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Neuropsychological Support for Teaching Young School-Age Children Annotation

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Abstract: *The article is devoted to the problems of neuropsychological support of the educational process in elementary school, prevention possible disorders of primary school children's mental processes and neuropsychological correction of difficulties in their learning. The neuropsychological causes of school failure are generalized (summarized). The methods of correctional and developmental education of elementary school children with specific neuropsychological features are analyzed. Neuropsychological factors of educational failure, particulary left-handed children and psychophysiological principles of special children's psychological and pedagogical support in an inclusive environment are described. Organizational-didactic, diagnostic and correctional conditions of individual neuropsychological support of elementary school education are analyzed. A correctional and developmental program for neuropsychological diagnostics and correction of young schoolchildren's educational failure is developed. The neuropsychological approach to the psychological and pedagogical supervision of first-grade pupils, taking into account their learning success, the level of communicative skills development and cognitive mental processes are come near.*

Keywords: *neuropsychological correction, neuropsychological diagnostics, neuropsychological methods, cognitive processes, academic performance, neuropsychological exercises.*

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Introduction

Neuropsychology of childhood studies the peculiarities of formation of higher mental functions during ontogenesis. Children of young school age continue to form psychophysiological structures of the brain and develop depending on its features of functioning mental processes, as a result of which there may be nervousness manifestation of higher mental functions, the dynamics of ontogenetic development of the child. Peculiarities of children's mental activity are indirectly related to their adaptation to the new conditions of socialization at the initial stage of school education (Komogorova, 2021; Maksymchuk, 2020a, 2020b; Melnyk, 2019, 2021).

Memory's, thinking's, attention's individual peculiarities, perception of a young pupil are safely synchronized in one "melody" for learning the world in the process of school education, as evidenced by their educational success and adequate response to social requirements. The school life's path can be asynchronous, maladaptive for actualization of any mental function due to the lack of neuropsychological support for children of this age category, A thorough neuropsychological diagnosis of their individual learning abilities with further correction, as well as parents' neuropsychological education.

The neuropsychological method occupies a special place in science, only it allows to estimate and describe those system-dynamic changes that accompany the child's mental development from the point of view of its brain support. To describe means to understand the underlying mechanisms of her mental status and to plan a program of psychological and pedagogical support adequate to the ontogenesis of a particular child (Semenovich, 2002).

The neuropsychological concept of the cerebral organization of the higher mental functions was substantiated by Luria (1962, 2003) when certain areas of the brain are impaired. Modern neuropsychology investigates functions and mechanisms of high mental functions not only with disorders but also with their normal functioning and in situations of psychological disadaptation of people. Applied aspects of the use of children's neuropsychology in school education for the correction of educational failure or the development of certain mental functions in schoolchildren are quite poorly investigated in Ukraine. That's why this issue is highly relevant for scientific study for successful socialization of first graders as well as graduates of the primary school - for further successful education.

Theoretical analysis of neuropsychological support for primary school children

The youngest school age is sensitive for the formation of such psychological innovations as mental processes' controllability and plasticity, self-control, self-esteem, self-organization, internal plan of gradually formed mental actions, awareness of the learning's purpose and methods, reflexion - which ensure that the child is psychologically ready for school and learning, the world's harmonious knowledge, educational success, and a long process of school socialization at the school education's initial stage. Neuropsychological factors are the main ones among all the causes of educational failure of young schoolchildren, because they are directly connected with morphofunctional readiness to learning, formation of high mental functions - the basis for young schoolchildren's mental and personal development.

The study of neuropsychological determinants of primary school pupils' success and failure in the Russian educational system is based on the neuropsychological theory of the brain bases of mental activity (Luria, 1962, 2003). It enables the detection of brain dysfunctions in young students with learning difficulties. For example, in today's primary schools a large number of left-handed children join the first grade. Based on the works of Chuprikov et al. (2011), Khomskaya (2005), Luria (2003), Semenovich (2018), Tarasun (2008) and Trigub (2013), established that left-handedness is a consequence of structural and functional asymmetry of the brain and overtraining left-handed people can be interpreted as violent anti-pedagogical actions on them, interdiction of conditions of child's natural development.

Sirotyuk's (2003) work is very important for studying neuropsychological technologies and teaching methods (success's diagnostics, failure and development correction of higher mental functions) of young schoolchildren. The author investigated neuropsychological reasons and mechanisms of children's attention deficit syndrome and their hyperactivity disorder, revealed the effectiveness of psychological and pedagogical work based on the author's program for forming and developing the neuropsychological space of a problem child and studied the differentiated education's specifics for children with different brain structures.

Neuropedagogical factors of teaching hyperactive children with attention deficit by foreign neuroscience (Gaddes & Edgell, 1994; Petitto &

Dunbar, 2004) and peculiarities of functional brain asymmetry (Levy, 1988) are actively studied. Individual peculiarities of children's neuropsychological development were studied by Chuprikov et al. (2011), Khomskaya (2005), Semenovich (2002, 2018), Sirotyuk (2003), Tarasun (2008, 2017), Trigub (2013). In our opinion, no less important for initial school education is also the practical experience of educational psychologists (Yarova, 2011). It directly provides neuropsychological support for the development of young school-age children and share their methodological tools.

New foreign conceptual and methodological approaches study the problem of neuropedagogics influence on the innovative educational practices' implementation, cognitive functions' improvement of smart (cognitive) and educational schoolchildren' activities, neuropsychological interconnection's study of the cognition's process, emotions and social interaction (Pera, 2014). Current technologies of educational and cognitive neuroscience are used in experimental studies to study disorders in the children's mental development and the neuropsychological foundations of their successful adaptation to school requirements (Berson, 1990; Petitto & Dunbar, 2004), the influence of brain functionality and its specific zones on learning success in the context of neuropedagogy (Liu & Chiang, 2014; Vaninsky, 2017). From the point of educational neuroscience's view, learning is the new and reshaping of existing biopotentials' accumulation. They are regulated by the educational process, in connection with this, studies of the gifted children's brains show that their brains have their own peculiarities in terms of tissues or othe brain structure's peculiarities (Vaninsky, 2017).

In western pedagogy great attention is also paid to the development of primary school programs for intellectually handicapped children of young school age, taking into account the neuropedagogical mechanisms of self-perception, establishing positive social relationships, self-involvement in the social environment due to the cooperation of teachers and parents (Demirel, 2010). Children with disabilities are more likely to have neuropsychological disabilities and learning difficulties (Berson, 1990), so the inclusive education practice for special children, in the foreign researchers' opinion, must be established with respect for such requirements: positive attitude towards schoolchildren with disabilities, these children's inclusion in the inclusive education of the general education school, clear strategies provision of behavioral intervention (Mantey, 2014; Yazçayır & Pınar, 2014), we believe that the latter can be regarded as an effective neuropedagogical technology.

Neuropsychological causes of school failure are: deasontogenesis in the subcortical and cortical brain's parts, lack of intercortical and subcortical-

cortical connections, brain dysfunctions due to local brain injuries, as a result of which children experience lack of writing's, reading's, and speaking's development; There is decreased concentration of attention, inattention, autism, depression; lack of cognitive skills, which leads to changes in interests and needs; respectfulness's and hyperactivity's deficit. Most first graders who experience learning difficulties have abnormal neuropsychological data: children with temporal-frontal dysfunction of the temporal-frontal divisions of the brain left pivot (they are characterized by deviations from the normal volume of auditory-motor memory, rundown, words replacement with words close to the sense); children with a posterior sections' deficiency of the right pivulus (small volume of imaginative and auditory memory); children with a bilateral nature of changes in mental activity, when deviations from the norm are seen in the parameters of both the left and right pivulus. Efficient is the training, which is focused not on the weak, but on the strong lines of mental activity, due to which the work of the new brain structures by new nervous impulses is ensured, impaired mental functions' realization due to the change in the tasks' complexity and their gradual performance, the child's performance of joint tasks with the adult and self-directed tasks (Sirotyuk, 2003).

In our opinion, for effective neuropsychological support of the educational process it is important to take into account the central statements of the neuropsychological rehabilitation's concepts and development's peculiarities of the of primary mental functions developed by Russian psychologists: renewal or actualization of complex mental functions can be achieved by restarting the damaged functional systems, as a result of which the compensated mental function begins to be carried out with the help psychological tools' "set", which requires its new brain organization due to the fact that higher mental functions are plastic, have the ability to integrate, i.e. systemic and can be controlled with confidence; the individual peculiarities' study of psychology in the context of the problem of interdirectional asymmetry and interdirectional interaction is connected with the individual psychological peculiarities' typology. In particular, the emotional and specific characteristics, and the success in solving theoretical and verbal-logical tasks; in the process of ontogenesis higher mental functions exist as a form of interaction between people, after which they become internal processes (Khomskaya, 2005).

Neuropsychological support of learning is especially required for left-handed children. In connection with this, Semenovich (2018) notes a very strong dynamic's formation and kinesthetic components of the higher mental functions in the left-handed, that is why they are liable to get bored

in stress, disorders in speech and behavior, constant switching from one subject to another, experiencing fears, school disadaptation. The author provides specific recommendations and a set of exercises for the left-handed with the use of the substitutive ontogenesis's method - neuropsychological technology of educational failure's prevention.

The empirical study's results of young schoolchildren's motivation and thinking activity according to their motives and needs allow us to make the following conclusions, right-handed children's motivation, which is distinguished by social activity and communication, is more favorable for learning a foreign language compared to left-handed children. This means that it is necessary to create appropriate psychological conditions for effective foreign language acquisition by left-handed young schoolchildren (Trigub, 2013). Chuprikov et al. (2011) in their monograph "Brain Asymmetry and Handedness" bring physicians, psychologists, teachers, and other experts closer to understanding the handedness's nature, the right recognition of it and the need to mobilize them to protect left-handed children from over-education, considering it violence against the left-handed.

Tarasun (2008) states that learning leads to development and not and otherwise. Perceptual атв motor activity, language's acquisition and speech and other learning types contribute to the establishment and strengthening of inter-neuronal connections. Neuropsychological difficulties in teaching a child can be both viperadjustment and disordered development. Thus, the pressure on the brain's cortical parts (which cannot be avoided during teaching reading, writing, speech), due to its energy capacity, is wearing down those brain organisms which have already completed their development. Early teaching of signs, lyrics, writing for some children can instigate dysontogenic development. Such a child at school may, for example, demonstrate a good achievement in literature and mathematics, read encyclopedias with gusto remaining unmotivated in life (Tarasun, 2008, pp. 48-50).

New foreign conceptual and methodological approaches study the problem of neuropedagogics influence on the implementation of innovative educational practices, Improvement of cognitive functions of cognitive and educational activities of schoolchildren, study of neuropsychological interconnection of the process of cognition, emotions and social interaction (Pera, 2014). Current technologies of educational and cognitive neuroscience are used in experimental studies to study disorders in the mental development of children and the neuropsychological foundations of their successful adaptation to school requirements (Berson, 1990; Petitto &

Dunbar, 2004), the influence of brain functionality and its specific zones on learning success in the context of neuropedagogy (Liu & Chiang, 2014; Vaninsky, 2017). From the point of view of educational neuroscience, learning is the accumulation of new and reshaping of existing biopotentials, which are regulated by the educational process, In connection with this, studies of the brains of gifted children show that their brains have their own peculiarities in terms of tissues or peculiarities of the brain structure (Vaninsky, 2017).

The author attaches special importance to the implementation of correctional-synapse training, which includes the supportive environment's creation for the formation of higher mental functions through a tasks' system (integrated use of speech breathing's techniques, sensorimotor repertoire, massage, self-massage; exercises for development of perception, attention, memory, thinking, etc.), aimed at activity's intensification of reticulatory and cerebral subcircuitry's lymbic formation. As a result, this work will contribute to increasing the tone and energy capacity of the child's sensorimotor activity, activation his or her energy potential, support of the internal environment, brain tonal activation, formation of a generalized exhilarating active influence on the cerebral cortex, etc. It has been established that the ability of the brain to process information is determined by neuron contacts, and the strength of these contacts can change due to synapse training. Since the structure of neuronal connections covers all knowledge and skills, a great number of nerve cells in different parts of the brain become active during any conscious activity. This affects the neurons responsible for performing clearly defined tasks. For example, the neural cells of the eyes' cortex code the color, and the sound cortex's neurons transmit the sounds' quality (Tarasun, 2008, p. 150-248).

Attention deficit and hyperactivity disorder (ADHD) is one of the neuropsychological causes of failure for elementary school children, especially first graders, the main symptoms of which are impulsiveness, excessive activity, low level of concentration on learning. As a result, the behavioral aspect must be dominated by the child's behavioral intervention program (building relationships based on changes in the adult's behavior toward the child, on trust and mutual understanding; and on the willingness to perform tasks challenging for the child; explaining to the child her or his problem using varied strategies for solving it with correction of negative behaviors), everyday cognitive correction in teaching children and taking into account an individual approach and the possibilities of drawing intellectual and physical activity, creating a positive motivation for success (Sirotyuk, 2003).

Psychological and pedagogical support for special children is best provided in an inclusive environment, taking into account the neuropsychological diagnosis's results and psychophysiological principles: classification of the defect; prevention of learning difficulties (requires taking into account the state of synthetic structures' formation that ensure a sufficient level of children's general and specialized learning abilities' development - this approach focuses not only on the developmental disorderss correction, and on intensive development of sufficiently mature superior mental functioning functions and on preventing the transfer of these functions to other defects); the corrective and preventive orientation principle of the teaching points to the need for continuous adjustment to the individual characteristics of the process of mastering by students of the program material in order to, so their formed cognitive skills were implemented quickly, concurrently, simultaneously, i.e. passed into the skill; the principle of relying on the preserved analyzing systems, based on the theory of functions' plasticity as well as on the children's well-developed mental processes (memory, attention, thinking, imagination); the control principle and feedback, based on the position about the activity's comparison (results) performed with the achieved task and provides for a constant flow of feedback from the teacher to the pupil and vice versa (Tarasun, 2017).

Neuropsychological Approach to the Diagnostics of Educational Success of Young Schoolchildren and the Development of the Program of Psychological and Pedagogical Support for first-grader education

The neuropsychological approach to the psychological and pedagogical supervision of teaching first-graders involved the study of their learning success and reasons for failure, motivation to learn, the level of development of communicative skills; diagnostics of peculiarities of the cognitive psychological processes and identification of the leading hand through the use of tests by Luria (1962, 2003), «Popoviya. Luria's tests «Splash in the Long Spoon», «Keep your hands together», «Rest on one foot», etc.; quantitative and qualitative interpretation of the level of development of primary mental functions and study of their peculiarities in relation to school adaptation.

Correction of the revealed mental disorders and low level of neuropsychological children's development was carried out with the neuropsychological exercises' help (corrective and developmental games; role-playing techniques with constructors; breathing techniques; art therapy

exercises; cognitive exercises; exercises for developing spatial perception, hand motor skills, and sensorimotor interactions; communication exercises; body and hand exercises; visualization exercises, etc.); trainings for forming communicative skills and educational motivation for children' successful social interaction in an inclusive school environment; psychological and pedagogical support for left-handed children; psychological counseling of primary classes' children's fathers and teachers on the development of young pupils' cognitive mental functions (verbal and logical, the main objective of the program is to develop the cognitive mental functions (verbal and logical, auditory, motor and auditory memory, controlling attention and verbal and logical thinking) with a sufficient resource of adults' tolerance to the students' failure.

Today's neuropsychological paradigm in applied school education is shaped by the implementation of experimental psychological and pedagogical neuropsychological support programs for young students. One of them is the program "Skillful Hands" as a neuropsychological correction of young pupils focused on the development of children's constant attention and self-regulation, alertness, formation of sensorimotor control, optimization of tonus.

The aim of the program is to optimize the functional status of the brain's membranes and the interdisciplinary organization of the child's developmental processes at a young school age. The correction model based on the algorithm of the "method of substituted ontogenesis" is focused mainly on the correction and rehabilitation of the first brain's functional block (according to the doctrine of (Luria, 1962, 2003) about three brain's functional blocks: the first is the block of tone regulation and active basic state, the second is the block of reception, processing and storage of information, the third is the programming, regulation and control block). Neuropsychological correctional technology is the formation of the child's vertical and horizonal subcortical-cortical and intra-motor interactions by means of a complex method of psychomotor correction, neuropsychological, body-oriented and art-therapeutic psychotechniques (Yarova, 2011).

Sirotyuk (2003) developed recommendations for teachers who work with low functional children: the format of information should be algorithmic, clear, concise; it should be played up; illustrate and draw up information as often as possible; training demonstrations should be short (2-3 minutes); the child must be praised; memorization is better when the child is not required to reproduce the material accurately; if a child is not able to read and write, then both of these skills will not be formed at the same time,

as required by the educational program; reading should be a way to promote writing skills; the child must first understand the text and then read it; children are more productive when lessons are conducted in a playful way; children's strong negative as well as positive emotions must be avoided; if the same algorithm is repeated in class, the likelihood that all children will catch on to the content increases; the second phase makes comprehension, systematization and memorization of information difficult, because the brain activity is so disorganized that the established but unshackled nerve connections are destroyed; the work of teachers, psychologists and parents should be focused on the development of intellect, without deep training of memory, attention and self-control without normalization of the brain work increases the problems of the child.

Thus, the children's difficulties in the process of schooling, without timely corrective work grow into chronic failure. It's known, the state of long-term school failure contributes to the deviant behaviors formation, children's social maladaptation in general. A teacher with a rich arsenal of methodological techniques and technologies of developmental learning, can build a didactic scheme allowing each child to find his or her own way to master complex school subjects (Syrotyuk, 2003).

Conclusion

The development of elementary school children's higher mental functions is interconnected with their cognitive and educational activities. Children's nervousness in the individual development of primary mental functions of this age group can be connected on neuropsychological level with the syndrome of attention's deficit and hyperactivity disorder, brain's right-hand and left-hand functions domination, which inevitably affects the cognitive features of the child's cognition of the world, her self-control and behavior self-regulation in the social interactions' system.

Neuropsychological support of primary school children characterized with learning failure is a complex teamwork of many specialists (medical worker - neurologist or psychiatrist, clinical psychologist or school practical psychologist, social pedagogue, primary school teachers in cooper) and requires systematic application, methods, complex process of diagnostic, preventive, correctional integration and developmental procedures taking into account age and individual pupils' features.

Our proposed neuropsychological technologies of psychological and pedagogical support for first-graders are characterized by systematic and comprehensive nature of their implementation (diagnostic-prognostic-correctional-developmental) in order to ensure the children's mental

development in an inclusive environment, using differential-individual, personality-oriented and competence-oriented activity approaches. In addition, the applied neuropsychological methods in teaching elementary school children make lessons interesting. They contribute the formation of children's cognitive interests and their motivation to succeed, stimulate their mental and business activity in communicative interaction with adults and peers.

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