



Presents

Talk TO THE Book



TEAM MEMBERS

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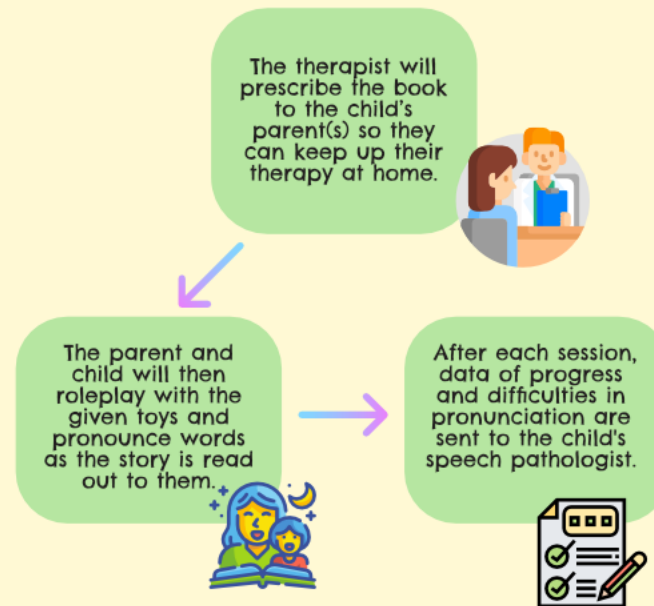
Our Concept

Talk to the Book aims to provide a more engaging and interactive solution to encourage proactive at-home practice for children aged 3-5 undergoing speech therapy. It does this through using an interactive storybook device that supports them in terms of pronouncing particular sounds and difficult words through engaging stories and tactile interactions.



How is it used?

The child reads the book provided in our device by along with their parent to keep up with their speech pathology training. The parent is encouraged to roleplay with the child with the toys given to them while the child practices. After each session data of progress and difficulty in pronunciation of words will be sent to the child's speech pathologist.



Research & Interviews

Our team has done research based on children and learning by sourcing peer-reviewed papers and interviewing researchers and those in the field.

According to one of our interviews, the main motivators for parents to send their children to speech therapy are as follows:

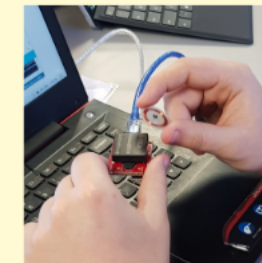
- Parents are worried of their child being mocked or ignored due to speech, leading to potential low self esteem issues
- Parents want their child to cope with academics including Maths and Science well
- Parents want their child to engage in preschool activities without trouble
- Parents are worried they can't understand their children without context, leading to their child feeling isolated

Research and findings showed that:

- External feedback is needed for children to really improve on speech
- Home-based learning is encouraged
- Getting children to hear & identify accurate sounds helps with self monitoring
- Pronunciation needs to be continuously corrected to be learnt

MERN is a framework written by that evaluates the efficacy of speech pathology apps - it was used to test many existing applications and found they were often not designed well. We hope to also tackle the lack of quality applications by making one that focuses on child engagement.

Technology Used



RFID

- Allows the user to place the character on the background & receive feedback
- Have 2 different readers; one using Arduino base, to avoid conflicting signals

Arduino & Neopixels

- Neopixels LED strips connect to an Arduino for visual feedback to enhance auditory feedback when device is being used

Google Voice API

- Records and analyse pronunciation of letters
- Not precise enough for real-world use, but demonstrates our proof-of-concept well

Unity3D

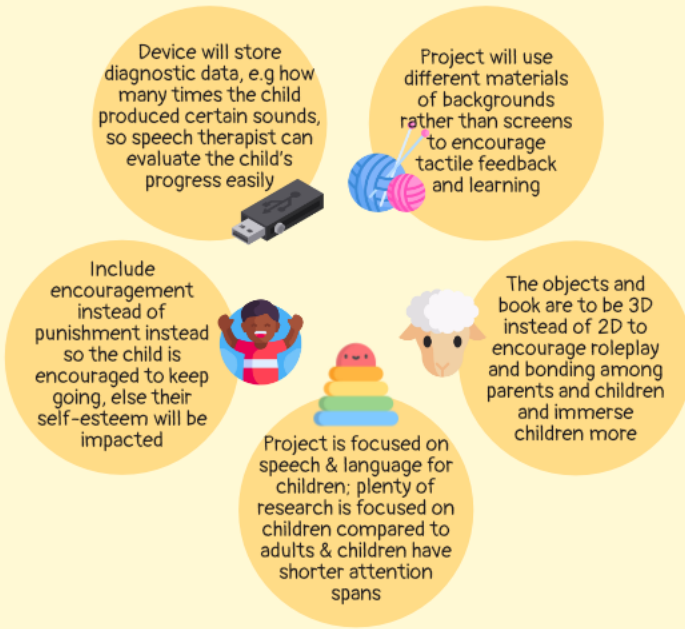
- Powers and coordinates our various technologies into a single controllable function

LeapReader [Image]. Retrieved from <https://www.leapfrogschool.com/>
 Technology Connections. The GeoSafari Jr. [Image]. Retrieved from <https://www.youtube.com/watch?v=7SZHA3qTc6c>

Icons by DinosoftLabs, wanicon, Freepik, ultimatearm & Eucalypt. Retrieved from flaticon.com
 Vaezipour, A., Campbell, J., Theodoros, D., & Russell, T. (2020). Mobile Apps for Speech-Language Therapy: Review of Content and Quality. Retrieved from <https://doi.org/10.2196/18858>

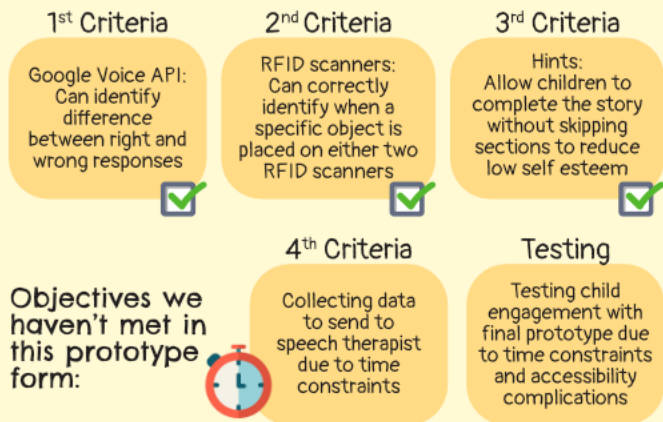
Design Decisions

Our team has held numerous discussions surrounding design decisions to make sure we stay on track on the theme of 'Future Mundane' and 'Skilled Play', and to make sure we achieve our main objective of keeping children engaged while improving their speech. Some decisions are explored below:



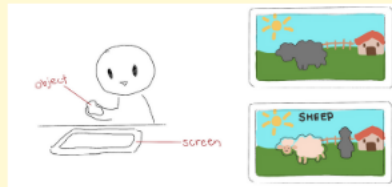
Success Criteria Evaluation

We previously set out four success criteria.



Prototype Iteration

Initial Concept



The child puts the correct object to the silhouette on the screen. The screen recognises it, asks the child to pronounce it and progresses the story.

Inspirations

LeapReader, which allow words to be read out by tapping a spot with a pen; this inspired us to use NFC or RFID technology to detect objects

GeoSafari Jr, which swaps background sheets to conform to hardware restrictions at their time; this inspired us to use textured backgrounds to increase tactile feedback



Design Decisions informed

Paper Prototype

We did a paper prototype of two backgrounds along with three characters, and tested it with one child, with a team member telling the story on site. The parent chose a playground as the location to ease their child.

Testing

- The child was interested at first
- The child quickly lost interest due to location and sometimes refused to say the words until the parent prompted them

Conclusion

- Location chosen is not a problem - in practice, the user will likely to be distracted by other toys around them
- The child is shy around strangers, hence might be more receptive with a recording
- Children are also more attracted to (bright) colours which are non-existent in this prototype

Mid-fidelity Prototype

We did a mid-fi prototype of two complete backgrounds, three characters and a visual representation of what the device would look like, including digital text.



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Mid-fi Testing Feedback

We removed hint and power buttons and opted for having hints be automatic, and having a crank to open the box

We removed text-only screen since it did not add much to the experience; we added LED lights to provide more visual feedback

We added separate backlit drawers for the backgrounds as we did not make the existing LED solution as clear as we would've wanted

Final Form

The device is a large acrylic box with a crank-opened lid. On the lid there is a pouch for storing the RFID-enabled characters.

The device turns on when opened and will light up one of its front drawers so the user selects the correct textured background. Once put in place, the story is read to them and they will be asked to place the characters on RFID readers or to repeat a phrase (which is checked by Google Voice API). If the task is done or if correct, they will be rewarded with flashing LEDs.

There are currently four backgrounds, but more would be added to practice additional pronunciation in the final version. The current prototype is externally powered and uses external microphones and speakers.

