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RESEARCH ARTICLE

Multisensory Approaches to The Activation of Cognitive Processes in Children with Vision Disorders (On the Example of Hospital Schools)

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Abstract

This article examines the activation of cognitive processes in hospital school students with visual impairments undergoing long-term medical treatment. The study analyzes the role of sensory compensation for information deficit, principles of neuroplasticity, and modern pedagogical technologies. The effectiveness of such methodologies as audio-tactile integration, problem-based learning, and cognitive-visual stimulation is scientifically substantiated. Furthermore, methodological recommendations are proposed to improve the quality of hospital-based pedagogy for children with special educational needs.

KEYWORDS

Hospital pedagogy, visual impairment, cognitive processes, inclusive education, sensory compensation, audio-tactile method, problem-based learning, neuroplasticity.

INTRODUCTION

Article 3 of the Law of the Republic of Uzbekistan "On Education" guarantees the right of every citizen to education, regardless of the form of education. Especially for children undergoing long-term treatment, the establishment of hospital schools is the most important step in ensuring inclusiveness. Students with visual impairments face the complex task of not only acquiring academic knowledge in a hospital setting, but also compensating for their existing psychophysical disabilities. In a hospital setting, the educational process directly affects the child's mental state. As noted in the textbook "General Psychology" by P.I. Ivanov and M.E. Zufarova: "The adaptation of the sensory organs to stimuli is clearly manifested in visual sensations" [3]. As a result of visual impairment, a lack of information arises, which, in turn, leads to changes in attention and memory processes. The task of the hospital educator is to fill this gap through other sensory channels. Today, the relevance of hospital pedagogy lies in the fact that it serves as a bridge connecting medicine and pedagogy. N.B. Goipova notes that "in preparing children with disabilities for inclusive education, it is important to provide psychological support for their cognitive activity"[2]. This article is aimed at analyzing modern methods that activate cognitive processes in children with visual impairments.

The cognitive development of children with visual impairments is determined not only by biological factors, but also by their adaptation to the socio-pedagogical environment. Long-term inpatient treatment in a hospital-school setting can cause sensory deprivation (information deficiency) in students,

which leads to a slowdown in cognitive processes. Therefore, in our opinion, the implementation of neuropedagogical approaches aimed at compensating for a child's disability in the organization of the educational process is the only effective way to preserve their intellectual potential. Children with visual impairments have a specific dynamic of cognitive processes - attention, memory, and thinking. Studies by Z. Celik Turan and E. Aki show that cognitive rehabilitation significantly improves the functional vision of children with visual impairments. In this process, based on the principle of neuroplasticity, the visual centers of the brain establish feedback with other sensory channels, which creates opportunities for the student to acquire new knowledge [5]. Because a student is confined to a limited space in a hospital setting, their spatial perception can be weakened. A. Fontaine-Winke [6], in his research, puts forward the concept of "vision strategies" and proposes to maximize the use of the existing visual residue in children with visual impairments. These strategies serve to focus the student's attention on a specific point during the lesson and to identify objects through audio-tactile aids.

The role of didactic principles in increasing cognitive activity is invaluable. As R.A. Mavlonova notes in the textbook "General Pedagogy": "Didactic principles are general requirements that cover all aspects of the educational process"[4]. For a student with visual impairments, the harmony of the principles of visualization and comprehensibility in education serves as a starting point in the development of their abstract thinking. As can be seen from the above analysis, increasing the cognitive activity of children with visual impairments should not be limited to teaching, but should be a mutual synthesis of medical and pedagogical rehabilitation. As the author, we conclude that the combination of such concepts as "neuroplasticity" and "visual strategies," put forward in modern research, with general pedagogical principles, serves as a methodological basis for activating cognitive processes in students of a hospital school. This, in turn, guarantees the child's full integration into society in the future. The process of working with visually impaired students in a hospital-school setting requires not only pedagogical skills from the teacher, but also the ability to deeply analyze the child's sensory and cognitive capabilities. To eliminate intellectual passivity caused by diseases and sensory insufficiency, it is necessary to abandon traditional teaching methods and introduce methods that activate alternative channels of information reception. As the author, I emphasize that the key to activating cognitive processes in a hospital educational environment is the expansion of the student's perception boundaries through multisensory (auditory, tactile, motor) approaches and the enrichment of the lesson content with problem situations that arouse their curiosity.

1. Audio-tactile communication and visualization method

This method is based on replacing the information received through the organ of vision with auditory and tactile sensations. As R.A. Mavlonova notes, "The principle of visualization in education requires the involvement of all types of sensory organs in the educational process, not only of vision"[4]. In a hospital setting, when explaining the lesson topic, the teacher connects each concept with audio-descriptive (sound image) and convex-dot (Braille or volumetric layouts) means. The essence of this method is that the child, by palpating the shape, size, and texture of the object with their hands (tactile perception), forms its cognitive map through the teacher's detailed description. This method serves to eliminate the uncertainty of imagination, especially in the lessons of exact sciences and natural science.

2. Method of creating cognitive-problem situations (heuristic conversation)

This method encourages students to draw logical conclusions rather than accept ready-made information. As indicated in P. I. Ivanov's textbook, "Thinking begins where the problematic situation arises, and it ensures the activity of the individual"[3]. The hospital teacher gives the student tasks that allow them to overcome the visual barrier caused by visual impairment with mental operations. For example, without showing the student an object, information is given about its function, smell, or sound, and it is required to find the name and properties of the object in a logical way. This method stimulates the brain activity of a child who has been inactive for a long time in a hospital setting and eliminates cognitive passivity[4].

3. MNEMO-Technology and Associative Memory Method

In children with visual impairments, the main reference point is auditory memory. As N.B. Goipova noted, "In hospital pedagogy, corrective exercises must serve the development of cognitive processes of the child, such as memory and attention" [2]. This method is based on memorizing the lesson material using rhythm, rhyme, musical associations, or

"mnemonic rules." For a hospital school student, complex terms or historical dates are associated with a certain sound image or a life event familiar to the child (association). This method increases the effectiveness of storing information in the child's long-term memory and reduces fatigue caused by the study load. A hospital school teacher should use the "Audio-tactile integration" methodology when working with children with visual impairments. R.A. Mavlonova, while classifying teaching methods in the textbook, specifically notes the effectiveness of visual methods[4]. For a visually impaired child, "visualization" is a method of "hand feeling" (tactile perception) of the lesson topic through simultaneous sound description and volumetric (tactile) materials.

The use of digital technologies and methods of cognitive-visual stimulation in the process of hospital education is not only a source of knowledge for visually impaired students, but also a new sensory portal for perceiving the external world. In our opinion, virtual reality and voice interfaces fill gaps in the student's visual memory through intellectual modeling, which, in turn, reduces depression in a hospital setting and awakens an inner motivation for learning in the child. The comprehensive application of these methods, as noted by R.A. Mavlonova and other scientists, along with ensuring the effectiveness of education, serves to maximize the realization of the child's individual capabilities. Another modern method is the "Problem-based learning" method. Mavlonova said about this method: "Problem-based learning teaches the student to search, to apply existing knowledge in a new situation"[4]. Giving a child with visual impairments in a hospital setting problem situations such as "What method would you use if you had to determine the shape of objects without seeing them?" activates their logical thinking and the ability to search for solutions. Also, the "Cognitive-Visual Stimulation" methodology provides for the use of ICT tools. As noted in the journal "Pedagogical Skills," virtual reality (VR) technologies create a safe learning environment for children with visual impairments. Within the framework of this methodology, special contrast programs and voice interfaces are used that activate the student's visual analyzer, which facilitates the process of encoding information in their memory[7].

CONCLUSION AND RECOMMENDATIONS

Activation of cognitive processes in students of a hospital school with visual impairments is not only an educational, but also a complex correctional and rehabilitation task, requiring a systematic approach from the teacher. As determined during our research, cognitive rehabilitation methods, audio-tactile methods, and problem-based learning technologies serve as the main tool for overcoming the child's physical limitations and forming a holistic understanding of the world. In this regard, R.A. Mavlonova explains the mechanism for achieving real results as follows: "To achieve results in education, it is necessary to correctly select and apply pedagogical technologies"[4]. Especially in a hospital setting, considering the variability of the student's psychophysical state, the chosen methods must be flexible and stimulating.

Based on the conducted scientific and methodological analysis and international experience, we propose the following recommendations aimed at improving the quality of hospital education:

It is necessary to use special lighting, contrasting materials, and texts in large font, taking into account each student's visual acuity, medical history, and individual learning speed. In this process, the principle of differentiated education, put forward by Mavlonova, should become the main criterion of a hospital school.

In the educational process, the widespread introduction of methods that activate tactile (touching), kinesthetic (movement), and olfactory sensations[4], rather than relying solely on the auditory canal, increases the effectiveness of the lesson. This opens up multiple channels for encoding information in a visually impaired child.

When determining the study load, it is important to coordinate the general health of the child, the effect of medications, and the degree of fatigue. Combining cognitive exercises with medical procedures increases the student's stress resistance.

In conclusion, the introduction of modern and innovative methods of hospital pedagogy into practice accelerates not only the education of a child with visual impairments, but also their socio-psychological adaptation to society. These approaches, regardless of the student's physical condition, serve to fully demonstrate their intellectual potential, overcome sensory barriers through mental operations, and find their place in life in the future. Our scientific analysis shows that the combination of the pedagogical process with medical rehabilitation in the conditions of a hospital school, eliminating the cognitive stagnation that may arise in a child due to illness, maintains their internal motivation for cognition.

At the same time, these methods of activating cognitive

processes in visually impaired students will become a solid foundation for further deepening the principles of inclusiveness in the education system. In the future, it is possible to raise the effectiveness of education to a new level through the widespread introduction of digital technologies, voice assistants based on artificial intelligence, and personalized training modules into the practice of hospital schools. Indeed, meeting each child's need for knowledge and creating a flexible learning environment remains the highest goal of modern pedagogy.

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