MODELING A SENSORIMOTOR DEVELOPMENTAL ENVIRONMENT FOR PRESCHOOL CHILDREN WITH ALALIA: A CORRECTIVE-PEDAGOGICAL APPROACH

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Abstract. This article examines the corrective-pedagogical foundations of modeling a sensorimotor developmental environment for preschool children with alalia. The study is conceptually aligned with the uploaded dissertation, which substantiates the corrective value of rhythmic exercises, kinesthetic stimulation, adaptive individual environment, and the integrative use of pedagogical means in speech rehabilitation. The dissertation shows that speech development can be improved through the optimization of movement and kinesthetic influence, the adaptation of visual-phonetic and acoustic-phonetic tasks to a physiological individual environment, and the staged use of rhythmical exercises for voice, breathing, and diction. In the uploaded logopedic source, alalia is described as a condition that requires a holistic, systematic, and long-term intervention directed at all speech functions and at the child's personality as a whole. Based on these ideas, the article argues that a sensorimotor developmental environment for children with alalia should be organized as a purposeful pedagogical system combining movement, rhythm, visual support, tactile and kinesthetic stimulation, speech imitation, and communicative tasks. Such an environment creates conditions for the emergence of speech initiative, the activation of speech perception and production, and the transition from pre-verbal or minimally verbal behavior to functional communication.

Keywords: alalia, sensorimotor environment, preschool children, corrective pedagogy, speech initiation, rhythm, movement, kinesthetic stimulation, speech therapy.

Annotatsiya. Mazkur maqolada alaliyali maktabgacha yoshdagi bolalar uchun sensomotor rivojlantiruvchi muhitni modellashtirishning korreksion-pedagogik asoslari tahlil qilingan. Maqolada ritmik mashqlar, kinestetik stimulyatsiya, adaptiv individual muhit, harakat, ko‘rish, eshitish va nutqiy taqlidni birlashtiruvchi integrativ yondashuvning mazmuni yoritilgan. Sensomotor rivojlantiruvchi muhit bolada nutqiy tashabbusni yuzaga keltirish, nutqni idrok etish va ishlab chiqishni faollashtirish, pre-verbal xatti-harakatlardan funksional muloqotga o‘tishni ta’minlovchi pedagogik tizim sifatida talqin qilingan.

Shuningdek, maqolada bunday muhitni modellashtirishning tarkibiy qismlari, tamoyillari, bosqichlari va amaliy ahamiyati bayon etilgan.

Kalit so‘zlar: alaliya, sensomotor muhit, maktabgacha yoshdagi bolalar, korreksion pedagogika, nutqiy tashabbus, ritm, harakat, kinestetik stimulyatsiya, logopedik ta’sir.

Аннотация. В статье анализируются коррекционно-педагогические основы моделирования сенсомоторной развивающей среды для детей дошкольного возраста с алалией. Раскрывается содержание интегративного подхода, объединяющего ритмические упражнения, кинестетическую стимуляцию, адаптивную индивидуальную среду, движение, зрительное и слуховое восприятие, а также речевое подражание. Сенсомоторная развивающая среда рассматривается как педагогическая система, обеспечивающая возникновение речевой инициативы, активизацию восприятия и продуцирования речи, а также переход от довербального поведения к функциональной коммуникации. Кроме того, в статье представлены структурные компоненты, принципы, этапы и практическое значение моделирования такой среды.

Ключевые слова: алалия, сенсомоторная среда, дети дошкольного возраста, коррекционная педагогика, речевая инициатива, ритм, движение, кинестетическая стимуляция, логопедическое воздействие.

INTRODUCTION.

In modern speech therapy and special pedagogy, the problem of alalia cannot be solved through isolated speech drills alone. The uploaded logopedic source emphasizes that alalia is a medical, psychological, and pedagogical problem, and that intervention must address speech functions comprehensively while taking into account ontogenetic patterns of speech development. It also notes that systematic logopedic work should be organized so that the child becomes prepared for later school learning and communication. At the same time, the uploaded dissertation offers a broader corrective framework that can be extended beyond hearing impairment to other developmental speech disorders. In its conclusions, the dissertation states that the development of children’s speech requires the use of complex methodological and didactic opportunities of phonetic rhythmics, including movement, kinesthetic influence, and the integration of rhythmic components into speech rehabilitation. It also argues that speech development may be improved by ensuring the physiological orientation of visual-phonetic and acoustic-phonetic tasks and by maintaining the unity of kinetics and kinesthetics within a rhythmic interval.

For preschool children with alalia, these ideas are especially important because speech does not emerge in a stable and spontaneous way. A structured

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sensorimotor environment can become the medium through which perception, movement, imitation, and communicative intention gradually transform into speech activity. Therefore, the aim of this article is to describe the principles and components of modeling a sensorimotor developmental environment for preschool children with alalia.

A sensorimotor developmental environment may be defined as a specially organized corrective-pedagogical space in which the child's visual, auditory, tactile, kinesthetic, motor, and speech experiences are integrated into purposeful communication-oriented activity. This definition is conceptually supported by the dissertation, where speech development is linked to the combined participation of auditory, visual, movement, and kinesthetic analyzers, and where phonetic rhythmics is presented as a movement-based corrective technology for developing pronunciation and prosody through multisensory influence.

In relation to alalia, such an environment should not be reduced to a collection of toys or exercises. It should function as a methodically designed system. The uploaded dissertation demonstrates that corrective work becomes more effective when pedagogical means are used integratively, when rhythmic exercises are graded according to specific components, and when the child's individual physiological and educational environment is taken into account. This is highly relevant for alalia, where the child often needs structured repetition, external support for initiation, and multimodal stimulation to activate speech processes.

The first component of a sensorimotor environment for alalia is the **rhythmic-motor component**. It includes stepping, clapping, body imitation, movement sequencing, and coordinated motor patterns that prepare the child for temporal organization of speech. The second component is the **visual-supportive component**, which includes gesture, object demonstration, picture-symbols, visual sequencing, and face-to-face articulation modeling. The third is the **kinesthetic-tactile component**, where tactile prompts, hand support, object manipulation, and articulatory-kinesthetic awareness exercises are used to build bodily grounding for speech. The fourth is the **breathing and voice component**, where vocal play, prolonged exhalation, sound onset exercises, and simple prosodic patterns are introduced. The fifth is the **communicative-play component**, through which speech units are embedded into emotionally meaningful interactions. The dissertation supports this structure through its emphasis on voice, breathing, diction, movement, rhythmic intervals, and integrative pedagogical influence in speech rehabilitation.

The methodological principles of modeling such an environment are as follows. First, the principle of **systemicity** means that all elements of the

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environment are connected and directed toward the gradual emergence of speech. Second, the principle of **adaptivity** requires adjustment to the child's age, functional state, and individual speech profile. Third, the principle of **multisensory integration** implies that speech is supported simultaneously by movement, perception, and tactile-kinesthetic reinforcement. Fourth, the principle of **staging** presupposes that speech development proceeds from pre-speech activation to imitation, from imitation to stable verbal production, and from verbal production to communicative use. These principles are consistent with the dissertation's methodological model and with the alalia source's insistence on comprehensive and differentiated intervention.

The practical modeling of the environment may be organized in four stages. At the first stage, the therapist creates a safe and motivating space for attention, imitation, and sensorimotor activation. At the second stage, simple movement and perception patterns are connected with vocal reactions, gestures, and proto-speech elements. At the third stage, words and short verbal patterns are introduced within rhythmic and visually supported communicative routines. At the fourth stage, the child is encouraged to generalize speech activity into broader interaction with adults and peers. Such staged work corresponds to the dissertation's conclusion that the methodological stages of speech development may be improved through the integrative use of phonetic-rhythmic technologies and pedagogical means in speech combinations.

An important implication of this approach is that the environment itself becomes corrective. It continuously prompts the child toward perception, action, anticipation, imitation, and verbal response. In preschool age, this is especially valuable because speech activity often depends on emotionally meaningful and physically grounded interactions. The alalia source also highlights the need for long-term systemic work aimed at overcoming speech underdevelopment and preparing the child for educational tasks. Therefore, modeling a sensorimotor environment is not an optional supplement but a central corrective strategy in early work with alalia.

Modeling a sensorimotor developmental environment for preschool children with alalia is a productive corrective-pedagogical strategy grounded in a systemic view of speech development. The uploaded dissertation offers a transferable methodological framework by emphasizing movement, kinesthetic influence, rhythmic organization, adaptive individual environment, and the staged integration of pedagogical means into speech rehabilitation. The uploaded logopedic source on alalia confirms that the disorder requires holistic, differentiated, and long-term intervention directed at all speech functions. On this basis, a sensorimotor developmental environment may be understood as a structured medium in which

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speech emerges through the coordinated interaction of rhythm, movement, perception, breathing, and communication.

The effectiveness of a sensorimotor developmental environment largely depends on how the physical space is organized. For preschool children with alalia, the environment should be predictable, accessible, emotionally safe, and sufficiently stimulating without becoming overloaded with sensory information. The organization of space should therefore follow the principle of functional differentiation. Different areas may be designated for movement, articulation, auditory perception, visual activities, tactile exploration, breathing and voice exercises, and communicative play. Such differentiation makes it possible to gradually direct the child's attention from one type of activity to another while maintaining continuity between sensorimotor and speech tasks.

The motor area should provide sufficient space for walking, stepping, jumping, rhythmic movements, imitation and coordination exercises. The purpose of this area is not physical training as such, but the formation of the temporal and motor foundations that can subsequently support speech production. Rhythmic movements can be accompanied by clapping, tapping, counting, simple vocalizations or repeated syllables. In this way, movement becomes connected with sound and gradually with meaningful verbal material.

The visual area should contain objects and materials that support recognition, categorization and sequencing. Pictures, objects, symbols, visual schedules and simple sequences can be used to help the child understand the structure of an activity. For a child with alalia, visual support is particularly useful when verbal instructions alone are insufficient. Instead of providing lengthy verbal explanations, the specialist can demonstrate the action, present a picture, use a gesture and then invite the child to imitate. This reduces the cognitive demands of the task and creates conditions for successful participation.

The tactile and manipulative area should contain objects with different textures, shapes, sizes and functions. Manipulating objects can be incorporated into speech activities. For example, the child may sort objects, select a required item, give an object to an adult, place an object in a specified location or imitate an action with it. Each action creates a natural communicative situation in which a gesture, vocalization, word or short phrase can be encouraged. The environment should also include a clearly defined place for face-to-face interaction. Direct visual contact between the child and the adult is important for imitation of facial expressions, articulatory movements, gestures and intonation. The specialist can use a mirror, pictures and objects while maintaining a position that allows the child to observe both the model and the consequences of his or her own actions.

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One of the central principles of the proposed model is the integration of movement and speech rather than their separate training. Speech is a complex functional system requiring coordination of perception, motor planning, breathing, phonation, articulation, attention and memory. Consequently, corrective work may become more meaningful when these functions are activated simultaneously within a structured activity. At the initial level, movement can be accompanied by nonverbal vocal reactions. The child may imitate environmental sounds, rhythmic sounds, prolonged vowels or simple vocal patterns. The specialist gradually introduces combinations of movement and vocalization. For example, stepping may be accompanied by repeated syllables, while clapping may correspond to the rhythm of a short word. The aim is to establish a stable connection between temporal organization, motor action and vocal production.

The next level involves the introduction of simple verbal units. A movement sequence may be associated with a familiar word, action or object. For example, the child can perform an action and simultaneously produce a corresponding word such as “go,” “give,” “take,” “sit” or “come.” These verbal units should initially have a clear communicative function. The child should understand that speech is not merely an exercise but a means of influencing another person and obtaining a desired result.

Gradually, two-word combinations and short phrases can be incorporated into rhythmic activities. The adult may model a phrase, accompany it with a gesture or movement, and then encourage the child to reproduce it. Repetition should be varied enough to prevent mechanical performance. The same speech pattern can be used in different play situations, with different objects and communicative partners. Such variation promotes generalization.

An important methodological consideration is the regulation of task difficulty. If a child is unable to reproduce a complete word or phrase, the specialist should not immediately increase the number of repetitions. Instead, the task may be simplified by reducing the verbal unit, slowing the tempo, providing a visual cue, adding a gesture or returning to a previously mastered movement pattern. This creates a gradual progression from supported performance to greater independence. The development of speech in children with alalia requires attention not only to speech production but also to speech perception. A child may have difficulty distinguishing, organizing or retaining speech information, which can affect imitation and verbal expression. Therefore, the sensorimotor environment should provide repeated opportunities to connect auditory information with visual and motor experience. For example, the specialist can present an object while pronouncing its name and simultaneously using a consistent gesture. The child first observes the object, then hears the word, and finally performs an action with the

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object. This creates several interconnected representations of the same concept. Over time, the visual and motor cues can be reduced so that the child increasingly relies on auditory information.

Auditory discrimination activities may be organized around contrasts in intensity, duration, rhythm and sound quality. The child can distinguish a loud and quiet sound, a long and short sound, a fast and slow rhythmic pattern or different environmental sounds. These tasks can later be connected with speech sounds and syllables. Such progression allows the specialist to move from general auditory attention toward more specific phonological processing.

Rhythmic patterns are particularly useful because they provide an external temporal structure. The child does not have to organize the sequence independently from the beginning. The rhythm acts as a model that helps maintain attention and anticipate the next action or sound. Gradually, external rhythmic support can be reduced as the child's internal organization improves.

The same principle applies to visual perception. Pictures can be arranged in sequences representing an action, event or short story. The child first observes the sequence, then reproduces the actions and finally attempts to verbalize them. In this way, visual sequencing, motor planning and speech production are brought together within one task. Breathing and voice should occupy an important position in the sensorimotor environment. Speech requires controlled exhalation, appropriate phonation and coordination between respiration and articulation. For preschool children with alalia, breathing exercises should therefore be presented in a playful and functional manner rather than as isolated physiological drills. Simple activities can include prolonged exhalation, blowing lightweight objects, producing sustained vowels, imitating animal sounds and alternating short and long vocal patterns. These activities should be carefully dosed and integrated with communication. The purpose is to develop controlled vocal activity that can subsequently support speech.

Prosody is another important component. Speech is not limited to individual sounds and words. Intonation, rhythm, stress, tempo and pauses contribute to the communicative meaning of an utterance. The sensorimotor environment can provide opportunities to reproduce different rhythmic and intonational patterns through games, songs, movement and role-play. For instance, the same phrase can be pronounced as a question, statement or emotional response. The child can accompany these patterns with corresponding facial expressions and gestures. Such multimodal presentation helps make prosodic differences more perceptible and meaningful. The use of movement is particularly valuable for establishing speech rhythm. A child may walk according to a rhythm, clap syllables, tap a drum or move a hand in correspondence with speech. Gradually, the external movement can

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be synchronized with verbal production. The transition from gross motor movement to smaller articulatory movements may then be used to support the development of speech coordination.

The ultimate purpose of a sensorimotor environment is communication. Therefore, play should not be treated as an additional entertaining element but as one of the principal mechanisms through which corrective objectives are achieved. Preschool children learn most effectively when an activity has emotional meaning and provides an immediate reason to interact. Communicative games can be structured around requesting, choosing, giving, refusing, greeting, commenting, answering and initiating interaction. For example, the child may need to ask for a toy, choose between two objects or tell an adult what action should be performed. Initially, the adult may provide a gesture or verbal model. As the child's abilities increase, the level of support is gradually reduced.

Role-play provides another useful context. Simple situations such as “shop,” “family,” “doctor,” “transport,” “cooking” or “going for a walk” can create repeated opportunities for the use of functional vocabulary. The same words can appear in different contexts, which supports semantic consolidation and generalization. Peer interaction should also be introduced gradually. At first, children can participate in parallel activities with the specialist providing support. Later, cooperative tasks can be organized in which one child gives an object to another, imitates an action, waits for a turn or responds to a simple request. These activities help transfer speech skills from individual therapy into natural communication.

An important feature of communicative play is the use of motivation. The child should have a meaningful reason to communicate. If the desired object is freely available at all times, there may be little need to request it. If access to the object is organized within a communicative routine, the child receives a natural opportunity to initiate interaction. Such situations should be created ethically and positively, without causing frustration or excessive dependence on adult prompting. A sensorimotor environment cannot be identical for all children with alalia. The disorder has heterogeneous manifestations, and children may differ considerably in their receptive speech, expressive speech, motor abilities, attention, imitation, sensory processing and communicative motivation. Therefore, the environment should be individualized on the basis of an initial assessment and continuously modified according to developmental progress.

Individualization may concern the duration of activities, number of repetitions, complexity of movement, amount of visual support, type of tactile assistance, verbal demands and degree of adult participation. One child may require stronger visual and gestural support, whereas another may benefit more from

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rhythmic and motor stimulation. Monitoring should be systematic. The specialist may record changes in several areas: ability to maintain attention, imitation of movements, imitation of sounds, understanding of instructions, initiation of communication, vocabulary, phrase production, articulation, prosody and participation in joint activities. The purpose of monitoring is not simply to assign scores but to identify which components of the environment are producing functional changes.

A useful approach is to compare the child's performance under different conditions. For example, the specialist may observe whether a word is produced more successfully when it is accompanied by a gesture, rhythmic movement or visual cue. Such observations help determine which forms of sensory support are most effective for the individual child. Progress should also be evaluated in natural communication. A child may successfully reproduce a word during a structured exercise but fail to use it spontaneously. Therefore, successful intervention should be reflected not only in exercise performance but also in the child's ability to transfer learned speech units into play, interaction with adults and communication with peers.

The sensorimotor developmental environment should not be limited to the logopedic room. Its principles can be extended to the child's everyday environment through cooperation between the speech therapist, teachers and family. Consistency is particularly important because speech development requires repeated practice in different situations. Parents can use simple rhythmic routines at home, such as greeting songs, movement games, picture-based activities and everyday verbal routines. Ordinary activities such as dressing, eating, washing, cleaning toys or preparing for a walk can become opportunities for communication. The adult can name actions and objects, provide short models and encourage the child to respond.

Teachers in preschool settings can reinforce the same principles through predictable routines, visual schedules, movement breaks, songs, group games and structured peer interaction. This creates continuity between individual correctional sessions and the child's daily educational experience. The cooperation should nevertheless avoid turning the entire child's day into therapy. The goal is to create a naturally supportive communicative environment in which speech is encouraged without excessive correction or pressure. Emotional security, positive reinforcement and the child's interest should remain central. The proposed sensorimotor environment may contribute to several interconnected developmental outcomes. At the sensorimotor level, systematic activities may support body awareness, coordination, imitation, motor sequencing and the ability to organize

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actions in time. At the perceptual level, they may facilitate auditory and visual attention, discrimination and integration of sensory information.

At the speech level, the environment is intended to create conditions for the gradual development of vocal activity, syllable production, word formation, vocabulary expansion, phrase construction and prosodic organization. At the communicative level, it may increase the child's motivation to initiate interaction, respond to another person and use speech for functional purposes. The expected changes should be understood as interconnected rather than isolated. Improvement in motor organization may facilitate rhythmic speech production; increased auditory attention may support imitation; stronger visual support may improve comprehension; successful communicative experiences may increase motivation for further speech attempts. Therefore, the effectiveness of the environment lies precisely in the integration of these processes.

The model can consequently be represented as a dynamic system: *sensory perception → movement → imitation → vocalization → syllable → word → phrase → communicative action.*

This sequence should not be interpreted as a rigid linear pathway. Children may move between stages, return to previously practiced forms and require different types of support depending on the task. The model instead represents the general logic of gradual integration. The modeling of a sensorimotor developmental environment for preschool children with alalia reflects a shift from isolated speech exercises toward an integrated corrective-pedagogical approach. The central assumption is that speech development cannot be separated from the functioning of perception, movement, attention, imitation, breathing, voice and communication.

The value of such an environment is therefore not determined by the number of exercises or materials available. Its effectiveness depends on the relationships established between them. A movement becomes corrective when it is connected with rhythm or communication. A picture becomes useful when it supports comprehension or verbal expression. A tactile prompt becomes meaningful when it helps the child organize an action that leads to communication. A vocal exercise becomes functionally important when it prepares the child for meaningful speech. This approach also emphasizes the importance of gradual reduction of external support. At the beginning, the adult may provide a complete model using movement, gesture, picture and speech. Later, one or more supports are removed. The child is thereby encouraged to rely increasingly on internal representations and independent communicative strategies.

Another important feature is the possibility of transferring the model across educational contexts. The same principles can be used in individual logopedic

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sessions, small-group activities and preschool routines. This makes the environment a flexible corrective system rather than a fixed set of therapeutic exercises. Modeling a sensorimotor developmental environment for preschool children with alalia provides a theoretically grounded and practically oriented framework for organizing comprehensive speech intervention. The approach combines rhythmic movement, visual support, tactile and kinesthetic stimulation, breathing and voice activities, auditory perception and communicative play within a unified corrective system.

The central methodological principle is the integration of sensory and motor experiences with meaningful speech activity. Rather than teaching speech through isolated repetition, the specialist creates situations in which the child needs to perceive, act, imitate, vocalize and communicate. Such organization corresponds to the developmental nature of preschool learning and creates opportunities for gradual movement from externally supported activity toward independent communication. The proposed environment should be systematic, adaptive, multisensory, staged and communication-oriented. Its organization requires careful consideration of the child's individual abilities and should be continuously adjusted through developmental monitoring. The involvement of the family and preschool teachers further increases the possibility of transferring emerging speech skills into everyday communication.

Thus, the sensorimotor developmental environment can be regarded as an integrated corrective-pedagogical technology in which movement, rhythm, perception and communication serve as interconnected pathways for the development of speech. Its potential significance for preschool children with alalia lies in creating conditions where speech is not practiced as an isolated skill but develops as part of purposeful action, interaction and participation in the social environment.

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