

The Neuropedagogical Aspects of Mental and Cognitive Activity in Younger School-Age Children

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Abstract This article discusses theoretical angles of investigating the psychological development of younger school-age children and the examination of cognitive processes, due to the fact that each age group is associated with its own predominant activity. The leading activity is distinguished by the formation and alteration of other forms of activity, the restructuring of fundamental cognitive processes and personality development. It might not consume all of a child's spare time, but it does affect his/her growth during that age. Engaging in learning activities is of paramount importance for young learners. Firstly, it establishes essential relationships between the child and society. Secondly, it serves as the groundwork for developing core personality traits and certain cognitive processes of younger school-age children. The level of success that students in this group attain will significantly determine their well-being and standing in the class. Ukrainian research has outlined various learning challenges commonly experienced by younger school-age children and the psychological factors behind them. Accordingly, learning challenges can be attributed to a lack of attention, inadequate short-term and long-term memory, visual reasoning, mental processes and general intelligence. However, not only children with learning difficulties require an individual approach. Considering the distinct cognitive mental processes of younger school-age children, teachers can create the most favourable conditions for their learning and growth. Therefore, this article aims to study the characteristics of cognitive mental processes in younger school-age children.

Keywords: *Ability, Productive Development, Logical Thinking, Individual Peculiarities, Adaptation;*

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Introduction

Upon beginning school, a child enters the younger school age that encompasses grades one to four. Cognitive processes at this age exhibit intensity, favouring indirectness and awareness. Children gain control over their mental processes, while their desire for memory management, perception and attention intensifies. Certain characteristics of thinking specific to this period of development remain intact. Cognitive activity predominates, leading to a rearrangement of all mental activities. As intelligence increases, mental functions advance from visual thinking to verbal and logical thinking.

Ukrainian and foreign academics have made significant efforts to investigate the features of educational competences and strategies of mental and cognitive processes in younger school-age children. As noted by Shevtsova (2015), Bekh (2013) and Komarivska (2016), since there is no consistent interpretation of perception, students may have trouble recognizing objects that seem identical at first sight. During the lesson, the child changes his/her perception, gains a sense of purpose and is more able to control himself/herself. Perception can be deepened, analyzed and differentiated.

Khilya et al. (2020) argue that attention develops precisely during the early school age. If this mental function is not formed, the learning process becomes impossible. For a young school-age child, focusing on a particular task may last no more than 10-12 minutes, after which concentration disappears. In the early school age, involuntary attention is considerably more advanced. Younger school-age children tend to memorize not what is essential for their education but what they find stimulating and emotionally involving. Mechanical memory is the predominant form of memory at this stage of ontogenesis. The authors' observations have revealed that the shift between stages of ontogenesis can be energy-consuming and stressful.

This article aims to 1) theoretically justify the development of mental processes in younger school children as the leading form of learning, 2) analyze the neuropsychological characteristics of younger school children with high and low academic performance, 3) identify the links between neuropsychological indicators of younger school-age children and the specifics of pedagogical communication during children's socialization.

Mental Activity Growth in Younger School-Age Children as the Primary Form of Learning

Historically, the younger school age is a relatively recent phenomenon in a child's life. It covers the period from seven to ten or eleven years old. This was not an option for children who had no schooling or only went to primary school. This era owes its emergence to the introduction of a system of comprehensive secondary education.

Dutkevych (2012) claims that chronological milestones and psychological characteristics of the younger school age cannot be considered immutable. From a scientific standpoint, the impact that younger school age has on a child's mental development can vary depending on the modification of the objectives and importance of primary education. (p. 424).

This age range of seven to ten years old is most notably characterized by the transition of a child from preschool to school age. During school years, a crucial juncture, traditionally referred to as the "seven-year crisis", marks the start of childhood. This period of transition, similar to any other, holds numerous concealed developmental prospects that must be noticed and encouraged promptly.

During the younger school years, the groundwork for many mental abilities is laid and strengthened. Memory, perception, attention, imagination and thinking all progress significantly during this time, Zhuravlyova (2017).

The ability of younger school-age children to remember depends on their understanding of the task's premise and their proficiency in applying appropriate techniques and methods for memorization and recall. Initially, children employ straightforward methods like repeating material multiple times and splitting it into segments that may not correspond to significant elements. As they learn techniques for deliberate memorization, such as meaningful grouping of material, comparing its parts and creating a plan, the psychological role of these techniques undergoes significant changes. In turn, they form the foundation of an involuntary memory that performs intricate tasks not only in the concluding stage of primary school but also during the subsequent years of schooling.

This process results in a qualitative psychological alteration of memory processes. Logical approaches to unlocking an involuntary memory must be taken advantage of when starting to learn. This is one of the main reserves for improving memory in the learning process (Demchenko et al. 2021).

Qualitative changes occur in both voluntary and involuntary memory, which illustrate their strong connection and transitions. Each form of memory must be employed by children in suitable circumstances. The entire younger school age marks the development of certain mental processes. The maturing of the cerebral cortex during this age and the advancement of intracortical interactions are manifested in alterations of the process of perception.

The specialization of projection, posterior associative and anterior associative zones in sensory analysis, memorization, recognition and classification operations leads to high resolution in perceptual function and the ability to perceive new complex objects and develop corresponding standards, which contributes to significant enrichment of individual experience. The stage of transitioning the perceptual system to another level of organization is considered a crucial period for developing information processes that underlie cognitive activity. The characteristics of cognitive activity at this stage are largely determined by the organization of brain attention, which undergoes significant changes in the younger school age. Gradually, children learn to concentrate and sustain attention on what is necessary, not just on externally attractive objects. By the time students reach 2nd and 3rd grades, they often already have the power to apply their focus to the material taught by the teacher or written in a book, (Serhieienkova et al. 2012).

According to Kostikov (2015), the attention span of younger school-age children is insufficient, and their concentration and attention allocation are poorly developed, despite the teacher demanding daily control over their actions as well as their own. The general direction of attention development lies in the child's transition from achieving goals set by the teacher to independently solving self-imposed tasks. The voluntary attention of first-graders is not stable since they have not yet formed internal self-regulation mechanisms. The development of attention is also accompanied by an expansion of its scope and the ability to distribute attention among various activities. Imagination in the younger school-age develops in all classes as children acquire the ability to recognize and represent expected states of objects that are not explicitly stated in the description but logically follow from it. They also develop the ability to understand the conventionality of certain objects, their properties and states. As they acquire information about objects and the conditions of their creation, many new combinations of images gain justification and logical explanation. During this process, the ability to construct reasoning is developed, either in elaborate verbal form or

in concise intuitive reasoning. The younger school age is a productive period for developing logical thinking and intellectual activities (Pavelkiv, 2015).

The fact that a child has acquired certain knowledge is the most crucial indicator of their intellectual abilities. However, these abilities need to be, firstly, identified and demonstrated and secondly, solidified and transformed into real intellectual skills. The current primary school curricula are the first step towards the practical use of the real cognitive abilities of younger school-age children. The programmes have significantly deepened and expanded the theoretical aspects of knowledge, such as explaining phenomena and establishing connections between them. This teaches primary school students simple but essential techniques of logical reasoning and abstract thinking.

The development of thinking in younger school-age children can be divided into two main stages. During the first stage (from 1st to 3rd grade), their cognitive activity is quite similar to that of preschool children. At this stage, the analysis of educational material mainly occurs through visual and practical means. Children rely on real objects or their direct substitutes, i.e., pictures. Students in 1st and 2nd grades often assess objects and situations in a very one-sided manner, focusing on external characteristics. The conclusions of children are based on visual presuppositions, data gathered through perception. The characteristics of thinking in younger school-age children form the basis for the extensive use of visualization in primary school teaching.

At younger school age, the main motivation for children's activities is the pursuit of success. Occasionally, another type of motivation is observed, namely, the motivation to avoid failure. Certain moral ideals and behavioural models become ingrained in children's consciousness. They begin to understand their value and necessity. Nevertheless, for the fullest development of a child's personality, adults must pay attention to the child and value him/her. The emotional and evaluative attitude of adults towards the child's actions determines the development of his/her moral sense and individual responsible attitude towards the rules he/she learns in life. The child's social space expands as he/she constantly interacts with the teacher and classmates according to clearly defined rules.

Importantly, the productivity of memory in primary school students increases with constant practice and largely depends on the mastered memorization techniques and the teacher's professionalism. Initially, upon entering school, children use visual-imaginary thinking, and later, they transition to verbal-logical thinking through instruction. This process vividly

illustrates the concept of the zone of proximal development, where learning precedes development. It is through the process of education, with the teacher setting educational tasks, that voluntary thinking is formed, its controllability is developed, and all mental operations are enhanced.

The Neuropsychological Characteristics of Younger School Children with High and Low Academic Performance

The current state of child neuropsychology is characterized by a shift in research goals from diagnostics to prognosis, from identifying deficits to describing syndromes and developing corrective strategies. This is primarily because children entering school often show similar results in psychological tests. At the same time, their academic success may differ significantly. Among the children considered ready for school, some adapt well to increasing academic demands, workload and learning pace. Others may perform well in the first year but begin to experience difficulties in their studies, show disinterest in school and exhibit signs of academic maladjustment at the end of the first or the beginning of the 2nd grade, without any apparent external reasons.

This indicates that commonly accepted criteria of psychological tests, which do not provide a qualitative description of the psychological structure of mental processes and the reasons for their high or low level of development, are insufficient for detecting school immaturity. The neuropsychological analysis allows distinguishing learning and behavioural difficulties caused by individual brain structure peculiarities from maladjustment related to improper pedagogical influence or pathological personality traits of the child. Accordingly, the crucial prerequisites for effective assistance to children with developmental and learning problems include a differentiated description of qualitative characteristics, strengths and weaknesses of each child's mental functions and the identification of the areas in which they can best develop.

It follows that the mental and social functioning of the child does not correspond to his/her psychophysical capabilities and needs and/or the conditions of the surrounding environment, that is, the demands of the microsial environment. Today, the mental and somatic health of children is not only a matter of professional interest. The aggregation of pre-pathological and pathological symptoms in numerous children can be shocking at times.

Although there are objective clinical signs that the child is healthy, this still occurs. Paradoxically, the child's medical record describes his/her

overall condition as normal, and, yet, he/she struggles to acquire the simplest skills and constantly faces conflicts with peers and adults. The situation can also be reversed. Each of the consulted specialists (doctor, psychologist, speech therapist) notes the presence of certain symptom complexes. Prolonged (“multidisciplinary” in form but narrow-focused in essence) treatment/correction begins in various directions. Surprisingly, however, it does not lead to a significant improvement in the child’s condition. It is also vital to note that the growth of children nowadays is different (in terms of material and phases) than it was two decades ago.

Both the somatic and brain-organic (more precisely neurosomatic) organization of a person’s behaviour, who was born naturally, breastfed with mother’s milk and read fairy-tales with their grandmother, drastically differs from someone born through a caesarean section or assisted deliveries, raised on artificial feeding (thus missing the stage of interaction with the mother’s breasts), swaddled in diapers and grown in a computer subculture. Today, the latter represents the vast majority. However, these are just two different ways of psychological development, resulting in two different individuals, each speaking their own body language and brain language.

Without discussing the advantages and disadvantages of both paths of development, each of them involves the activation and consolidation of different neuropsychosomatic systems. This leads to natural differences in a child’s cognitive activity at each age and throughout ontogenesis. However, the social demands placed on the child remain unchanged, meaning they are directed toward the previous generation with a certain organization of psychological processes. Each child undergoes a series of phases in his/her development, the specifics of which qualitatively influence the overall picture of psychological development. Every child develops in his/her way, determined by both genetic and equally important environmental factors. Consequently, it is entirely typical (and normal) to have unevenness in psychological development, where some mental functions are better developed than others. When considering a child’s psychological development, several main systems can be distinguished, including voluntary guidance and control of behaviour, systems of spatial and quasi-spatial representation, phonetic and kinaesthetic analysis and synthesis, fine motor skills, degree and strength of perception and memorization of verbal and visual stimuli, reasoning and communication skills (Nerubasska & Maksymchuk, 2020).

Some of these systems must be formed by the time a child enters school, while others (such as spatial imagination and regulatory abilities) are

still developing. Due to the complexity of its structure, a psychological function is never completely impaired, and its components always remain intact. Additionally, not all functions are disrupted simultaneously. Therefore, neuropsychological correction should be built on the principles of rehabilitation, aiming to rebuild the impaired function with reliance on preserved components.

Identifying the Links between Neuropsychological Indicators of Younger School-Age Children and the Specifics of Pedagogical Communication during Children's Socialization

Recently, there has been increasing focus on the incorporation of upbringing, learning and development of younger school-age children within a distinct systemic approach to facilitate social adaptation. This approach considers their neuro-psychological peculiarities and involves the sequential realization of educational tasks through coordinated collaboration between families, schools, extracurricular childcare institutions and mass media. Social adaptation of younger school-age children is marked by adults' consistent resolution of educational tasks through the use of all legitimate means, methods and resources (Hroshovenko, 2018).

The cultivation of the child's traits throughout their learning process is key to preparing them for independent life at younger school age. It is derived from the particularities of the maturation of the nervous system necessary to adapt to new situations and to determine the neuropsychological characteristics of the child and its social influence in the family and school. Through this interaction, the child is engaged in acquiring material and spiritual values of the people around him/her, constantly gaining and enriching personal experiences in various fields of knowledge, relationships and communication. Thus, a systematic and profound study of children's personal, behavioural and neuro-psychological development is a necessary condition for implementing an individual approach during the child's stage of social adaptation.

Teachers and parents might consider that all children are equivalent, while most specialists contend that examining cognitive cycles, nature, moral-volitional qualities, relationship frameworks, interests, capacities and collected individual encounters demonstrates the remarkable quality of every single child's social adaptation.

According to Gerasymova et al. (2019), dynamic changes in the integrative functioning of the child's brain systems occur through intra- and inter-functional reorganization, in which the hierarchy of interaction

between components and their relative contributions to the overall functioning of the functional system can be modified. Properly employing the developing individual's attributes and skills creates a conducive environment for children to adjust successfully to social situations when addressing educational and developmental assignments. After all, the individuality of a younger school-age child can fully develop and manifest only within society. Therefore, an individual approach cannot be isolated from the overall system of educating the child within the group, in activities and communication with other group members.

Teachers should strive for each student to take a necessary and appropriate position in the class, use public opinion and harness the collective influence on individuals. An individual approach within the group is necessary for every child, not just those who deviate from the accepted norms of social life. The interaction of one's age and individual characteristics significantly complicates the adaptation process. The individual approach, as a correctional system employed by the teacher within the general adaptation process, is a crucial prerequisite for constructing the developmental and educational process for children in this age group.

An individual approach necessitates a careful investigation of one's inner resources, an evaluation of one's background and an inspection of the pedagogical effects that affected one's development or interference. A well-known characteristic of younger school age is its emotional activity and a tendency towards specific, relatively short-term activities that are accompanied by noticeable outcomes for the student (Marshall et al. 2021).

How students act, behave and think determines the further course of the whole educational process. Skilful, rational and well-structured pedagogical activities by the teacher are the key to creating positive experiences in the child's behaviour and interactions with others. It is therefore essential for younger school-age children to learn the ways of action and communication that society requires and cultivate constructive motives for action and behaviour within society.

When organizing activities for younger school-age children, teachers should use multiple diverse techniques and approaches for socialization. Educators, cognitive scientists and social workers have discovered a crucial consistency that shapes the overall structure of its management. It follows that when the child finds the objectively significant to be necessary, desirable, enjoyable, and beneficial, the process is at its most effective (Bekh, 2013).

The teacher must be sensitive to the distinctiveness of each student when working with a class community, appreciating him/her as a socially meaningful individual. Having an extensive insight into the mental and personal characteristics of the children, derived from organized research, enables the teacher to create and direct the growth of every student. A distinct and well-defined orientation in dealing with individuals allows for the choice of instruments in the system of pedagogical impacts on the class and increases the efficiency of social acclimation for each student in the educational process overall. Thus, the social adaptation within the group and the teacher's individual approach to students occur in tandem, reinforcing one another.

Conclusions

This article is significant in highlighting that the younger school age is suitable for building aptitudes in cognitive and learning activities, as at this age, all activities help improve cognitive abilities. Attention, imagination, memory and perception become more deliberate, while the student is capable of mastering various methods of self-control. Furthermore, younger school-age children acquire skills in classification, comparison, analysis, synthesis and modelling, which are prerequisites for forming universal learning and cognitive actions in the future.

The article also proves that younger school-age children can cultivate voluntary attention and memory. Given that their academic success depends to a large extent on these abilities, both teachers and parents should pay attention to developing children's skills in regulating activities, planning tasks and checking results. Many educational programmes focus on developing the thinking skills of younger school-age children. However, it is also important to monitor the development of other types of thinking, especially verbal thinking. Therefore, within the framework of educational activities, much emphasis should be placed on all cognitive mental processes. Their timely and harmonious development largely determines the success of learning activities of younger school-age children.

Finally, the article concludes that most children nowadays lack sufficient cognitive development. Attention and thinking are among the most important cognitive processes. Any activity, whether mental or physical, requires one to first engage in the process of cognition which, in turn, involves thinking. Through the mechanisms of attention and thinking, it becomes possible to explore the surrounding world, acquire new knowledge, develop skills and enrich the inner world. One acquires the ability to recognize the causes and predict the course of events, discover

previously unknown aspects of the studied object, formulate conclusions, modify and improve practices.

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