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METHODOLOGY FOR DEVELOPING FUNCTIONAL LITERACY IN ELEMENTARY STUDENTS WITH HEARING IMPAIRMENTS

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ABSTRACT

This article analyzes the theoretical foundations of developing functional literacy among primary school students with hearing impairments. The research is based on a theoretical approach and presents methodological recommendations for teaching language, mathematics, and natural sciences. The paper substantiates the effectiveness of using visual, interactive, and corrective methods in the learning process through the integration of surdopedagogy principles with the concept of functional literacy. The findings indicate that specialized teaching approaches contribute to the comprehensive development of reading, mathematical, and scientific literacy among students with hearing impairments.

Keywords: Students with hearing impairments, functional literacy, surdopedagogy, primary education, language learning, mathematics, natural sciences, methodology, inclusive education.

Introduction

ESHITISHDA NUQSONI BO‘LGAN BOSHLANG‘ICH SINFI O‘QUVCHILARINING FUNKSIONAL SAVODXONLIGINI RIVOJLANTIRISH METODIKASI

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Chirchiq davlat pedagogika universiteti talabasi



ANNOTATSIYA


Ushbu maqolada eshitishda nuqsoni bo'lgan boshlang'ich sinf o'quvchilarining funksional savodxonligini rivojlantirishning nazariy asoslari tahlil qilinadi. Tadqiqot nazariy yondashuv asosida olib borilib, ona tili, matematika va tabiiy fanlar bo'yicha metodik takliflar ishlab chiqilgan. Maqolada surdopedagogika tamoyillari bilan funksional savodxonlik konsepsiyasi integratsiyasi asosida dars jarayonida ko'rgazmali, interfaol va korreksion usullardan foydalanish samaradorligi asoslab beriladi. Natijalar shuni ko'rsatadiki, maxsus yondashuvlar eshitishda nuqsoni bo'lgan o'quvchilarda o'qish, matematik va tabiiy-ilmiy savodxonlikni kompleks shakllantirishga yordam beradi.

Kalit so'zlar: eshitishda nuqsoni bo'lgan o'quvchilar, funksional savodxonlik, surdopedagogika, boshlang'ich ta'lim, ona tili, matematika, tabiiy fanlar, metodika, inkluziv ta'lim.

Introduction

Today, the formation of functional literacy in the educational process is an important task, which is aimed at developing students' life skills. Functional literacy is usually defined as a system of skills that means the ability to solve practical tasks in everyday life using textual, numerical and graphic information. International assessments also test students' reading, mathematical and scientific literacy and recognize them as important indicators of the quality of education. Therefore, improving the functional literacy of students in primary education is one of the urgent issues in Uzbekistan.

Especially for children with hearing impairments (deaf or hard of hearing), having functional literacy is very important for independent living in society and not falling behind their peers. Due to hearing impairment, these children develop more slowly - many of the knowledge and skills that a hearing child learns on their own in everyday life must be conveyed to a hearing-impaired child through special education [1]. As a result, such students have limited oral speech and language skills, and difficulty in perceiving information from the environment. This complicates the formation of their reading literacy (the ability to understand

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the text and extract information from it). In particular, the incomplete development of speech and limited auditory perception due to hearing impairment can cause problems in understanding the content of the text. Therefore, teaching primary school students with hearing impairment using special approaches and tools, and developing their functional literacy in their native language, mathematics, and natural sciences is relevant today from the point of view of research and practice.

The need to study this issue arises from the fact that currently special methodologies for teaching children with hearing impairments have not been sufficiently developed. Many researchers in the field of surdopedagogy have identified the difficulties of these children in speech development and text comprehension and have determined the directions of corrective work. Nevertheless, a unified approach to the development of functional literacy, in particular reading literacy, in students with hearing impairments has not yet been fully formed, and methodological guidelines are still insufficient. Therefore, conducting research in this area and developing scientifically based methodologies is extremely important for educational practice.

LITERATURE ANALYSIS AND METHODOLOGY

This study is based on a theoretical approach and is based on the integration of the concepts of special pedagogy (surdopedagogy) and functional literacy. Surdopedagogy studies the theoretical and practical issues of teaching and educating deaf and hard of hearing children. In particular, surdopedagogy has developed methods such as teaching children with hearing impairments to speak, teaching them to "lip-read" (read lip movements), and speaking using a special hand alphabet (dactylology), and currently tools such as sound amplification devices, computer technologies, and multimedia materials are also being involved in the process. Such theoretical foundations are aimed at meeting the communicative needs of children with hearing impairments and are aimed at developing their speech and language skills as much as possible.

At the same time, our study was based on the theory of functional literacy. Functional literacy is characterized by the ability of a learner to independently



apply the acquired knowledge and skills in various non-traditional situations, to solve real-life problems. In this system of competencies, reading (text comprehension) literacy occupies a central place, since the ability to work with text is a basic condition for acquiring knowledge, participating in social life, and achieving the goals set for oneself. Research shows that the formation of reading and writing skills is especially important for children with hearing impairments - it is these skills that open up an alternative way for them to “hear” and understand the environment. However, due to the limited auditory activity and underdeveloped oral speech, such students have difficulty consciously understanding the content of the text. Therefore, in the process of analyzing the theoretical literature, we considered existing approaches and methods for solving the problem of forming reading literacy in children with hearing impairments. Among the various methodological approaches proposed in scientific sources, the most effective is considered to be the combination of traditional special education methods with modern interactive approaches. For example, the Russian scientist E.V. Sergina in her research emphasizes that the use of a complex of various methods for the formation of conscious reading skills in primary school students with hearing impairments gives good results. According to her, it is necessary to systematically expand the vocabulary of children, perform corrective tasks aimed at developing oral and written speech, and stimulate the use of auditory residues. At the same time, compliance with special methodological requirements during the lesson - for example, performing articulation (phonetic) exercises at the beginning of each lesson, displaying the lesson plan and main tasks on the board, presenting key words related to a new topic in visual forms (pictures, exhibits) - helps children with hearing impairments to better understand the material.

A review of the literature shows that special approaches have been developed by teachers to develop not only reading, but also mathematical and scientific literacy of such children. In particular, foreign and domestic researchers note the existence of a “language and thinking gap” between hearing and deaf children [2]. That is, since mathematical literacy largely depends on language (speech) skills, additional assistance is needed in the formation of mathematical concepts in children with hearing impairments [2]. Therefore, as a theoretical and

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methodological approach, it is proposed to widely use methods based on visual (demonstrative) and practical movement. In this case, children learn more by seeing and doing with their hands than by hearing - that is, the principle that a "deaf" child should learn "by seeing" and "by doing". This approach is considered very important in mathematics and natural sciences. Also, the use of the project method is shown as one of the effective methods - according to the results of research, it has been proven that it is possible to form functional literacy components in children with hearing and speech impairments through project activities.

Based on the analyzed literature and conceptual approaches, in this article we have theoretically substantiated the methodology for developing functional literacy of 1st-4th grade students with hearing impairments using the example of their native language, mathematics and natural sciences. Methodological proposals in each subject are presented below.

RESULTS

Based on theoretical analysis and existing experience, the following methodological proposals were developed for developing functional literacy of primary school students with hearing impairments. The proposals are presented in the context of subjects, explained with examples.

Methodology for the native language (reading and writing literacy)

Increase in vocabulary and speech development: To enrich the vocabulary of students, new words are introduced in each lesson through special visual aids. For example, new words related to the topic are explained using pictures, objects or sign language, and then written and oral pronunciation is worked on. Also, regular corrective exercises (for example, oral dialogues, short text composition, listening comprehension exercises) are organized during the lesson and outside of the lesson, which serves to develop the oral and written speech of children.

Teaching children with hearing impairments to read text consciously: A visual reading method is used to develop the ability to understand the content of the text. First, incomprehensible words and phrases in the text are explained through pictures or physical actions. Then, children are invited to read the text several



times: first, the teacher reads the text expressively (where necessary, he explains the content through sign language or lip reading), then the students read it independently in a whisper or silently. After each reading, questions are asked, a sequence of pictures is created according to the content of the text, or role-playing games are played (for example, reenacting the event in the text). Such a repetitive and interactive reading method forms the logical perception skills of hearing children and achieves a deep understanding of the content of the text.

Special organizational techniques during the lesson: In native language lessons, a number of methodological techniques are used to attract the attention of students with hearing impairments and clearly explain the tasks to them. In particular, a visual presentation of the lesson plan and tasks is important - at the beginning of the lesson, the teacher writes the plan of today's lesson on the board or hangs it in pictures, showing each stage as he explains it. At the same time, if there are hearing aids or amplifiers in the classroom, the teacher's speech is amplified through them; but the main emphasis is still on visual observation. The use of sign language and dactylology is also recommended - children are taught the signs of complex words, and for students who know the alphabet, the letters of the word are shown in dactyl writing. For example, when learning the word "bird", the teacher shows a picture of a bird, shows the letters "Q-U-SH" in hand writing (dactyl), and if there is a special sign (imo) for this word, he also demonstrates it. Then the children read the sentence in which this word is involved from the lips and repeat it in writing.

Written literacy and spelling: To develop writing skills in the subject of the mother tongue, dictation and tracing exercises are adapted to the capabilities of children with hearing impairments. For example, instead of a simple dictation, a pictorial dictation method can be used: the teacher shows a picture representing the content of the sentence and says the sentence orally, and the students write it down. If students with poor hearing have difficulty understanding the sentence, cards with sentences written in advance are distributed, and they are engaged in tasks such as filling in the blanks or arranging the words. Thus, children develop the skills of correct and competent expression of written speech.



As a result of the above approaches, the functional literacy of students with hearing impairments in their native language - that is, the ability to understand and read the text, express their thoughts through written speech, and verbal communication skills - significantly develops. Students begin to acquire the skills of finding the necessary information from the text, being able to apply it in real life situations, and being able to express their opinion on the text.

Mathematics (mathematical literacy) methodology

Visual explanation of mathematical terms: When teaching mathematical concepts to children with hearing impairments, it is necessary to pay attention to their level of language knowledge. Often, the vocabulary of mathematical terms of such children is limited compared to their peers [2]. Therefore, each new mathematical term or practical rule is explained demonstratively. For example, when explaining the action of “subtraction,” the teacher demonstrates the movement of removing objects with his hands, draws a picture on the board, and shows the writing (“-” symbol). If necessary, the sign language equivalent of the term is also used. This method helps children understand the concept without relying on oral speech.

Visual aids and concrete examples: It is recommended to widely use modeling and object-based environments in the formation of mathematical literacy. Deaf children tend to work with concrete objects longer than hearing children - for example, they use tools such as fingers, abacus, colored chips, cubes more often when counting [3]. Therefore, before the abstract explanation, real examples are given in the lesson: mathematical problems are demonstrated using dolls, fruits, toys. For example, before verbally stating the problem “There were 5 apples in the store, they bought 2, how many are left?”, the teacher shows a picture or object of 5 apples, removes 2 of them and shows the children how many are left, writes the equation “ $5 - 2 = 3$ ” on the board. After that, students solve this problem in writing. Thanks to this “visible mathematics” method, children perceive mathematical operations as a life process, understand the meaning behind dry numbers.

Problem analysis and working with language: Mathematical problems are often in text form, and one of the most difficult aspects for students with hearing impairments is to understand text problems. Therefore, special techniques are



used to teach them to analyze problems: dividing the text of the problem into parts, underlining key words and numbers. For example, when reading a text problem, students are taught to underline key words such as “how many?”, “how many?”, “how many” and the given numbers [4]. Then, based on these key words, they discuss the solution to the problem. This method “filters” the content of the text and forms the ability of hearing children to work with mathematical meaning. If children’s speech allows, they are encouraged to explain how they solved the problem orally or through sign language. They are also allowed to explain the process of solving the problem by drawing a picture or writing down the sequence of actions - this way the student learns to express his or her thinking process [5]. For example, if a hearing child is asked to tell the answer after solving a problem, a child with a hearing impairment can show the answer in writing or by drawing it. If he or she explains the answer through gestures or typing, the teacher confirms that he or she has understood his or her idea correctly and then connects it to the written form of speech [6]. This method does not limit children’s thinking, but creates conditions for expressing mathematical logic in a way that is convenient for them.

Individual approach and pace: The rate of mental development of children with hearing impairments may differ from each other, since their hearing level and previous preparation are different. For this reason, one of the most important principles in mathematics lessons is an adapted individual approach. Some students need extra time and attention: they are given additional opportunities to understand or solve the problem. For example, when giving a complex problem and asking for an answer, the teacher will give twice as much time to a child with hearing impairment as to a hearing child, or he will first ask the question to the group and then return to the child after a while. This method provides sufficient opportunity for the child to form his own opinion. Also, if children have difficulty solving in a certain way, they are given the right to choose alternative methods: for example, if one solves by drawing, another can do the addition and subtraction in writing - the main goal is for the child to develop an understanding of the procedure.

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Information technology and interactive methods: Special multimedia applications and computer programs for children with hearing impairments also help to improve mathematical literacy. For example, children can practice independently using educational programs that provide subtitles and explanatory notes on a computer. Using the capabilities of an interactive whiteboard, activities such as correctly placing geometric shapes and viewing modeled animations of problems can be organized. This, on the one hand, increases children's interest in the lesson, and on the other hand, serves to compensate for the limitations of their hearing with technical capabilities. As a result of the above methods, mathematical literacy is gradually formed in primary school students with hearing impairments. They begin to acquire life skills such as practical visualization of numbers, independent performance of simple calculations, and understanding quantitative problems in everyday life (for example, counting money in a store, periodically moving according to a table). In short, through a special approach, the mathematical thinking of such children is developed and they are taught to apply mathematical knowledge in real situations.

Methodology for natural sciences (natural and scientific literacy)

Education based on sensations and experience: In teaching natural sciences and other natural sciences, it is very important to convey knowledge about the environment to children with hearing impairments through direct observation and experience. Due to their hearing impairment, they are better able to learn by relying on other senses such as sight, touch, and smell. Therefore, lessons are enriched with laboratory experiments, excursions, and outdoor observation activities as much as possible. For example, when studying the topic “Plant Growth”, students themselves plant beans and monitor their growth day by day; they keep a diary by taking pictures of the growth process. Through this project-style assignment, children not only learn about plant development, but also begin to learn scientific literacy skills such as observation, data collection, and documentation.

Use of visual aids and models: In science lessons, visual material is always needed to explain concepts and phenomena to children who cannot hear. For example, when explaining the Earth's rotation around the Sun, it is necessary to



use a globe and a lamp (a model of the Sun); for the topic of the "rain cycle", drawings and video animations depicting the water cycle should be shown. Such visual models visualize abstract scientific concepts and make it easier for children with hearing impairments to understand. If possible, each student should be given the opportunity to hold them in their hands or participate in an experiment - for example, when studying the gravitational force of magnets, children themselves try to attract different objects with a magnet, or observe different objects in water and air.

Life connection and communication with nature: Instilling a love for nature and emotional perception of it in children with hearing impairments is considered part of their functional literacy. Studies show that bringing such children closer to nature, strengthening environmental education and upbringing enriches their worldview and has a positive effect on their psychological development. For this purpose, it is recommended to conduct more outdoor activities in natural science lessons (for example, observing plants and insects in the school garden, trips), organize a nature corner, and take care of animals and plants. For example, on the topic of "Change of Seasons", the children are given the task of going out to the school yard together and finding signs of the current season (color of leaves, air temperature, bird behavior, etc.). Then, returning to the classroom, they prepare a collage based on the autumn leaves and fruits they found and, with the help of the teacher, describe the characteristics of the season in writing. In this process, children not only see and understand natural phenomena, but also acquire skills such as describing them, grouping them, and explaining cause-and-effect relationships [8].

Bilingual approach to working with terms and concepts: As in native language lessons, it is not easy for children with hearing impairments to master scientific terms in natural sciences. For this reason, an approach that combines sign language and written speech is used when necessary. For example, when teaching the concept of "season", the sign language sign of this word is shown, then the concept of four seasons is explained using pictures, and the spelling of the word "season" is repeated several times. In this way, students memorize the new concept simultaneously in written and visual-gestural form. Later, when asked




questions, if the student can explain the concept of “season” through gestures, the teacher confirms his correct understanding and then reinforces it with a written answer. This method helps children with hearing impairments to master scientific concepts through an alternative communicative channel.

As a result of the above methodological approaches, the natural and scientific literacy of students with hearing impairments begins to form. They develop skills in observing and explaining environmental phenomena, understanding simple cause-and-effect relationships, applying the knowledge they have gained in everyday life (for example, understanding information about the weather, dressing appropriately, applying knowledge about plant care at home, etc.). In addition, such educational aspects as love and preservation of nature are also formed. From an early age, children are laid the foundation of a healthy ecological worldview and scientific knowledge related to real life.

DISCUSSION

The advantages of the methodological approaches proposed above are that they serve to improve the quality and efficiency of education, taking into account the specific needs of children with hearing impairments. In particular, demonstrative and interactive methods increase children's interest in the lesson and allow them to better understand the subject. Through these approaches, students are encouraged to be active, and knowledge is acquired not just by memorizing it, but through practical activities. As a result, the acquired knowledge and skills are formed at the level of functional literacy - that is, in a state ready for application in real situations. For example, theoretically difficult abstract concepts (a mathematical formula or a scientific phenomenon) are stored in the student's mind along with a clear image, which makes it easier to remember and apply this knowledge in the future. In addition, the proposed methods are also relevant in inclusive education - if they are implemented not only in special schools, but also in general education schools, they will help children with hearing impairments to successfully master the subject in the same class as their peers. For example, visual materials and visual explanations do not harm other children in regular classes, but also contribute to a better understanding of everyone, in accordance

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with the principle of universality of education [9]. There are also some limitations to the methodological proposals. First of all, the practical application of such approaches requires high pedagogical skills and special training from the teacher. Providing each lesson with visual materials, introducing interactive methods can require additional effort and time from the teacher. Also, due to the need for an individual approach, it is difficult to adapt to the needs of each student in the classroom - for example, additional assistants (sign interpreters, tutors) may be needed to provide individualized instruction to children with different hearing levels. If such assistants or special equipment are not available, it is difficult for a teacher alone to fully cover all children. Another limitation is that these approaches can be more time-consuming, since class hours are used for demonstration experiments or repeated exercises. As a result, it may be difficult to cover all topics in the state education program within the specified time. In this case, it is necessary to optimize the curriculum and, if necessary, compensate through additional lessons or club activities.

The possibilities for implementing the proposed methods are wide, but their success depends on certain conditions. First, teachers should be specially trained - it would be useful to organize refresher courses on modern methods of sign language pedagogy, the basics of sign language, and the use of audio equipment. Second, schools should be provided with the necessary material and technical base: resources such as hearing aids, visual displays, projectors and interactive boards, and educational videos will facilitate the learning process for children. Third, if a child with hearing impairment is studying in an inclusive (general) class, then it is advisable to establish a tutoring service at the school - a tutor (or sign interpreter) will provide individual support to the child in collaboration with the teacher, explaining the lesson material. Fourth, cooperation with parents is also of great importance: parents continue the educational process by helping the child perform additional exercises at home, read books, and work with electronic applications. In this case, the integral cooperation of the school and the family serves to strengthen the functional literacy that is being formed in the child.

Another important aspect is the issue of ensuring an individual approach. Each of the children with hearing impairments has a different level of hearing ability,



speech development, and psychological characteristics. Therefore, in the implementation process, it is necessary to find the most optimal set of methods for each child. For example, some children can master visual material very quickly, while others learn better through tactile (touching) experiences. The teacher should monitor during the experiment which method is most effective for which child and take this into account in future planning.

In general, the correct implementation of the proposed methodological approaches will expand the educational opportunities of children with hearing impairments. If the educational process continues in a traditional, stable and uniform pattern, these children often get used to applying the knowledge they have learned only in that situation and cannot adapt to new conditions. To prevent this, it is necessary to teach them to apply knowledge in different environments and situations in the educational process (for example, rehearsing the same topic in different places and conditions). Then the student will not only be associated with a specific exhibition in the classroom, but will also be able to generalize his knowledge and correctly apply it in changed conditions. Although this issue is controversial, in our opinion, the principle of striving for innovation and the comprehensive development of the child should be a priority in education.

CONCLUSION

In conclusion, it should be noted that the methodological proposals developed for the development of functional literacy of primary school students with hearing impairments are theoretically sound and promising for practical application. The IMRAD analysis presented in the article shows that a special approach is needed to teach such students, in which a combination of demonstrative, interactive and correctional-methodical methods in the native language, mathematics and natural sciences is effective. The main idea is to consciously form knowledge and skills in children and direct them to solve various life tasks.

Theoretical analysis and practical examples confirm that the proposed methodological approaches develop reading literacy (understanding and using text), mathematical literacy (solving arithmetic and logical problems), and scientific literacy (understanding the environment and applying scientific

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concepts) in students with hearing impairments. These approaches increase children's interest in the lesson, encourage them to think independently and be creative, and most importantly, allow them to master the general education program in a comprehensive manner, meeting their specific needs. Of course, it is necessary to adapt the methods, taking into account the individuality of each child. However, in general, the effectiveness of the proposed methodology is that it accelerates the process of forming functional literacy in children with hearing impairments and improves its quality. As a result, such students grow up as individuals who can more actively participate in society and have the necessary competencies in solving everyday problems. This will contribute to the full realization of the principles of inclusive and equal opportunity education and the prosperity of society by providing quality education to every child.

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