

Is educational software a luxury or a necessity in speech therapy for children diagnosed with intellectual disability?

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Abstract

Technology is often used today in the therapies of children with language disorders, especially during the COVID-19 pandemic. Studies show that artificial intelligence makes the work of therapists more efficient in the corrective-recovery process. Largely due to new technologies, the importance of skills and abilities – application, critical thinking, creativity, problem solving, communication, collaboration – is increasingly confirmed to the detriment of verbal information. The evolution of technological means not only requires the educational system to form the student's ability to use them, but, at the same time, makes available to all educational actors a set of resources, tools and teaching methods, indispensable today for the efficiency of training, in all areas transposed into educational disciplines. At the same time, the current knowledge society, governed by the emergence of information technologies, displays a new set of educational imperatives with which the school must permanently align its purposes. This information society determines the emergence of a new type of student, the digital native, the young person born into a technology-dominated environment, who has an inherent understanding of digital technologies, these being integrated into his life since childhood. Thus, this study aimed to investigate possible differences between the opinions of specialists regarding the integration of educational software in speech therapy according to their demographic characteristics. Our results highlighted differences in terms of gender, level of education of the specialists and the type of disorder suffered by the child they are working with. These results can be used in the development of mentoring programs for specialists in the field of special psychopedagogy to make their work more efficient or in the corrective-recovery approach.

Keywords: *special psychopedagogy; educational software; language disorders; intellectual disability; opinion of speech therapists*

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Introduction

Technology is a wonderful thing, and we are seeing it used more and more in speech-language pathology practices. Speech therapists use computers, tablets, smartphones, smart boards, and more in speech therapy for a variety of purposes. Parents can download apps and games to help their children practice their speech and language skills at home. Some speech therapy services are even conducted over the internet through video conferencing platforms such as "Skype." (Anghel et al., 2023; Matei, 2022; Naing et al., 2023, 2023; Newton & Dell, 2011; Penman et al., 2021)

Children also have easier access to alternative and augmentative communication devices through the use of apps that are less expensive than their dedicated counterparts (Clark et al., 2021; De Taeye et al., 2023; Lincă, 2018; Lincă et al., 2022; Lincă, 2019; Lincă & Matei, 2023). Therefore, it is necessary for specialists in fields related to speech disorders to educate themselves about the usefulness of using educational software in this form of therapy.

Intellectual disability is characterized in the mental life plan by a series of specific general features: genetic viscosity, heterochrony, psychic rigidity, rigidity of behavior, communication deficiencies, heterogeneity, intellectual hetero-development. A special characteristic of the mentally deficient is represented by infantilism, his behavior being marked by shallow interests (Hall et al., 2005; Marrus & Hall, 2017).

The fragility of previously achieved acquisitions, the limited nature of the prospects for further development, the extensive slippages towards reactions and behaviors specific to previous stages. Another specific feature of this deficiency is represented by rigidity (Moeschler et al., 2014).

The language of the children with intellectual disability bears the imprint of the characteristics of concreteness, rigidity and inertia specific to the level of thinking. We can talk about the delayed appearance of speech and the difficulties that the child with mental deficiency encounters in using sentences (Marrus & Hall, 2017).

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The delayed development of language concerns all its aspects: phonetic, lexical, semantic, grammatical and entails the high frequency of language disorders in this category of deficiencies. The most frequent manifestations of language disorders against the background of mental deficiency are those of the type: dyslalia, dysgraphia and dyslexia (Baker et al., 2003).

Another characteristic of the child with this disorder refers to the size of his vocabulary which seems more developed than that of the normal child, although from the point of view of instrumentation and organization based on symbols the capacity of the former varies between 20 -50% of that of the normal child (Einfeld et al., 2011).

The language of the child with intellectual disability has strong accents of infantilism which appear against the background of verbal immaturity. In the intellectual disability, the gap in the development of language and other psychic functions is very obvious due to the fact that the possibilities of understanding and ideation remain limited, the capacity of expression registers progress (Baker et al., 2003)..

Considering all of the above, research is needed to illustrate the efficiency of using educational software in speech therapy for these children. Up to now, only validation studies of scales on the topic under study are known, but variables related to specialists in terms of increasing the efficiency of speech therapy for children with intellectual disabilities have not been taken into account. Thus, our study fills a gap in the literature.

Research methodology

Objectives

O1. Exploring possible differences between the opinions of speech therapists in the field of special psychopedagogy regarding the attitude towards the use of educational software depending on their demographic characteristics (gender, age, length of service), but also on environmental factors such as: the category of institution in which the specialist works and the degree of intellectual disability of the pupil being worked with

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Hypotheses

H1. There are statistically significant differences between the opinions of speech therapists in the field of special education regarding the attitude towards the use of educational software depending on their demographic characteristics (gender, age, length of service), but also on environmental factors such as: the category of institution in which the speech therapist works and the degree of intellectual disability of the child being worked with.

Description of data collection procedures

To achieve the objective of the study and to test its hypotheses, a questionnaire was developed to investigate the attitude of speech therapists regarding the use of software in speech therapy in the communication process.

The scale was disseminated online through the Google Forms platform to all speech therapists in special schools and other forms of professional practice. Before completing the questionnaire, participants signed the informed consent.

Participation was voluntary, and participants were told that there were no good or bad answers, but only answers consistent with each person's reality. From February 2024 to May 2024, respondents could complete the questionnaire.

The data collection procedure involved the use of CSV data extraction modules from Google Forms in RStudio, version 4.3.0, for PC, then they were processed by applying the Mann Whitney and Kruskal Wallis tests for the difference between the means of the ranks of two, respectively three independent groups.

1. Gender: male, female.
2. Age: 20-40 years, 41-60 years.
3. Work experience: a few months, 1 year, 1-10 years, over 10 years.
4. Attitude towards the use of educational software in speech therapy: positive, neutral and negative.
5. Institution category: state, private.

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6. School type: preschool, primary, secondary, high school, private psychology office, speech therapy office.
7. Category of the institution:
 - a. Special Secondary School
 - b. Special Vocational School
 - c. Special Technological High School
 - d. School Center for Inclusive Education
 - e. County Resource and Educational Assistance Centers
 - f. County Speech Therapy Centers
 - g. Sheltered Workshops
 - h. Day centers in school centers for inclusive education
 - i. Groups of students with SEN integrated in mainstream schools
 - j. County Psychopedagogical Assistance Centers
 - k. County Resource Centers for Inclusive Education
 - l. Others.
8. Degree of intellectual deficiency of the pupil being worked with:
 - a. Severe and profound intellectual disability (IQ below 35) - can be assimilated with the serious degree of disability;
 - b. Moderate intellectual disability with IQ - 35-49 without other association - can be assimilated with the accentuated degree of disability;
 - c. Mild intellectual disability with IQ - 50-65 if associated with another deficiency: sensory, somatic, mental (language and communication, hyperactivity, emotional, conduct); can be assimilated to the average degree of disability;
 - d. Language deficiencies with/without expressive disorders, which make it impossible to establish relationships with the environment, in a neurological context, clinically and paraclinically objectified • Autism, Rett syndrome, Asperger syndrome, in relation to the degree of impairment of intellect, affectivity and activity.

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Instruments

A questionnaire was developed based on the specialized literature by analyzing several materials (Abbasi et al., 2020; Alazzam et al., 2021; Dai et al., 2017; Lin & Neuschaefer-Rube, 2021; Saeedi et al., 2023; Tadayon et al., 2021). This instrument includes two parts. The first part was related to the demographic information of speech therapists in the field of special psychopedagogy, being composed of items that tracked data such as age, gender, type of employment contract, type of institution, background, length of service, etc., and the second part was designed to collect information related to the attitude towards the use of educational software in speech therapy. The questionnaire had items with predefined answers on a five-point Likert scale, ranging from 5=total agreement to 1=total disagreement for items aimed at achieving objectives in the speech therapy therapeutic process, on the one hand, but also a Likert scale from 1 to 10 for items aimed at satisfying educational needs of students by using educational software in the therapeutic process.

In order to determine the validity and content of the questionnaire, a series of 23 items were translated and adapted to the specifics of the Romanian language. A psychopedagogue and a clinical psychologist, as well as a pediatric neurologist and a translator contributed to the adaptation of the instrument. Following the translator's instructions, the necessary changes were made and subsequently, the items were applied to a sample of 30 speech therapists in the field of special psychopedagogy (speech therapy).

Thus, the Cronbach alpha index had a value of 0.79, which leads us to conclude that the instrument measures what it intended, so we can use it in our research.

The total score can have values

1. between 22 and 125, and the meaning of each is: between 22 and 58 we can talk about a low score, meaning the respondent has a negative attitude towards the use of software in speech therapy,
2. between 59 and 94 we can talk about a medium score, meaning the respondent has a neutral attitude towards the use of software in speech therapy,

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3. between 95 and 125 we can talk about a high score, meaning the respondent has a positive attitude towards the use of software in speech therapy.

In the case of our sample of 214 participants, the Cronbach alpha index was 0.86, which leads us to conclude that this instrument measured what it intended.

Sample

214 speech therapists from the field of special education participated in the study, 82 male and 132 female, 84 aged between 20 and 40 years, and 130 aged between 41 and 60 years ($M=37.51$, $SD=2.6$). 194 of the participants come from urban areas, and 20 from rural areas, 51 have university degrees, while 163 have postgraduate degrees. 186 have an indefinite contract, and 28 are employed for a fixed period. 75 of the participants have a work experience of several months to 10 years, while 139 have a work experience of over 10 years.

Most of the participants work in state institutions, 175 of them, and they come from secondary schools, 106. From the private sector, most work in psychology offices, 39. 164 speech therapists work in inclusive centers and schools. 96 of the speech therapists work with students with mild mental disabilities, and 56 with students with language impairments with/without expressive disorders, in a neurological context, clinically and paraclinically objectified.

139 of the participants (68 women and 71 men) have a positive attitude towards the use of educational software in speech therapy, 57 have a neutral attitude (48 women and 9 men), and 18 (16 women and 2 men) have a negative attitude. In addition, 83 of the participants aged between 41 and 60 support the integration of technology in speech therapy, as do 56 speech therapists aged between 20 and 40. 88 of the participants with a master's degree and over 10 years of teaching experience have a positive attitude towards the use of software in speech therapy, and the fewest, 5 bachelor's and 2 doctorate graduates, have a negative attitude. Most of those with a neutral attitude have completed master's studies, 40.

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Analysis and interpretation of the research data

To achieve the second objective, we tested the first hypothesis according to which it is assumed that there are statistically significant differences between the opinions of speech therapists in the field of special psychopedagogy regarding the attitude towards the use of educational software in speech therapy depending on their demographic characteristics (gender, age, length of service), but also on environmental factors such as: the category of institution in which the speech therapist works and the degree of intellectual disability of the pupil being worked with.

Before testing the hypothesis, we checked the normality of the distribution of the attitude towards the use of educational software variable.

In the table below, it can be seen that both the skewness and flatness indices, Skewness, Kurtosis, are outside the range -1 – +1, but also the Shapiro Wilk normality test, $p < .001$, indicates an asymmetric distribution.

Table 1. Descriptive statistics of the attitude variable towards the usefulness of using educational software in speech therapy

	score
Valid	214
Missing	0
M	91.332
SD	17.136
Skewness	-1.712
SE Skewness	0.166
Kurtosis	2.279
SE Kurtosis	0.331
Shapiro-Wilk	0.777
P	< .001
Minimum	35.000

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Table 1. Descriptive statistics of the attitude variable towards the usefulness of using educational software in speech therapy

	score
Maximum	118.000

In this case, even if we have a large sample, we will apply nonparametric tests for categorical data. Also in the table below we observe that the minimum value is 35 and the maximum is 100, and the average of the values is 91.3 for the score variable, attitude towards the inclusion of technology in speech therapy. It should be noted that the variable work experience was structured into two categories from a few months to 10 years and over 10 years.

On the other hand, for variables such as gender, age, seniority in work, category of institution, speaking of dichotomous variables, the U test was applied, and for the degree of intellectual deficiency of the student and type of studies, speaking of variables with several categories, the Kruskal-Wallis test was applied.

In Tables 2 and 3, we see that for the gender variable the hypothesis is supported by the collected data, $W=7208$, $p<.001$, and the means of the two groups being 97.65 and 87.40. Rank-Biserial Correlation, the effect size is average 0.33.

Table 2. Descriptive statistics

	Group	N	M	SD	SE	Coefficient variation	of
score	M	82	97.659	10.123	1.118	0.104	
	W	132	87.402	19.326	1.682	0.221	

Table 3. Mann-Whitney U

	W	df	p	Rank-Biserial Correlation	SE	Rank-Biserial Correlation
score	7208.000	< .001	0.332		0.081	

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Hypothesis 1 is not supported by the data collected for the variables age, institution category and length of service, $p > 0.05$, Tables 4, 5 and 6.

However, in Tables 7, 8 and 9, although not statistically significant, we can see differences between groups. Higher means have participants aged 20-40 years ($m=92.97$), those working in state institutions ($m=92.59$) and those with less than or equal to 10 years of service ($m=92.81$).

Table 4. Mann-Whitney U 2

W	df p	Rank-Biserial Correlation	SE	Rank-Biserial Correlation
score 5317.500	0.748	0.026	0.081	

Table 5. Descriptive statistics – age category

Grup	N	M	SD	SE	Coefficient de variație
scor 20-40 ani	84	92.976	13.133	1.433	0.141
41-60 ani	130	90.269	19.261	1.689	0.213

Tabel 6. Mann-Whitney U 3

W	df p	Rank-Biserial Correlation	SE	Rank-Biserial Correlation
score 3998.500	0.93	0.172	0.102	

Tabel 7. Group description – type of institution

Group	N	M	SD	SE	Coefficient of variation
score 1	39	92.594	16.224	1.226	0.175
2	39	85.667	20.011	3.204	0.234

Tabel 8. Mann-Whitney U 4

W	df p	Rank-Biserial Correlation	SE	Rank-Biserial Correlation
scor 5086.000	0.770	0.024	0.083	

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Table 9. Group description – work experience

Group	N	Mean	SD	SE	Coefficient of variation
sco a few months-10	75	92.81	13.90	1.60	0.150
re years		3	4	5	
over 10 years	13	90.53	18.64	1.58	0.206
	9	2	8	2	

Regarding the level of education, the hypothesis is supported $p=0.034$, $p<0.05$, with the highest mean being for those with doctoral studies, $m=94.66$, and the lowest being for bachelor's degree graduates, $m=90.17$ (Tables 10 and 11).

Table 10. Kruskal-Wallis Test

Factor	Statistic	df	p
Level of study	7.447	2	0.024

Table 11. Descriptive statistics

Level of study	N	Mean	SD	SE	Coefficient of variation
PHD	24	94.667	18.621	3.801	0.197
License	24	90.176	16.521	2.313	0.183
Masters	24	91.180	17.150	1.455	0.188

Regarding the degree of intellectual disability of the student, the hypothesis is supported $p < .001$, with the highest mean being those who work with pupils with mild mental disability, $m=98.37$, and the lowest being that of speech therapists who work with children with neurodevelopmental disorders, $m=73.52$ (Tables 12 and 13).

Table 12. Kruskal-Wallis Test

Factor	Statistic	df	p
Type of disability	50.485	4	< .001

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Tabel 13. Descriptive – type of disability

Degree of intellectual disability	N	Mean	SD	SE	Coefficient of variation
Autism, Rett syndrome, Asperger syndrome, in relation to the degree of impairment of intellect, affectivity and activity	25	73.520	20.851	4.170	0.284
Language impairments with/without expressive disorders, in a neurological context, clinically and paraclinically objectified	56	85.464	19.875	2.656	0.233
QI - 35-49	22	95.182	14.802	3.156	0.156
QI below 35	15	92.200	14.804	3.822	0.161
QI - 50-65	96	98.375	9.038	0.922	0.092

Also, considering all of the above, we can argue that hypothesis I1 is partially supported by the data collected. A possible explanation for these results is that perhaps the educational software was not adapted for the different language disorders that speech therapists work with.

Conclusions

In conclusion, the present study revealed that there are statistically significant differences between the opinions of speech therapists in the field of special education regarding the attitude towards the use of educational software in speech therapy depending on their gender and level of education, but also on environmental factors such as the degree of intellectual disability of the child they work with. The highest means were obtained by the group consisting of male participants, the group of participants working with children with mild intellectual disabilities and the group of speech therapists who followed doctoral studies.

One of the possible limitations of the present study is the unequal number of participants in each group.

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A future direction in research would be to expand the sample to other speech therapists in education, and to conduct a longitudinal study to see concretely the effectiveness of these applications in speech therapy.

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