

## THE USE OF COMPUTER APPLICATIONS TO SUPPORT THE DEVELOPMENT OF HEARING - IMPAIRED CHILDREN'S SPEECH IN INCLUSION CONDITION

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**Abstract.** This research work has been funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant No. AP19679272 «Development of educational mobile applications for inclusive education of children with hearing impairments»).

The article is aimed at determining the impact of computer applications for the development of hearing-impaired children.

The article reveals the research related to the development of speech in children with special educational needs. The category of children with special needs includes children with speech disorders, as a rule, this category of children has impaired auditory perception, phonemic hearing, fine motor skills, spatial orientation, which directly affects the development of speech of the child.

Many researchers such as R. Levina, R. Boskis, G. Nikashina who have studied the general underdevelopment of speech in children claim that the nodal formation of speech disorders is the lack of phonemic hearing. Consequently, children with speech disorders have difficulties in mastering sound analysis and word synthesis, which entails different types of deviations that manifest themselves in dyslexia and dysgraphia. Further, such children have difficulties in learning at school, so this problem is significant and relevant.

In the authors' opinion, it is necessary to use innovative methods in the work on speech development. The authors analyze various modern innovative technologies. An empirical study to identify the formed fine motor skills of preschoolers with general underdevelopment of speech, based on the relationship between the development of fine motor skills and speech development. The diagnostic method of fine motor skills examination by N.V. Nishcheva consisting of three blocks was used. The group of preschoolers participating in the experiment was determined.

From the practical point of view, recommendations and a system of exercises for the use of sand therapy are given, which allows to develop both fine motor skills and speech in unity. The system of proposed exercises is methodologically justified and experimentally tested.

The results of the study can be used in work with preschoolers in kindergartens, special organizations, as well as in the preparation of the program and universities of educators, speech therapists.

**Keywords:** developmental language disorder, speech development, sand therapy, computer applications, preschoolers, fine motor skills, hearing-impaired children, inclusion

## **Basic provisions**

General impairment of children's speech development, at the present stage, is the most urgent and poorly resolved. According to UNICEF data for 2019 in Eastern and Central Europe, and Central Asia, children with disabilities are about 5.1 million people (<https://ww.cefuni.org/kazakhstan/>) [1], approximately 40% of this number with general speech impairment. This indicator tends to increase, which leads to the need to find ways to solve the best methods and technology for preventive and corrective work. In our article, we consider corrective work as a complex assistance to children with speech impairments in acquiring individual educational program.

## **Introduction**

Comprehensive work with children with special needs involves the creation of special learning and upbringing conditions that will allow taking into account the special educational needs of children with speech disorders through individualization and differentiation of the educational process. Today, the effectiveness of inclusion in education largely depends on the special training of teaching staff. Therefore, professional training of personnel today is the main problem of developing the education of children with special educational needs [2].

Children with learning difficulties base the program of correctional work on the specifics of the assimilation of learning material. Correctional work is aimed at realizing the existing potential of children, developing a system of universal educational activities that will contribute to successful learning and self-development. This is achieved by developing correct, clear, expressive coherent speech in children, mastering specific subject knowledge and skills of pronouncing norms, oral and written speech, reading and conscious assimilation of social norms [3].

There are five main areas of correction work as following:

1. Sound wear correction: residual defects. The insufficient level of fixing the acquired sound-bearing skills in the general speech mode will contribute to the fact that the child in the independent speech will pronounce the given sounds with a disorder: the absence of sound analysis, breaking the syllable structure, etc.

2. Improving the skill of linguistic analysis, which includes differentiation of opposition phonemes on the material of independent written statements, the development of morphemetic analysis skills, the formation of linguistic benchmarks, improvement of the textual articulation skill on semantic sections.

3. Development of the prerequisites for speech activity. This area involves the formation of skills to establish contextual relationships, improve the skills of verbal and non-verbal communication, work on psychological processes that provide speech activities.

4. Formation of linguistic base for general training. In this direction, work will be carried out to improve the syllabic structure, the formation of skills in the

practical usage of speech parts, the practical development of grammatical structures.

5. Improving children's communication skills. In the course of activities in this direction, various forms of communication, the formation of skills necessary for effective interaction - accession, maintenance and interruption of contact, etc. [4].

The results of activities in these areas of correctional work will be:

- formation of a responsible attitude to teaching;
- development of the ability to work according to the plan proposed by the teacher;
- development of all aspects of speech – vocabulary, grammatical structure;
- ability to divide text into sentences;
- proficiency in oral and written speech, monologue;
- physical development.

The results of the activity can be traced in the development of fine motor skills of children. Fine motor skills are a set of coordinated actions of the nervous, muscular and bone systems, often in combination with the visual system in performing small and precise movements with the hands and fingers and toes [5]. Researcher V. Sukhomlinsky noted that the origins of children's abilities and talents are at their fingertips. Scientists have proved that with the development of fine motor skills, there is a significant improvement in children's academic performance and the development of significant mental processes (memory, attention, thinking) [6].

Innovative methods for the development of fine motor skills are the main consideration in the paper since various methods and techniques have been developed for the development of fine motor skills. Their selection depends on the individual and age characteristics of children.

For the versatile development of the motor functions of the hand, it is necessary to train in various movements – compression, stretching, relaxation, etc.

S. Prishchepa believes that for this it is necessary to adhere to:

- systematic use of techniques;
- sequences, from simple to complex, without allowing «jumping» through some types of exercises;
- all games should be held on a positive emotional background, at the request of the child;
- observe the measure in the load of children, switching attention to other activities [7].

V. Tsvyntarny believes that «all games and exercises that are conducted with children in an interesting, relaxed playful way, involving parents in this process, help to develop fine motor skills of kids' hands, speech, attention and thinking» [8].

G. Salgarayeva et al. considered in their research the effectiveness of digital games designed to prevent and eliminate speech disorders in students with general speech underdevelopment, especially to support children with special educational disabilities [9].

Traditionally, speech therapy work was based on those didactic practices that have long-term approbation. But today, given the influence of science on practice, this is not enough.

### **Methods and materials.**

As regards to development of innovative techniques in speech therapy, in XX and XXI centuries, computer applications have become the object of scientific analysis by many speech therapists. Computer tasks increase interest in the content of educational material, in the educational process, contribute to the development of self-control and independent work skills [10].

One of the main methods, in speech therapy practice, in the work with children with speech disorders is the simulator «Delpha» (Fig.1). The speech therapy simulator allows a child to perform speech exercises at different levels of complexity, thereby implementing the principle from simple to complex, considering the peculiarities of visual perception and cognitive sphere of children with speech disorders. As a rule, no more than 3 pictures or words are shown on the screen at the same time, thereby maintaining a health-saving effect. The main feature and importance in the work of the simulator is the ability to work out automation, differentiation of sounds, to develop coherent speech in the game form.



Figure 1 - Simulator «Delpha»

In addition to speech, children with speech impairments suffer from irrelevant functions, speech therapy practice actively uses various equipment initially not designed to work with children with speech impairments. For example, the SNOSILEN sensor room is a non-traditional environment with a light-color effect for the development of all kinds of sensations, feelings, psycho-emotional muscular relaxation, etc. For the development of general motor activity, tactile sensitivity with children with dysarthria is used Soft ROMPA room - a dry pool with colorful balls, ladders, slides, therapeutic balls of various shapes. Interesting adaptation of the SOUND BEAM system (interactive equipment) (Fig.2) to work with stuttering children, promoting the stimulation of body possession, developing the confidence of spatial movement, expanding the range of movements, stimulating hearing, attention and concentration, improve communication skills.



Figure 2 - SOUNDBEAM system

Montessori therapy is the most popular technology, where the classrooms are equipped with a unique technique and equipment. Montessori learning, in addition to developing self-service skills, has a positive impact on the development of fine motor skills, improving the coordination of movements, promoting the gradual formation of logical thinking and correct color perception in the child. Technology promotes the development of primary mathematical representations, concepts about geometric forms, enriches the passive and active vocabulary, prepares the child's hand for writing.

Multikid's multimedia education system (Fig.3) is a combination of software and teaching materials. The objectives of the system are: general education; development of cognitive skills; working with educational materials; teamwork skills and spatial orientation.



Figure 3 - Multikid educational multimedia system

Vocabulary enrichment is possible by inclusion in speech therapy of multimedia educational system Eduplay which includes both specialized software and educational materials: cards, puzzles, tables and more. All subjects studied are universal: colors; dictionary; orientation in space; world of nature; part and whole; mathematics. The program is operated with a six-button keyboard. Later, children move to software that uses a simple keyboard.

Learning activities on developing cognitive skills are mostly designed with Edutouch multimedia system. All computer control keys are programmed depending on the topic currently being studied.

Computer applications used in work with children with special educational needs include SpeechViewer, which was originally implemented in Russia by speech therapist O.I. Kukushkin [11].



Figure 4 - Computer application SpeechViewer

Significant experience has been gained in the use of this medium in the system for the formation and correction of the oral speech of hearing-impaired children of primary school age. With the correct use of «Speech Viewer» as an auxiliary means of learning the following results can be achieved: significantly increase children's motivation for pronunciation classes; to reduce the time of formation and automation of a number of speech skills; to make it easier for the child to learn self-control over pronunciation; to make visible to the child his level of achievements in pronunciation; to provide the opportunity to compare his pronunciation with the standard of intelligible speech and to consciously set new tasks for himself; the child in the targeted speech therapy process; to form attitudes to the classes and conscious attitude to them; to form proper speech breathing; develop and adjust votes; to develop voice modulations; to form normal pace and coherence of speech; to highlight verbal and logical stress; to adjust the sound quality; and to develop skills of pronunciation self-control.

The Tomatis method was defined by the author as the pedagogy of listening. Tomatis divided the concepts of «hearing» and «listening». Listening is the ability of the nervous system to use a sound signal for learning and communication purposes, involving the body and emotions in this process, it is the ability to use your hearing consciously. This function should not be equated with passive sound perception, which directly depends on the functioning of the auditory system. Hearing is a passive process that does not involve the brain [12].

The program created by Interactive Metronome (USA) designed to overcome speech, attention and behavior disorders related to timing and movement planning (Fig. 5). This is a training and developing program that helps to strengthen the work of the cerebellum, frontal, temporal, parietal and occipital lobes of the brain. They are known to be responsible for such functions as timing, action planning, control and management of behavior, mastering skills, processing and recognition of auditory signals, the ability to put parts into a whole.



Figure 5 - Computer-based training Interactive Metronome

Hand Tutor is an innovative development of Israeli specialists, which consists of a glove with sensors that respond to subtle movements of the fingers of the hand, wrist, as well as software that allows you to choose a set of exercises in accordance with the individual needs of the child (Fig. 6).



Figure 6 - HandTutor rehabilitation system

The system is used in leading rehabilitation centers around the world and has the necessary certification. Playing specially designed games on a computer, a child wearing a glove with sensors performs single exercises or exercises based on the interaction of body parts. The work takes place with an extended feedback that displays the status of the monitored function on the screen. The difficulty level is automatically adjusted to the child's capabilities. HandTutor is indicated for children with speech disorders; children with delayed psychomotor development; children with cognitive impairments; children with cerebral palsy and dyspraxia; children after prolonged immobilization of the upper limb to restore finger mobility; children with impaired writing process (poor handwriting).

Biofeedback is a modern non-drug method of correcting stuttering. The method is based on purposeful activation of the body's reserve capabilities using modern electronic equipment. Biofeedback includes fascinating computer game simulators. Positive dynamics appears not only in speech, but also improves the performance of children, memory, attention, psycho-emotional state: children become calmer, more friendly to peers, adults. At correctional classes using the logotherapeutic complex of BOS, the following tasks are solved: normalization of speech breathing; elimination or reduction of vegetative dysfunctions; stabilization of the psycho-emotional state; formation of coherent speech; formation of a new speech and behavioral stereotype [13].

Sand therapy is a game with sand as a way of therapy for a child. Swiss psychologist K.G.Jung was the founder of this therapy. The appearance of sand therapy is associated with the beginning of the twentieth century, in 1929, when the English child psychotherapist Margaret Lowenfeld first used the sandbox in play psychotherapy with children. This is how the technique of «building the world» was born [14].

It was during this period from 1911 to 1913 that Carl Gustav Jung further developed the possibilities of using sand therapy in psychotherapeutic work with children. The basis of this method was laid by Margaret Lowenfeld and Dora Kalff.

Not enough works are devoted to sand therapy, but it is necessary to mention the authors who dealt with this issue. T.M. Grabenko and T.D. Zinkevich-Evstigneeva wrote the book «Miracles in the sand. Sand game therapy». The book reveals various educational games with the use of sand therapy, there are also various subsections devoted to the development of tactile and physical sensitivity, fine motor skills of hands, phonemic hearing, correction of sound pronunciation, learning to read and write [15].

The textbook «Sand therapy» authored by E.E. Bolshebratsky is devoted to the use of sand therapy in working with children with speech disorders. It is intended for speech therapists, teachers of the Russian language, psychologists, as an additional methodological material. The manual includes a series of developing lessons, so the whole lesson takes place as one big fairy tale, during which one big correctional and developmental task is solved in the sandbox. The therapeutic effect is that the child builds something out of sand, can destroy it and build it again. By repeatedly repeating this process, the child learns to get rid of fears and anxieties, and the skills of changing events and relationships are also formed, which allows the child to independently look for a way out of the situation.

Playing with sand develops a child's tactile-kinetic sensitivity and fine motor skills of the hands, relieves muscle tension, helps to feel protected, in a comfortable environment for him, develops activity. Sand therapy allows the teacher to transfer life experience, in a form accessible to the child.

Physical culture and speech development. This technique is actively used in preschool organizations, and it is harmoniously connected with the above methods of speech correction. Physical education satisfies the natural need of children for movement and active cognition of the environment. This technique allows you to cover the main stages of the techniques described above, such as the development of fine and large motor skills, the development of the fingers, hands and wrists, the development of thinking and memory. During physical exercises, active pronunciation is used to develop speech. While doing physical activities, children actively comment on what is happening, the muscular and psychological load that appears during special classes is removed. Children in natural conditions master pronunciation and learn to listen to both the teacher and their peers.

Thus, it is possible to note the variety of technologies used in the organization of correctional care in the conditions of the office of psychological and pedagogical correction. One of the most common today are information and



communication technologies, which in our opinion is justified, however, an understanding of the conditions and indications for the use of ICT in working with children with SEN is required.

In order to include innovative methods of work in speech therapy practice, we conducted an experiment aimed at identifying the formed fine motor skills of preschoolers with general speech underdevelopment who receive speech therapy assistance in the conditions of a psychological and pedagogical correction office. It is known about the relationship between the development of fine motor skills of the hands and the development of speech. Performing finger exercises stimulates the development of speech. There is an ontogenetic interdependence of the development of fine motor skills and speech, hand movements historically, in the course of human development, have had a significant impact on the formation of speech function. In turn, the formation of hand movements is closely related to the development of the motor analyzer and visual perception, coordination of movements, various types of sensitivity, spatial orientation and much more.

Studies by physiologists also confirm the link between hand development and brain development. V.M. Bekhterev's works confirm the influence of hand manipulation on the functions of higher nervous activity, speech development [14]. A number of experiments, in particular conducted by M.M. Koltsova, have shown that finger exercises accelerate the process of functional maturation of the brain, since it is a strong tonic factor for the cerebral cortex. Therefore, finger training, that is, the development of fine motor skills, should be started as early as possible, especially in children with general speech underdevelopment.

The experiment involved preschoolers in the number of 10. All children in the speech conclusion had a general underdevelopment of speech, while 6 children had level 3 general underdevelopment of speech, 4 children had level 2-3.

The following methods were used: observation; conversation; experiment; and diagnostic methods (examination of fine motor skills of children).

Based on the results of preliminary observation, the following conclusions can be drawn. Preschool children aged 4-5 years are characterized by insufficient concentration and stability of attention, difficulties in the formation of communication skills, increased fatigue and exhaustion, difficulties in switching from one type of activity to another, from one thinking strategy to another, insufficient coordination of fingers, hands, underdevelopment of fine motor skills.

Personal history analysis for an individual approach during diagnostics revealed the children's personality. At the first stage of diagnosis, we applied the method of examination of fine motor skills of G. Volkov and N.Beggar, which was divided into three blocks:

- diagnosis of arbitrary motor skills of fingers;
- diagnosis of pencil skills;
- diagnostics of the skill of manipulation with objects.

Taking into account the age, physical and psychological development of the child, different tasks are selected for each child. Evaluation criteria - for each correctly completed task, the child receives 1 point, not correct – 0.

At the end of the survey, the total result of the completed tasks is calculated and the average score is displayed. When calculating the results, it should be noted whether the tasks are planned, accurately and simultaneously, whether there is tension, stiffness in movement, whether the pace of movement is broken, non-fulfillment, the presence of left-handedness. The methodology consists of three blocks (Table 1).

Table 1 - The steps of proposed method

| Blocks  | Instructions for children  | General calculation of results (points) |               |           |
|---|--|---|---------------|-----------|
|   |  | High level                              | Average level | Low level |
| Block 1<br>diagnostics of arbitrary finger motility.          | Complete the task under the account:<br>1. Clench your fingers into a fist – unclench (5-6 times);<br>2. Keeping your palms on the table surface, separate your fingers 5-6 times, connect them together;<br>3. Fold your fingers into a ring – open your palm (5-6 times);<br>4. «Fist – Rib – Palm» test - the test is carried out both with the right and left hand in turn and together. | 4                                       | 3-2           | 1-0       |
| Block 2.<br>diagnostics of pencil skills                      | Colored pencils, a sheet of paper and stencils are given. Task:<br>1. Draw a straight, polyline, closed and wavy line;<br>2. Outline the pencil;<br>3. Draw a person.  | 3                                       | 2             | 1-0       |
| Block 3.<br>diagnostics of the skill of manipulating objects. | Following games are offered to children:<br>1. «Button» - it is necessary to quickly unbutton and fasten the buttons;<br>2. «Shoelace» - quickly tie and untie shoelaces;<br>3. «Mosaic» - it is necessary to lay out the proposed pattern;<br>4. «Beads» - it is necessary to quickly string beads on a rope.   | 4                                       | 3-2           | 1-0       |

Sand therapy is also one of the areas of art therapy. The methods of sand therapy initially did not relate to speech therapy. But at the moment the above

techniques in our opinion can be a good addition to the practice of speech therapy. The use of sand therapy allows to deal with such problems as:

- developing - development and correction of all mental functions (perception, attention, thinking, imagination); development of ability of positive communication and cooperation.

- teaching - expanding knowledge and ideas about oneself; about others; about the world around; revealing creative abilities of children; ability to see unusual in the subject of research;

- correction - extension of lexical vocabulary, development of coherent speech, fine motor skills, spatial orientation, visual perception.

- educational - education of the love for work, the process of creativity and knowledge, education of independence and purposefulness in the performance of work, persistence and perseverance, ability to complete the work to the end, accuracy, accuracy, that is, all those qualities, which are poorly expressed in children with general underdevelopment of speech. The use of physical culture will allow you to relieve physical stress from classes and promote the development of speech during the period of physical exercises aimed at active speech accompaniment of your actions.

## Results

In accordance with the methodology of N. Nischeva, the total score and levels of fine motor skills development are presented in Table 2.

Table 2 - General scoring and levels of fine motor skills development.

| №       | Number of points | The level of development of fine motor skills |
|---------|------------------|---|
| Block 1 | 4                | High level                                    |
|         | 3-2              | Average level                                 |
|         | 1-0              | Low level                                     |
| Block 2 | 3                | High level                                    |
|         | 2                | Average level                                 |
|         | 1-0              | Low level                                     |
| Block 3 | 4                | High level                                    |
|         | 3-2              | Average level                                 |
|         | 1-0              | Low level                                     |

High level - 9 -11 points.

The average level is 4-8 points.

The low level is 0-3 points.

The application of the methodology of G.Volkova and N.Nischeva allowed us to obtain the following data (Table 3).

Table 3 - Analysis of the results of the study of the development of fine motor skills in the experimental group

| № | Surname, Name | Block 1 | Block 2 | Block 3 | Total points |
|---|---------------|---------|---------|---------|--------------|
| 1 | Camilla S.    | 3       | 3       | 3       | 9            |
| 2 | Alina M.      | 3       | 2       | 1       | 6            |

|                      |            |            |            |            |            |
|----------------------|------------|------------|------------|------------|------------|
| 3                    | Maxim Sh . | 1          | 1          | 1          | 3          |
| 4                    | Dmitry D.  | 2          | 1          | 1          | 4          |
| 5                    | Kostya B   | 3          | 3          | 2          | 8          |
| 6                    | Adil T.    | 2          | 1          | 1          | 4          |
| 7                    | Karim P.   | 2          | 2          | 2          | 6          |
| 8                    | Tanya L.   | 2          | 3          | 2          | 7          |
| 9                    | Ayan R.    | 1          | 1          | 1          | 3          |
| 10                   | Diana M.   | 3          | 2          | 2          | 7          |
| <b>Average point</b> |            | <b>2,2</b> | <b>1,9</b> | <b>1,6</b> | <b>5,7</b> |

Thus, it can be concluded that the lowest score is noted when performing tasks of the 3rd block: diagnostics of the skill of manipulating objects.

The most difficult task, according to our observation, was the «Shoelace» task - to quickly tie and untie the shoelaces.

Table 4 shows data on the completion of tasks by level. The criterion for dividing into levels was the following.

After analyzing the results of the initial examination, we conditionally identified three levels of task completion by children. The criteria for such a division were independence, accuracy, and the pace of task completion.

*The high level* involved the children performing tasks quickly, accurately, independently. The children understood the tasks. The results of the execution corresponded to the specified sample. Children who were able to complete from 9 to 11 tasks of 3 blocks were assigned to a high level.

*Average level:* tasks were mostly performed accurately, if individual mistakes were made, then when drawing attention to them, mistakes were noticed by children and eliminated independently. The pace of actions is average. Children who completed 7 tasks from 3 blocks were assigned to the average level.

*The low level* of task completion was characterized by incorrect task execution. To the low level, we attributed children who were able to complete only 5 tasks of 3 blocks.

The distribution of children by task levels of 3 blocks is shown in Table 4.

Table 4 - Initial level of fine motor skills development in children 4-5 years old

| Children with general underdevelopment of speech | Levels |         |      |
|--|--------|---------|------|
|  | Low    | Average | High |
|  | 20%    | 70%     | 10 % |

A high level of fine motor skills development when performing diagnostic tasks was revealed in Camilla, who scored 9 points. Average level: 7 children performed the movements correctly, but at a somewhat slow pace. Low level: detected in 2 children.

The results of the ascertaining stage of the experiment showed that preschool children do not have sufficiently formed fine motor skills of their hands. The second experimental stage was carried out in the form of a frontal experiment.

We have developed a cycle of exercises using sand/dough therapy and physical culture and included them in a traditional speech therapy lesson providing for the development of fine motor skills of preschool children. The experimental work was carried out for 2 months. The classes were individual.

The development and improvement of motor skills and fine motor skills in children with speech disorders are facilitated by games with natural materials, such as sand, grits, small stones, dough, etc.

Today there is extensive practical material, the use of which contributes to the effective development of the child's speech with the conclusion of general underdevelopment of speech.

Here are examples of exercises that we have used in the course of speech therapy work in Table 5. Exercises for the development of spatial representations, speech development using elements of sand therapy.

Table 5 - Examples of sand therapy based exercises applied during the experiment

| № | Exercise name                 | Equipment   | Description  |
|---|-------------------------------|---|--|
| 1 | « <i>Crystal hearts</i> »     | sandbox, figures in the shape of hearts and crystals. | The sandbox plane is divided by a horizontal line on the right and left sides. The child is given a box with figures of hearts and crystals. Important note: before presenting this exercise, the students launched an orientation that our heart is on the left side. The children really liked this rule, and they memorized it very quickly. In this task, the following instruction was offered to the children: «Lay out the hearts and crystals so that the hearts are on the left side of the sandbox, and the crystals are on the right»; Tell me where you put what on the left»; «Tell me what you put on the right»; «The heart lies on which side»; «Crystals lie on which side», etc. |
| 2 | « <i>Lay out the houses</i> » | 4 houses, any small figures, sandbox.                 | For this exercise, you need to place four houses in four corners. But before placing the houses, you need to ask the child to show you the right / left upper and lower corners. Then the speech therapist gives instructions to put the house in one corner or another. After all the figures selected for this exercise, according to the same instructions, are arranged in four houses. After the child has sufficiently mastered these concepts, it is possible to complicate the task by speeding up the pace of   |

|   |                               |  |  |
|---|-------------------------------|--|--|
|   |                               |  | its execution.   |
| 3 | « <i>Little Man</i> »         | sandbox, water, small buttons, glass beads or a small piece of tape. Instead of ordinary sand and water, kinetic sand can be used. | The student sculpts a figure of a man out of sand, attaches eyes, mouth with the help of additional materials. The little man can be put in the sandbox or on the table. Then we name the body parts, the child's task is to find them on the sandman, show them and name them. This is how we consolidate the child's ability to navigate the diagram of the person's body opposite him. In addition, this task contributes to the development of fine motor skills of the child.   |
| 4 | « <i>Kolobok</i> » fairy tale | ready-made dough, oilcloth.  | Let's take the dough in our hands. We will feel its warmth, tenderness, plasticity. Divide it into two equal parts. Let's put one part aside. And let's remember the modeling techniques. A piece of dough lies on the palm of your hand. The second hand is on top. We roll the ball in a circular motion. Look, a real bun! So that our gingerbread man does not roll away from us, as in that fairy tale, slightly spreading it out. A gingerbread man is a living being. He sees, hears and even sings. Do you know that kolobok left his grandmother and left his grandfather, so what does Kolobok have? (arms and legs). Kolobok looks at this world with wide-open eyes. Pinch off a piece of dough the size of a pea. Divide it in half and make small balls. Both hands work simultaneously. To prevent the eyes from accidentally falling off, we attach them with water. How beautifully you do it! And who will tell me how to do but with? The nose can be made in the same way as the balloon eyes. |
| 5 | « <i>Ball games</i> »         | a medium light ball  | Ball games develop the child's brain, stimulate the development of speech, imagination. Playing ball activates fine motor skills, attention, and establish contact with other children.<br>«The ball jumps like a live one.<br>Ball, ball, what's wrong with you?<br>He didn't say anything,<br>Only he rode away faster»  |
| 6 | <i>Breathing</i>              | none   | Breathing is an important stage of speech  |

|  |                   |  |   |
|--|-------------------|--|---|
|  | <i>exercises.</i> |  | development. The development of breathing under the force and duration of exhalation, pace and rhythm is carried out in the classroom in the process of motor exercise, first without speech, and then with speech. In the first variant, physiological respiration is formed, in the second, speech respiration is formed. |
|--|-------------------|--|---|

There are other types of physical exercises that can be used to form speech breathing: with the help of jump ropes, a swedish wall, etc.

### Discussion

Thus, in the process of performing the exercises, we began to note the steady interest of children in the process of working with sand and speech. Children actively accepted game situations, actively participated in the conversation, offered interesting original ideas.

Table 5 - The initial level of fine motor skills formation in children aged 6-7 years.

| Children with general underdevelopment of speech | Levels (%) |       |         |       |        |       |
|--|------------|-------|---------|-------|--------|-------|
|  | Low        |       | Average |       | High   |       |
|  | Before     | After | Before  | After | Before | After |
|  | 20         | 10    | 70      | 60    | 10     | 15    |

A high level of fine motor skills development during the diagnostic task was found in Camilla, Alina and Kostya, who scored 10 points. Average level: 6 children performed the movements correctly, but at a somewhat slow pace. Low level: 1 child (does not perform the movement carefully and slowly).

### Conclusion

All in all, the experiment showed that with the use of sand therapy and physical exercises, it is possible to actively develop the fine motor skills of preschoolers, while children do not experience stress while learning in a natural and familiar environment.

The use of psychotherapy and physical exercises in speech therapy involves many options for its use. Speech therapy work can aim at following issues, including development of the pronunciation side of speech, increase and activate the dictionary, development of grammatical categories, development of coherent speech, phonetic and phonological processes, teaching children to read and write, and learning to communicate with others.

Sand therapy - based assignments and activities, and physical exercises tend to provoke positive emotions in children, and speech therapy procedure can be conducted with high motivation. It is also important that during the sand/test robots, the child relies on several analyzers simultaneously in productive activity -

vision, hearing, tactile perception, which also has a positive effect on the speech development.

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## **ИНКЛЮЗИЯ ЖАҒДАЙЫНДА ЕСТУ ҚАБІЛЕТІ ЗАҚЫМДАЛҒАН БАЛАЛАРДЫҢ СӨЙЛЕУІН ДАМУ ТҮШІН КОМПЬЮТЕРЛІК ҚОСЫМШАЛАРДЫ ҚОЛДАНУ**

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**Андатпа.** Бұл зерттеу жұмысын Қазақстан Республикасы Ғылым және Жоғары білім министрлігінің Ғылым комитеті қаржыландырды (ИРН АР19679272 «Есту қабілеті зақымдалған балаларға инклюзивті білім беру үшін үйретуші мобильді қосымшалар әзірлеу»).

Мақаланың мақсаты есту қабілеті зақымдалған балалардың сөйлеуін дамытуға компьютерлік қосымшалардың әсерін анықтау.

Мақаланың мазмұны ерекше білім беру қажеттіліктері бар балаларда сөйлеудің дамуына байланысты зерттеулерді қарастырады. Ерекше қажеттіліктері бар балалар санатына сөйлеу қабілеті бұзылған балалар жатады, әдетте, балалардың бұл санатында есту қабілеті, фонематикалық есту қабілеті, ұсақ моторикасы, кеңістіктік бағдары бұзылған, бұл баланың сөйлеуінің дамуына тікелей әсер етеді.

Сияқты көптеген зерттеушілер Р.Е. Левина, Р.М. Боскис, Г.А. Никашина балалардағы сөйлеудің жалпы дамымауын зерттегендер сөйлеудің жалпы дамымауының түйіндік формациясы фонемалық есту қабілетінің қалыптаспауы деп санайды. Демек, сөйлеудің жалпы дамымауы кездесетін балаларда дыбыстық талдау мен сөз синтезін меңгеруде қиындықтар туындайды бұл дислексия мен дисграфияда көрінетін әр түрлі ауытқуларға әкеледі. Содан кейін мұндай балалар мектепте оқуда қиындықтарға тап болады, сондықтан бұл мәселе маңызды және өзекті болып табылады.

Авторлардың пікірінше, сөйлеуді дамыту жұмысында инновациялық әдістерді қолдану қажет. Авторлар әртүрлі заманауи инновациялық технологияларды, жұмыс әдістерін талдайды. Қолдың ұсақ моторикасын дамыту мен сөйлеуді дамытудың өзара байланысы туралы ережеге негізделген сөйлеудің жалпы дамымауы бар мектеп жасына дейінгі балалардың ұсақ моторикасының қалыптасқан дағдыларын анықтау бойынша эмпирикалық зерттеу жүргізілді. Үш блоктан тұратын Н.В. Нищеваның ұсақ моторикасын зерттеудің диагностикалық әдісі қолданылды. Экспериментке қатысатын мектеп жасына дейінгі балалар тобы анықталды.

Практикалық тұрғыдан алғанда, ұсақ моториканы да, сөйлеуді де бірлікте дамытуға мүмкіндік беретін құм терапиясын қолдану бойынша ұсыныстар мен жаттығулар жүйесі берілген. Ұсынылған жаттығулар жүйесі әдістемелік негізделген және эксперименталды түрде тексерілген.

Зерттеу нәтижелерін мектеп жасына дейінгі балалармен жалпы үлгідегі балабақшаларда, арнайы ұйымдарда, сондай-ақ ТЖКБ және ЖОО жүйесінде тәрбиешілерді, логопедтерді даярлау кезінде пайдалануға болады.

**Тірек сөздер:** жалпы сөйлеудің дамымауы, сөйлеуді дамыту, құм терапиясы, компьютерлік қосымшалар, мектеп жасына дейінгі балалар, ұсақ моторика, есту қабілеті зақымдалған балалар, инклюзия

## **ИСПОЛЬЗОВАНИЕ КОМПЬЮТЕРНЫХ ПРИЛОЖЕНИЙ ДЛЯ РАЗВИТИЯ РЕЧИ СЛАБОСЛЫШАЩИХ ДЕТЕЙ В УСЛОВИЯХ ИНКЛЮЗИИ**

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**Аннотация.** Данная исследовательская работа была профинансирована Комитетом по науке Министерства науки и высшего образования Республики Казахстан (ИРН АР19679272 «Разработка обучающих мобильных приложений для инклюзивного образования детей с нарушением слуха»).

Целью статьи является определение влияния компьютерных приложений на развитие речи слабослышащих детей.

Содержание статьи раскрывает исследование, связанное с развитием речи у детей с особыми образовательными потребностями. К категории детей с особыми потребностями относятся дети с нарушениями речи, как правило, у данной категории детей нарушено слуховое восприятие, фонематический слух, мелкая моторика, пространственная ориентировка, что непосредственно влияет на развитие речи ребёнка.

Многие исследователи такие как Левина Р.Е., Боскис Р.М., Никашина Г.А. изучавшие общее недоразвитие речи у детей утверждают, что узловым образованием ОНР является несформированность фонематического слуха. Следовательно, у детей с ОНР возникают трудности при овладении звуковым анализом и синтезом слов что влечет за собой разные виды отклонений, которые проявляются в дислексии и дисграфии. Дальше у таких детей возникают трудности при обучении в школе, поэтому данная проблема является значимой и актуальной.

По мнению авторов, в работе по развитию речи, необходимо применение инновационных приемов. Авторами анализируются различные современные инновационные технологии, приемы работы. Проведено эмпирическое исследование по выявлению сформированных навыков мелкой моторики дошкольников с общим недоразвитием речи, основанное на положении о взаимосвязи развития мелкой моторики рук и развитием речи. Использована диагностическая методика обследования мелкой моторики Н.В. Нищевой, состоящая из трех блоков. Определена группа дошкольников, участвующих в эксперименте.

С практической точки зрения даны рекомендации и система упражнений по использованию песочной терапии, позволяющей в единстве развивать как мелкую моторику, так и речь. Система предложенных упражнений методически обоснована и экспериментально проверена.

Результаты исследования возможно использовать в работе с дошкольниками в детских садах общего типа, в специальных организациях, а также при подготовке в системе ТИПО и Вузов воспитателей, логопедов.

**Ключевые слова:** общее недоразвитие речи, развитие речи, песочная терапия, компьютерные приложения, дошкольники, мелкая моторика, слабослышащих детей, инклюзия

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