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Argumentation of the use of educational software in the mediation of language disorders in students with intellectual disability

Elena Crișan [1]

Abstract

Communication is produced through language, language being also an instrument of thought. The correction of speech and language disorders, in general, stimulates the psychic development of the individual, his integration in activity and life, leads to the affirmation of the personality on a social and cultural level. Speech therapists are increasingly challenged in offering and performing high-quality speech therapy for the correction of people with language disorders. The computer can be an excellent game partner and a good "educator" and its intervention, depending on the variety of programs used and the involvement of psychopedagogical factors, will be reflected in the shaping of the child's personality. Our results illustrated significantly higher performance in language development at all levels for the group that received the Logopedix software-based intervention compared to the control group. These results can be used in the development of new psychopedagogical intervention programs involving multiple specialists.

Keywords: special psychopedagogy, educational software, language disorders, intellectual disability

Introduction

According to the author Buganu D. A. (2019) human communication is perhaps the most important way for the being to exist. The communication process is of such great importance that it conditions the very development of human society. In the process of communication, individuals approach each other armed with a set of assumptions about how each evolves the other, each adapts to the other, and an adjustment of behavior to the other occurs.

As Carantina and Totolan (2007) note, the child with intellectual disability mainly uses external language. It is known that in these children cognitive and motivational areas are primarily affected, and manual coordination is deficient. They have a low interest in learning, extrinsic motivation is predominant, which will make their school adaptation more difficult. They cannot concentrate for a longer period of time and fail to adapt their volitional capacities to the demands formulated by the adult.

Gherguț (2013) believes that the existence of a large number of language disorders and the deficit of thinking give the speech of the child with mental deficiency an almost unintelligible character, its reception being much more difficult, and in terms of expression a simple, uniform verbal behavior.

[1] PhD candidate, „Ion Creangă" State Pedagogical University Chisinau, Republic of Moldova
https://orcid.org/0009-0005-6946-043X
Corresponding Author:
Email: elena81crisan@gmail.com

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In Popovici's view, D.V. (2000) under the phonetic and phonological aspect, the child with mental deficiencies encounters difficulties caused by his inability to observe the exact way of producing the pronunciation, necessary for a correct imitation. Pronunciation defects, speech disorders in general, can go as far as alalia, the most frequent being, however, cases of polymorphic dyslalia. Uncertainties in pronunciation can appear both in the pronunciation of consonant words, diphthongs and triphthongs, as well as in the case of pronouncing sentences and phrases that involve deep thinking and conveying complex information.

The current guidelines (Burlacu, 2014), (Gherguţ, A., 2006), (Gherguț, A.; Frumos, L.; Raus, L., (2016), (Popovici, D. V., (2016), in the field of psychopedagogy recommend the use in school of tools derived from professional computer software.

On the other hand, the new orientations in the field of special psychopedagogy (Fogarassy – Neszly, P., (2007), (Gherguț, A., (2016), (Mușu, I. (2000), (Pădure, M., (2007), (Popovici, D.V.; Racu, A.; Racu, S.; Danii, A., (2007)), (Roșan, A., (coord.), (2015), (Rotarașu, Ștefania, (2012), (Tobolcea, I.; Karner-Huțuleac, A., (2010) discuss the functions that the "computer" and its related programs have, namely as a mediator - it supports and motivates the child by adopting learning at his level, a "protein" function (the computer ensures a transcoding of a deficient sensory or motor channel into another well-controlled one), this type of applications is useful whenever working with children who present different types of impairments.

The use of multimedia means and related applications is a reality and a necessity, and the logotherapeutic process so complex in this case becomes the scene of three actors: the speech therapist - the child - the computer, who together try to ensure the success of the therapeutic approach (Tobolcea, 2013).

The author Istrate O. (2012) claims that any practicing speech therapist recognizes the fact that this technique of sustained repetition of the correct pronunciation of sounds, syllables, words and sentences leads to a decrease in interest and motivation for practice, because it causes a certain monotony, fatigue and regression in correction. Precisely for this reason, a combination of traditional techniques with the new logo-therapeutic computer technology would stimulate the child's motivation for systematic practice and accelerate therapeutic progress. By means of computerized technology, the therapeutic relationship is improved in the sense of eliminating the frustration activated by the monotonous exercises of classical therapy, which indirectly also determines the increase of the children's self-esteem.

Bodea Hațegan C. (2015) recommends that for computer technology to be fully effective, the development of these techniques must be carried out in accordance with the requirements of the users - software created according to the frequency of language problems encountered in children. Aspiring to and acquiring selected new technologies is just the beginning. For new technologies to fully benefit education, most schools need to broaden their managerial vision—how administrators/managers, teachers, students, and community members work together. Changes are needed at the level of infrastructure, teachers, educational administrators/managers and students.

To live, learn and work successfully in an increasingly complex and information-filled society, students and teachers must use technology effectively. In a healthy educational environment, technology, in the view of authors such as: D.Banes (2002), McNaughton (2013), P.R.Petrescu (2011), can help students: to be able to use a new learning environment based on technology, to learn, communicate, collaborate, produce and develop their knowledge.

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Research methodology

The purpose of this research is to verify the applicability of educational software in correcting language disorders in students with intellectual disabilities.

The initial group of participants included in the study consists of 40 students of the "Constantin Păunescu" Special Secondary School, Tecuci, county. Galatians, participants who met the following inclusion criteria:

- chronological age: between 10 - 14 years;
- grades: Vth- to - VIIIth.
- degree of mental deficiency: moderate and mild mental deficiency: QI = 35–70.

Note: the level of intellectual development of the subjects (the value of the intelligence coefficients) was not calculated but was extracted from the personal files of the children submitted to the school secretariat.

Data collection procedure

Consents were obtained from school principals and children's parents for the application of all instruments and the use of educational software prior to interaction with children. The children were told that they were going to play with a lady so that they could maintain their well-being before, during and after the intervention.

A diverse range of methods was used for data analysis and interpretation, with the aim of highlighting as clearly as possible the results of the integration of educational software in speech therapy, compared to classical therapy.

In the intervention program, the Logopedix educational software was used, offering the possibility of developing the ability to imitate actions and verbal commands, onomatopoeia, recognizing objects by the sounds produced and then identifying them in images. All these actions took place according to the software in the first stage of speech disorder correction.

In the final working stage of the program, the child's ability to recognize letters, reproduce them graphically and form sentences with words was worked on. All these exercises were carried out according to the program of the educational software. Thus: - The Initial Stage, the application of tests was aimed at detecting language comprehension and language disorders, in relation to the psychological age of the language and lexical difficulties; depending on the results obtained by the subjects in the initial tests, the composition of the two groups (experimental and control), the speech therapy groups and the objectives of the intervention program were established. - The Final Stage, the application of the tests and the interpretation of the results had the purpose of comparing the initial results obtained by the students with the final results, but also to check the efficiency of the speech therapy intervention program made with the help of the computer, in comparison with the speech therapy program applied by classical methods, as well as the validation of the research hypotheses; the comparison aimed at the initial and final results obtained by students from the same group, as well as establishing the differences between the results obtained by the two groups.

Steps in data collection

The research was carried out in the "Constantin Păunescu" Special Secondary School, Tecuci, county. Galatians, and consisted of:

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- theoretical documentation related to the research topic, by studying and analyzing Romanian and foreign specialized works mentioned in the bibliography (books, articles, legislative documents in classic and electronic format);
- establishing objectives and formulating research hypotheses;
- the correlation of the proposed objectives with the research theme, with a work methodology suitable for verifying the hypotheses and particularities of the participants in the study;
- establishing, preparing and applying the test battery for the complex initial speech therapy assessment, collecting the results, recording and analyzing them;
- establishing the structure of the groups of participants (experimental and control), based on the results obtained at the initial assessment tests;
- designing and drafting the intervention program based on the speech therapy software "Logopedix".
- investigating the opinions of speech therapists regarding the effectiveness of using educational software in speech therapy.

Description of the instruments

The TACL-R (Elizabeth Carrow-Woolfolk Test of Auditory Comprehension of Language) is a self-administered test for testing the auditory comprehension of language in children between the ages of 3 and 9.11. It consists of 120 items presented in three sections of 40 items each. Each item consists of a word or sentence and a set of three adjacent pictures, drawn in black and white. One of the three pictures illustrates the meaning of the tested word, morpheme or syntactic structure. The other two pictures depict either two contrast elements with a test stimulus, or a contrast and a misleading structure.

The examiner reads the item aloud, and the subject is instructed to point to the picture they think best represents the meaning of the word, sentence, or construction expressed by the examiner. No oral response is required from the subject.

All sections are administered individually for each subject. The verbal stimulus corresponding to each item is presented orally by the examiner, and the subject responds by indicating one of the three images. The incentive is offered only once. If the subject hesitates to answer, he should be encouraged. If he indicates more than one picture, he is asked to indicate only one response that will be recorded, even if the second response appears to be a spontaneous correction of the first. If the subject continues to indicate more than one image, the item is recorded as not completed.

Correct answers are marked with 1 point.

Description of Logopedix educational software

Logopedix is an interactive, online software platform for speech therapists, psychologists and support teachers used to correct language disorders in children with special educational needs, including those with autism spectrum disorders (ASD). The platform provides tools and exercises for assessment and therapy, allowing direct interaction between specialist and child, even remotely.

Educational software LOGOPEDIX is professional software in the therapy of language disorders. The program has a significant degree of interactivity and language training, it is intended to correct some categories of language disorders frequently found in children: dyslalia, dyslexia, delay in speech development. The LOGOPEDIX online application is a program with collaboration -

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interaction functions, where the teacher sees the student's actions on the tablet or computer screen, what actions the student does on the application screen, where he accesses and what he accesses in the program. Also, the student sees the actions of the psychopedagogue or speech therapist, the student can be assisted by a teacher or therapist.

The LOGOPEDIX online platform contains over 300 distinct exercises; phonoarticulatory motricity – tongue acrobatics, mouth gymnastics, breathing regulation exercises, phonoarticulatory relaxation; diagnosis – psychological age of language, dyslalia diagnosis, phonemic hearing assessment, spatial assessment; it hosts over 4700 images, 3870 sounds and 3860 words.

The educational computer program "LOGOPEDIX" is approved by the Ministry of Education of Romania and is an interactive software product that allows children to participate in the process of correcting language disorders, has a friendly interface and is very easy to use in correcting language disorders: delays in language development, dyslalia, dyslexia.

The computer educational program "LOGOPEDIX" is developed by the SNAC Romania Association and used by 3 users of the Informer software. The most popular version among users of this product is 1.0. the name of the executable files of the program is LOGOPEDIX.exe. on the start page we are presented with the files that the software contains, each referring to a specific domain:

– Delay in language development.
– Dyslalia.
– Dysgraphia.
– Methodological guide.
– The speech therapy sheet.

The children participated for one school year in 1.5 hour sessions 3 times a week in activities specific to the difficulties found at each level. We considered both general characteristics of the sample, but especially the particularity of each student.

Findings

Results on the TACL-R (Elizabeth Carrow-Woolfolk Test of Auditory Comprehension of Language)

Purpose: post-intervention assessment of language comprehension level

Working hypothesis: we assume that the subjects in the LE group will show a higher level of language comprehension than the subjects in the LC group, as a result of the positive changes due to the training intervention.

Table 1. Mean score values and Wilcoxon test, test-retest LE/LC groups, on sections of the TACL-R test

	Group LE				LC group			
	Test M1	Retest M2	***Z***	***P***	Test M1	Retest M2	***Z***	***P***
Section 1 – Word classes and relationships	24.90	38.35	-3.939	0,000	24.85	33.80	-3.941	0,000
Section 2 – Grammatical morphemes	24.15	38.50	-3.928	0,000	23.55	32.00	-3.935	0,000
Section 3 – Developed sentences	20.25	34.80	-3.930	0,000	19.20	31.85	-3.941	0,000

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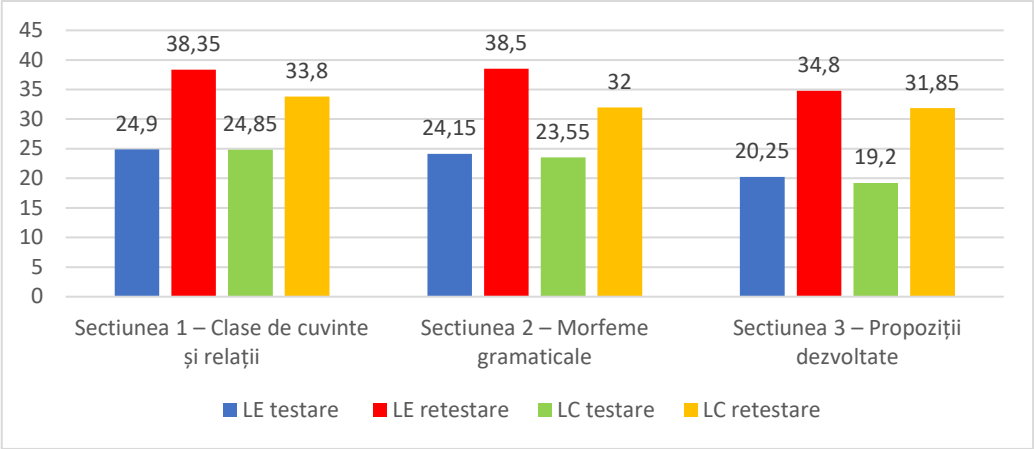

Figure 1. Mean score values and Wilcoxon test, test-retest LE/LC groups, on sections of the TACL-R test

By applying the Wilcoxon test, a significant statistical advance in development was revealed in the experimental group schoolchildren, in all three sections of the TACL-R test: in the Word classes and relat
ions section (M1=24.9; M2=38.35; Z= -3.939; p= 0.000), in the Grammatical morphemes section (M1=24.15; M2=38.50; Z= -3.928; p= 0.000), in the section Developed sentences (M1=20.25; M2=34.80; Z= -3.930; p= 0.000), On the other hand, the students in the control group also achieved significant progress in development on all sections of the TACL-R test: in the section Word classes and relations (M1=24.85; M2=33.80; Z= -3.941; p= 0.000), in the Grammatical Morphemes section (M1=23.55; M2=32.00; Z= -3.935; p= 0.000), in the Developed Sentences section (M1=19.20; M2=31.85; Z= -3.941; p= 0.000).

In the testing stage, the application of the U-Mann Whitney test did not indicate significant differences between LE/LC, the two samples being homogeneous (Annex - table of LE/LC differences during testing). At the retest stage, the values of the U-Mann-Whitney test indicated statistically significant differences between the experimental group and the control group: in Word Classes and Relations U= 48,000; p= 0.000), at Grammatical Morphemes U= 3.500; p= 0.000), at Developed Sentences U= 38.000; p = 0.000).

The results obtained in the three sections of the TACL-R test demonstrated that the performances of the LE experimental group are significantly superior to the LC group from the perspective of language comprehension skills, at the end of the application of the training program, which validates the working hypothesis advanced at this level.

Table 2. Mean score values and Wilcoxon test, LE/LC test-retest groups, on section 1- Word classes and relationships, TACL-R test

	Group LE				LC group			
	Test M1	Retest M2	***Z***	***P***	Test M1	Retest M2	***Z***	***P***
Nouns	6.70	8.75	-4.128	0,000	6.65	8.05	-3.600	0,000
Verbs	4.50	6.70	-3.978	0,000	4.75	6.15	-3.817	0,000
Direction	1.90	2.90	-3.542	0,000	1.80	2.30	-3.162	0,002
Quality	6.20	8.75	-4.058	0,000	6.30	8.20	-4.184	0,000
Amount	2.30	4.60	-4.008	0,000	2.20	3.35	-3.624	0,000
Semantic relations	3.30	6.65	-3.999	0,000	3.15	5.75	-4.011	0,000

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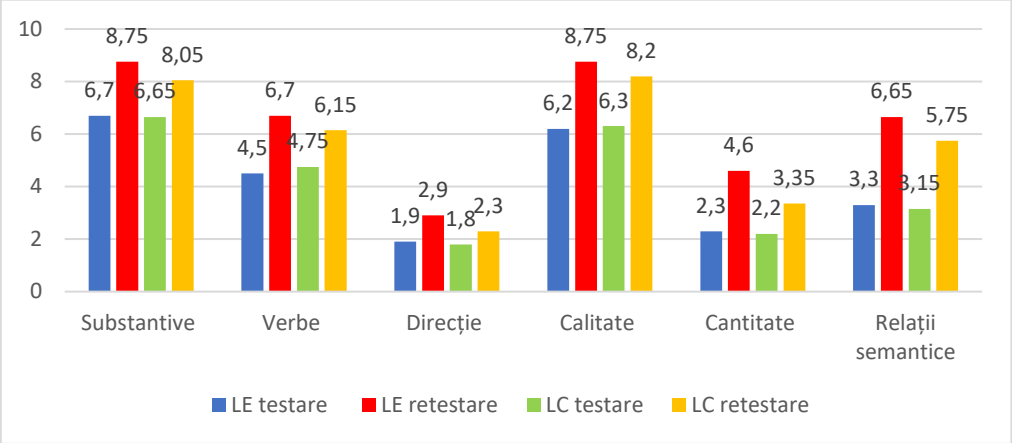

Figure 2. Mean score values and Wilcoxon test, LE/LC test-retest groups, on section 1- Word classes and relationships, TACL-R test

At the retest stage, the U-Mann-Whitney test values in *the Word Classes and Relations* section indicated statistically significant differences between the experimental group and the control group, with U-test values ranging from 28,000 – 125,000, and significance threshold values between 0.000 – 0.010.

Table 3. Mean score values and Wilcoxon test, LE/LC test-retest groups, on section 2- Grammatical morphemes, TACL-R test

	Group LE				LC group			
	Test M1	Retest M2	*Z*	*P*	Test M1	Retest M2	*Z*	*P*
Morphemes- nouns	4.90	6.70	-3.880	0,000	4.50	6.20	-4.042	0,000
Morphemes - verbs	4.05	8.55	-3.981	0,000	3.90	6.40	-3.998	0,000
Morphemes - noun-verb agreement	2.45	2.90	-2.714	0,007	2.35	2.55	-2.000	0,046
Morphemes- pronouns	6.80	11.50	-3.946	0,000	6.10	8.55	-3.782	0,000
Morphemes- prepositions	5.95	8.85	-3.844	0,000	6.70	8.30	-3.987	0,000

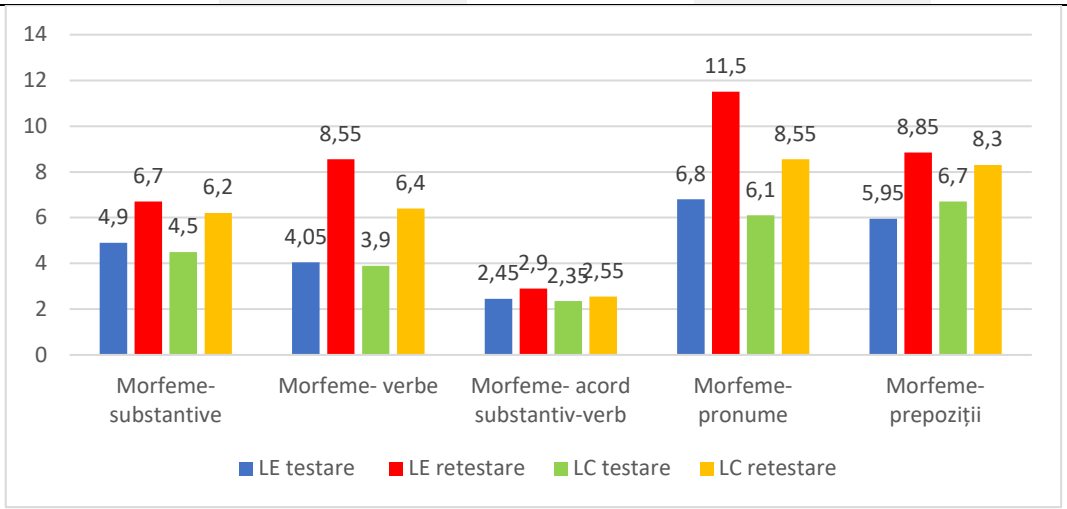

Figure 3. Mean score values and Wilcoxon test, LE/LC test-retest groups, on section 2- Grammatical morphemes, TACL-R test

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At the retest stage, the values of the U-Mann-Whitney test in the Grammatical Morphemes section indicated statistically significant differences between the experimental group and the control group, the U-test values being between 6,000 – 130,000, and the significance threshold values between 0,000 – 0,014.

Table 4. Mean score values and Wilcoxon test, LE/LC test-retest groups, on section 3- Developed sentences, TACL-R test

	Group LE				LC group			
	Test M1	Retest M2	*Z*	*P*	Test M1	Retest M2	*Z*	*P*
Interrogative sentences	3.00	4.85	-4.130	0,000	2.90	4.50	-4.053	0,000
Negative sentences	1.70	3.70	-3.878	0,000	1.35	3.15	-3.779	0,000
Sentences- active, passive diathesis	3.05	4.70	-3.904	0,000	2.90	4.10	-3.874	0,000
Coordinate sentences	4.35	6.45	-3.994	0,000	4.15	5.95	-4.093	0,000
Subordinate clauses	5.55	8.65	-3.994	0,000	5.30	7.80	-4.028	0,000
Interleaved subordinate clauses	2.60	7.05	-4.056	0,000	2.60	6.35	-3.982	0,000

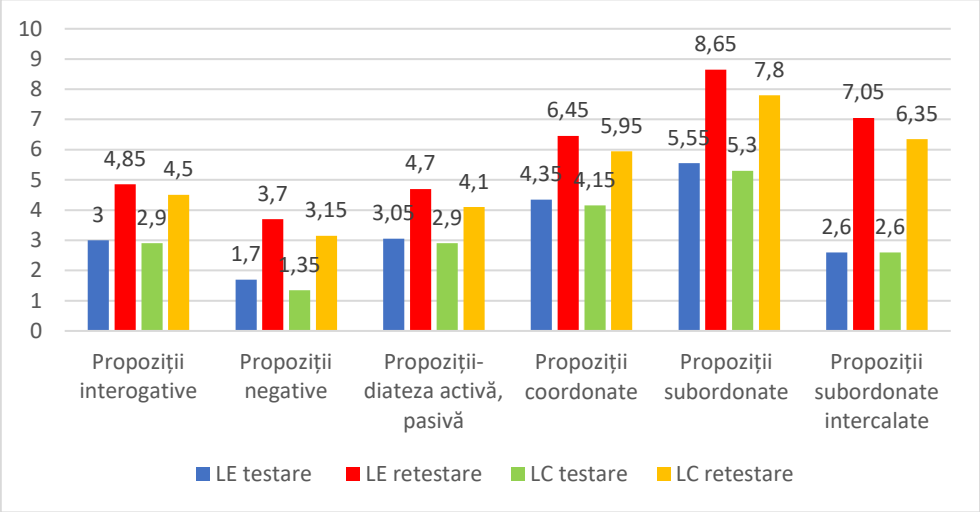

Figure 4. Mean score values and Wilcoxon test, LE/LC test-retest groups, on section 3- Developed sentences, TACL-R test

At the retest stage, the U-Mann-Whitney test values in the Developed Sentences section indicated statistically significant differences between the experimental group and the control group, with U-test values ranging from 93,000 – 130,000, and significance threshold values between 0.001 – 0.031.

Conclusions

Within the modern means used in speech therapy activity, an important place is occupied by the use of computers and educational-therapeutic software. These modern means create a special learning atmosphere and cause a considerable increase in motivation and interest in correct pronunciation. Speech therapy that involves the use of speech therapy software determines the

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activation of motivational impulses in students. The use of the computer as a support for the remediation of language disorders cultivates the students' interest in therapeutic activity. By systematically presenting and providing new, rich, well-selected information that can be played in its natural ambience and dynamics, the computer sustains the student's curiosity for continuous knowledge and increases the motivation to correct language disorders.

In conclusion, using educational software can help people with disabilities overcome their disability, become less dependent, and enrich their repertoire of skills and capabilities. However, reality has shown that these beneficial effects were not possible in all situations. Thus, reference is made to the problem of matching between the needs of the beneficiaries and the demands of the technology, which was overlooked when government or quality organizations thought of providing computers to educational units that integrate children with special requirements.

It is difficult to estimate the role of modern technology, especially computers, in our society. The computer is a unique tool for individualizing and improving the learning process, which is especially necessary when working with these children.

In our study we revealed that educational software specially created for children with disabilities is an important resource in correcting deficiencies. The potential of technologies and communications to influence instruction and enhance learning is great, but their full exploitation in education depends on the degree to which the teaching staff is prepared to integrate, the capacity and openness of the entire teaching staff, and the technological resources available. All this is justified by higher results of our experimental group compared to the control group at all language levels, from pronouncing words to composing sentences, $p<0.05$.

The impact of the educational software on students is obvious: you can see the increase in interest in learning, the increase in class attendance, better school results. From a psychological and pedagogical point of view, they are in a direct causal relationship. Teaching-learning strategies of curricular content through educational software require detailed study and a good knowledge of educational reality. In addition to the obviously informative and formative valences of using software, we must not neglect an aspect considered important, at least in international pedagogical conceptions, namely that of attractiveness. Modern IT means significantly increasing the attractiveness of the educational process. Educational software represents the most important technological innovation of modern pedagogy.

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