

## Users' Needs in Telehealth Speech-Language Pathology Services

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### Abstract

Telehealth, as a provision of health care at a distance by usage of ICT, has also found its application in speech-language pathology (SLP) services. There are many advantages of remote usage of SLP services like extending the treatment or reaching remotely located people who need a treatment at affordable cost. While in the developed countries SLP telepractice is becoming common, there is little evidence about their usage in transitional and developing countries. This paper presents the findings of a survey conducted among SLP professionals and their clients in Croatia. The research results provide insights into the profiles of these two categories of SLP users regarding their computer literacy as well as their needs and preferences in using remote speech-language services. These findings present an important input for development and implementation of telerehabilitation approaches into environments that still lag behind developed countries.

**Keywords:** Speech-Language Pathology, Telehealth, eHealth, Telerehabilitation, Users, Survey

### 1. Introduction

In the past decades the use of information and communications technologies (ICT) in providing health services have become increasingly important, ranging from the simple usage of computers in medical institutions (e.g. for logging electronic health records), through employment of multimedia medical applications or health knowledge systems to advanced use of ICT such as robots in surgeries, etc. On the other hand, ICT and the Internet have enabled health professionals to exchange clinical information more easily and to provide remote health care thus allowing patients to access health information and services in their home environment. The set forth is commonly referred to as telehealth.

Rudel and Fisk [15] emphasize that definitions of telehealth and terms related to this concept have not yet been agreed, neither in Europe nor globally, and their understanding largely depends on people's experience or their personal or professional viewpoint. For instance, European Commission did not even defined telehealth until late 2013 where in the *European Code of Practice for Telehealth Services* telehealth was defined as "the means by which technologies and related services concerned with people's health and well-being are accessed by them or provided for them at a distance" and regarded as one aspect of eHealth [18]. The *American Physical Therapy Association (APTA)* defines telehealth as "the use of electronic communications to provide and deliver a host of health-related information and

health care services, including, but not limited to physical therapy-related information and services, over large and small distances" [2].

Unlike the telemedicine, which has narrower focus on the delivery of medical services to patients at a distance [15, 17], telehealth includes variety of health care and health promotion activities like education, advice, reminders, interventions, and monitoring of interventions [2]. There is a number of different domains within telehealth such as teleradiology, teleophthalmology, telepsychiatry, remote intensive care, telesurgery, teleconsultation, and telerehabilitation. The last mentioned one involves the delivery of therapeutic rehabilitation interventions using telecommunication technologies [11].

Speech-language pathology (SLP) has been a leading profession in the use of telerehabilitation - the usage of telephone and mailed printed materials to deliver SLP services is dating back in 1970s [19]. Today, there are numerous evidences and applications which confirm that SLP benefits a lot from recent advancements in ICT. The main benefit of telerehabilitation in SLP is providing equitable access to SLP services and reducing services costs [19], thus improving the quality of care and quality of life of people who need those kinds of services. Technology used in SLP telepractice can range from simple ones, such as e-mail or photos that are exchanged between a SLP professional and a client, to more complex one, like usage of videoconferencing systems for real-time communication or experts systems for diagnostic assessment. Given that myriad of ICT can be used for SLP telerehabilitation, it is very important to know specific environment and user population, e.g. what kind of technologies and applications SLP professionals find useful to enhance their everyday work and rehabilitation process of the clients, or what kind of online services SLP clients find beneficial for their recovery. In that respect, users' computer literacy and their needs present an important foundation for the development of applications and systems in this specific field.

While there is a number of studies (e.g. [4, 6, 14, 19, 21]) that provide advantageousness of telerehabilitation in SLP in the developed European countries, USA and Australia, there is no evidence that monitored telerehabilitation by means of advanced ICT is provided in Croatia (member of the European Union since July 2013) or other Western-Balkans countries. Nevertheless, several applications that exist on Croatian market for SLP telehealth, e.g. mobile applications developed within the project ICT-AAC [9] or EVOK (Web application for logging users' records that also contains several SLP diagnostic tools; [1], confirm that there has been progress in Croatia's involvement in recent SLP services trends.

In order to provide better insight into speech-language pathology telehealth services offered in Croatia, the authors of this paper have conducted a survey research to reveal current state of the practice in use of ICT and digital services among SLP professionals and their clients. The survey also elicited professionals' and clients' needs as well as their preferences in delivering telehealth services. These findings present an important input for development and implementation of telerehabilitation approaches into environments that still lag behind developed countries.

## **2. Telehealth in SLP**

### **2.1. Benefits of Telehealth/Telerehabilitation in SLP**

The main characteristic of many speech and language therapies is that they require continuous work of SLP therapist and the client during several weeks or months, both in SLP office and at client's home. Many treatments that are provided in the therapist's offices are usually followed by homework that patients have to practice until next visit to therapist. Even when official treatment of the patients' disorders is already over, some disorders like stuttering require continuum of supervision. Frequent visits to SLP therapist present substantial costs to the patient (or his/hers family) as well as to the healthcare system, which can be easily reduced with employment of the Internet and sophisticated technologies to provide rehabilitation at a distance.

On the other hand, SLP therapist is not always accessible to the patients, e.g. to those that live in rural or distant areas or to those whose mobility is limited due to their health condition. Since the population of our society is aging, it is likely that more chronic disabilities will occur, which will reduce capacity to mobilize easily [19]. Therefore, new ways of reaching the SLP services by means of ICT is a necessity in order to improve the quality of healthcare.

According to ASHA, the *American Speech-Language-Hearing Association*, school is the most common setting in which telepractice services are delivered, with a lot of evidences of effectiveness and satisfaction with them [3]. *Telepractice* is another term used to describe usage of ICT to deliver SLP services at a distance, but it includes the non-health care settings such as pre-school, school or social care system environments.

In general, telerehabilitation enables SLP to optimize timing, intensity and sequencing of intervention [22], provide sustained intervention, and facilitate self-management [19].

## 2.2. ICT for SLP Services

ICT can tremendously enhance SLP practice and enable accessibility of SLP services to more people in need. There is a wide range of technologies that can be used to support SLP telepractice.

ASHA identifies three types of ICT used in telepractice [3]:

- synchronous technologies for real-time audio and video interaction (e.g. telephone, audio and videoconferencing systems),
- asynchronous technologies for capturing and transmitting clinical data (e.g. capturing photos, recording voice and video, storing audio and video clips, receiving and storing users assignments by e-mail or other services and systems, etc.), and
- hybrid technologies as a combination of two aforementioned technologies.

Technologies are supported by various types of applications and information systems which can be categorized in three working areas of SLPs:

- *ICT for SLP assessment and diagnosis*: online collaboration environments [14], and expert systems [21];
- *ICT for SLP therapies*: special software applications [16, 20], game applications [16], communication software like Skype [6], media editing software like Audacity [6], e-learning systems [4], mobile applications [9, 23];
- *ICT for management of SLP practice*: Web information services (specialized Websites for SLP professionals and SLP clients; forums, social networks), Web services for education and training of SLP professionals, systems for logging clients' records, systems for storing SLPs documentation (e.g. informed consent, feedback, surveys), administration of therapies, reimbursement, therapy scheduling [13].

The choice of technologies that should be used in SLP telepractice largely depends on the client population being served, the cost of equipment, available training and technology support, the level of network connectivity [19], as well as on computer and information literacy of the clients.

## 2.3. Current Evidence of SLP Telehealth in Croatia

Croatian SLP telehealth still lag behind current trends in the developed countries, but nevertheless computer-aided speech and language therapy is present in almost every SLP office. Equipment used for the speech-language therapies vary among institution, depending on financial resources, and is reduced mainly to the usage of diverse video games delivered in the form of CD/DVD in Croatian language for the purpose of adopting the right techniques of reading and writing or spelling. Some institutions use specific hardware and software for rehabilitation of a particular disorder. For example, special acoustic filters are used for sound filtering in the spectrum analyzer to evoke adequate perception and pronunciation of the specific sound. Also, *Delayed Auditory Feedback* device [5] is used in rehabilitation of stuttering in order to establish the proper rhythm and tempo of speech. Furthermore, Hedever [7] introduced specialized digital SLP set in the form of a device for digital sound processing

in speech and language rehabilitation that can be employed without the computer in therapy of voice, articulation, dysarthria, stuttering, auditory processing disorder, dyslexia, etc. Different biofeedback devices with specific software for registration of laryngeal muscle tone, abdominal breathing and mimic in stuttering are applied in the multidimensional approaches to the therapy of stuttering, e.g. in the VaLMod program [12].

In the past two years there has been more research and practical implementation of research results in the area of SLP telerehabilitation. Under the umbrella of the EU-funded project ICT-AAC (*ICT Competence Network for Innovative Services for Persons with Complex Communication Needs*), three innovative Web applications and about a dozen of mobile applications for Android and iOS have been developed, targeted for persons with complex communication needs. Main feature of the applications is that they provide augmentative and alternative communication to target group to be able to respond to everyday communicative challenges [8].

In recent years there is an increasing interest among SLP professionals in the usage of advanced ICTs in order to provide online SLP practice. More and more SLP institutions employ Internet technologies and applications to enhance their services and enable continuity of re/habilitation. Main example of this trend is the usage of e-mail and smart phones to enable faster scheduling and more frequent contacts between the client and the speech therapist for the purpose of the therapy supervision and keeping it on a high-quality level. However, until this study took place, there was little evidence about usage and perceptions on SLP telerehabilitation in Croatia.

### **3. Research Study**

#### **3.1. Research Method**

Considering advancements in SLP services presented in the previous sections, authors of this paper have conducted a survey research in July and August 2013, in order to identify state-of-the-practice in the usage of ICT among two categories of SLP users in Croatia: speech-language professionals and their clients. The research had two goals: 1) to reveal frequency of using ICT among SLP users and their computer literacy, and 2) to identify users' needs regarding SLP therapies provided online.

The survey was administered as a Web questionnaire which had two branches: one with the questions adapted to the SLP professionals and the other adapted to the SLP clients. Having in mind that a lot of SLP clients are children, questions in the questionnaire were formed in a manner that parents can provide answers for their minors. Ethical issues such as voluntary participation, anonymity and data confidentiality were taken into consideration while preparing the questionnaire and invitation to participate in research, as well as during analysis of gathered data.

A research sample for both user categories was compiled using non-probability snowball sampling which is appropriate for locating members of a specific population. Invitation to participate in a survey was distributed by e-mail to speech-language therapists using distribution list of the Croatian Logopedics Association that had about 450 members at the time the research was taking place. SLP clients were recruited by posting an invitation to several forums dedicated to SLP topics. In order to reach a greater client population, a printed version of the Web questionnaire was also distributed to the patients of the Speech and Hearing Department of the General Hospital Varaždin. Although this might introduced additional bias to the sample, this decision was made because many clients of the aforementioned department arrive from different parts of Croatia and even abroad.

### 3.2. Research Findings

Data gathered from SLP professionals and SLP clients were analyzed with SPSS tool version 19 and this section provides preliminary analyses of data using descriptive statistics.

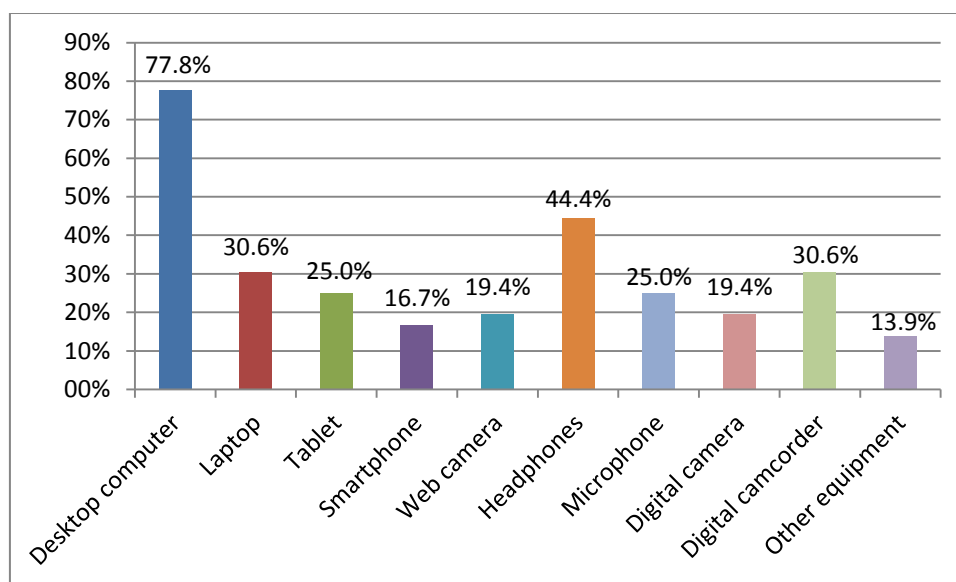
#### SLP Professionals

A total of 36 SLP professionals, one male and all others female, completed the questionnaire. Majority of them (55.6%) were SLP therapists from the City of Zagreb. They provided SLP therapies in the following settings: preschool (44%), healthcare (22.2%), school (19.4%), social welfare institution (5.6%), private SLP office (5.6%), and an assistant in tertiary education (2.8%).

#### A) Use of ICT and Computer Literacy among SLP professionals

The use of ICT and the level of computer literacy were investigated with several questions. First, we wanted to find out the frequency of computer usage and the Internet usage in their professional life. According to participants' responses, computers are not used to a large extent in Croatian SLP practice. Most of SLP professionals (38.9%) use the computers for up to two hours during their working hours. Many of them use it for less than one hour (30.6%). Minority of SLP professionals use a computer for up to three hours or more (13.9% for both categories). One respondent (school SLP therapist) indicated that she doesn't have a computer at her working place. Significant number of SLP professionals (11.1%) doesn't have access to the Internet at their work; however, most of them (66.7%) use the Internet on a daily basis.

Study participants revealed that they use different kind of ICT equipment for work, where the use of desktop computers prevails (see Figure 1). Other equipment, like tablets or smartphones, is much less used. Even standard SLP equipment like headphones or microphones is not used to a large extent. Four respondents had mentioned the employment of special digital SLP set that can be used without the computer and one respondent use a biofeedback device in her SLP practice.



**Fig 1.** Use of ICT among SLP professionals

Study participants who have access to the Internet use it for various activities to enhance their service as well to educate themselves. Results are presented in the Table 1. Regarding online services that are directly aimed to the clients, SLP professionals mostly use e-mail communication while file sharing or synchronous communication is used sparingly.

**Table 1.** Internet activities used in SLP practice.

Scope	Activity	Percent
Administration of SLP practice	Online purchasing of SLP materials (books, HW and SW, other equipment)	66.7%
	Online banking	41.7%
	Electronic patient record used within an institutional information system	36.1%
	Electronic patient record used as a desktop application	8.3%
	Electronic patient record used as a Web application	8.3%
Services provided to the clients	E-mail messaging with the clients	52.8%
	Storage and sharing of files with the clients using Google Drive, Dropbox or similar service	16.7%
	Synchronous communication with the clients using Skype or similar service	11.1%
	Storage and sharing of video with the clients using YouTube or similar service	5.6%
	Storage and sharing of photos with the clients using Flickr, Picasa or similar service	2.8%
Communication with the audience	Communication and providing feedback on SLP topics on social networks (Facebook, Twitter or similar network)	27.8%
	Communication and providing feedback on SLP topics on Web forums	19.4%
Professional development	Web searching and browsing for various SLP topics	94.4%
	Education on freely available Web pages with SLP topics	63.9%
	Education on freely available online courses with SLP topics	22.2%
	Education on paid online courses with SLP topics	16.7%
	Download of files needed in SLP practice	5.6%

### ***B) SLP professionals' needs and preferences regarding SLP therapies provided online***

In the second part of the questionnaire, SLP professionals have expressed their attitudes towards employing remote speech-language therapies as well as preferences regarding type of activities they would like to apply.

Out of 36 study participants, almost 70% of them expressed their readiness to provide SLP therapies online. Most of them are interested to do that only periodically (61.1%), while two of them (8.3%) would like to provide online therapies most of the time. Majority of the speech therapists who declined willingness to do online treatments were preschool therapists. We might speculate that their answer is connected with the specificities of the treatments that involve children, like security and ethical issues, correctness of the therapy performance, etc.

Vast majority of study participants (68.0%) were willing to provide online therapies not only during official treatment but as well after the treatment is over, by providing periodical online supervision of the patients. However, SLP therapists have estimated that their clients are not very interested to participate in remote speech-language therapies: 68.0% of therapists think that only up to 20% of current clients would like to participate in online therapies, while 20.0% of SLP therapists estimate interested clients to be between 20% and 40%.

SLP professionals have also discovered how much time they would like to be engaged in the implementation of SLP therapy sessions remotely. Compared to time used for conventional face-to-face (F2F) therapies, majority of SLP professionals (48.0%) would like to spend less time providing online therapies, while 44.0% of them would spend approximately the same amount of time for online therapies as for the F2F therapies. Only two respondents (8.0%) have expressed willingness to spend up to 20% more time than in F2F therapies.

Online activities that SLP professionals (N=25) would like to perform during treatment are presented in the Table 2.

**Table 2.** Preferred activities to be used in online SLP practice.

Type of preferred activity	Percent
Providing homework (tasks) to the patient until the next session with the therapist	96.0%
Having possibility to create own assessment or rehabilitation content	84.0%
Communicating with the patient/parent via a video link	80.0%
Using questionnaires for assessment of disorders	76.0%
Providing a particular therapy as a video demonstration	76.0%
Providing a particular therapy as a video game	72.0%
Providing constant online monitoring of the progress of a patient on treatment	72.0%
Management of electronic patient record	72.0%
Communicating with the patient/parent via instant messages	48.0%
Communicating with the patient/parent via an audio link	36.0%

Almost all activities enlisted in the Table 2 are found highly acceptable except communication by messages or audio link. The reason for that might lie in the fact that those two activities are already incorporated into SLP practice, e.g. exercise with speaking on the phone or texting on the mobile phone to agree the schedule.

Enlisted activities can be regarded as user needs that could be translated to user requirements during development of SLP telerehabilitation system that would provide three main functionalities: patient's records management, SLP disorder assessments and SLP therapies. Given that continuance of the treatment is necessary for successful rehabilitation, it is not surprising that almost all respondents would like to provide homework (a task or exercise accessed online) that patients need to perform until the next face-to-face session. In that respect, a functionality that enables tracing patients activities or a functionality of uploading homework (e.g. scanned handwriting or audio file with pronunciation) are on the top of functional specifications for the development of SLP telerehabilitation system.

Having control over the creation of assessment or rehabilitation content is also high on the list of SLP therapists' preferred activities. Since many therapists apply their own methods in the treatment of particular disorder, this means that system solutions used in telerehabilitation should be adaptive and provide easy content creation and content management. Video therapy is an important requirement, whether used in synchronous communication or as a video demonstration that shows the patients how to execute the rehabilitation exercise. Therefore, integration of the Web camera into the system is also an important functionality. Video games, particularly educational one, present a type of therapy that can be easily used with children or with the patients that have cognitive disorders. They are usually used as a standalone application (mobile or Web), so their integration into the system with functionality of score tracking would enable monitoring of the patient progress over the time and assist therapist to prescribe additional therapies in order to achieve desired rehabilitation outcome.

### SLP Clients

A total of 136 persons who use SLP services took part in the study. Majority of them (86%) completed paper-based questionnaire whereas remaining 14% completed a Web-based questionnaire. Forty eight respondents (35.3%) were parents of children that were attending SLP therapies and 88 respondents (64.7%) were end-users of SLP therapies of whom 44.3% were high school students, 35.2% were adults and 20.45% were primary school students. Regarding gender, 85.4% of mothers and 14.6% of fathers in contrast to 23.9% female end-users and 76.1% male end-users have participated in the survey. This is in line with other

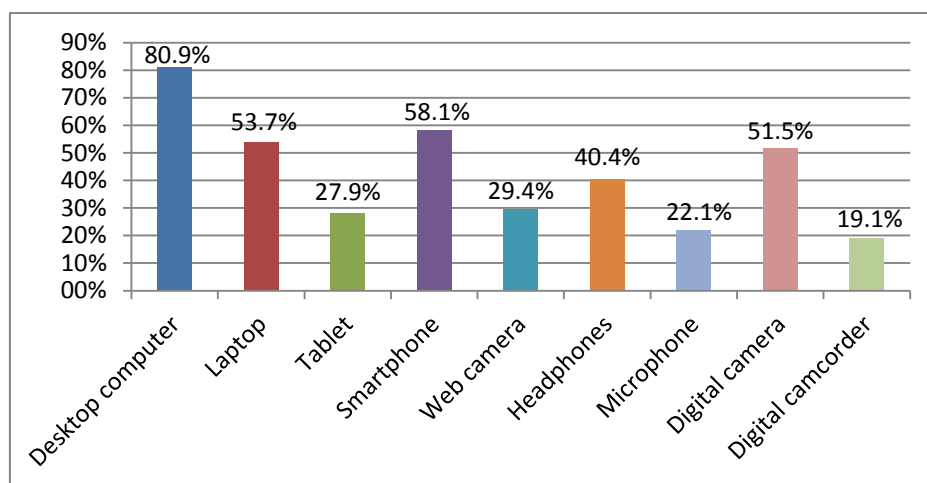
studies whose findings indicate that majority of persons who are taking SLP therapy are males, while mothers are those who are caretakers in majority of cases.

Respondents were from 19 out of 21 Croatian counties. The majority of respondents were from The City of Zagreb county, the capital city of Croatia (23 respondents or 16.9%) while other counties were represented with between 1 and 9 respondents. This gives roughly uniform distribution of respondents across Croatia. The questionnaire was also completed by respondents from the region countries: Bosnia and Hercegovina (10 respondents), Serbia (3 respondents) and Austria (3 respondents).

#### A) Use of ICT and Computer Literacy of SLP clients

At the moment the study was carried out, all but one respondent had a computer in their household and all of them had an access to the Internet. This is very optimistic result given that percentage of households with computer in Croatia was 66.3% while Internet penetration was 64.4% in 2013 [10], showing a slight decrease in both categories in comparison to a previous year. Timespan of usage of computer at home is rather high: most of the users (35.3%) stated they use a computer up to two hours per day, while next major category with 30.1% of respondents use a computer for less than an hour per day. More than 60% of users access the Internet every day, while 20.6% access it almost every day or one-to-three times per week (15.4%).

Regarding usage of various information and communication technologies, respondents could have select up to nine types of technologies in the questionnaire and add additional technology if used. Majority of respondents claimed they possessed a desktop computer in the household, while a smartphone and a laptop are the next two ICT categories that are most frequently used by study participants. Comparing this result to one of SLP professionals, it is notable that SLP clients use smartphones to a greater extent (58.1%) than SLP service providers (16.7%). ICT usage among SLP clients is presented in the Figure 2.



**Fig 2.** Use of ICT among SLP clients

Relatively low employment of peripherals like Web camera and microphone might suggest that these are not used as a standalone piece of equipment but as an integrated part of the laptop, smartphone, or tablet. Those two, including the headphones (40.4%) or a headset instead of the headphones and microphone are prerequisites for synchronous communication between SLP professional and the client in online environment.

Usage of various Internet services by SLP clients is presented in the Table 3 that displays general online activities of study participants, not only those connected with the SLP topics. One of the activities that sample of clients use more than SLP professionals are services for synchronous communication like Skype (44.9% and 11.1%, respectively), which might suggest that clients are more prone to use modern communication technologies than their therapists.



**Table 3.** Internet activities of SLP clients.

Scope	Activity	Percent
General	Web searching and browsing	81.6%
	E-mail correspondence	67.6%
Communication	Communication on social networks (Facebook, Twitter or similar network)	58.8%
	Communication using Skype or similar service	44.9%
	Communication on Web forums	30.1%
Storage and File Sharing	Storage and sharing of video using YouTube or similar service	28.7%
	Storage and sharing of files using Google Drive, Dropbox or similar service	11.8%
	Storage and sharing of photos using Flickr, Picasa or similar service	6.6%
Online Education	Education on freely available Web pages	30.9%
	Education on freely available online courses	7.4%
	Education on paid online courses	2.2%
E-commerce	Online purchasing (books, clothes, etc.)	27.9%
	Online banking	25.7%

### ***B) Needs and preferences of SLP clients regarding SLP therapies provided online***

In the second part of the questionnaire, SLP clients have indicated their own or their children disorder profiles and expressed attitudes and preferences towards employing remote speech-language therapies from their homes.

Out of 136 study participants, 77.2% of them have indicated a stuttering as the main reason for visiting the speech therapist. Other disorders were dyslalia (7.4%), autism spectrum disorders (6.6%), delayed speech development (3.7%), dyslexia and/or dysgraphia (3.7%), unspecified disorders of speech and language development (0.7%) and anxiety (0.7%).

Most of the participants (67.6%) have responded that their SLP therapist were not resident in their home county. In addition, five respondents (3.7%) indicated that they were visiting two or more SLP therapists, of which one is outside their hometown or county. Only 18.4% respondents have attended SLP sessions in their hometown and additional 10.3% respondents have been visiting SLP therapist who is resident in the other town of their county. These responses imply that more than 80% of SLP clients have higher traveling costs to attend SLP sessions than those who visit SLP therapists in their hometown, and those clients are potential users of online therapies.

Indeed, more than 86% respondents have expressed their readiness to participate in online SLP sessions, of which 59.6% were interested to participate in it from time to time, while 27.2% respondents were interested to participate in it majority of time. However, those respondents who selected "No" for online therapies have indicated later in the questionnaire their preferences regarding usage of online SLP services.

Although higher number of SLP clients than therapists (86.5% and 69.4%, respectively) was interested in remote online therapies, we further explored if there is a significant difference among them. Differences between study participants (SLP therapists, parents and patients) in terms of their attitude towards employing remote speech therapies were explored with Kruskal-Wallis H statistics. The reason why we applied this non-parametric alternative to the one-way ANOVA is because results of Shapiro-Wilk Tests uncovered that variables involved in a pairwise comparison violate the assumption of normality in data ( $p < .05$ ). Considering the set forth, the results reported in Table 4 are expressed as median values.

**Table 4.** Results of the Kruskal-Wallis test.

Groups of study participants	N	Mean Rank	H	p
Speech therapists	36	90.35	1.420	.492
Parents	88	88.34		
Patients	48	80.25		
<b>TOTAL</b>	172			

The analysis of the collected data revealed that there are no statistically significant differences ( $H(2) = 1.420$ ,  $p = .492$ ) between the three groups of study participants in terms of their willingness to adopt remote speech-language therapies.

Majority of SLP clients (61.0%) are interested to use remote SLP services after official treatment and they would like to use it both with the therapist supervision and independently. More than 50% of respondents have chosen remote usage during official SLP treatment: 22.1% would use it only with the therapist supervision and 31.6% would use it both with and without the therapist supervision. Only 12.5% of study participants have indicated they would prefer to use online SLP services without the therapist supervision when official SLP treatment is over. Those results indicate that clients are aware of the importance of supervised online therapies as well as the importance to continue with exercises in prolonged period of time.

Online activities that SLP clients ( $N=136$ ) would like to perform are presented in the Table 5, sorted by the most preferred activities.

**Table 5.** Preferred online activities of SLP clients.

Type of preferred activity	Percent
Communicating with the SLP therapists via a video link	68.4%
Video demonstration of a particular therapy (exercise)	63.2%
Communicating with the SLP therapists via an audio link	33.8%
Particular therapy in the form of a video game accessed through the Web	33.8%
Particular therapy in the form of a video game installed on mobile phone or tablet	29.4%
Calendar with SLP sessions	8.8%

Similarly to the SLP professionals, clients find video as an important feature of online SLP treatments, both for communication, demonstration of exercises and improving skills using a video game.

#### 4. Conclusion

This paper presents research results of a survey on use of ICT among Croatian SLP users: therapists and their clients, as well as their readiness to provide or participate in treatments conducted online. According to responses collected in the survey, speech therapists sample don't use ICT to a large extent in their practice, especially modern technologies like tablets, smartphones or services for synchronous communication and file sharing with the clients. SLP patients are better equipped and more prone to use various communication services, which might be employed in the online speech-language therapies as well.

There are no statistically significant differences between the study participants in terms of their willingness to adopt remote online therapies. The survey has revealed that majority of therapists and clients would like to use remote SLP services after official treatment, with periodical online supervision of the clients' disorder status. Both groups of respondents have indicated a video as an important part of telerehabilitation, whether integrated in the systems' solution as communication tool, demonstration content or a game for improving skills.

Although this study has revealed some important aspects of SLP telerehabilitation that should be taken into consideration when planning and implementing systems for online

therapies in the countries who are not economically advanced as developed countries, results should be taken with a caution due to a few limitations in the research methodology. One of them is data collection which was taken using dual-mode questionnaire, with the paper version of the questionnaire taken only at one SLP institution, specialized in the treatment of stuttering. Therefore, majority of responses were collected from the people who stutter (or their parents), so their responses might be biased and not reflecting responses of people with other speech, language or communication disorders. Another drawback is relatively small number of speech therapists who completed the questionnaire.

Nevertheless, the survey results indicate that SLP users in Croatia and region countries are aware of benefits of remote online treatments and have met the minimum requirements in terms of ICT equipment and computer literacy to employ speech-language telerehabilitation. The findings of this study also reveal context of use and general needs of stakeholders who will use SLP telerehabilitation systems. While a survey presents a good method for elicitation of users' needs in early stage of system development, future work in requirements engineering for telerehabilitation systems should incorporate other methods such as interview, storytelling, and personas to refine users' needs into formal specifications.

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