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SPEECH THERAPIST'S ICT COMPETENCE AS FACTOR OF STUDENTS WITH SEN ORTHOGRAPHY DEVELOPMENT

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Abstract

This article is devoted to the use of ICT in correctional education of children with SEN. The author reviews modern views on the integration of multimedia technologies into the educational process within the context of creating special pedagogical conditions to overcome writing disorders on the basis of interdisciplinary research in pedagogy, psychology and neurophysiology and logopedics. The article also reviews mechanisms of selection multimedia tools that result in proper formation of speech communication and correct writing among students with SEN. Really using speech-based manipulatory actions didactic objects at the planned, pre-PC stage can be effective for developing phonetic and orthographic writing skills. The importance of hand movements - manipulations, gestures - when teaching writing was emphasized by Vygotskii in the article "The Prehistory of His Written Speech". The author concludes that actions with real objects - prototypes of virtual software tools used by the means of determining the erroneous place in words. The purpose of the study is to determine the specific aspects of the use of information technologies and multimedia tools to prevent and overcome dysgraphia and dysorthography. According to Piaget, only if the learning or new knowledge is organized in stages (step by step), taking into account the new level structure of the cerebral cortex, can one hope for a developing effect from the educational process. Such training in relation to children with disabilities has specific features, the main one of which is: it is necessary to use a computer in conjunction with a traditional didactic set.

1. Introduction

Learning to read and write for children with speech underdevelopment is hard work, and often a source of negative emotions. Efimenkova and Missarenko (2011) note: "Speech disorders of primary school students are a serious obstacle in their assimilation of the programs of all humanitarian subjects" (p. 2).

At the same time Efimenkova and. Missarenko (2011) rightly believe that "... with proper organization and implementation of correctional work, a speech therapist teacher helps such children cope with their speech disorders and, on an equal basis with other students, master school knowledge" (p. 3).

One of the conditions for the "correct" organization of speech therapy classes, which is more and more relevant today, is the use of computer technologies in special education, thanks to which the possibilities of motivating a child's educational activity are significantly expanded (Denisenkova, 2020).

2. Problem Statement

Researchers dealing with the problems of education of children with general speech underdevelopment have long come to the conclusion that, since overcoming a speech defect in them has more complex dynamics than in children with normal speech development, they are noticeably more resistant to pedagogical influence and need special means of providing motivation to learn. The use of new technologies attractive for such children in the educational process, which are part of the youth computer subculture, can significantly increase the motivation for learning and increase the effectiveness of correctional work. In addition, the use of computer technology makes it possible to optimize the pedagogical process, individualize the teaching of children with general speech underdevelopment and significantly increase the effectiveness of educational activities (Bespalko, 2002).

The use of a computer in the learning process with the vivid images it creates arouses the interest of any child, even without the special work of a teacher, but it should be borne in mind that children with general speech underdevelopment are, unfortunately, not characterized by spontaneous development of higher mental functions. Therefore, the performance of tasks using multimedia requires special conditions and techniques to achieve a correctional and developmental effect - the development of their higher mental functions.

Hence, it is not surprising that in the pedagogical science and practice of Kazakhstan today the question of the use of computer technologies in the educational process is becoming more active: for example, according to the data of the National Scientific and Practical Center for Correctional Pedagogy (NSPCCP), more than 78% of teachers working with children with special educational needs (hereinafter - SEN), use them in their activities. However, the issues of organizing speech therapy classes using computer programs, as well as the problems of increasing the digital competence of speech therapists, remain insufficiently developed. Conducted in 2014-2017 by specialists of the same NSPCCP, an analysis of the use of multimedia educational systems (a computer hearing-speech simulator and a speech communicator) in correctional education of children revealed several negative aspects in the practice of their application:

- Aforementioned manner does not include the psychological and technical specifics of a child with speech underdevelopment;
- Insufficient psychological structure of the computer task assignment procedure;

- Insufficient understanding of the need to use the principle of communicative orientation, which can significantly expand the possibilities for the development of speech among children with general speech underdevelopment: as a rule, the execution of computerized tasks is carried out by the child autonomously outside the dialogue with both the teacher and other children. Even if situations of paired work on a computer task are created, as a result of insufficient thoughtfulness of instructions and ignoring the factor of the child's psychological readiness for joint activities, the participants in the game quickly lose interest in their partner (Movkebayeva et al., 2017).

Overcoming these shortcomings, it seems, should be based on the correct organization of speech therapy classes using multimedia tools and providing special pedagogical conditions, on the one hand, and improving the qualifications of teachers, on the other; an effective component of such an organization of the correction process will be the formed skills of verbal communication and competent writing, with the undeniable urgency of the issues of prevention of secondary, dysorthographic, writing disorders in students with general speech underdevelopment in Kazakhstan, where, in general, the prevalence of writing disorders among younger students over the past 10 years has increased more than 2 times (Movkebayeva et al., 2017).

3. Research Questions

This way, the relevance of the research is determined by the following factors:
- Increasing prevalence of dysgraphy and dysorthography among primary school students and subsequent need of discovering new tools for solving and preventing the issue;
- Expansion of the range of PC implementations in the logopedic process with the aim of increasing the effectiveness of correctional influence due to improving its motivational component;
- Insufficient development of special approaches to the use of informational and multimedia technologies in the correctional speech education.

4. Purpose of the Study

4.1. Purpose of the study

Determination of the specifics of the use of information technologies and multimedia tools in the prevention and overcoming of dysorthography of primary schoolchildren with general speech underdevelopment and the role of digital readiness of a speech therapist in this process.

4.2. Research objectives:

- To highlight the specifics of the correct writing skill development structure;
- To determine the specifics of orthographic skills formation among children with speech disorders;

▪ To determine the correlation between a logopedist's computer literacy and the effectiveness of the educational process for students with general speech underdevelopment.

4.3. Research subject:

Correctional education process for children with General Speech underdevelopment.

4.4. Research context:

The conditions for the use of digital technologies and tools in the work of a speech therapist to correct writing disorders in primary schoolchildren with general speech underdevelopment.

Our experimental work was carried out on the basis of a special correctional boarding school No. 9 for children with severe speech disorders in Almaty in the 2019-2020 academic year.

5. Research Methods

The theoretical and methodological basis of the study was the neuropsychological concept of the level structure of the central nervous system (Vinarskaya, 1989), the theory of the gradual formation of mental actions (Galperin, 1974), and the concept of levels of cognitive actions (Bespalko, 2002).

6. Findings

In accordance with modern ideas about the structure of the development of the skill of literate writing, the formation of spelling action occurs during the interaction and interdependence of speech and non-speech mental processes. In accordance with the point of view we share Prishchepova (2006), at the initial stages of correctional work on the formation of writing, a speech therapist should create functional prerequisites for mastering spelling, such as visual gnosis, mnesis, optical-spatial representations.

At the first, sensory-perceptual, stage of the child's work, the child is taught to recognize, correlate and contrast non-speech, speech, and then linguistic elements. The second, gnostic-practical, stage of work includes the formation of the ability to reproduce, combine, analyze and synthesize linguistic structures (syllables, words, phrases and phrases), constructing words from morphemes or syllables practically "manually" using chips. The importance of hand movements - manipulations, gestures - when teaching writing, was drawn by Vygotskii (1935), however, an experimental test of the relationship between manual activity and the development of children's speech with general speech underdevelopment has not yet been carried out, which determined the main structural and content link of the experiment in the course of developing the research methodology. At the third, final and longest - up to the 1st year - stage, schoolchildren, according to Prishchepova (2006), they train in performing abstract language tasks, for example, in solving spelling problems according to a certain algorithm.

The specificity of teaching children with general speech underdevelopment, including speech pathology children, determined by the variety of psychological characteristics of this contingent, lies in the substantive and practical nature of all activities of the process of psychological and pedagogical support. The basis of this approach in the practice of special (correctional) education is the idea of the level-

hierarchical structure of the central nervous system. From a psychological point of view, the timing of the final maturation of the cerebral cortex is different for all children, but children with disabilities among them turn out to be the most "uneven" category. Therefore, in relation to them, taking into account the "level factor" is perhaps the most important condition.

What is the content of this factor? Due to the above-mentioned hierarchical structure of the cerebral cortex, brain structures of different levels are "responsible" for external (real) and internal (mental) actions. According to the research of Piaget (1983), the developmental effect of the learning process is possible only when the activity of transferring a new action or new knowledge is organized in stages, taking into account the level structure of the cortex. That is, any educational skill (including spelling) should be practiced, rising from real manipulative actions at the level of visual-practical or visual-figurative intelligence to the level of abstract linguistic activity. Moreover, the developmental effect is possible only when work at all levels is carried out using the same objects or their images.

Computer-related activities are virtual and, in fact, abstract. This means, according to the level-hierarchical theory, at the initial stage, the child's pre-computer manipulative activity with speech visual material should be implemented. Ignoring this stage will not only complicate the child's intellectual task when working with a computer, but also weaken (at best) the developmental effect of completing the task. It was the hypothesis about the importance of the stage of "pre-computer" manual activity that formed the basis of our experimental study.

For the experiment, two groups of the same age with general speech underdevelopment (8-9 years old) were selected - 5 people in each, with a similar state of oral and written speech. The diagnostic experiment involved writing a dictation as a tool for assessing educational achievements. An analysis of the mistakes of students of both groups, made during the ascertaining experiment, showed a homogeneous character of violations of the letter (Table 2).

The formative experiment was carried out on the basis of the computer simulator "Initial spelling, 1-4", developed by the specialists of the NSPCCP and included grammatical tasks of different levels, ranked according to the degree of complexity in accordance with the concept of levels of cognitive actions by Bespalko (2002). At each level, it was supposed to complete 3 tasks: the first - on the ability to distinguish linguistic objects among similar ones, the second - on the ability to perform a practical language action and explain it, and the third - on the ability to systematize or analyze linguistic information.

Already during the preparation of the experiment, a correlation was revealed between the level structuring of the tasks of the simulator (Bespalko, 2002) and the stages of traditional speech therapy work, determined by Prishchepova (2006). Thus, the tasks of the first level corresponded to the goals of the sensory-perceptual stage; the second - the content of the Gnostic-practical stage, and the third - the abstract-linguistic. Thus, the general content and structure of the computer simulator turned out to be a condensed version of the traditional system of work on the development of literate writing, which is quite natural, since both systems were based on the formation of the structure of the skill of competent writing.

Although both groups - both the control and the experimental - were trained using a computer simulator at the stage of the formative experiment, the organization of the learning process was built in different ways.

The participants in the control group were immediately involved in working with the simulator without any preparatory measures. The teacher, according to the experiment program, only performed the following actions:

- Determined that all subjects had experience in using Windows OS;
- Highlighted the lack of technical ability of skipping an uncompleted task;
- Drew attention to the absence of time limits for completing tasks, with the exception of compliance with hygiene requirements (no longer than 15 minutes);
- Emphasized the need for careful and paced completion of the assignment;
- Drew attention to the possibility of receiving help from an adult;
- Forwarded to the need to "give a report" at the end of the work with the Program - to recall and name the actions performed.

In the course of the experiment, the fulfillment of tasks caused difficulties in 95% of students, regardless of the level of its complexity. The speech therapist was forced to start providing them with guiding assistance, but even under these conditions, the children performed tasks with errors. Serious difficulties were also caused by the "report" on the work done. Only with the help of a speech therapist, children could remember the names of the actions performed, mixed words, content and spelling names.

The research program with an experimental group based on the ideas of L. S. Vygotskii on the importance of hand movements in teaching writing, developed by P. Ya. Galperin's method of forming mental actions through interiorization, according to which any mental action is a transfer to the inner plane of an expanded external practical action.

Therefore, preparatory pre-computer activities with the use of "worksheets" were organized with the students of the experimental group. The contents of all tasks (instructions and language material) of the simulator reproduced on sheets of paper in a special table (see Table 1) were supplemented with instructions containing the need to perform a practical action - manual manipulation: for example, instead of the action "Underline the vowels", you had to first close them (letters) with cards of the cut alphabet, and then underline.

At the same time, the child received instructions simultaneously through two analytical channels: auditory - through a speech therapist, and visual - placed on the "worksheet". The use of such a multisensory approach should have better prepared the child for independent work with the program. At this stage, the computer was turned off, but the instructions were consistent with those given in the Program.

Following the instructions, children, instead of "clicking" with the mouse on virtual objects, had to perform actions with real ones: a board, magnetic letters, cut alphabet, cards, etc. The instruction required the use of a wide variety of types of manipulations: attaching letters, overlaying signs, moving objects, interchange of location, etc. In this case, the children had to explain their actions with words or pointing gestures.

Table 1. Example of the worksheet for task no. 2 of the Program

Instruction	Task
First, take these letters down from the board, name them, then write them down	Write: Russian language has the following vowels:
First, cover these letters with the cards from your alphabet, then underscore them	Underscore vowels in the following words: дедушка, прямой, кино, ем
You can look through your dictionary. If you are having any difficulties - build a sound schema from those chips	Choose and write down a word with the following number of sounds and letters: 3 sounds, 4 letters; 4 sounds, 3 letters.

Both in the process and at the end of the assignment, the children had to pronounce everything that had been done: "closed the vowels with cards ...", "moved the letter ...", "made a scheme out of chips", etc. It is this verbal designation of real actions (selection of verbs with prefixes) turned out to be the most difficult for children. However, with the help of a teacher, they managed to significantly expand their verb vocabulary. Thus, the sounding of manipulations can contribute to solving another important problem - the development of speech as a means of communication.

The actual computer stage in this group proceeded according to the same principles as in the control group, but, unlike it, did not cause serious difficulties. Children understood and successfully followed the instructions presented by the program, freely compiled a report on the results of the work, updating their verb dictionary.

Checking the assimilation of the material worked out on the simulator, carried out at the end of the experiment with the help of dictation, showed an improvement in the results in both groups (Table 2), which gives grounds to speak about the effectiveness of ICT use in speech therapy work in general.

Table 2. Results comparison of the forming experiment

Indicators	Control group		Experiment group	
	Before education	After education	Before education	After education
Dysgraphic errors	21	13	20	11
Decrease in number of errors (in %)	38%		45 %	
Orthographic errors	27	22	29	12
Decrease in number of errors (in %)	18%		58%	
An increase in the quality of writing a dictation (in %)	+28 %		+51,5 %	

At the same time, comparison of the results by groups showed that the students of the experimental group made much fewer mistakes in the final dictation than their peers from the control. The average increase in the quality of dictation writing in the first group was almost 2 times greater than in the second.

Thus, it can be quite confidently asserted that a comprehensive training option with the organization of pre-computer activities is more effective (Gianelli, 2018), and the use of ICT in work to correct writing disorders in children with general speech underdevelopment should be carried out taking into account the following conditions:

- A computer task should be an integral part of a training complex that includes both software and traditional didactic objects.
- Work with a computer program should be carried out in 2 stages: first - real activity with a didactic object, then - virtual activity with its image.
- All performed manipulations must be voiced (pronounced) by the learner.

Thus, the experiment clearly proved the necessity and possibility of using information technologies in the work on the formation of writing skills in children with general speech underdevelopment, provided that special approaches and methods for their application are provided.

But, at the same time, this also imposes additional requirements on the speech therapists themselves, who must be able to use new technologies in their work not spontaneously and chaotically, but systematically, on the basis of sufficient digital literacy, which makes it possible to select ICT in accordance with the psychological characteristics of children.

Apparently, the most effective solution to the problem can be a special coursework on the use of IT products. But we should talk not just about new courses, but about a significant modernization of the system of advanced training. The best, in our opinion, means of preparing teachers for the use of ICT in the educational and correctional process is their direct involvement in course activities that would acquaint students with the content of auxiliary technical means and would be conducted using information and distance technologies. And given the peculiarity of the contingent of students with OEP, when many children for health reasons cannot participate directly in the educational process, the task of teaching special teachers the basics of using distance learning technologies becomes urgent.

Remote training of speech therapists will allow them to acquire the initial skills of using distance learning technologies, gain knowledge about the methodology and organization of training sessions, testing students (control procedures, use of questionnaire results), the use of modern assistive and developmental equipment that makes up the technical resource of the speech therapy office and school generally. Conducting classes should be based on maximum visualization of the material and the use of interactive methods, such as "Brainstorming", "Role-play", "Case-Study", "Association graphics" and others, feedback from students and teachers in questionnaires and in online communities. In this case, indicators of the effectiveness of course activities using distance technologies should be considered not only the results of the final testing of students, but also the number of facts of using ICT in speech therapy classes with the provision of special conditions, which are mentioned above.

The use of remote and other information technologies in the advanced training system will allow to quickly form the willingness and ability of speech therapists to use information and communication (including assistive, assistive) technologies in corrective work with children with general speech underdevelopment, which, in turn, will help to overcome the disabilities of such children and their successful integration into the general educational process and society (Movkebayeva et al., 2017).

7. Conclusion

Thus, the use of distance and other IT in the advanced training system will allow faster formation of the readiness and ability of speech therapists to use information and communication technologies in corrective work with children with OOP, which, in turn, will help to overcome the disabilities of such

children and successful integration them into the general educational process and society (Movkebayeva et al., 2017).

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