MSc Product Design Engineering

Major Project

10 Page Summary

THE
ELEPHANT

ENZO

University of Glasgow

THE GLASGOW SCHOOL OF ART

Indraneil Ghosh

CONTENTS

CONTEXT

Problem

An estimated 36.5 million (41%) of the 89.3 million forcibly displaced people in the world are children below 18 years of age.

It becomes increasingly difficult for refugee children to process the horrors they witnessed, while assimilating in a place that is completely alien.
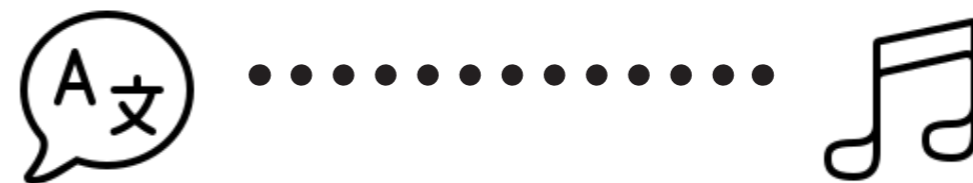
Language

Language is one of the primary changes a child has to process. Children that go through this transitionary phase of learning a new language, go through a "nonverbal period" .

Communication becomes increasingly difficult, and children feel alienated. This is most prevalent in a classroom situation, where children might feel reluctant to socialize or often frustrated with the inability to express and be understood.

Aim

Teaching Language to Immigrant Children

Opportunity

Teaching Language Through Music

An effective tool to learn a language quickly is to incorporate music. Music and language are processed similarly in our brains. Improvement in music ability improves language skills and vice-versa.

Who	Where	When	What	Why
Immigrant and Refugee Children of the age 4-12	Schools and Community Centres across UK	During a lesson, in a classroom	Help Children learn a new language	To help children transition from one home to another

RESEARCH

Music

Some similarities

- Rhythm
  – Systematic patterns of timing, accent, grouping
- Melody
  – Structured patterns of pitch over time
- Syntax
  – Discrete elements + principles of combination
- Affect

Music and the Brain: The Music of Language and the Language of Music

Different Rhythms for different langauges

The syntax of music and langauge. spacing

Enough differences and similiarities

How learning music early will make your child a better reader

Music and language are processed in similar manner in our brains. These similarities can be observed in rhythm, melody, syntax etc.

Babies learn to process sound before they learn language. Studies showed that music education helped in development of phonological skills.

1. Listening
2. Focusing
3. Imitation

Social Inclusion Collaboration

According to Australian composer and educator Richard Gill, children learn in the following way:

- Students first LISTEN to a teacher.

- They FOCUS on the concept and break it down in their heads

- When asked, they IMITATE what was heard and reinforce the concept in their minds.

Language

Language brokering - Wikipedia

Language brokering is translating language by a youth for their parents or other adults who are less able to understand the dominant language. Brokering is a process of language brokers dealing with a more complex social relationship through translation. Brokering between school and parents is ...

'Teaching artists': creative ways to teach English to immigrant kids

Bringing professional actors and dancers into the classroom may seem an unusual strategy for boosting the speaking skills of children who speak a language other than English at home. Yet, these creative drama and movement activities can help children struggling to improve their fluency in the ...

Teaching a 2nd language takes a different approach. Incorporating visual and auditory techniques are more common in these situations. It helps children build confidence and as they start communicating for their parents.

Music is widely used in learning a second language. Jackie Chan learned English by practicing old country songs. It also helps in assimilating in the culture.

The pace of the songs should be slow enough to distinguish syllables. When this is done, the melody establishes those syllables, thus solidifying the word in the memory.

The Bell Foundation is a non-for-profit organization that helps refugees and immigrants learn English in the UK.

According to Bell Foundation, Early Years Foundation Stage (EYFS) are children of the ages 4 – 8 years. The primary focus on these students is the ability to speak and listen.

INTERVIEWS

Chris Sergeant

Specialist Instructor - Teaching 3 - 18 y/o

1. The process of teaching skills must be done slowly and progressively, in small incremental steps.

2. Younger children need to be refreshed with silly sound every so often, to keep their attention.

3. The most challenging scenario is teaching in a group setting, and trying to develop children with different skill levels.
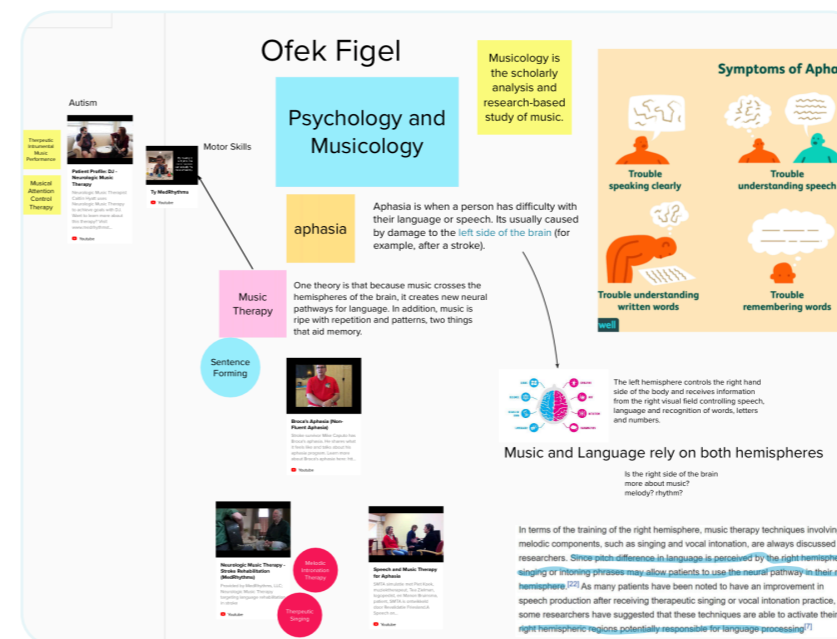
Ofek Figel

Psychology & Musicology Student

1. Music therapy principles and how it can be used to cure Aphasia.

2. Aphasia is speech impediment which can be caused due to a stroke. She directed me towards the methods therapist employ to cure aphasia:

3. In Melodic Intonation Therapy (MIT). The therapist encourages patients to speak out each word in a set melody, which helps them connect the word and to their speech.

Niharika Sharma

English Teacher - Teaching 5 - 9 y/o

1. Voice modulation was essential to keep the attention of students. It also helps in articulating the sounds of a word.

2. Dramatic narration was another strategy employed. A lion had to be mentioned by following a roar. This was especially important for younger children.

3. The style of teaching incorporates more actions. The actions helped in shaping what the words meant.

Micheal Tougher

Founder of Soundbops

1. Teacher's are shy to incorporate music without musical knowledge.

2. Many devices ringing at once can cause a big commotion.

3. The business model of Sphero, where they customize each device depending on the school was hugely successful.

INTERACTION

The toys made of wood. They have a very abstract aesthetic. Whether it is a DJ turntable or an animal, the toys have just enough detail to ascertain what they are. This is done to give an idea to children and then let their imagination run wild.

Since the product will be catered to children of ages 4 – 8 years old, Principles of sound design are to be applied. Having an educational toy is very popular and is frequently bought by parents. There are different playstyles that categorize the way children interact with toys.
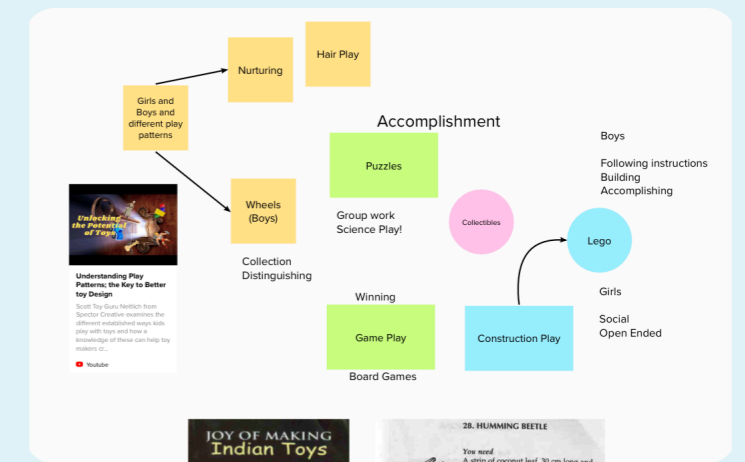
Puzzle and Gameplay styles are collaborative, which involve coming up with strategies. Nurturing and Collectibles are more about roleplaying. There are also differences in how boys and girls play within those styles. Puzzle and Gameplay are played similarly by both genders.

Designers often include two or more playstyles in their game. Usually, roleplaying is added to each style. Lego does this well by buying licenses to popular brands such as Star Wars. A new future of toys includes the use of AI.

Researching sound installations and tagging each example with their method of interaction and what they are trying to achieve. Green for their attributes and intended outcome.

Orange for their use of senses or technology. Most installations incorporate the use of touch and movement.

CONCEPT

Using Richard Gill Method
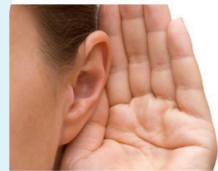
1. LISTEN
- Attention
- Storytelling

2. FOCUS
- Collaboration
- Melody-Language Correlation
- Movement
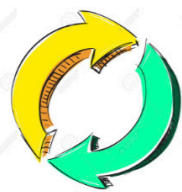
3. REPEAT
- Gameplay

Taking keywords from research and interviews and placing them with each step that described steps for music teaching.

Creating a games that centres around the process of teaching.

Early sketches
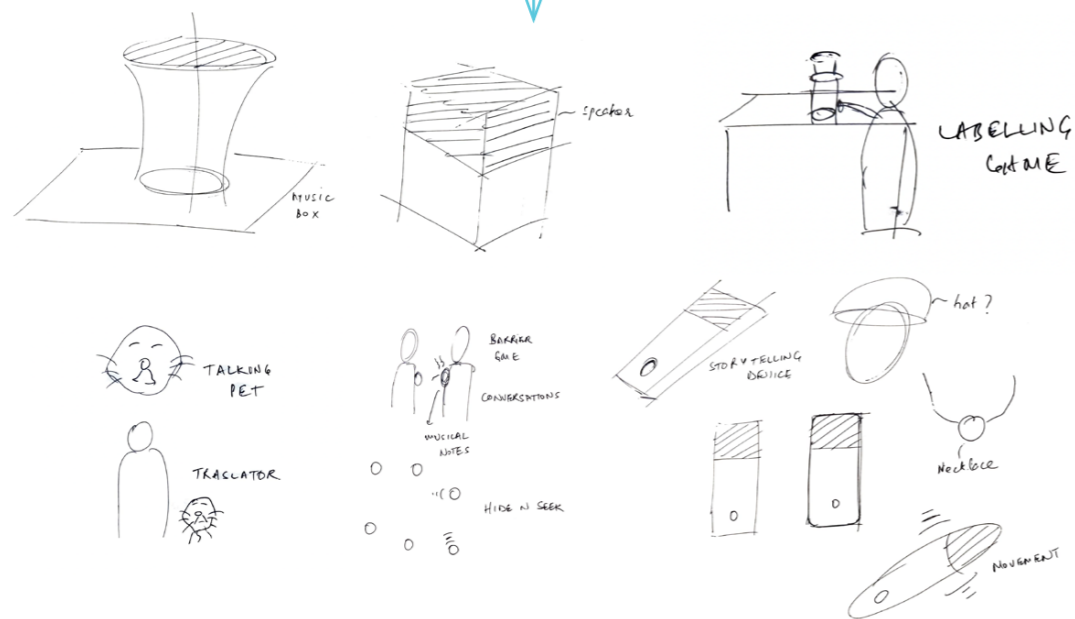
Developing Ideas based on Bell Foundation EAL Games
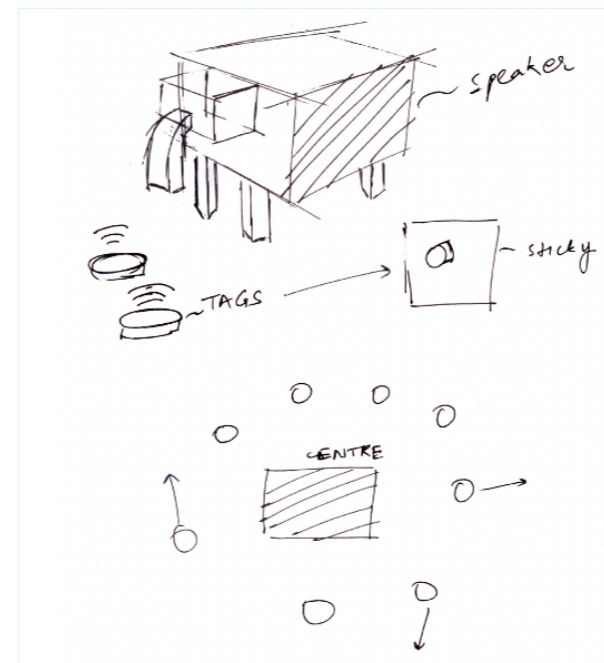
Enzo the Elephant is a classroom-based interactive game that helps children of varying ages (4-12 years old) learn new words. The product consists of two modules:

1. Enzo the elephant is a speaker system that generates unique melodies to help children correlate their lesson and retain it better in their memories.

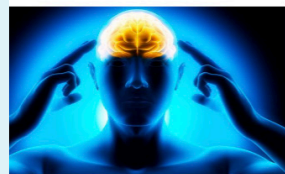**2.** The tags accompany the speaker system. These tags can be placed on any person or object and can communicate wirelessly with the speaker. The speaker generates music when these tags are touched.
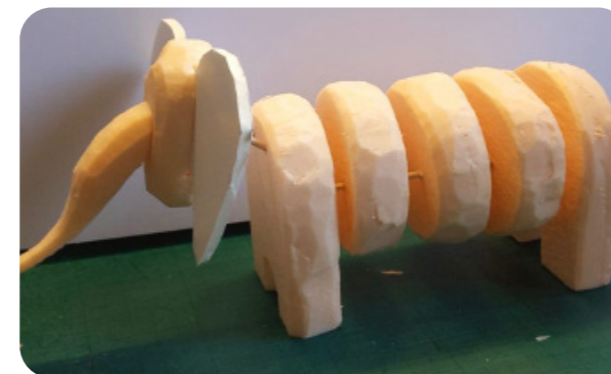
-Attention

-Storytelling

-Melody-Language Correlation

-Collaboration

-Movement

-Gameplay

SCENARIO
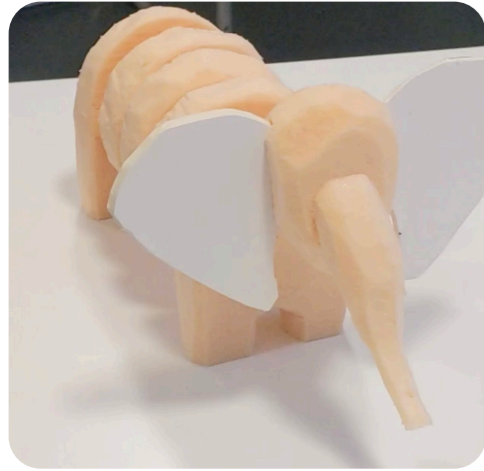
Speaker is kept on the table.

Teacher asks to touch an object that can hold water.

Students touch a tag placed by the teacher before.
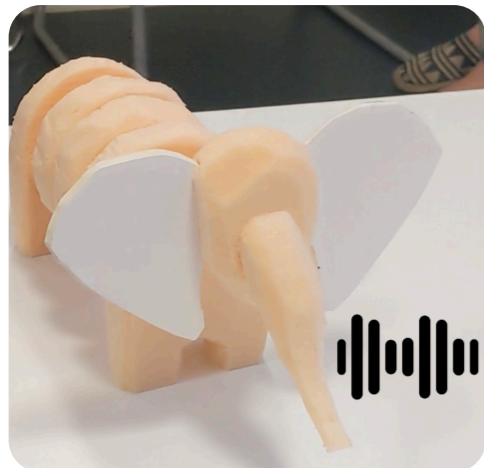
Elephant generates a unique melody.

Students are asked to define what they are touching.
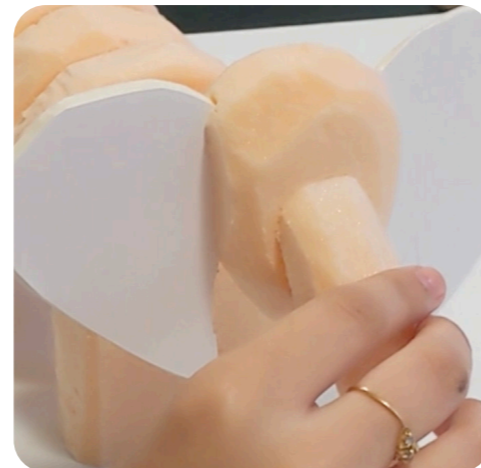
Students then touch the trunk of elephant to stop the music.
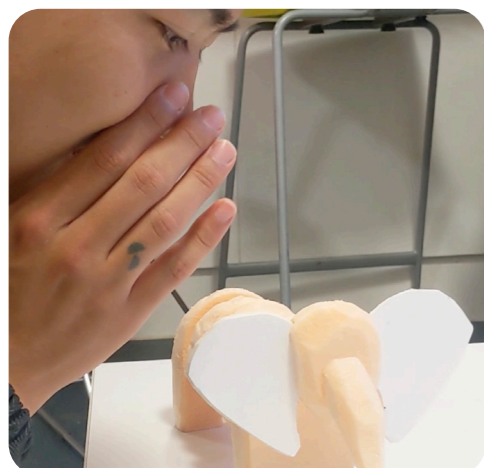
They speak their answer in the elephants ear.

The process is repeated for different color tags.
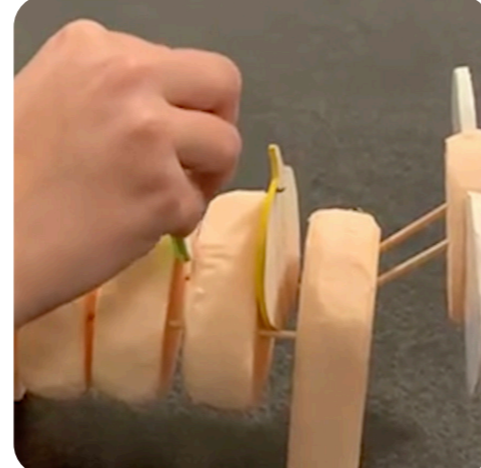
The elephant and tags are stored away after lesson.

CONCEPT VERIFICATION

Ankna Arockam

Ankna is a volunteer at Garnethhill Multicultural Community Centre. She teaches English to Ukrainian refugees, both children and adults.

Her feedback:

Good tool for teaching, Fun activity.

Could be used as a songwriting tool.

Should generate different tones and scales.

Should have very few instructions.

Consider which scales to use.

DESIGN

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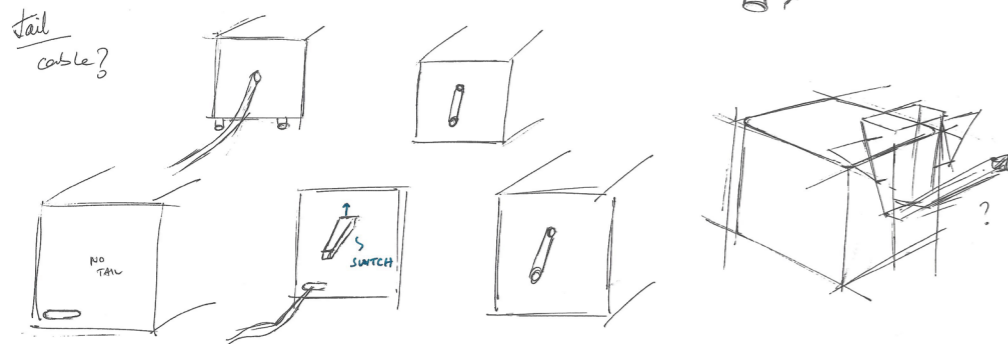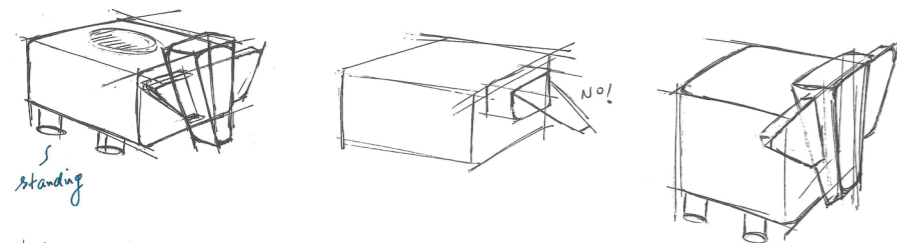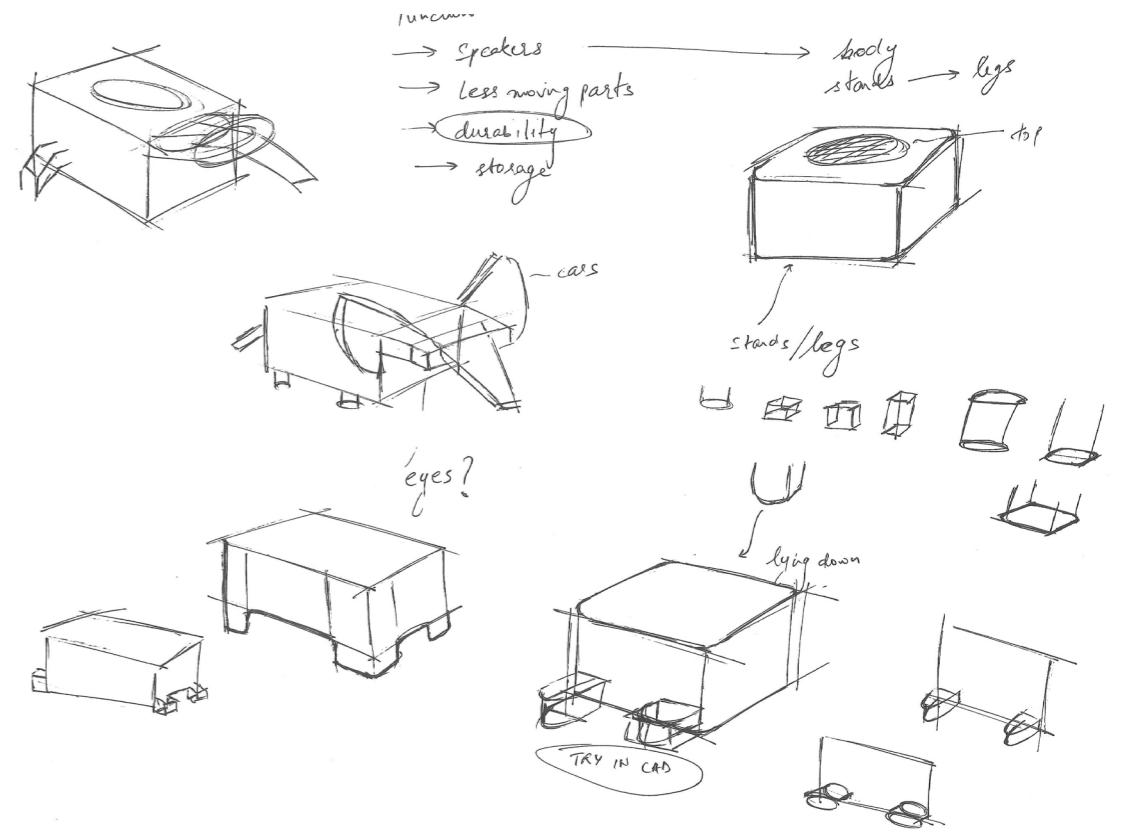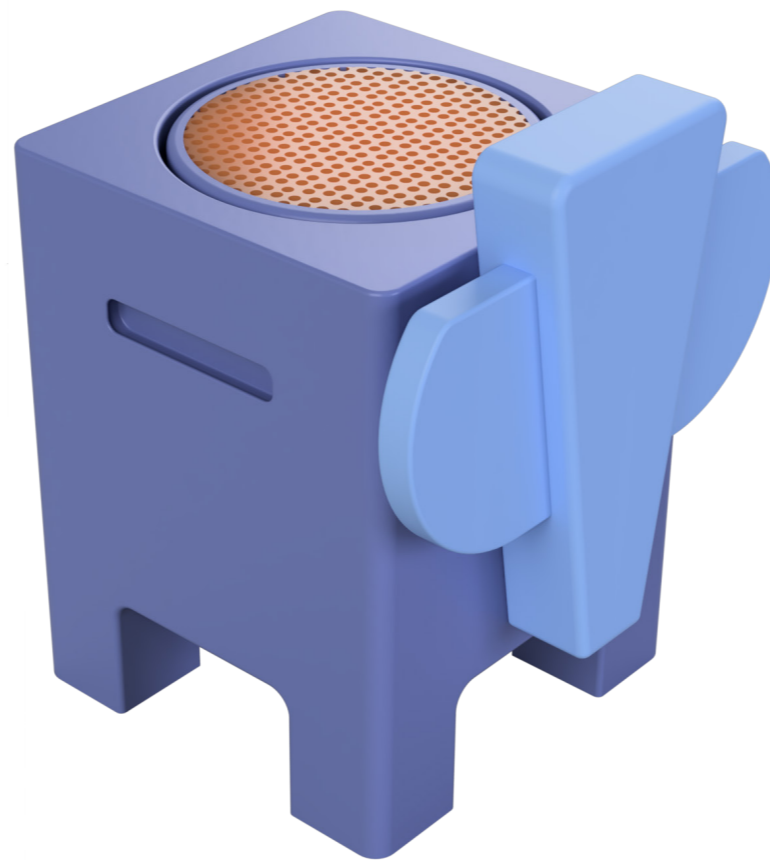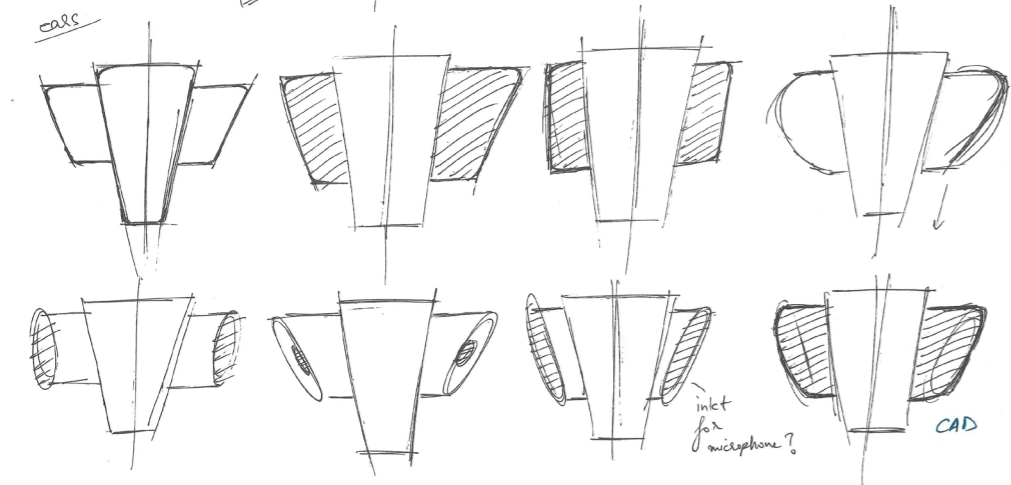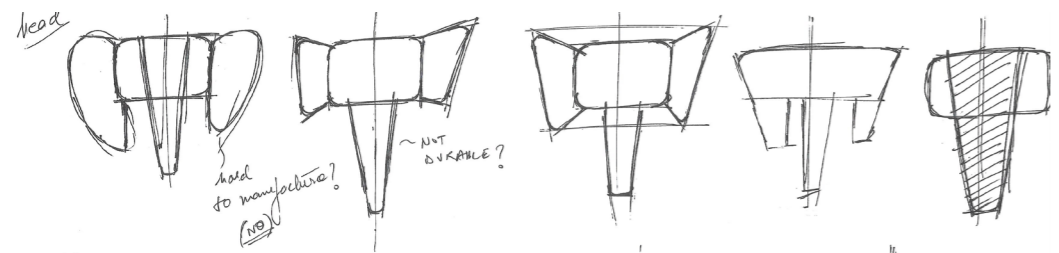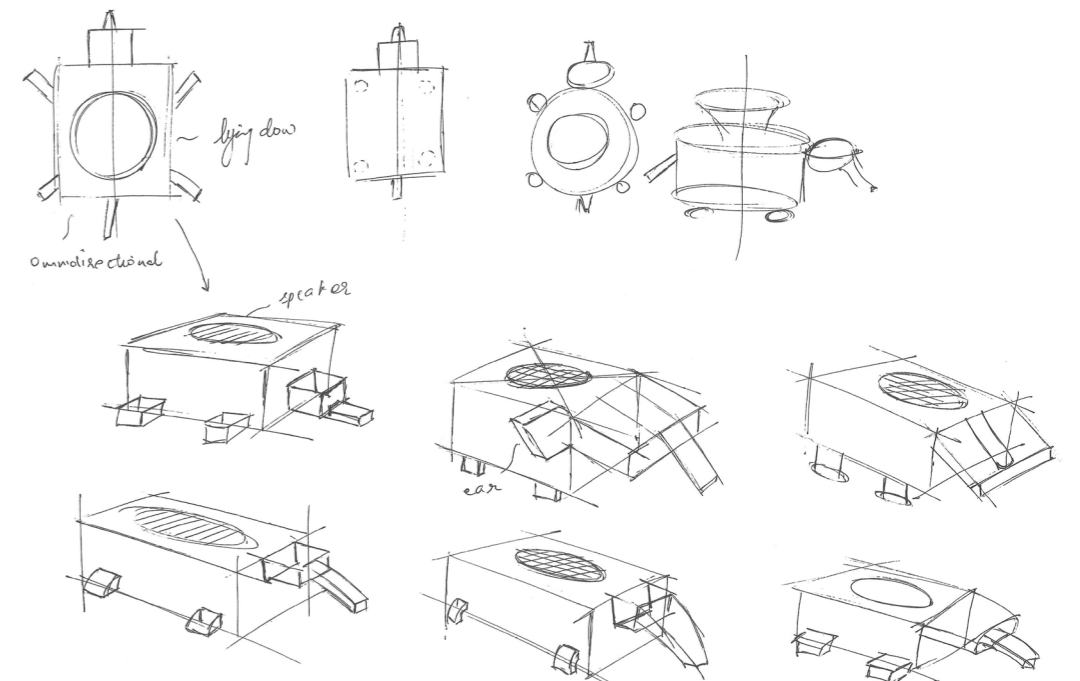
PROTOTYPE

For the structure of the elephant itself, an important consideration was to make it repairable. A toy in a classroom can go through very significant wear and tear.

It was decided that having a plastic body would not be appropriate for this build. Since plastic can be chipped easily and is hard to repair. Wood was the clear winner in this regard. Being sustainable, non-toxic, and easy to repair.
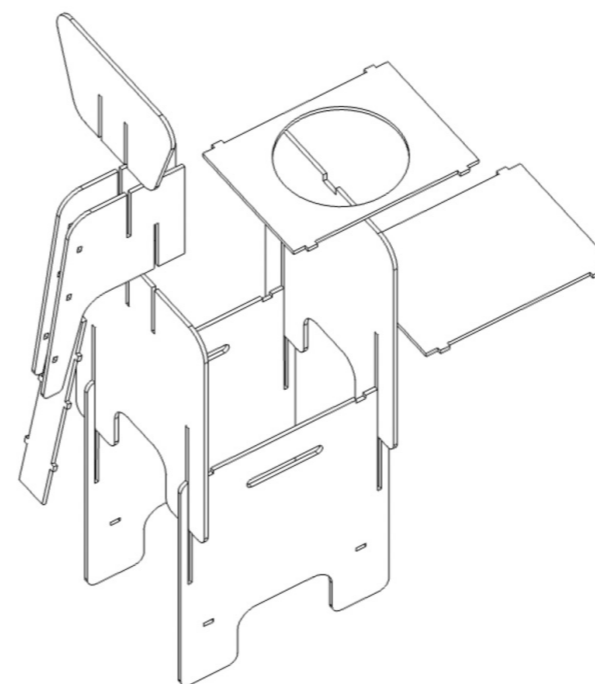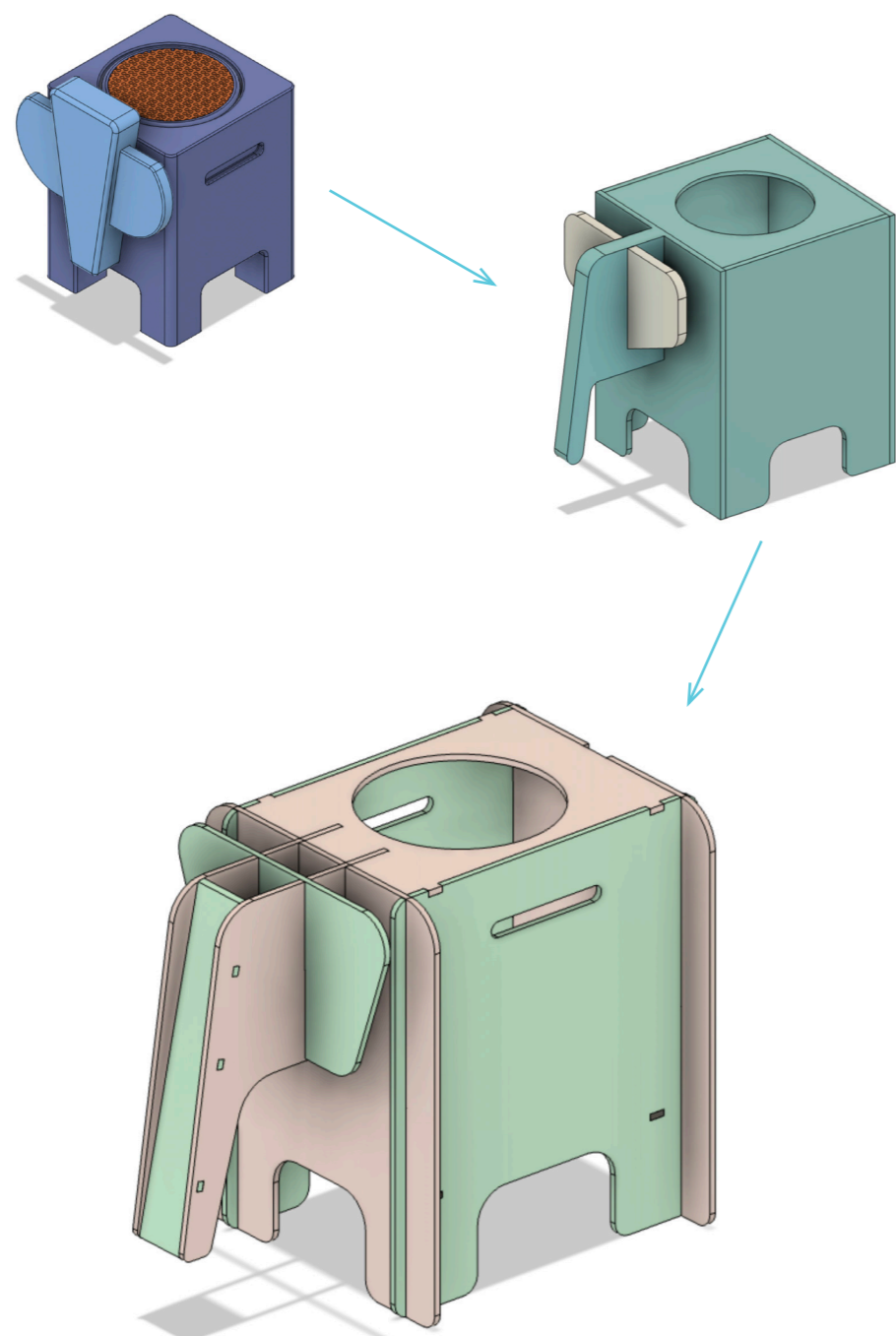
As it houses the speaker, the choice of material is Medium Density Fibre (MDF) board. MDF is a popular and most economical option for building a speaker enclosure.

1. It is a lot cheaper than plywood or solid wood.

2. It keeps the sounds and vibrations to an ideal level in addition to keeping extra vibrations at bay.

3. Since MDF is relatively thick, it provides protection to the speaker against bumps and kicks. This would be ideal in a classroom

MELODY GENERATION
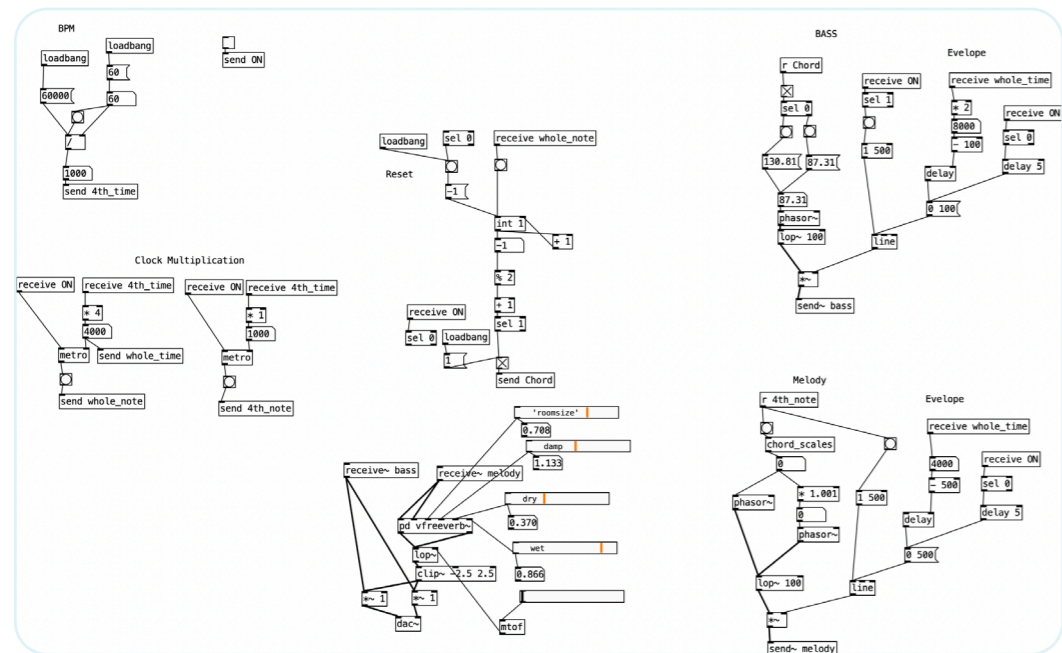
For the teaching process to work for new themes every time, it is important for the speaker system to generate its own unique melody, and this melody should be changed for every lesson. This has been achieved by incorporating Puredata program on to the RaspberryPi.

PureData is visual programming language used for creating interactive computer music and multimedia works. Pd is an open-source project and is used extensively for interactive art and design installations.
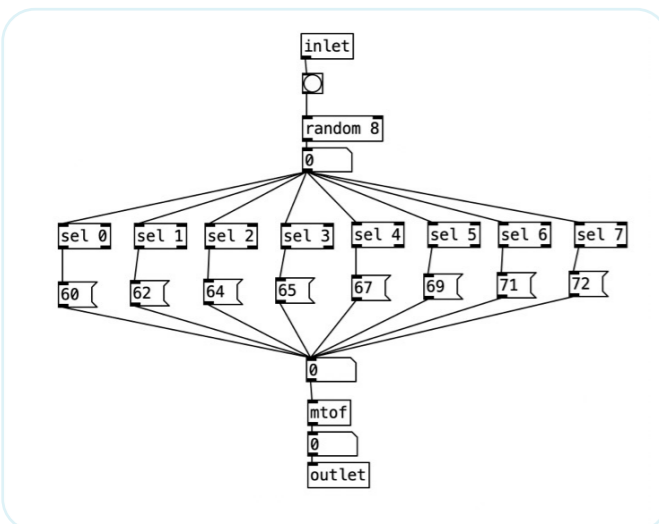
The program is coded to generate melodies using the major scale. This is in accordance with the western style of music. However, the scales can be easily changed to any other, depending on the context. For instance, the Lydian scale will be more suitable for immigrants in Southeast Asia.

Following the model of nursery rhymes the melody is kept simple with an even slow beat. This is done to have a sense of calm and focus and not rush children.
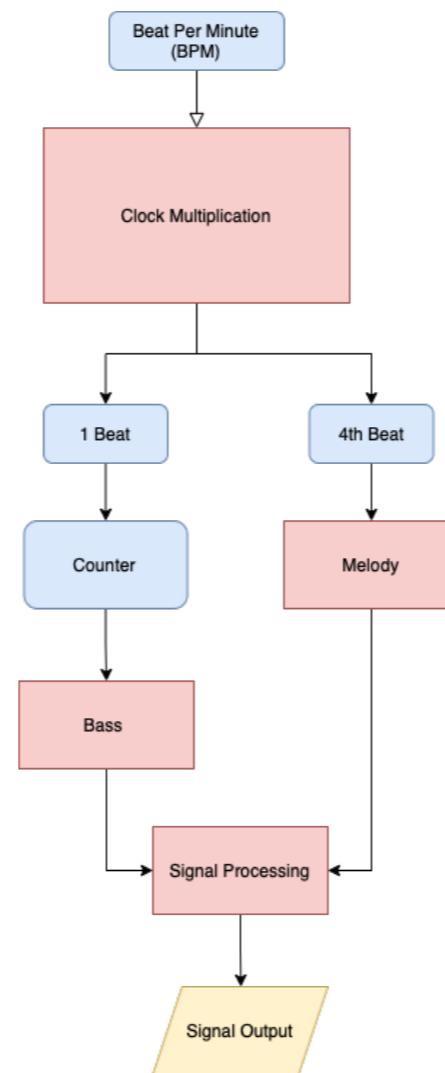
PROTOTYPING

Since the tag itself is placed by the teacher, the size of the tag is determined by the surface area. It is kept large enough so that any child could touch it, but also small enough so that it can be stuck to a discernible object.

The adhesive used is gecko tape, which is reusable and can be stuck on slippery surface.
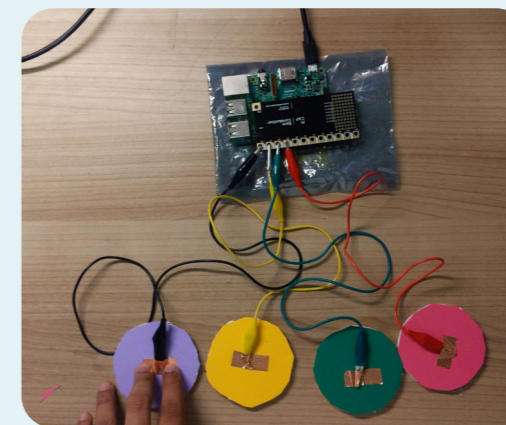
Using the BareConductive RaspberryPi attachment to simulate a touch sensitive surface on the tags. Copper tape is stuck on the tags, which can also be used to make parts of the elephant touch sensitive. The RaspberryPi is running PureData for all the audio processing.

PRODUCT
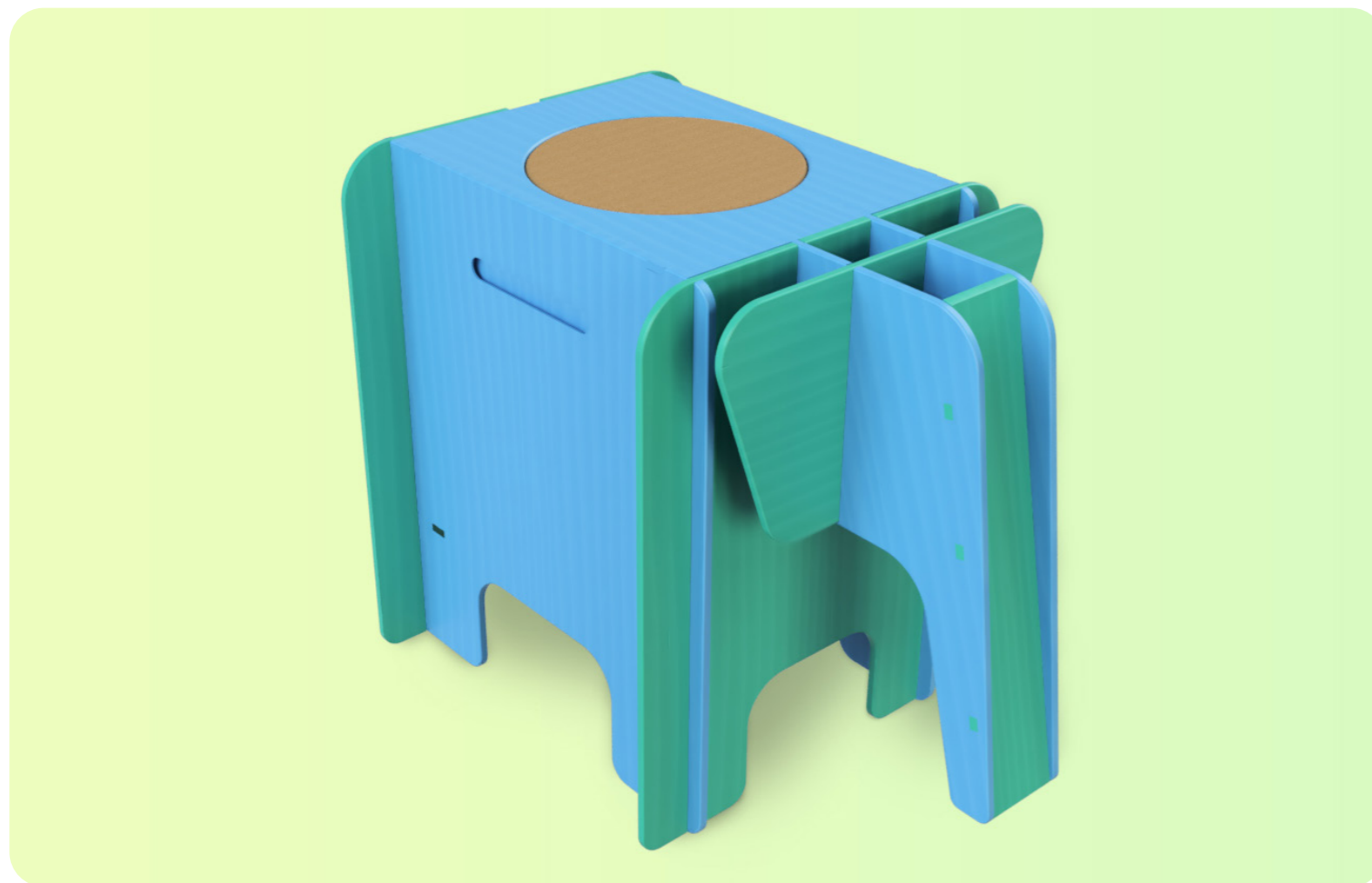
Repairability

The finished product will also be made of MDF board. The structure of the elephant is kept the same for repairability. Since each part is laser cut separately, it can be replaced for a new one.

Assembly

Assembly of the elephant is easy, without any glue, and can be done in the classroom as an activity.

Marketing

The business model should be like that of Sphero. Each set will be provided based on the school's needs. It should be customized for the different settings, such as community centres.

The total cost of manufacture will be about £120.

Enzo the Elephant is portrayed as an energetic musical elephant that can be helpful to you.

Battery

A 4000 mAh rechargeable battery was chosen to drive the speaker and electronics. This gives the product a battery life of 3 – 4 hours. I calculated it to last at least two long sessions. This was done in accordance with the time schedule of Garnethhill Multicultural Community Centre. They have two language classes on a given day.
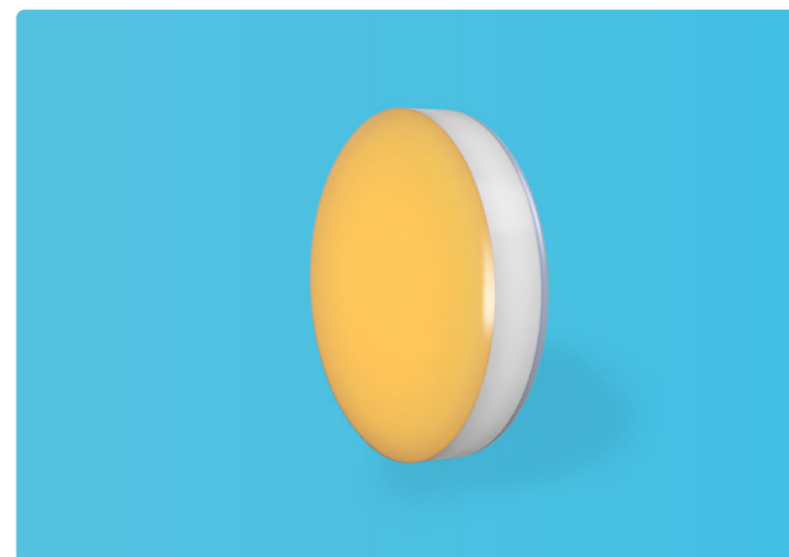
Tags

Tags use the LPWAN technology which gives it a range of 100m. This is usually used for IoT devices in home networks. The tags are touch sensitive and has a battery that can last up to 10 years.

The product should be provided with a set of 8. This makes them the most expensive component of the product.
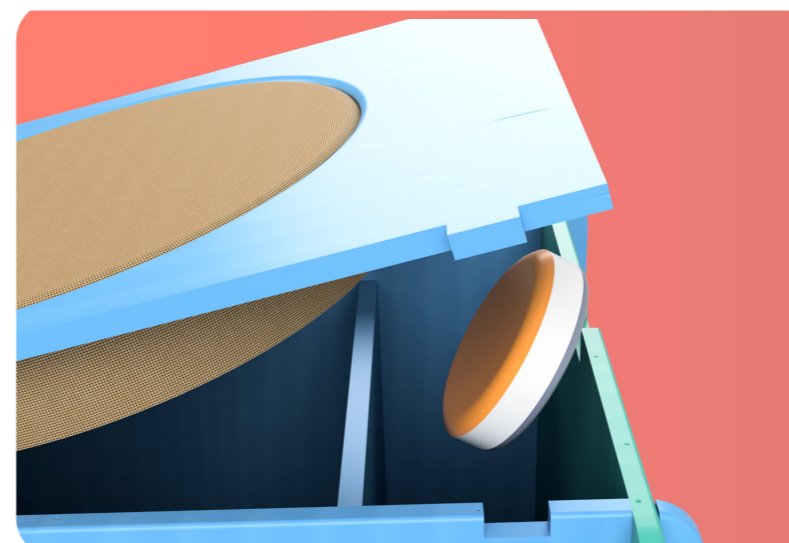
Storage

A part of the enclosure is divided to store the tags inside. This is done so that the students do not know about the tags in case they break it or lose it. It is meant to be accessed by the teacher.

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