and psychologists of secondary schools.

The purpose of our work is the organization of neuropsychological support of children with mental retardation in a secondary school. As a result of neuropsychological diagnostics for each first grader the individual neuropsychological profile is made. The main directions of correction work are defined and realized. The main attention is paid to the development of spatial notions, which are key in teaching reading, writing and counting.

As a result, the positive dynamics in the development of all levels of spatial notions – from the notions of the body to quasi-dimensional notions - is shown. This helped children overcome their training maladjustment. As a result of our work, it has also become possible to achieve the introduction of neuropsychological support in the daily educational process, to provide school teachers with basic algorithms of neuropsychological support of learning processes.

Keywords: neuropsychological support, mental retardation, spatial notions

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1. Introduction

Long-term observations of A.V. Semenovich allow us to state that up to 1991 the main dysontogenetic mechanism determining the deviation of children's development was the lagging functional maturation of the most late and long-formed – temporal and frontal - structures of the left hemisphere. In case such violations the main methods of correction were cognitive methods aimed at overcoming the difficulties in mastering school knowledge, the direct formation of such mental functions as speech, counting

and writing. In literature this approach is often referred to as oriented "to the head", in contrast to the approaches "to the body" (movement correction, body-oriented psychotechnologies) [1, 2].

In 1992, there was a sharp jump in the number of children with learning problems, which was associated with the disintegration of the formation of subcortical and hemispheric functional interactions, which is apparent at all levels of ontogenesis of emotional, cognitive, autoregulatory and psychosomatic processes. Such disorders are practically impossible to correct by cognitive methods oriented "on the head" [1, 2].

Methods focused on the "body" are based on the idea of the teacher's need to work not just on a direct "recipe" (If there is no speech – so we will teach to speak), but primarily on the basic processes that participate in the formation of more complex functions, such as fine motor skills, inter-hemispheric interactions, spatial notions [1–3].

Until now, many teachers and psychologists have ignored the need for a strictly individual approach to children with problems in mental development, do not take into account or do not know enough the problem of the relationship of higher mental functions, such as speech, thinking, etc., with different parts of the brain.

This fact has determined the topicality of our research, the purpose of which is organization of neuropsychological support of children with mental retardation in comprehensive schools.

2. Methodology

The study was conducted on the basis of comprehensive secondary school № 16 in Glazov, the Udmurt Republic. 24 children of 1 "G" and 1 "D" classes with the diagnosis "mental retardation" took part in the experiment.

Before the experiment, all teachers, who took part in it, had passed training courses on the use of neuropsychological methods for supporting children with special health needs.

There was preliminary neuropsychological express-diagnostics of children, including a study of lateral preferences and visual and auditory gnosis, kinesthetic and kinetic praxis, spatial notions, memory and intellectual processes according to the modified method of J. M. Glozman [4]. This technique takes a little time (on the average of 30 minutes per child), which is very important in mass surveys of children and makes it possible to give not only qualitative but also quantitative picture of disorders. It uses a three-point scale of evaluation. Each test has its own key for evaluation, but with some simplification it can be represented as follows

- 0 – error-free task execution;
- 0.5 - one error with self-correction;
- 1 - few errors with their possible correction only after drawing the child's attention by the examiner;
- 2 - multiple errors with partial correction;
- 3 - uncorrectable errors in more than 50% of the answers.

Express-diagnostics did not include reading, counting and writing research. Data on these activities were received from class teachers, speech therapists, while analyzing children's notebooks and their answers in the classroom, that is, using the so-called "tracking diagnosis" [5].

On the basis of neuropsychological examination, neuropsychological profile was compiled for each child and for each class. In accordance with it, there were programs developed for group and individual remedial classes, which were realized in complex with the help of a speech therapist, a psychologist, a defectologist, a primary school teacher, a physical education teacher and an afterschool group teacher. Interested parents were also involved in the work.

The authors of the paper conducted advanced training courses for teachers of the school, coordinated the activities of all professionals and parents, conducted classes aimed at correcting the spatial notions that were in this or that way defective in all examined children. The remedial program for the development of children's spatial notions included:

1. kinesiological exercises for the development of inter-hemispheric interactions;
2. mastering bodily space;
3. assimilating of external space, moving dictations;
4. copying complex shapes, a shape of a cube and / or copying and designing with matches;
5. stretching;
6. formation of a "quasi-spatial" ideas (a task with prepositions).

Exercises were taken from tutorials by A.V. Semenovich [2, 3], Al. Sirotyuk [6], N. B. Kasimova [7].

Correctional work was carried out within 5 months. After that, a repeated neuropsychological express- study was conducted to determine the degree of effectiveness of the corrective work.

3. Results

According to the results of the preliminary diagnostics, individual neuropsychological profiles were compiled for each child (Fig.1) and at average for the class (Fig.2).

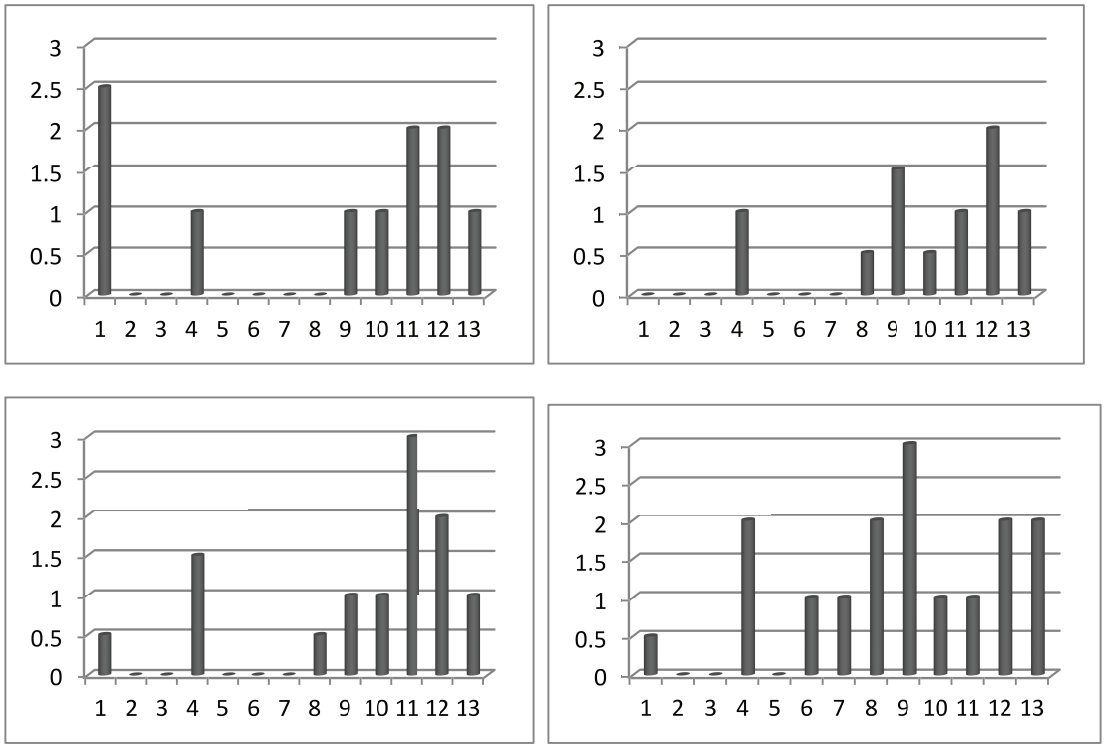

Figure 1: Examples of neuropsychological profiles of 4 examined children (on the ordinate axisf - penalty points, on the abscissa axis - test to determine the level of auditory memory (1), visual gnosis (2), auditory gnosis (3), visual memory (4), kinesthetic praxis (5), reciprocal coordination (6), dynamic praxis (7), Head's test execution(8), copying a complex figure (9), "blind watch" test(10), preposition selection (11), story-telling on a series of plot pictures (12), "the fourth out!" test (13)).

Presence of individual neuropsychological profile allowed providing strictly individual approach to each child. Our study confirmed this basic postulate of neuropsychology that, in spite of the external similarity of problems in training and communication, different children may have completely different cerebral disorders in organization of mental processes. So, students № 1 and № 17 are equally unsuccessful in school: they know the letters and numbers very badly, they almost can not read. At the same time, they have different neuropsychological status. The weakest link in the 1st student's status is a short-term and long-term auditory memory (upper left graph in Figure 1), whereas the other student's disorders of spatial notions are put in the first place (lower right graph in Figure 1). At the same time, both students demonstrate disorders of intellectual processes (Fig. 1), which is typical for all children with mental retardation [4, 5].

The average test results for the classes were quite close to almost all the parameters studied (Fig. 2).

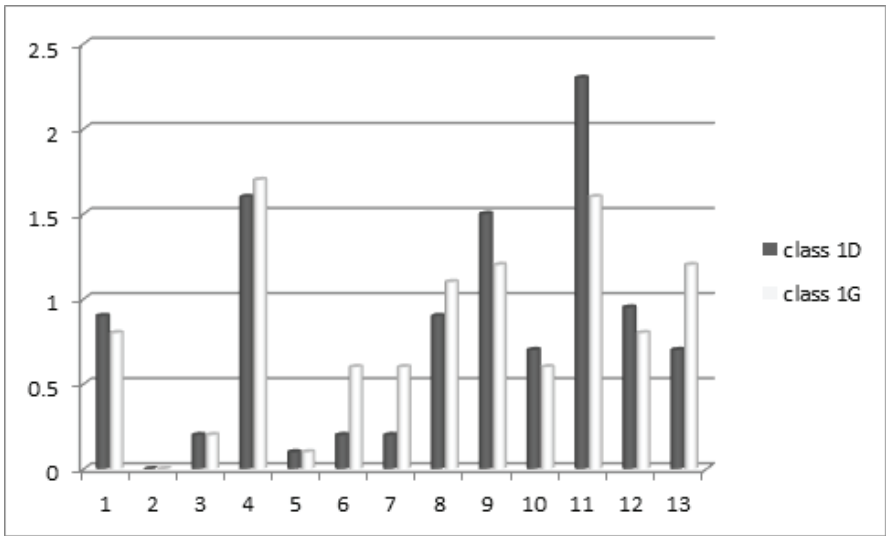

Figure 2: The average neuropsychological profile of the class (the symbols are the same as in Figure 1).

The average level of development of auditory and visual gnosis in both classes is at a high level (all children have 0 points – visual gnosis, 0-0.5 points – auditory gnosis). Children easily recognized superimposed and contour images of animals, distinguished close-sounding words. Emerging difficulties with naming of animals and objects were not related to the disorder of visual gnosis, but to insufficient vocabulary (for example, many children did not know the words "a walrus" and "an ostrich"), as well as the presence in the drawings of objects that children almost do not face in their lives (images of a sugar bowl with lump sugar, a trolleybus or a tram).

The average indicators for the development of auditory memory are also approximately the same in both classes and are on the border between the average and the high level (close to 1 point) (Fig.2). In this test, despite the good grade average, there was a great diversity of children. 14 of the 23 (61%) children had a rather good auditory memory: they were able to remember 6 or more words after 3 repetitions, in 30 minutes the amount of their memory decreased by not more than 1-2 words. 4 (17%) children had auditory memory below the norm by 1 word, 1 child (4%) – by 2 words, 4 (17%) child had a very low level of auditory memory (made many mistakes and/or remembered less than 50% of the words of the age norm, or refused to answer).

Tests for kinesthetic and dynamic praxis, reciprocal coordination revealed a fairly high level of development of these functions in the examined children (Fig.2). The difference in the averages between class 1 "G" and class 1 "D" – children in class 1 "G" on average performed the task better - in our opinion, related to the fact that before

the start of the examination, the teacher often used the exercises on the reciprocal coordination and activity "fist-edge-palm" during PE breaks.

Almost all children coped very badly with the task of making up a story on a series of plot pictures. Only 6 (23%) children showed the average level of development of the examined function (1.5 points), the remaining 16 children – low (2 points), one child refused to answer. Their stories were short, meager, at times not logical. No one understood the hidden meaning of the picture without the help of an experimenter. When processing the results of the survey it is necessary to take into account that up to 7 years of age, even healthy children demonstrate difficulties in the perception and interpretation of the plot, especially of serial paintings. Quasi-spatial verbal synthesis and programming of independent speech statement mature even later – by 8-9 years of age [1]. Thus, at least partially, children's failure to perform this test can be not only due to the disorder of intellectual functions, but also to their age characteristics.

When doing Head's test, 11 (48%) of 23 children copied movements in a mirror way. Those children, whose test was performed correctly, usually spent a lot of time thinking about movements.

The "blind clock" test had to be modified during the experiment. It turned out that none of the 24 children could tell the time by the clock. In this regard, we did not ask the children to name the exact time, but asked them to name the figures shown by the minute and hour hands (that is, in fact, we approximated the task to the test for the orientation of A. Benton's lines [1]). Approximately half of the children (12 pupils, 52%) were able to complete the task only with the help of a teacher.

When copying Taylor's figure, less than half of the children (39%) showed deductive (normative) copy strategy, 10 children (43%) – fragmentary strategy, 4 (17%) – chaotic one. Almost all the children made metric errors that may partially be due to their age characteristics. The fact is that in the sphere of spatial notions, structural-topological and coordinate factors (6-7 years) mature earlier, while metric notions and the strategy of optical-constructive activity – by 8 and 9 years [1]. 4 children had gross topological and coordinate errors (the copied figure of two of them was almost impossible to be recognized).

The test for the ability to use prefixes was very poorly done by most children. 13 out of 23 children (57%) got 2 and 3 points for this test, which indicates a low level of development of the tested function. The most difficult thing for the children was to use prepositions "behind" and "before". It is Interesting to mention, that almost none of the children knew the word "a crate".

Thus, the tasks "Head's test", "blind clock test, "copying a complex figure", " use of prepositions " allowed us to identify disorder of spatial and quasi-spatial notions in more than half of the children.

And high penalty scores in the test of level of visual memory, perhaps in part to do with it. In our chosen task, children were not simply to memorize 6 deverbalized figures, but then also to draw them correctly. When drawing them, children made mistakes in the type of dysmetria, changing the place of parts or skipping them, dividing the figure into parts, contamination, complex changes in the figure or its "improvement", changing the slope of the figure, mirroring. 14 (61%) children received 1-1.5 points, 8 – 2 points for this test, one child refused to perform the test.

After remedial work, the average for all tests in both classes improved significantly. Due to the limitation of the article in volume, we present the results of repeated neuropsychological examination of children only in tests to determine the level of spatial notions, as we personally developed and implemented a corrective program in this direction.

According to the results of the test "copying a complex figure" and "Head's test", for correction and development of spatial notions, children were divided into 2 groups. During 5 months children with more pronounced disorders of spatial notions (№№ 2, 3, 8, 13, 14, 15, 16, 17, 19, 20, 21, 23) had classes 2 times a week for 30 minutes, the rest – one time a week.

Levels of formation of spatial notions of children before and after correction are presented in table 1. The table does not have the results of child № 18, as he was absent being ill during the final diagnosis.

When copying a complex figure (Taylor's figure), the average penalty point in the first group decreased from 0.95 to 0.85 points (by 11%), in the second group – from 1.75 to 1.13 points (by 35%). Without exception, all the children began drawing with the basics, with the main details, that is, they used the deductive (normative) copy strategy. The big difference in results between groups may be due to the fact that the children of the first group initially had had a high level of job performance, and all indicators had almost corresponded to age norms (table. 1).

A similar pattern was observed when holding Head's test. The average penalty score in the first group decreased from 0.7 points to 0.6 points (14%), in the second group – from 1.17 to 0.58 points (50%). The children began running the test more correctly (and made fewer errors of the mirror type) and spent less time on thinking.

In the "blind clock" test, the average penalty score for the groups also changed for the better. In the 1st group it decreased from 0.7 to 0.45 points (36%), in the second

group – from 0.7 to 0.54 points (23%). Most of the children completed the task faster and more confidently. Some of them worked out their own strategy for getting the correct result: they helped themselves with a finger, holding it first on the hand of the blind clock, and then tried to transfer this movement to the reference clock.

Table 1: Development of spatial representations before and after the experiment (penalty points).

№	Taylor's figure		Head's test		Blind clock		Preposition usage	
	before	after	before	after	before	after	before	after
Group 1 (1 class a week)								
1	1	0,5	1	1	0,5	1	1	1
4	1	1	0,5	0	1	1	2	2
5	1	1,5	0,5	0,5	0,5	0	3	2
6	0,5	0,5	2	2	0,5	0,5	0,5	1
7	1	1	0,5	1	1	0,5	3	0,5
9	1,5	1,5	0	0,5	1	0,5	2	1
10	0,5	0,5	0,5	0	1	0	2	0,5
11	1	0,5	1	0,5	1	1	2	0,5
12	1,5	1	0,5	0,5	0,5	0	2	1
22	0,5	0,5	0,5	0	0	0	1	1
Group 2 (2 classes a week)								
2	2	2	0,5	1	1	1	1	1
3	1	1	1	0	0,5	0	3	1
8	2	1	2	1	1	1	2	2
13	1,5	1	2	0,5	1	0,5	3	2
14	3	1	0,5	0,5	1	1	3	2
15	1,5	1,5	0,5	0,5	0	0	1	1
16	1,5	1	0,5	0	0,5	0	3	3
17	3	2	2	0,5	1	1	1	0,5
19	1,5	1	1	0	1	1	1	1
20	1	0,5	2	1	1	0,5	1	0,5
21	1,5	0,5	0	0	0	0	3	1
23	1,5	1	2	2	0,5	0,5	1	1

In the test on the use of prepositions, the average penalty score in the 1st group decreased from 1.9 to 1.1 points (42%), in the second group-from 1.9 to 1.3 points (32%). Despite the overall positive dynamics, the children did not feel very confident when answering, they made many mistakes. The majority of children continued to have difficulty using the pretexts of "before" and "behind".

Perhaps, a rather high level of penalty points in the test for the use of prepositions, in comparison with the other tests of the experiment, is due to the fact that quasi-spatial notions are usually formed more slowly and require a complete formation of spatial notions [1].

Thus, the results of the experiment show that the neuropsychological approach has allowed improving the indicators of the formation of spatial notions of both children with minor disorders, and children with very low levels of this function development.

4. Discussion

Our study shows that even in a regular school with a large number of students, it is possible and effective to conduct neuropsychological express-diagnostics. It takes a little time (30 minutes per child), but it allows you to identify both qualitative and quantitative disorders of all major mental functions. At the same time, quantitative assessment is of particular importance. Its importance is relative to a large number of surveyed children, uneven development of individual functions and the need to accurately assess the dynamics of their development.

Basing on the obtained practical experience in carrying out neuropsychological examination, we have found the possibility of further reduction and simplification of the chosen research methodology. In our opinion, it is possible to exclude diagnostics of visual and auditory gnosis from the examination. Children with severe disabilities do not usually attend usual schools. If necessary, these samples can be carried out additionally for children with suspected optical and acoustic dysgraphia. In our opinion, the "blind clock" test can be replaced with "Benton's test", since many modern children do not use clocks with hands.

As mentioned above, in our set of tests in the study of the level of visual memory it is more appropriate to present verbalized figures and not to force children to draw them. This change is necessary in order to separate the actual level of visual memory from the level of spatial notions development.

Modern school psychologists and teachers should not be handicraftsmen mechanically applying certain techniques. They should understand the problems of their students' mental development and organize their learning process flexibly, in accordance with the needs and potentials of the children entrusted to them. This understanding of the learning difficulties neuropsychological mechanisms is especially necessary for specialists working with children having partial development of individual mental functions or their components [5, 8]. Using neuropsychological approach, we were able to

identify each child's own cause of failure in school and to show teachers that these equally school -unsuccessful children need different remedial programs.

For successful support of children with mental disabilities, participation of specialists of different profiles is necessary. And they should be trained to participate in such interdisciplinary work. In our opinion, the bridge to such interdisciplinary cooperation is the science of neuropsychology. We carry out systematic work on acquaintance of school psychologists, teachers of primary and secondary schools, speech therapists and preschool teachers with neuropsychological methods of supporting children with developmental disabilities, which makes their work more targeted and effective.

We pay special attention to body-oriented methods. Our study confirms that the more complicated the disorder, the more time it is necessary to be devoted to the development of basic sensorimotor functions, without which it is impossible to teach a child writing, reading and counting.

5. Conclusions

The purpose of our work was the organization of neuropsychological support of children with mental retardation in a secondary school. To do this, the technique of neuropsychological express-diagnostics was mastered, which then took no more than 30 minutes per person, which is very important with a large number of children tested. As a result of the final neuropsychological diagnostics, an individual neuropsychological profile was compiled for each first-grader. We were able to show teachers that children with mental retardation and equally unsuccessful in school can have a completely different neuropsychological profile. That is, the heart of their failure is different brain mechanisms, which means that for such children different remedial programs are to be composed.

The results of our correctional work have confirmed the effectiveness of neuropsychological approach not only to the diagnostics, but also to the correction of impaired mental functions in children. On the basis of individual neuropsychological profiles we have identified and implemented the main directions of individual and group remedial work. The main attention is paid to the application of the basic method of neuropsychology – the method of replacing ontogenesis. Most of the exercises used in the classroom were body-oriented and aimed at the formation of the earliest maturing ontogenesis functions.

Bodily-oriented methods used by us, included the development of spatial notions, which are key in teaching reading, writing and counting. As a result, the positive

dynamics in the development of all levels of spatial notions – from the ideas of one's own body to quasi-spatial notions - was shown, which helped children to overcome educational maladjustment. We have received general positive dynamics of spatial notions development for both the children having small deviations from the norm, and for children with very low level of these functions development.

In addition to direct assistance to children, as a result of our work, it has also become possible to introduce neuropsychological support into the daily educational process and provide teachers with basic algorithms of neuropsychological support of learning process.

We hope that the experience of our work will contribute to the consolidation of the different specialists' efforts - school administrators, psychologists, defectologists, speech therapists, subject teachers - and the full implementation of the neuropsychological approach to accompany children with difficulties in the development of the school curriculum in secondary schools.

References

[1] Semenovich, A. V. (2002) Neiropsikhologgicheskaya diagnostika I korrektsiya v detskom vozraste. Moskva: Akademiya.

[2] Semenovich, A. V. (2005). Vvedeniye v neiropsikhologgiyu detskogo vozrasta. Moskva: Ggenezis.

[3] Semenovich, A. V. (2012) Neiropsikhologgicheskaya korrektsiya v detskom vozraste. Metod zameshchayushchego ontoggeneza. Moskva: Ggenezis.

[4] Glozman, J. M. Soboleva, A. E. (2014). Neiropsikhologgicheskaya diagnostika detei shkolnogo vozrasta. Moskva: Artoprint.

[5] Akhutina, T. V., Ignatieva, S. Yu., Maksimenko, M. Yu., Polonskaya, N. H. Pylaeva, N. M. Yablokova, L. V. (1996). Metody Neiropsikhologgicheskogo obsledovaniya detei 6-8 let. *Vestnik Moskovskogo universiteta. Seriya 14: Psikhologgiya,* 2, 51-58.

[6] Sirotyuk, A. L. (2007). Psikhologgicheskiye osnovy obucheniya shkolnikov. Moskva: Sfera.

[7] Kasimova, N. B. (2008). Spichki detyam ne iggrusha! No.... Glazov: Glazovskaya tipografiya.

[8] Pylaeva, N. M. Akhutina T. V. (2012). Neiropsikhologgiya i shkola. *Vestnik Moskovskogo universiteta. Seriya 14: «Psikhologgiya»*, 2, 116-123.