

Neuropsychological Means of Developing Emotional Intelligence in Children

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Abstract: *The article analyzes the age and neuropsychological features and means of developing the child's emotional intelligence based on foreign and domestic experiences. An attempt is made to generalize the definition of emotional intelligence in the scientific literature. A neuropsychological approach to studying the relationship between a child's emotional development and emotional and rational brain has been implemented. The vital role of social and emotional learning of students (SEL) on their academic success and personal growth in the research of modern foreign researchers is emphasized. In the organization of emotional development of the child's personality, a complex combination of the principle of systematics is recommended, taking into account the social nature of the psyche with the principle of biological (brain) organization of emotional phenomena. The psychological characteristics of the emotional and personal sphere of the child and some emotional disorders in the context of neuropsychology are analyzed. The essence of the interaction of biological and social factors in the development of mental functions of emotions taking into account their subcortical-cortical brain mechanisms is revealed. The program on developing the child's emotional intelligence with the indication of actual conditions of its realization is developed. The success of the development of emotional intelligence in children with reliance on art-therapeutic methods has been noted. It is recommended to use neuropsychological technologies for the child's mental development, focusing on the doctrine of the three functional blocks of the brain and solid mental activity to form new neural connections. The necessity of neuropsychological support of left-handed children is argued.*

Keywords: *Emotional development, social development, mental processes, ontogenesis, neuropsychological exercises, academic performance, rational brain, emotional brain.*

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1. Introduction

Child neuropsychology studies the features of emotional development of a child from infancy. The formation of higher mental functions in the process of ontogenesis (Huidu, 2018) is closely interrelated with emotional processes that stimulate the child's assimilation of information about the outside world through emotional attitude to it, first due to the ancient brain (emotional brain) (up to 6 years) and then - the neocortex. (rational brain). Uneven formation of psychophysiological structures of the child's brain also develops depending on the peculiarities of emotional processes. The dynamics of the child's ontogenetic development, the peculiarities of his mental activity and the formation of emotional intelligence are directly related to socialization. Mental development depends on the emotional well-being of the environment and emotional competence, which is formed based on the ability to empathize, empathize, empathize and is determined by the peculiarities of mental development. Despite many textbooks on child neuropsychology, the problem of developing the emotional intelligence of the child's personality is poorly studied in developmental psychology. Therefore its research is a topical interdisciplinary issue.

The purpose of the article is to theoretically substantiate the peculiarities of the formation and development of a child's emotional intelligence and to develop a program on neuropsychological influence on the formation of his emotional intelligence. Practical significance and novelty of the work - for the first time, neuropsychological technologies of the development of emotional intelligence of the child's personality in combination with pedagogical technologies are considered. The study results can be used for neuropsychological support of children with emotional disorders and low levels of emotional intelligence.

2. Theoretical analysis of the study of the problem of the peculiarities of the development of a child's emotional intelligence: foreign and domestic experience

There is no unambiguous definition of emotional intelligence in science yet. Emotional intelligence is defined primarily by scientists as the ability to name, define, express, and understand emotions and related needs, both their own and those of others; form and method of self-attitude and attitude to others, which are associated with the management of emotions, self-knowledge and self-control, socialization in the process of adaptation to

the requirements of the environment. For a child, emotions are a reference point in his living space. The primary function of emotions is to assess his inner state and reality and adapt to social circumstances. Mayer (2004) examines emotional intelligence to cognitive processes, with the ability to reflect on emotions themselves and reflexively regulate emotions, promoting emotional and intellectual growth.

Goleman (1995) notes that the activity of brain structures forms a set of qualities essential for human life called emotional intelligence - for example, the ability to control their emotions, understanding to recognize the feelings of others, to build harmonious relationships. The higher centres of the brain have grown from the limbic zone or beyond it; the emotional brain plays a crucial role in the structure of the nervous system. Representing the root from which the new brain grew, the emotional areas are connected to all parts of the neocortex by myriads of connections. It gives emotional centres endless opportunities to influence the functioning of the rest of the brain, including the cortex of the large hemispheres. The corresponding reaction of the neocortex appears to be slower (in terms of brain processing time) than the "emotion capture mechanism" is triggered because it goes on a longer chain. Such a reaction is usually more appropriate and balanced because the feelings are preceded by reflection, reasoning. With the coordinated interaction of the emotional brain and the neocortex, emotional intelligence can motivate oneself and strive to achieve a goal, despite failures; restrain impulses and postpone pleasure; control the mood and do not allow feelings to overshadow the mind; empathize and hope. Instead, people who perceive and transmit emotions poorly have problems maintaining positive interpersonal relationships because others often feel uncomfortable when communicating with them. However, they may not always be able to explain the reason. Establishing an emotional tone of interaction means managing the emotional state of another person.

In our opinion, to thrive in the implementation of individual neuropsychological programs to develop the child's emotional intelligence from the standpoint of the competence approach, it is essential to consider the patterns of manifestation and their general psychological characteristics by neuropsychologists. Thus, in the work of Chomskaya (2005), it is noted that emotions in any cognitive activity, on the one hand, act as its motivators, "trigger" the components of this activity, and on the other - control, regulate (using the mechanism assessment) its course by the need to meet which it is aimed. The emotional and personal sphere has a level structure. The first level is emotional reactivity (which characterizes mainly basal emotions). The second level - emotional states (moods, emotional

background). These two classes of emotional phenomena differ in duration and are subject to different laws. Emotional reactivity (or emotional response) is a short-term response to another influence, mainly situational. To a greater extent, emotional states reflect the general attitude of a person to the environment, to himself and are more related to personal characteristics. The third level of the emotional-personal sphere is emotional-personal qualities that reflect emotional features (optimism, pessimism, courage, cowardice, aggression, etc.) and are related to the features of basal emotions. The emotional and personal sphere includes positive and negative emotional systems responsible for the emotional phenomena of different signs. Many parameters characterize emotions as complex systemic psychological formations as the most important of them can be considered the following: qualitative characteristics ("modality", the connection with the basal need); sign; intensity; duration; reactivity, i.e. the rate of occurrence or change of emotion; degree of awareness; degree of arbitrary control, etc. The above parameters characterize both the emotional response and emotional states (actually emotions); in the most general form, they can characterize any emotion, both standard and in various pathological conditions.

The development of emotional intelligence in a child by neuropsychological means provides morphofunctional readiness of the brain for adequate and comprehensive knowledge of the world and learning through a system of emotional attitudes in the process of awareness of real cognitive situations in conjunction with the formation of higher mental functions. In turn, Mikadze (2013) also asserts that the problem of interaction of biological and social factors in the development of mental functions plays an important role.

Psychological features of the development of emotional intelligence of a child in early, preschool and primary school age are most fully disclosed in the works of Shpak (2016; 2017) and Derevyanko (2016); theory and practice of formation of emotional intelligence in primary school students and psychophysiological principles of development of emotional intelligence of junior schoolchildren - in the work of Kotyk (2020); development of emotional intelligence of a junior schoolchild as an essential component of personality formation - in the work of Savchenko (2014); neuropsychological features and principles of development of the emotional and personal sphere - in the work of Chomskaya (2005); the concept of integration of the right and left hemispheres of the child's brain - in the work of Siegel and Bryson (2014).

In theoretical and empirical research, modern foreign researchers have studied the relationship of emotional intelligence of students with

academic performance and responsibility (Petrides et al., 2004; Yazici et al., 2011; Parker et al., 2004; Weissberg et al., 2015). Programs of social and emotional learning of students (SEL) are actively implemented in foreign educational practice, which promotes a positive climate in the school environment, improves intrapersonal, interpersonal and cognitive competencies of students, their self-esteem and self-efficacy; (Durlak and Weissberg, 2018; DePaoli et al., 2017; Schonert-Reichl et al., 2017).

In developing a child's emotional intelligence, it is essential to consider the presence of emotional disorders, their causes (hyperactivity or "right hemisphere") and consequences. It is known that left-handedness is a consequence of structural and functional asymmetry of the brain, and retraining of left-handed people can have a very negative impact on the development of emotional intelligence in left-handed people. In this regard, the features of the functional asymmetry of the active brain are studied by foreign and domestic scientists (Levy, 1988; Siegel, 2014; Chomskaya, 2005 and many others). Neuropedagogical factors of learning of hyperactive children with attention deficit are actively studied by foreign neuroscience (Gaddes & Edgell, 1994; Petitto & Dunbar, 2004). A new foreign methodological approach to modern neuropedagogy involves introducing innovative educational practices of successfully activating students' cognitive and educational activities, with a significant role in the neuropsychological relationship of emotions, social interaction and cognition (Pera, 2014; Demtsko, 2021; Kosholap, 2021).

Most junior high school students have the following features of emotional intelligence: children do not know how to identify their own and others' emotions, do not understand the reasons for their occurrence, and therefore respond inadequately to other people's emotional expressions, except for basic emotions of fear and joy; unable to control their own emotions, significantly negative ones, so not prone to interpersonal communication; are characterized by emotional ignorance, lack of self-motivation and empathy. The level of emotional intelligence of most junior high school students needs to be corrected (Kotyk, 2020).

Emotions and feelings of a preschool child become more complex, compared with the peculiarities of their development at an early age, but are primarily situational. They are primarily due to the expansion of its communication with people, mastery of language tools and the development of elements of independence. There is a bright emotional colour of cognitive processes (feeling, perception, thinking, imagination); emotional saturation of various activities, especially play activities, and the process of communication with adults and peers; the child masters the "language" of

emotions and feelings; a feeling of curiosity is manifested, which stimulates the child's cognitive activity. In the old preschool age, there is the socialization of emotional intelligence, which is expressed in the emotional orientation of the child to other people than to particular objects or things, develops the ability to empathize. However, it is not yet stable enough, but the child can show empathy and compassion, which ensures the development of her interpersonal emotional intelligence development. All this is an essential prerequisite for developing emotional intelligence in early school age and helps to increase children's ability to understand emotions, both their own and other people's, and manage them (Starling, 2016).

Based on the empirical study of Shpak (2017) identified psychological types of emotional intelligence of primary school children: rational (good understanding of their own emotions and emotions of others and the reasons for their occurrence, the ability to verbalize and identify emotions, high self-knowledge and reflection), emotional (well-developed emotional expression, intense and frequent manifestations of emotional reactions, increased emotional sensitivity to emotional situations), socio-adaptive (ability to emotional self-control and emotional self-regulation), socio-communicative (emotional competencies in communication and social interaction), harmonious (internal balance of all structural components of emotional intelligence). In each type, one of the structural components of emotional intelligence is leading, and the others complement it.

The process of development of emotional intelligence has features. However, the essential structural elements of emotional intelligence begin to develop in early school age and do not disappear with age but improve during the learning period. The effectiveness of developing the emotional intelligence of younger students depends on the creation of psychological conditions in secondary schools methodological support and awareness of specialists of the need for this professional activity. The subject of special attention of psychologists, teachers and educators should be such concepts as: "emotional talent", "emotional balance", "emotional style", "emotional freedom", "emotional maturity". They should know and consider that emotionally significant situations for the child encourage self-expression; emotions create a "platform" on which new knowledge is written; emotionally coloured knowledge motivates the child to further knowledge, study and research.

To develop emotional intelligence in the early school years, it is necessary, to begin with, the basic emotions and gradually pass to their shades: reading books with the analysis of mood and feelings of characters of different types of theatres; game exercises "Guess the mood"; situations

from children's lives; demonstration of photos, drawings of people with fundamental emotions and later with shades of emotions; drawing "own mood", as well as relatives, friends and analysis of mood causes; aesthetic perception of the world (Savchenko, 2014).

Derevyanko (2016) interestingly describes the age-specific features of the development of the emotional sphere of the child's personality: up to 10 years, there is a fairly low level of arbitrary regulation of emotions; the ability to manage emotions by socially acceptable means develops gradually, under the influence of socio-cultural environment. Emotion management at this age is manifested mainly in two forms: 1) as control of expression (for example, masking emotions, i.e. replacing the emotional state experienced by the external expression of another emotion, this form of behaviour becomes available to children 3-4 years, for other data - in 10 years); 2) as psychological protection (typical for all age groups and modalities of emotions is the mechanism of displacement, unconsciously used techniques "forget", "think about something else", "do something else", etc.). Age features of the development of the ability to establish emotional contact: from birth to 5 years - the development of the need to establish emotional contact; 5-7 years. - coordination of acquired social skills with their emotions and the emotions of others; 7-10 years - the child's awareness of the diversity of emotions that can be experienced about one person; use of personal information to establish close relationships. Development of the ability to control other people's emotions: the growth of the ability to intentionally express emotions and feelings that are used to influence others, i.e. turn into a certain "language" that can convey shades of mental well-being. By the age of 15, emotional engrams are formed: already in the early stages of development, a child quickly and easily establishes a connection between two phenomena: certain emotions cause the desired behavior of others. Throughout life, a person can use specific emotions for manipulative purposes. Gottman and Deckler (2015) offer parents essential strategies for emotional education: awareness, recognition and acceptance of the child's emotions; compassionate listening and confirmation of the validity of the child's feelings; determining the goals of solving the child's problems based on family values; avoid excessive criticism, derogatory comments and ridicule of your child; not imposing their decisions on the child; increase your child's self-esteem, giving her a choice and respecting her desires; showing honesty with your child. Only those who can accept their emotions can understand their child's emotions. Common ways to get senses to include meditation, prayer, keeping a diary, and forms of artistic expression, such as playing musical instruments or drawing. Emotional awareness

requires being alone, something that modern busy parents often do not have time. Another good way to better understand feelings is to keep an “emotion diary” to record your reactions to the emotions of others, especially the emotions of children.

3. Neuropsychological approach to the development of emotional intelligence of the child

Both social and biological factors influence the emotional manifestations of the child. Emotions arise under the influence of physiological processes in the body; emotional susceptibility may be partially hereditary and have a non-genetic nature of the transmission of emotional intelligence. The brain is the leader of emotional behavior. Any emotion is accompanied by the activation of the nervous system, the appearance in the blood of biologically active substances that change the respiratory rate, heart rate, the activity of internal organs. The brain processes all signals from the outside world recognizes threats and dangers. However, its functions may be exhausted, activity is reduced, and the nervous system is depleted when emotional stressors or children influence the child's psyche are busy more time watching TV. The brain's efficiency depends on the number of connections between neurons: the more of them, the better the brain will find a way out of a difficult situation. The connective cells die if the child does not learn, the brain is immersed in stagnation, or the nervous system is too excited. Active learning stimulates the formation of contacts between the centers in the cerebral cortex.

At the heart of neuropsychological work on the development of emotional intelligence in children is the principle of systematics. In the theoretical analysis of the emotional-personal sphere based on a generalization of many works, Chomskaya (2005) confirms that in socio-cultural development, a complex multi-component complex of higher emotions, emotional phenomena and states united in a holistic emotional-personal sphere is formed. Emotional and personal mental phenomena and cognitive processes have a systemic organization and are formed under the influence of cultural and historical factors. There is an emotional connection between emotional and cognitive processes, which manifests itself in the form of "intellectualization" of emotions in the process of ontogenetic development of the child. The principle of systematization, taking into account the social nature of the psyche, must be combined with the principle of biological (brain) organization of emotional phenomena. It is essential to develop higher emotions (intellectual, aesthetic, moral), taking into account the subcortical-cortical brain mechanisms of emotions.

For practical neuropsychological classes on the development of emotional intelligence, it is essential to consider the results of neuropsychodiagnostics of the emotional and personal sphere and the presence of emotional disorders in children, especially at an early age, for their timely correction. As noted in the work of Chomskaya (2005), neuropsychological syndromes are usually associated with disorders of the emotional and personal sphere in the form of inadequate emotional reactions, decreased interest in communication and interaction with others. Central to the development of consciousness and the entire system of mental functions, including emotional and the prevention of various disorders, is the development of thinking and “intellectualization” of emotions.

In the concept of integrated education, Siegel and Bryson (2014) propose integrating right-handed and left-handed modalities of the brain, i.e. to form neural connections on both sides of the brain in the learning process. Thus, the strategy of education “communication and redirection” allows communication with the right - the emotional brain and can redirect the child's attention to the left - the rational brain, using logical explanations with complexity. The second strategy of education - “call to tame” carries out self-integration of the right (emotional) and left (rational) modality of the brain - this is facilitated by the child's identification of their emotional states through storytelling.

We believe that art therapy is a well-chosen neuropsychological tool for a child's emotional development program. Essential goals of art therapy are the formation of aesthetic, moral and intellectual emotions, the development of voluntary attention and emotional self-regulation in children, the formation of sensorimotor control, optimization of nervous system tone and relaxation on the body and psyche of the child through painting, dancing, sand therapy, mesotherapy, dramatic art. Glotova and Aksenova (2019) described the successful work on the development of emotional intelligence in older preschool children based on art-therapeutic methods, which is confirmed by quantitative and qualitative assessment of the positive dynamics in the development of emotional and volitional regulation after implementation programs (only 18 classes of 30 minutes, once a week).

Our program for the development of emotional intelligence of the child covers essential, in our opinion, tasks: neuropsychodiagnostics of the emotional and personal sphere of the child with a quantitative and qualitative interpretation of the level of development of higher mental functions; neuropsychological support of left-handed children; exercises for emotional development based on art-therapeutic methods, which at the

system level ensure the mental development of the child, stimulate the emergence of spatial representations, hand motility and sensorimotor interaction; breathing techniques; neuropsychological correctional and developmental exercises and games - for the correction of identified emotional disorders and the development of positive emotional qualities and states; physical and motor exercises; visualization exercises. Of course, the tasks of the neuropsychological program are subordinated to the goals of the main blocks of emotional training of the child's emotional intelligence, taking into account age, individual approach, the presence of emotional disorders and low levels of emotional intelligence in general or some of its structural components.

Neuropsychological causes of emotional disorders may be desontogenesis in the subcortical and stem sections of the brain, lack of interhemispheric and subcortical-cortical connections, brain dysfunction due to local brain lesions, resulting in children with hyperactivity, decreased concentration of negative emotions, dominance, depression, low level of development of cognitive processes. Therefore, the child's emotional development requires neuropsychological support, with a focus on mental solid activity, which will provide the formation of new neural connections needed to test the child's experience gained in partnership with an adult during a problem-based learning task.

It is expedient to combine neuropsychological work on the child's mental development with neuropsychological exercises on the formation of communicative skills and development of cognitive mental processes; their complex combination can be plot-role technologies with designers. The use of a methodical arsenal of neuropsychological technologies for the child's mental development should focus on the doctrine of the three functional blocks of the brain - the regulation of tone and active vigour; receiving, processing and storing information; programming, regulation and control. Such work will contribute to the activating effect on the cerebral cortex and so on. Involved neurons and new neural connections will be ready to apply the child's experience in emotional interaction through knowledge of the world.

4. Conclusion

Emotions are, for the child, an indicator of the degree of trust in themselves, other people and the world. They significantly affect its mental development in ontogenesis, providing the emotional level of manifestation of cognitive processes and behaviour and determining the direction of attention and features of perception of the environment. A child's low level of emotional intelligence may be related to the “information hunger” of his or her brain, provided that the child is not provided with psychological and pedagogical learning conditions; weak emotional competence in communication and social interaction; insufficient emotional self-control and self-regulation of behaviour in the system of social relations. Neuropsychological support of children with low emotional intelligence should be combined with pedagogical technologies for their successful emotional socialization, taking into account students' age and individual characteristics. Neuropsychological means of developing emotional intelligence should be implemented systematically and comprehensively, based on the results of neuropsychodiagnostics, partnerships with teachers and peers, and differential, competence, and activity approach taking into account neurobiological mechanisms of “emotional” and “rational” children's brain.

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