EDUKACJA ELEMENTARNA W TEORII I PRAKTYCE Vol. 20, 2025, No. 1(76)
e-ISSN 2353-7787
DOI: 10.35765/eetp.2025.2076.08

Nadesłano: 27.01.2025 | Zaakceptowano: 14.03.2025

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The Use of New Technologies in Speech Therapy Diagnosis and Therapy – a Research Report

Zastosowanie nowych technologii w diagnozie i terapii logopedycznej – raport z badań

KEYWORDS

information and communication technologies, new media, speech therapist, speech therapy, speech therapy diagnosis

ABSTRACT

The main aim of this paper is to present the experiences and opinions of Polish speech therapists on the use of modern technology in speech therapy and diagnosis. 105 participants (n = 105) participated in the online survey from March to October 2023. The study showed that most of the Polish speech therapists, in the 6 months preceding the study, had never used modern technology when diagnosing their patients (32.4% responses) or had done rarely (35.2% responses). The situation is different for speech therapy. 47.6% of the respondents answered that during the six months preceding the survey, they had often used modern technology when working with patients, and 5.7% of the respondents indicated that they had always done so. 8.6% of respondents had never conducted speech therapy sessions using modern technology, and 29.5% answered that they had done so rarely. The results suggest that Polish speech therapists have divergent opinions on the use of ICT in their profession, some see it as an opportunity, while others see it as technology overload.

SŁOWA KLUCZE

technologie informacyjno-komunikacyjne, nowe media, logopeda, terapia logopedyczna, diagnoza logopedyczna

ABSTRAKT

W artykule przedstawiono doświadczenia i opinie polskich logopedów na temat wykorzystania nowoczesnych technologii oraz mediów cyfrowych w diagnozie, a także terapii logopedycznej. W badaniu przeprowadzonym online (w okresie od marca do października 2023 roku) wzięło udział 105 osób (n = 105). Z badania wynika, że polscy logopedzi w ciągu 6 miesięcy poprzedzających badanie w ogóle nie korzystali z nowoczesnych technologii w diagnozowaniu swoich pacjentów (32,4% wskazań) lub robili to rzadko (35,2% wskazań). W przypadku terapii logopedycznej 47,6% respondentów odpowiedziało, że w ciągu sześciu miesięcy poprzedzających badanie często korzystało z nowoczesnych technologii w pracy z pacjentami, 5,7% wskazało, że robiło to zawsze, a 8,6% ankietowanych nigdy nie prowadziło zajęć logopedycznych z wykorzystaniem nowoczesnych technologii; 29,5% odpowiedziało, że robiło to rzadko. Opinie na temat użytkowania nowoczesnej technologii i mediów cyfrowych są podzielone – część logopedów widzi w nich szansę (np. dla osób z ograniczonym dostępem do terapii), inni zaś obawiają się ich wpływu na relacje międzyludzkie i przebodźcowanie.

Introduction

A speech therapy diagnosis is essential to a therapist's work, involving the assessment of communicative competence, language skills, basic functions (e.g., breathing, swallowing), and advanced aspects (e.g., articulation, pragmatics). It also includes hearing and speech analysis to develop tailored therapeutic plans. The diagnostic process should include culturally and linguistically appropriate observation of the patient's behaviour, as well as the use of standardized and/or criteria-based diagnostic tools. An interview with a patient and the family, analysis of language production, review of medical records, case history and results of previous tests and examinations are also an essential part of the diagnosis (Jastrzębowska & Pelc-Pękala, 2003; Kielar-Turska, 2018; ASHA, 2016b).

Speech therapy diagnosis often requires a multidisciplinary approach and can be carried out in collaboration with other professionals such as a neurologist, psychologist, audiologist, or orthodontist (ASHA, 2016b).

Nowadays, speech and language therapists most often carry out the diagnosis in an office-based format, which involves a better opportunity to observe the patient, using tools that are available in printed form. In recent years, technology-based tools have begun to help speech therapists in diagnosis. Mobile medical apps as tools to support doctors in diagnosis have already been used for many years (Kajzer & Szlachetka, 2017), so it makes sense to introduce them to the field of speech therapy as well. Studies indicate that German speech therapists perceive digital media as beneficial, and

their application of these tools in their practice is significantly increasing (Leinweber et al., 2023). Such programs and tools make it possible to automate certain tasks (editing opinion statements, monitoring the patient's progress) and, once an appropriate diagnosis has been made, they can facilitate and improve the therapeutic process.

The use of information and communication technology could be used not only during diagnosis, but also in speech therapy. It opens new possibilities, like for example – it allows to conduct distance therapy (ASHA, 2016a). A systematic review by Wales et al. (2017) shows that remote speech therapy interventions for patients who cannot attend traditional sessions, in the case of school-aged children with pronunciation difficulties, are as effective as face-to-face meetings. Hayakawa's study in Japan provides similar conclusions. It showed a significant correlation between the number of remote sessions and improved therapy outcomes for children with congenital malformations (Hayakawa et al., 2023). The use of modern technology also works well in the therapy of dyslalia (Jatkowska, 2018, 2020), aphasia (Katz & Wertz, 1997; Raymer et al., 2006), cluttering (van Zaalen & Reichel, 2019), voice therapy (van Leer & Connor, 2012), therapy of implanted patients (Skarżyński et al., 2013; Rostkowska & Wojewódzka, 2020), and patients with dementia (Talbot & Briggs, 2022).

Moreover, digital tools allow speech therapists to keep detailed records of patients' progress, which facilitates controlling the effectiveness of therapy and modifying the therapeutic plan in real-time.

The research presented in the article aimed to explore the experiences and opinions of Polish speech therapists regarding the use of digital technologies in their diagnostic and therapeutic practices. The practical objective was to highlight the benefits and potential applications of modern technologies in speech therapy and to develop preliminary recommendations in this area.

The main research problem was formulated: *Which technologies support Polish speech therapists during diagnosis and speech therapy?* The research focused on: 1) identifying the specific tools, software and solutions used by speech therapists, 2) the frequency of their use, and 3) assessing using new technologies and digital devices by Polish speech therapists in their work. This paper will provide answers to the research questions related to speech therapy diagnosis and therapy, i.e. whether and how digital media support these parts of Polish speech therapists' work.

Methodology of research

The study was conducted as quantitative research, with qualitative elements. The method was a diagnostic survey, the technique was a questionnaire, and the tool was a self-designed survey questionnaire. The questionnaire consisted of 47 questions

which concerned the use of information and communication technologies in 5 areas of speech therapists' work, i.e. 1) prevention, 2) diagnosis, 3) therapy, 4) self-development – self-education, 5) cooperation with others (consultation with specialists, childminders). The survey questionnaire, designed as MS Forms, was available online from March to October 2023. A link was sent to the Polish Association of Speech Therapists, the Polish Logopedic Society and psychological and pedagogical clinics. Moreover, it was also shared on Facebook groups for speech therapists, such as *Logopedki bez hejtu!*

In total, 105 participants (n = 105) took part in the study. Most of them were female (n = 103). In addition, 1 man participated (n = 1) and one person did not indicate their gender. The mean age of the respondents was 39, the median 40 and the dominant 24. The oldest respondent was 65 years old and the youngest was 23. Almost 40% of the respondents, at the time of the survey, worked in cities with more than 250,000 inhabitants. The seniority of nearly 42% of respondents exceeded 11 years. 13% of the respondents had practised the profession of speech therapist for less than 1 year. Almost half (49.52%) of those who completed the survey questionnaire declared they had qualified to become a speech therapist in postgraduate courses. The main workplace of the respondents was a public primary school (29 indications, or 27.62%) and some were self-employed (23 indications – 21.9%).

Research results

The study showed that the majority of Polish speech therapists, in the 6 months preceding the survey, had never used modern technology when diagnosing their patients (32.4% responses) or had done rarely (35.2% responses). Approximately 20% of the subjects answered that they had done so frequently whereas 3.8% answered they had done it always, and 8.6% were not to answer this question.

The situation is, however, different for speech therapy. 47.6% of the respondents answered that during the six months preceding the survey, they had often used modern technology when working with patients, and 5.7% of the respondents indicated that they had always done so. 8.6% of respondents had never conducted speech therapy sessions using modern technology, and 29.5% answered that they had done so rarely. Similarly, as in the case of conducting diagnosis using modern technologies, 8.6% of the respondents could not answer this question. During the 6 months preceding the completion of the questionnaire, participants in the study most frequently used these four items during diagnosis and speech therapy: picture/illustration cards, photocopied worksheets (from textbooks and workbooks), worksheets printed out from the Internet, listening games and exercises. Furthermore, in the case of diagnosis, CD

programs dedicated to speech therapists were indicated 19 times (so they were used by 18.10% of participants) and 33 times in the case of speech therapy (31.43% of participants) (Table 1).

Table 1. Diagnostic and Therapeutic Aids Most Frequently Used by Polish Speech Therapists (Respondents Could Select up to 5 Answers)

Type of aid	Number of indications for diagnosis	Percentage	Number of indications for therapy	Percentage
picture/illustration cards	80	76.19	75	71.43
photocopied worksheets (from textbooks and workbooks)	52	49.52	78	74.29
worksheets printed out (from the Internet)	49	46.67	88	83.81
listening to games and exercises	48	45.71	85	80.95
CD programs dedicated to speech therapists	19	18.10	33	31.43
other	18	17.14	10	9.52
interactive books	13	12.38	18	17.14
multimedia presentations	10	9.52	19	18.10
remote communication tools (e.g. MS Teams)	6	5.71	9	8.57
mobile games (e.g. on smartphones)	3	2.86	27	25.71
films	2	1.90	7	6.67
audiobooks/podcasts	1	0.95	4	3.81
sensory aids printed out in 3D	1	0.95	3	2.86
digital comic books	0	0.00	0	0.00

Source: the author's own research.

In the answers to open-ended questions concerning the usage of new technologies, many overlapping statements refer to the possibilities, skills and predispositions of a patient and the speech therapist themselves. The following statements can be quoted as examples:

1. *I could answer all questions 'it depends' on the individual patient. They should be used, like all aids, tailored to the individual* (female, 44 years old, Pomorskie Voivodeship, seniority in the profession: 11–15 years);
2. *I think it always depends. The individual approach to the patient is key during therapy, rather than the Method to the patient* (female, 25 years old, Wielkopolskie Voivodeship, seniority in the profession: up to 1 year)
3. *Each therapy is an extremely individual matter, when marking the answers we usually have a specific case in mind. This is the most common statement that speech therapists use, but how true: IT DEPENDS. In many cases, however, despite my great scepticism towards technology, it works very effectively in terms of motivation* (woman, 31 years old, Mazowieckie Voivodeship, seniority in the profession: 6 to 10 years).

In the answers given by the interviewees, considerable doubts are raised about the use of modern technologies when working with patients who show major communication problems or demonstrate intellectual disabilities. This is an interesting point, as high technologies in the case of such patients are quite common (after all, we have assistive and alternative communication (from Eng. AAC) based on digital media). Examples of respondents' answers are below:

1. *It seems to me that modern technologies will work anywhere where there is not a large deficit and disability* (female, 31 years old, Śląskie Voivodeship, seniority in the profession: 1 to 5 years);
2. *I think that the more severe the disability or disorder, the less effectively IT works* (female, 46 years old, Pomorskie Voivodeship, seniority in the profession: 11 to 15 years);
3. *I most often use modern technology with children with dyslalia, thanks to computer software or applications, classes are attractive, it motivates children to work, the same with children and adolescents with aphasia. However, with children with delayed speech development or genetic defects, the use of computer software is not always effective in therapy. Also, elderly people with aphasia do not like classes using computer technology. Children and adolescents with hearing and visual impairments like classes with software and applications designed for them* (female, 47 years old, Śląskie Voivodeship, seniority in the profession: 6 to 10 years).

One of the respondents (female, 44 years old, Pomorskie Voivodeship, seniority in the profession 6 to 10 years) highlights the high costs of using new technologies in the practice:

I think technologies work well for all kinds of disorders! Unfortunately, there is no money for new technologies at school – these programs are highly expensive, about 2- to 5-thousand PLN one. A Polish school can't afford them, and a speech therapist at school even less with an income of 3 thousand PLN net. There is also no step-by-step training on how to teach or how to work with modern technologies.... which are often in English or payable and the loop closes.... The Ministry of Education requires them and the speech therapist at school has

neither the chance nor the opportunity to use them because they have to buy most of the aids themselves!!![1]

However, it should be emphasized that the Polish government and the European Union offer many programs, in which headmasters, speech therapists and teachers can gain didactic and therapeutic aids. Such a program is, among others, Aktywna Tablica, which is available in Poland from 2020[2], so it is not always necessary to buy resources with their own money.

When it comes to equipment in offices, the results show that most respondents have a computer (88.57%), a printer (80.95%), a photocopier (72.38%), a smartphone (69.52%) and a CD/mp3 player or headphones (52.38% each) in their place of work. Less than 10% of speech therapists who took part in the research have in their office devices like: a 3D printer (9,52%), educational robots (8.57%), a 3D pen (6.67%) and VR goggles (3.81%).

The devices most frequently used by the speech therapists who took part in the study to prepare for speech therapy classes were computers (95.24%), printers (70.52%), smartphones (62.86%) and photocopiers (42.86%).

Table 2. ICT Equipment in Speech Therapy Consulting Offices

Device	Number of indications	Percentage	Name of the Software/tool	Number of indications	Percentage
computer desktop/ laptop	93	88.57	Games and materials available online (e.g. Wordwall)	72	68.57
printer	85	80.95	Tools for remote communication (e.g. MS Teams)	59	56.19
photocopier	76	72.38			
smartphone	73	69.52	Games and materials available online (e.g. Wordwall)	72	68.57
CD/mp3 recorder	55	52.38	Products from the series mTalent	39	37.14
headphones	55	52.38	Computer software Available on CDs (e.g. Sokrates)	24	22.86
dictaphone	50	47.62	Mówik app	24	22.86

1 The original script was preserved.

2 More: MEN, n.d.

Device	Number of indications	Percentage	Name of the Software/tool	Number of indications	Percentage
computer desktop/ laptop	93	88.57	Games and materials available online (e.g. Wordwall)	72	68.57
printer	85	80.95	Tools for remote communication (e.g. MS Teams)	59	56.19
photocopier	76	72.38			
smartphone	73	69.52	Games and materials available online (e.g. Wordwall)	72	68.57
Bluetooth speaker	44	41.90	other	19	18.10
microphone	44	41.90	Logopedia PRO	18	17.14
tablet	33	31.43	Multimedia Logopedic Package	17	16.19
interactive board / interactive screen	29	27.62	Eduterapeutica Logopedia	16	15.24
multimedia projector	26	24.76	Porusz umysł professional series	11	10.48
digital camera	14	13.33	Afast	7	6.67
Multimedia carpet (e.g. FlySky)	12	11.43	eye tracker (e.g. Tobii)	5	4.76
3D printer	10	9.52	GoSense series	3	2.86
			Kokolingo	2	1.9
Educational bots (np. Ozobot, Beebot)	9	8.57	Series with Bambik	1	0.95
3D pen	7	6.67			
other	5	4.76			

Device	Number of indications	Percentage	Name of the Software/tool	Number of indications	Percentage
computer desktop/ laptop	93	88.57	Games and materials available online (e.g. Wordwall)	72	68.57
printer	85	80.95	Tools for remote communication (e.g. MS Teams)	59	56.19
photocopier	76	72.38			
smartphone	73	69.52	Games and materials available online (e.g. Wordwall)	72	68.57
VR goggles and technologies for working with augmented reality	4	3.81			

Source: the author's own research.

Polish speech therapists have various types of software at their disposal. The most popular tools are those available online, which do not require installation from a CD or other portable media. The data collected showed that the majority of respondents have access to games and materials available online, e.g. on *Wordwall* (68.57% of respondents), and applications for remote classes and online meetings are also popular, e.g. *Google Meet*, *MS Teams* (56.19%). Products from the *mTalent* series are available in 39 consulting offices (37.14%), computer programs available on CD and *Mówik* application are used in the offices of 24 surveyed speech therapists, which represents 22.86% of respondents each (Table 2).

When conducting a speech therapy diagnosis, 58.10% of respondents indicated the usage of a computer, a printer 41.90%, a photocopier 30.48% and a smartphone 21.90%. Nearly 27% of the respondents declared that they do not use modern technology during diagnosis. In the case of therapy, the number of indications is slightly different. There were 84 indications for computers (80%), 61 indications for printers (58.10%), 50 indications for smartphones (47.62%) and 41 indications for photocopiers (39.05%) (Table 3). Almost 5% of the respondents indicated that they had not used technological devices when conducting speech therapy in the 6 months preceding the survey.

Table 3. Application of Selected Devices and Software by Polish Speech Therapists in the 6 Months Preceding the Survey

Device	Number of indications in the case of diagnosis	Percentage	Number of indications in the case of therapy	Percentage	Name of The software	Number of indications in the case of diagnosis	Percentage	Number of indications in the case of therapy	Percentage
desktop computer/ laptop	61	58.10	84	80.00	I didn't use any	59	56.19	20	19.05
printer	44	41.90	61	58.10	Games and materials available online (e.g. Wordwall)	18	17.14	52	49.52
photocopier	32	30.48	41	39.05	remote communication tools	11	10.48	17	16.19
I didn't use any	28	26.67	5	4.76	other	11	10.48	3	2.86
smartphone	23	21.90	50	47.62	Products from the series mTalent	9	8.57	36	34.29
dictaphone	16	15.24	22	20.95	MultimediaLogopedic Package	7	6.67	12	11.43
headphones	13	12.38	21	20.00	Logopedia PRO	5	4.76	15	14.29
CD/mp3 player	11	10.48	22	20.95	Eduterapeutica Logopedia	4	3.31	9	8.57
microphone	10	9.52	20	19.05	Computer software available on CDs (e.g. Sokrates)	3	2.86	19	18.10
tablet	9	8.57	22	20.95	Afast	2	1.90	5	4.76

Device	Number of indications in the case of diagnosis	Percentage	Number of indications in the case of therapy	Percentage	Name of The software	Number of indications in the case of diagnosis	Percentage	Number of indications in the case of therapy	Percentage
interactive board/screen	5	4.76	19	18.10	eyetracker (e.g. Tobii)	2	1.90	4	3.81
speaker Bluetooth	4	3.81	14	13.33	Mówik app	2	1.90	12	11.43
digital camera	2	1.90	2	1.90	Kokolingo	1	0.95	2	1.90
multimedia projector	2	1.90	10	9.52	Porusz umysł professional series	0	0.00	5	4.76
other	2	1.90	2	1.90	GoSense series	0	0.00	1	0.95
3D pen	0	0.00	1	0.95	Series with Bambik	0	0.00	1	0.95
3D printer	0	0.00	0	0.00	Toker	0	0.00	0	0.00
VR goggles and technologies for working with augmented reality	0	0.00	0	0.00					

Source: the author's own research.

Even though the software is available in consulting offices, 59 respondents (56.19%) declared that they did not use modern technology during diagnosis, and another 52 respondents (49.52%) used free online materials (e.g. *Wordwall*) when conducting speech therapy sessions. Just under 35% of the respondents identified *mTalent* products as something they use in their speech therapy sessions. 20 respondents (19.05%) reported that they had not used digital media when conducting speech therapy during the last 6 months before taking part in the study (Table 3).

Discussion

Research showed that Polish speech therapists have access to some ICT tools in their consulting offices (mainly rudimentary equipment such as computers, printers, and photocopiers). They use this infrastructure mostly to prepare for classes, not often strictly for working with patients.

Information and communication technologies in speech therapy diagnosis could be helpful in terms of: 1) photographing the patient accurately (according to the guidelines, frontally, sideways, in specific plans, including photos of the inside of the mouth) and storing the collected material, which would make it possible to assess the progress of the work, recording the patient (with the option of sound only or sound combined with images and preferably with a recording of the place of uttering of particular sounds, so that the correction can be as precise as possible), 3) using artificial intelligence for recognition of malocclusion, type of frenulum, analysis of work and position of the tongue, 4) preparation and storing documentation, taking into account personal data protection and possible online safeguards.

The fact that more than 67% of speech therapists in Poland never or rarely use technology in diagnosis may reflect a deficiency of appropriate standardized diagnostic tools available in the form of apps or online, low awareness of the existence of such tools, or fear of using them in their work due to low digital competence (according to the DESI 2023 report: Digital Economy and Society Index – European Commission, n.d.), our citizens have some of the lowest levels of media competence in the European Union.

Polish software and applications that could be successfully used by speech therapists for screening diagnosis, phonematic hearing testing, stuttering risk assessment, etc., include, for example, the *Logotest* series tools from Learnetic. Unfortunately, they are not standardized, so perhaps this is why speech therapists do not use them very often.

In the case of speech therapy, the answers are somewhat different. 47.6% of the respondents declared that they often use modern technology when conducting therapy sessions, while 5.7% said that they always do so. Speech therapy classes with the use of modern technologies are never conducted by 8.6% and 29.5% said they do it rarely. However, the use of information and communication technologies in speech therapy could be much more widespread, as there are programs and tools available on the market to support speech therapists. Examples of such software include the *mTalent* series, *Kokolingo*, *Afast! Say it* (Michniuk & Faściszewska, 2023). Moreover, they could not only add variety to face-to-face meetings with a speech therapist but also (and perhaps most importantly) encourage people to work on their difficulties between therapy sessions in the office. Modern technologies could also prove to be effective

in myofunctional therapy, in teaching correct swallowing or breathing (Michniuk & Faściszewska, 2024).

Conclusions

The study has shown that Polish speech therapists tend not to use information and communication technology in their practice; moreover, many deny the potential of using technology effectively in their work with patients. They have a low awareness of how digital media can support their work and the effort their patients make to overcome their communication or articulation difficulties. In addition, many of them are reluctant to use digital media in their work. This suggests that Polish speech therapists need to be trained in the possibilities of using digital media in speech therapy and diagnosis, as well as in the methodology of using specific tools. Although the study curricula for speech therapists include subjects on the use of information and communication technologies, one gets the impression that not much attention is paid to them – 38 (36.19%) of the respondents stated that they could not remember what they had done during those classes, and 32 (30.48%) indicated that the classes involved making presentations. The range of possible applications of information and communication technology in the work of speech and language therapists is wide-ranging and should be disseminated among this professional group to help in both diagnosis and speech therapy. Moreover, speech and language therapists should also pay attention to the opportunities that arise in speech therapy due to the development of artificial intelligence. The solutions that arise from it could make the work of speech therapists faster and more efficient.

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