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DEVELOPMENT OF MOTOR SKILLS IN PRESCHOOL CHILDREN WITH CEREBRAL PALSY THROUGH MULTISENSORY TECHNOLOGIES.

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Abstract:
This article examines the effectiveness of multisensory technologies in developing motor skills in preschool children with cerebral palsy. Modern multisensory approaches, methods of their application, and practical outcomes are analyzed. It has been studied that multisensory technologies significantly help improve motor coordination, balance, and physical activity in children.

Keywords: cerebral palsy, preschool age, multisensory technologies, motor skills.

Cerebral palsy is one of the most widely discussed medical and pedagogical issues worldwide, directly affecting human health and social life. Today, it is recognized as one of the most complex neurological disorders occurring in children. Cerebral palsy is a condition caused by early damage to the central nervous system, which limits a child's motor, speech, and coordination abilities.

Globally, the number of children born with cerebral palsy is increasing year by year. According to the World Health Organization, at least 2–3 out of every 1,000 newborns are diagnosed with this condition. Unfortunately, the increasing number of children with cerebral palsy in our country further highlights the urgency of this issue. This condition requires not only medical treatment but also social and pedagogical rehabilitation. Therefore, early identification, creating special educational and developmental conditions, and providing psychological support to parents are essential factors in mitigating the impact of cerebral palsy.

The issue of cerebral palsy is a complex process that requires collaborative efforts not only from physicians but also from educators, psychologists, speech therapists, and social workers. Thus, in-depth study of this topic and the development of effective methods that support a child's personal development are among the most pressing tasks of today.

Preschool age is the most critical period for motor development. Therefore, working on muscle control, balance, and coordination during this stage is essential for ensuring effective rehabilitation.

First, it is necessary to answer the question: "What is motor skills?" Motor skills are a fundamental ability essential for every individual. They directly influence a child's physical, social, emotional, and intellectual development. Motor skills are manifested in two main forms:

Gross motor skills involve movements that engage large muscle groups.

These include walking, running, jumping, climbing stairs, playing with a ball, swimming, and cycling.

Fine motor skills involve the activity of small muscles, particularly hand and finger movements.

Examples include writing and drawing, buttoning clothes, packing, cutting, eating with a spoon, modeling with clay, and grasping small objects.

Motor skills play a crucial role in a child's physical, intellectual, social, and emotional development. Therefore, innovative methods are required to support motor development in children with cerebral palsy (CP).

In both healthy children and children with CP, modern physical exercises can be used to develop motor skills. These include functional movement exercises and play-based physical activities.

Functional movement exercises are natural movements that prepare children for everyday activities through physical exercises, such as crawling, climbing, and grasping objects.

Play-based physical exercise approaches are more engaging for children and develop motor skills through structured games. Examples include obstacle courses and movement combined with music.

If we focus on these individually, for example, what is an obstacle course?

a) Obstacle course – a specially designed movement path (playground) for children that requires performing various tasks. Depending on the child's condition, activities begin with simple exercises.

Simple obstacles include walking over soft cushions, crawling through small tunnels, and walking around low stools. The main goal is to develop balance and safe walking skills.

More complex obstacles include hopping on one foot, running along zigzag lines, jumping over ropes, and climbing ladders. These activities actively develop coordination and gross motor skills.

b) Combination of music and movement is a powerful tool that promotes not only motor development but also cognitive and speech development.

Children perform movements such as clapping, stepping, and jumping in accordance with the rhythm of the music. This integrates auditory and motor sensory systems. For example, slow music encourages slow movements, while fast music encourages quick movements.

To make exercises more engaging, musical games can also be organized.

For example, in the game "Freeze when the music stops," children dance to the music and must remain motionless when the music stops. This develops quick reaction and balance.

The game "Sit on the empty chair first" develops speed, agility, and balance. Children move around chairs while music plays—clapping, raising their hands, or holding hands in a circle—and quickly sit on an empty chair when the music stops.

In the game "Animal dance," children imitate movements of different animals (jumping, crawling, flying) while dancing to music. This game supports both motor and cognitive development.

In the game "Follow the path," children move along various paths (straight, curved, circular) drawn on the floor, guided by traffic light cards and music rhythm. This game develops motor and cognitive skills, color recognition, signal differentiation, and concentration.

Today, information and technology fields are developing rapidly. The use of various technological programs significantly contributes to children's development and disease management. Global experience shows that high results can be achieved in developing motor skills of children with cerebral palsy through multisensory technologies.

Multisensory technology is a modern method that differs from traditional rehabilitation approaches by engaging multiple sensory systems (vision, hearing, touch, balance) simultaneously, enabling effective development of motor, perceptual, and emotional skills. This approach not only improves muscle control and balance but also positively affects emotional stability and social development.

In particular, virtual reality technology transforms ordinary exercises into games. When children experience adventures in a virtual world, their motivation to perform exercises increases. In a virtual environment, children are not afraid to try new movements because falling or making mistakes has no real-life consequences, which increases self-confidence. Programs adapt to each child's level, gradually increasing difficulty. Children see immediate results and receive feedback, accelerating the learning process.

Examples of such games include:

Virtual movement games: Children cut targets with a virtual stick in rhythm with music. This develops hand-eye coordination, reaction speed, and upper body movement.

Virtual sports games: Playing tennis, basketball, boxing, and other sports in a virtual environment allows children to practice full-body movements such as striking, jumping, and bending in an engaging way.

Adventure games: Children travel through virtual worlds, overcome obstacles, and climb peaks by performing real physical movements such as stretching, bending, and jumping.

These programs primarily target the development of gross motor skills. Programs aimed at developing fine motor skills include:

Finger exercises: Using special sensor gloves or cameras, children's finger movements are tracked as they grasp, squeeze, and move virtual objects. This strengthens hand muscles and refines precise movements.

Writing and drawing simulators: Children draw and write letters with a virtual pen. The program analyzes pressure and movement accuracy and provides recommendations.

Construction games: Children build complex structures using virtual blocks or LEGO, developing spatial thinking and hand-eye coordination simultaneously.

Touchscreen technologies also play an important role in fine motor development. Examples include:

Interactive drawing: Children mix colors, draw lines, and create shapes with their fingers. Different pressure levels produce different results, enhancing tactile sensitivity.

Logical games: Matching shapes, assembling puzzles, and completing patterns require precise finger movements.

Multisensory technologies significantly enhance the effectiveness of motor skill development in children with cerebral palsy. This approach not only complements traditional rehabilitation systems but also elevates them to a new level. For preschool children, multisensory therapy integrates play, movement, and sensory stimuli, creating broad opportunities for holistic development. However, although rehabilitation services for this group of children exist in Uzbekistan, open and sufficient scientific-practical data on the systematic implementation of multisensory-based programs remain limited. Therefore, to further improve rehabilitation for children with cerebral palsy in our country, it is necessary to introduce multisensory stimulation rooms (Snoezelen), train qualified specialists based on international best practices, develop multisensory storytelling and specialized programs, and actively utilize modern technologies.

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