

Speak Up: A Multi-Year Deployment of Games to Motivate Speech Therapy in India

By: Amal Nanavati (Computer Science)

Faculty Advisors: Aaron Steinfeld, M. Bernardine Dias (Robotics Institute)



INTRODUCTION

Children from developing communities who are deaf and hard of hearing (DHOH) lack the resources necessary to learn to communicate beyond their support networks. This is due to cultural stigmas that equate deafness and "dumb"ness, a lack of standardized and socially accepted sign language, and a dearth of trained speech therapists. Our work address this problem through a suite of voice-powered games we developed for and with the Mathru Centre for the Deaf in India, that have been used for the last 2 years.

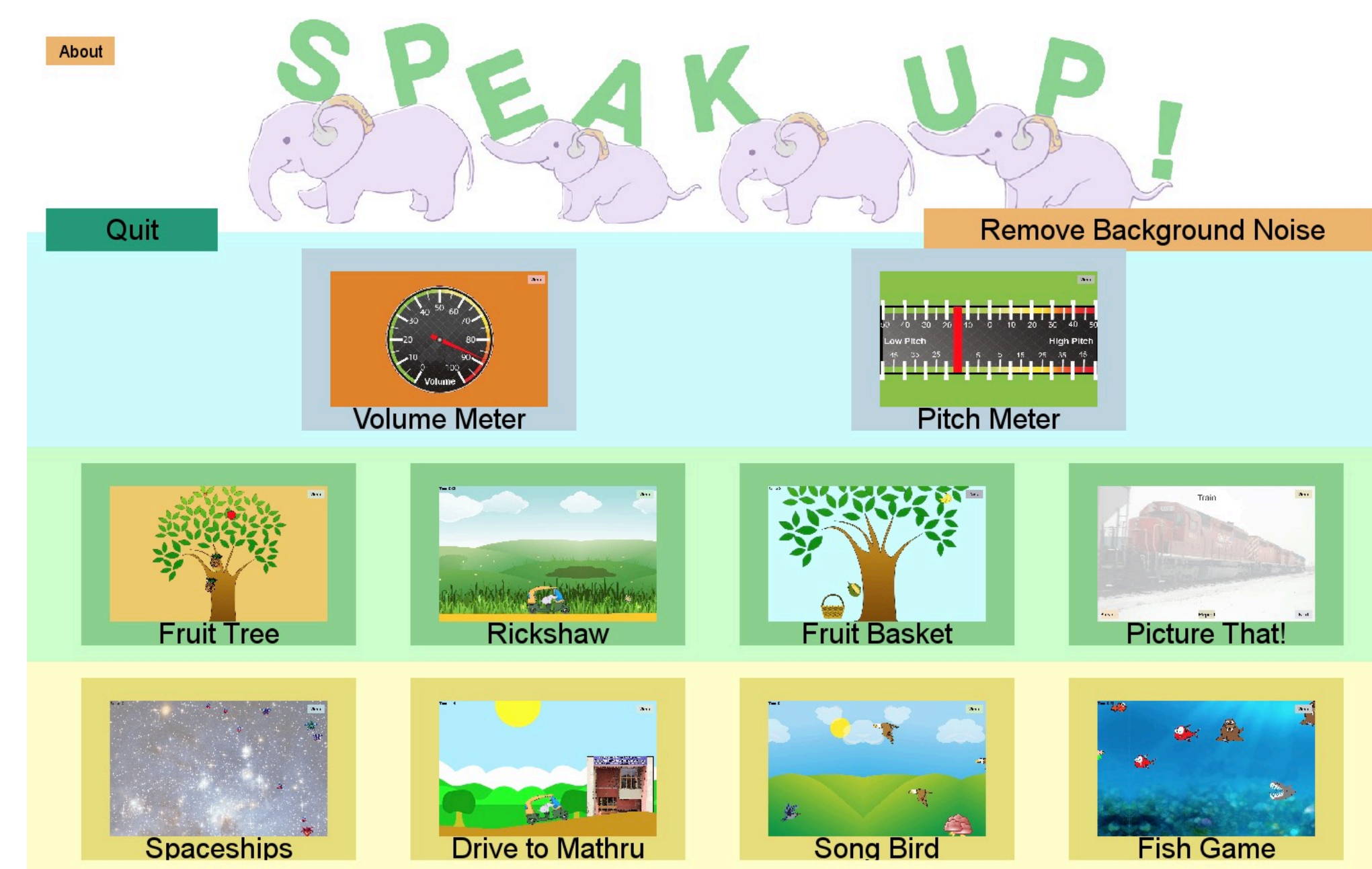


A teacher leading Speech class at the Mathru Centre for the Deaf

SPEAK UP GAMES - 2015

NEEDS ASSESSMENT

- Students were pre-verbal – struggling with vowel and consonant sounds
- Students often got distracted or bored during Speech class
- It was exhausting for teachers to go around one-by-one to teach speech



Speak Up, a suite of voice-powered games to help DHOH students understand, visualize, and explore their voices

GAME DESIGN

- The computer displays and responds to student vocalizations. Example games include:
- **Rickshaw**: Students voice propels a rickshaw forward. Students must continuously vocalize for the rickshaw to crest the hill, otherwise it rolls down.
- **Spaceships**: Student voice shoots a bullet, and students must time bullets to hit enemies
- **Bird Game**: Students must varyate volume to move a bird up/down and avoid obstacles
- **Picture That**: As students vocalize, a picture of an object gradually becomes opaque



Left: Students playing the Rickshaw game



Right: A teacher tells students to say the names of fruit as they fall in the **Fruit Tree** game

ETHNOGRAPHIC FINDINGS - 2017

In 2017, we returned to study how the school was using the games. Findings include:

- Teachers and students had grown increasingly familiar with operating and understanding computers
- Teachers grouped the games into those for students "can't speak" versus "can try." In contrast, we intended the games to be grouped based on aspects of voice (i.e. timed vocalization, volume modulation...)
- Students used the games collectively, unlike the one-on-one usage we had imagined
- Students were more familiar with using computers than teachers, so often took control of the games away from teachers
- A hierarchy formed amongst students based on how good they were at the games (related to students' hearing and speech capabilities)



A teacher engages multiple students during a collective usage of **Picture That**

ENHANCEMENTS TO SPEAK UP - 2017

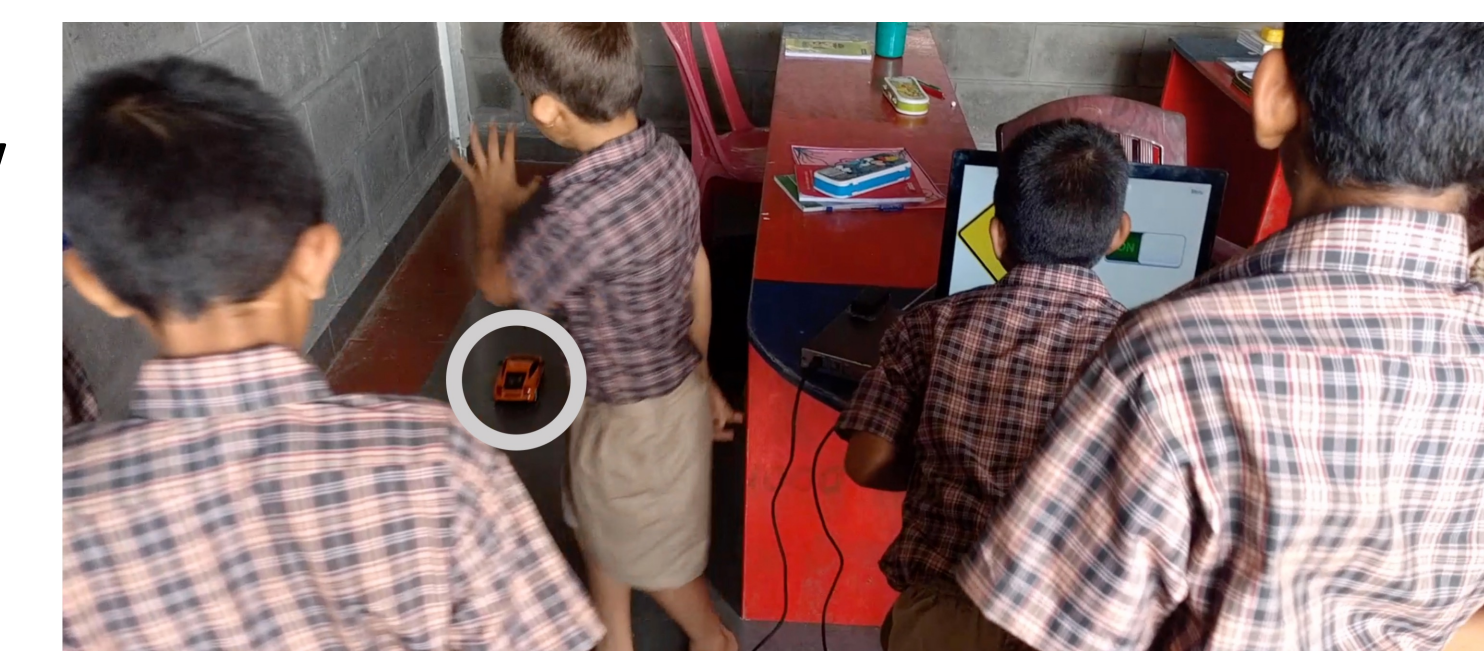
Informed by the above ethnographic insights, we made the below enhancements to *Speak Up*:

- We added keyboard control, to encourage teachers/students to further develop computer skills
- We added a feature to allow teachers to add pictures to **Picture That**, so they could create more content for students who "can try [to speak]"
- We drew teachers into-the-loop by requiring them to verify whether students were pronouncing words correctly. This enhanced the games by drawing on teachers' local expertise in speech and pedagogy.
- We introduced a voice-controlled robotic car, to show teachers/students further ways technological tools could serve as aides in their classroom



Top: A teacher using the keyboard to mark a student correct

Bottom: Students follow behind the robotic car as the student at the computer moves it forward with his voice



FOR MORE INFORMATION

Amal Nanavati, M. Bernardine Dias, and Aaron Steinfeld. 2018. *Speak Up: A Multi-Year Deployment of Games to Motivate Speech Therapy in India*. CHI '18.

Maya Lassiter, Amal Nanavati, Erik Pintar, Minnar Xie, Ermine A. Teves, and M. Bernardine Dias. 2016. *iSTEP 2015: Cross-Cultural Technology Development Towards Language Access for the Deaf and Hard of Hearing*.