

QUALITATIVE RESEARCH

Research in the form of semi-structured interviews with speech therapists and experts in the field of teaching speech to the hearing impaired was conducted to understand the problems that hearing impairment pose in learning speech and the shortcomings of the existing market solutions. Visits were made to schools for the hearing impaired children, to understand how the process of learning takes place in these institutions. The questions asked in the interviews, mainly focus on the methods and challenges that the therapists, as well as the children, face in the speech learning process. Following are the predetermined questions that were asked during these interviews:

- What are the different types of cases that require speech therapy?
- How does the process of speech therapy work?
 - What are the different types of sounds?
- What are the different parameters that you focus on in the speech therapy process?
- What problems do you face while providing therapy?
- What difficulties do hearing-impaired children face in the learning process?
- Can you share some of your experiences as a speech therapist?
- On an average how long does it take for speech therapy to start showing results?
- What factors affect the effectiveness of the treatment?
- What software or hardware equipment do you use while the therapy process?
- According to you what are the existing systems lacking?
- What do you think will help in the process of speech learning?

Minutes of the interview were noted. From the data provided by the speech therapists and teachers, along with further understanding from online references, qualitative data were analysed. Major observations made are as follows:

FINDINGS FROM THE INTERVIEWS

- **Different cases**
There are several types of people who need speech therapy: children born with hearing impairment, people with biological defects in the speech organs like clipped lip, clipped palate, children suffering with autism, delayed learning disorder, stammering, tongue-tie, people who due to some accident or trauma lost their ability to form proper speech, etcetera. The process of speech therapy differs from person to person. Cases involving children are treated differently from those involving adults. It is on the speech therapist's

discretion, how they want to proceed with the treatment for each case. Therefore, therapy for every case should be personalised.

- **Factors affecting the process of speech therapy**

The cause of speech impairment and the age of the patient are very important factors. The time it takes for speech therapy to show improvement, increases with age to a certain extent. Young children respond to speech therapy very fast as compared to older children or adults. This is because young children (mostly under the age of 5) are fast learners. After a certain age, the psychology of the patient also starts affecting the speech therapy process. Patients become more aware of their disability and due to social reasons may become reserved and hesitant to speak. Breaking the ice with these patients can take time and only after that does a patient become comfortable with their speech therapist and speech therapy starts showing results.

- **Speech and language therapy**

Mainly speech exercises can be divided into focusing on two parts - the verbal output (the speech) and the language part. The verbal output is only the sound which comes out and the language part consists of the vocabulary, the grammar, the formation of sentences etc. If dealing with both it is called speech and language therapy. Languages are divided into groups and each group has a particular set of phonemes. Indian languages belong to the group of Aryan languages and have a defined set of phonemes using combinations of which you can form pronunciations of words in any Indian language. International Phonetic Alphabet (IPA) is a system for phonetic notations which contain the standardized representation of sounds for spoken languages.

- **Learning vowel and consonant sounds**

Vowels form the basis of learning other sounds i.e. consonant sounds. The speech teaching process includes learning of vowel sounds and then the consonant sounds. Vowel sounds have different articulation positions and variations, thus are easier to teach and learn. After one learns to pronounce vowel sounds, the therapist checks what are the sounds that the case already knows to pronounce. The only task is recognition by the case that he/she is pronouncing which sound. After an acceptable range of sound is known, the learning shifts to words where all words containing a particular sound occurring at different positions are taught.

- **Importance of articulation**

Articulation (pronunciation and talking) is the ability to physically move the tongue, lips, teeth and jaw to produce sequences of speech sounds, which make up words and sentences [1]. Different sounds produced are due to the difference in the position of the lips, tongue and teeth. However, there are sounds which have similar articulation position but sound differently. Hence teaching articulation alone does not guarantee that the child learns to pronounce a particular sound. To further teach the pronunciation the therapist uses tactile methods so that the child understands factors such as airflow, nasal vibrations, cheek vibrations, etc (in technical terms: differentiate the sound as nasal, glottal, etc)

- **Methods used**

Tactile methods are used to teach different sounds with similar articulation position to the hearing impaired. These processes include feeling nasal vibrations, the airflow that comes out of the mouth while uttering a sound, cheek vibration, throat vibrations, etc. However, these are required only while learning consonants.

- **Classifying the mistake made by the patients**

The SODA classification is used by speech therapy by the speech therapists to classify the types of errors made by the case. This is then used to decide the method of correction. SODA stands for:

S - Substitution

This is when the case substitutes another sound in place of the required sound. Example Pot is pronounced as Bot. Here the sound of B replaces the sound of P.

O - Omission is said when a particular sound is omitted when a word is pronounced. Flag as Fag. The sound of 'l' is omitted.

D - Distortion happens when the word sounds the way it but it is not perfect.

A - Addition is said to be done when an unexpected sound is added to the required sound.

- **Problem**

Difficulty that hearing-impaired people face in the speech learning process overhearing people is the lack of a reception and feedback mechanism, which include listening to correct sound and pronounced sound. This hinders the hearing impaired person from evaluating the sound that he/she has produced. In such cases, they need to be able to visualize the speech. This includes looking at the movement of the lips and the tongue, identify which sounds require the expulsion of air and which don't, and most importantly be able to distinguish between sounds that have similar lip and tongue movements.

- **Human empathy a major factor**

Every case differs in the impairment level, perception power, ability and speed of learning and nature, which makes each unique and would require different methods to be used in the therapy process. Along with this, it is important to understand what is the case feeling, thus determining the therapy process accordingly. 'Empathy' is a factor that software should bring into consideration to give effective results by decreasing user frustration and increasing user satisfaction.

- **Comment on current systems**

All the current systems give an objective evaluation which helps speech therapists to log the progress of a case. However, it does not give a method of correcting one on the mistake made and help them correct or improve their errors. Thus this software can only be used as an assistive device.

➔ CONCLUSION

From the findings of the interviews, it was concluded that currently there exists no system which completely removes the dependency of speech therapists in the process of teaching speech to the hearing impaired children. Secondly, the systems which partially solve the problem of providing speech therapy do not exist in all languages including the Devanagari Language, hence, do not benefit the hearing impaired children in India. Thirdly, speech teaching-learning process is expected to be highly personalized. All these points indicate the need for a system which replicates the process of speech therapy with a constant feedback mechanism and humanized interactions which should provide therapy by understanding the case and personalizing the therapy accordingly.

➔ LINK TO THE ORIGINAL MINUTES OF THE INTERVIEW

1. **Dr. Dnyanada J. Potdar, Consultant Audiologist and Speech Therapist - HEAR WELL CLINIC ([Link](#))**
2. **Dr. Shailee Anjaria, Speech Therapist - COCHLEAR IMPLANT HABILITATION CENTER & INFANT TRAINING CENTER. ([Link](#))**
3. **Ms. Vasvi Dave, Principal - KAMLA DHARAMSHI NARSEE SHRUTI SCHOOL(For deaf and hearing hard children) ([Link](#))**