



# UTM

UNIVERSITI TEKNOLOGI MALAYSIA

## APPLICATION DEVELOPMENT FINAL REPORT



Prepared by

Ahmad Fitri bin Abdul Razak

A17CS0003

Ong Le Foo

A17CS0189

Tan See Jou

A17CS0218

Lecturer Name: Prof Dr. Mohd Shahrizal bin Sunar

## REVISION PAGE

### A. Overview

This document is about the full information, details, and interfaces of the final stage of Auducation Application.

### B. Target Audience

This documentation is intended for the lecturer, Prof Dr.Mohd Shahrizal bin Sunar, and our target user, the manager of Little Genius Center.

### C. Organization Chart

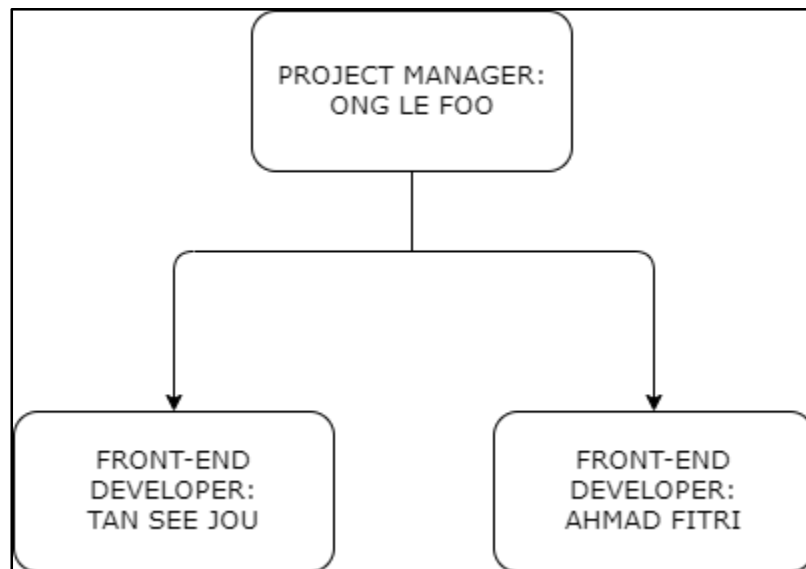


Figure 1: Organization Chart of Auducation Application

#### 1. Ong Le Foo

- Project Manager
- Back-end developer
- Documentation

#### 2. Ahmad Fitri bin Abdul Razak

- Front-end developer
- Designer
- Documentation

#### 3. Tan See Jou

- Front-end developer
- Data-analyst
- Designer

# Contents

1. INTRODUCTION .....	6
1.1 Background .....	6
1.2 Proposed Application .....	6
1.3 Objectives.....	7
1.4 Scope .....	7
1.6 Non-functional Requirements .....	8
2. MATERIALS AND TOOLS .....	10
3. OVERALL DESCRIPTION .....	11
4. PROTOTYPE .....	12
4.1 Low Fidelity Prototype .....	12
4.2 Exact Prototype .....	14
5.APPLICATION INTERFACE .....	18
5.1 Login -Sign Up.....	18
5.1.1 Login Page .....	18
5.1.2 Sign-up.....	19
5.2 Child Interface (Main).....	19
5.2.1 Avatar interface .....	20
5.2.2 Sticker interface (Gamification) .....	21
5.2.3 Leader Board interface (Gamification).....	21
5.3 Child Interface (Lessons) .....	22
5.3.1 Lesson Selection Interface- Number .....	22
5.3.2 Lesson Selection Interface- Puzzle.....	23
5.3.3 Lesson Selection Interface- Emotion.....	23
5.4 Lessons- Number.....	24

5.4.1 Counting Interface .....	24
5.4.2 Advanced Interface .....	27
5.5 Lessons- Puzzle .....	28
5.5.1 Lessons- Puzzle- Patches .....	28
5.5.2 Lessons- Puzzle- Outline .....	30
5.5.3 Lessons- Puzzle- Odd One Out .....	31
5.6 Lessons- Emotion .....	34
5.6.1 Lessons- Puzzle- RECOGNITION .....	34
5.7Parent Interface .....	38
5.7.1 My Child .....	38
5.7.2 Progress .....	39
5.7.3 Setting .....	41
6.CONCLUSION .....	42
7. APPENDIX .....	43
8.ACKNOWLEDGEMENT .....	50
9.REFERENCE .....	51

# 1. INTRODUCTION

## 1.1 Background

Autism Spectrum Disorder (ASD) is a complex developmental disorder. Individuals with ASD have a high risk of suffering difficulties in social and communication, repetitive behaviours, and narrow or overly-focused interests. According to Autism Speaks – an international organization that advocates for ASD cases worldwide – reported that the incidence of ASD is estimated to have increased from one case in every 68 children (in 2016) to one in every 59 children (in 2018). The symptoms or indicators of ASD usually can be noticeable by the age of 2 or 3, and early therapy can lead to positive outcomes later in their life. Early intervention is important as it can prevent the problematic behaviour of the children from becoming a habit when they grow up and also has a better chance of changing the brain development of the children.

## 1.2 Proposed Application

Auducation application is an application purposely for Autism children age before 7, which is before they enter primary school. autistic children normally have trouble or difficulties in communication, focus and understanding the emotion and feeling. They have some difficulties in expressing themselves, no matter through words, gestures, facial expression or touch. To this day, there is still no cure for autism, however, it is so much better for the autistic children to undergo treatment as earlier as possible because the younger they are, the more adaptable is their brains. Therefore, the goals of this Auducation application are to help the autistic children in recognizing emotions, basic education skills and so on. Our team believes that every autistic child is smart and have strong passions and interests, only that they have to find out the most suitable learning ways.

## 1.3 Objectives

The objectives for this application are stated as below:

- ❖ Provide a platform for the autistic child to learn at anytime anywhere
- ❖ Provide a better and interesting way for the autistic child to learn
- ❖ Provide training of education skills for the autistic child
- ❖ Support the early intervention and treatment for the autistic child
- ❖ To provide a gamification feature for the autistic child in order to gain their interest to continue learning

## 1.4 Scope

Auducation is an application version of early education for autistics child to enable them to learn anywhere anytime. This application allows the autistic child to have comfortable and fun learning by using the interesting interface and colour tone. It is designed to help and encourage the autistics child to learn consistency by giving rewards and can check their leader board every time they complete the lessons.

Besides, the autistic child's parents can also check the progress of their child easily, for example, the number of attempts for certain lessons, the duration of training their child had done and so on. However, to have a good experience, merely stable connection is needed and can be used anywhere and anytime.

## 1.5 Functional Requirements

*Provide different kinds of categories of lesson for the kids to play*

The app provides lesson from 3 categories - Number, Puzzle and Emotion.

### *A change-able Avatar*

Kid can choose their avatar according to their liking

### *Provide point system*

The app will store point when each kid perform their lesson

### *Provide timing system*

There will be a record of time spent by the kid in the lesson.

### *Provide gamification*

The app will have gamification element such as using point to unlock sticker where they can use it to show on their avatar and also a leaderboard.

### *Provide progress and history*

Parent can use the statistic data to view and check the progress of child's activity.

## 1.6 Non-functional Requirements

### **Security**

- The first time user should register their account.
- The user (autistic child/parent) should log in to access their databases.  
Unauthorized users are not allowed to access the system.
- The login requires password.

### **Privacy**



- Protect user's personal information
- The server should be able to hold a huge number of users to prevent server down.

### **Capacity**

- Able to support the increase of users every year

### **Performance**

- High system performance enables the application to perform tasks within a short time.

### **Reliability**

- Able to produce an accurate result of the user's performance.
- Able to store and keep user's data without the loss of data.

### **Maintainability**

- Low cost and easy to maintenance

### **Usability**

- The application should be user-friendly, easy to use and organized so that the errors can be minimized, the performance can be maximized.

### **Portability**

- The system should be compatible with android

## 2. MATERIALS AND TOOLS

Tools and software that we used:

Name: Apache Cordova

Version: 9.0.0

Description: Apache Cordova is a mobile application development framework. It allows the use of standard web technologies such as HTML5, CSS3 and Javascript for cross-platform development.

Use: The main software used to develop the application, All of the codings are made using this software including the interface and functionality.

Name: Firebase

Description: Firebase is a real-time database connecting through a WebSocket, faster than HTTP. It is also a server, API and datastore at the same time which allows the user to modify to suit their needs.

Use: The database to store users information, email and password. API for login authentication, and Google Login

Name: Adobe Illustrator CC

Version: 2019

Description: Adobe Illustrator CC 2019 is a graphic-driven software use for creating vector graphics. It allows user to start from scratch or just modify from existing arts.

Use: The medium to create and design some of the illustrations of the application.

Name: Adobe Premiere Pro

Version: 2017

Description: Adobe Premiere Pro 2017 is a timeline video-editing software built for modern file-based creative video production.

Use: To create and edit the 'making of' and 'teaser' video.

### 3. OVERALL DESCRIPTION

This section will describe about the app function and how it is done.

#### *Google Login*

The app provides an alternative login method which is by using google login. The user can use existing google account to login to the app. The function to do this is by using Firebase API Google Authentication. Firebase provided a way to login to the system using google and we simply use the API to connect to our app.

#### *Gamification*

Firstly, our app uses point and minute as a metrics to calculate user's performance. The point can be earned once the user finish a lesson or attempt a lesson. The minutes are calculated based on how much time user spent doing the lesson. The way to implement this is by using Firebase API to store the data of both point and metric for each user.

#### *Gamification - Sticker*

Sticker is the thing that can be collected by the user and show it off on their avatar. There are many various stickers, some can only be achieved by completing certain tasks such as reaching a milestone with their point. The way to implement this is by using condition and set it for each sticker.

#### *Gamification - Leaderboard*

Leaderboard is the function to show the ranking of the user. Our app only show the top 10 users on the leaderboard. However, there is also a ranking spot that will be displayed to the user who are not on the top 10 list. The way to implement this is by using the Firebase API to retrieve the data points from each of the user's data, then display it in order from largest to smallest.

## 4. PROTOTYPE

### 4.1 Low Fidelity Prototype

In this stage, the low fidelity prototype is sketching out and still incomplete yet, however, the main functions and the characteristics is already there.

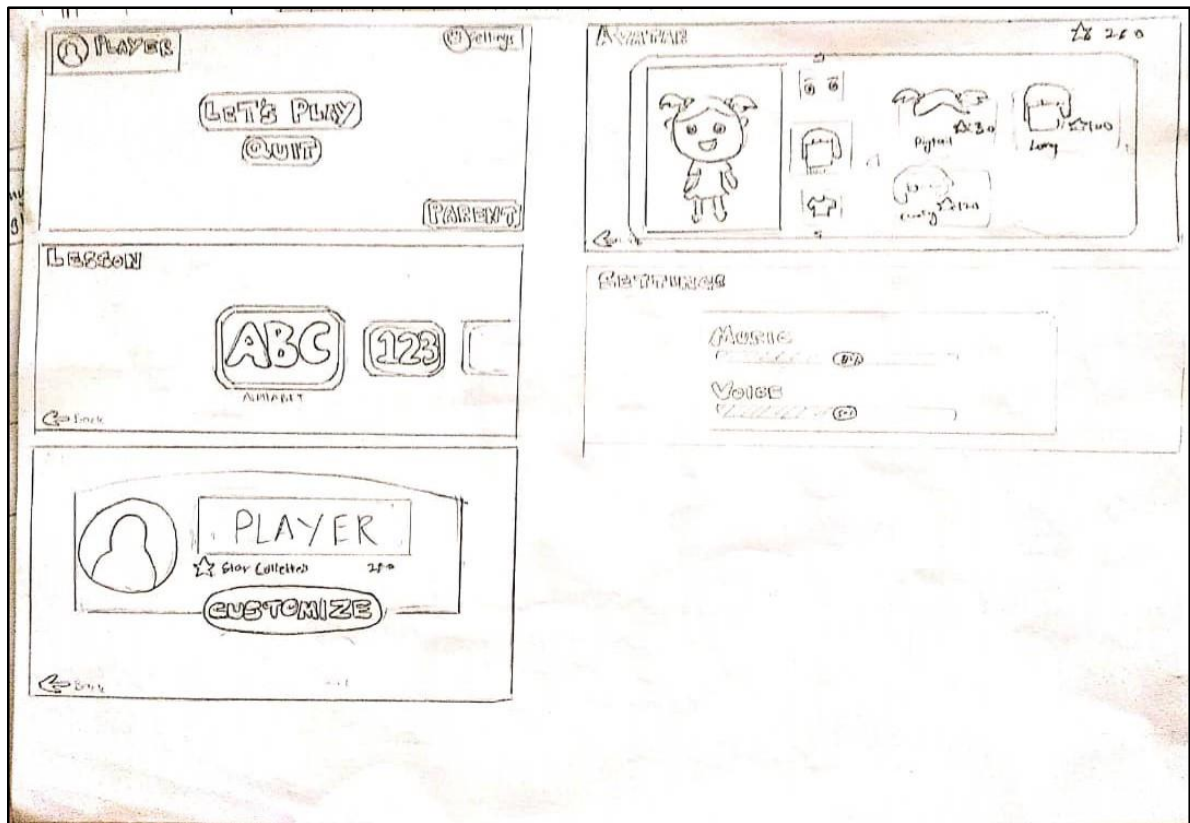


Figure 2: The child interface

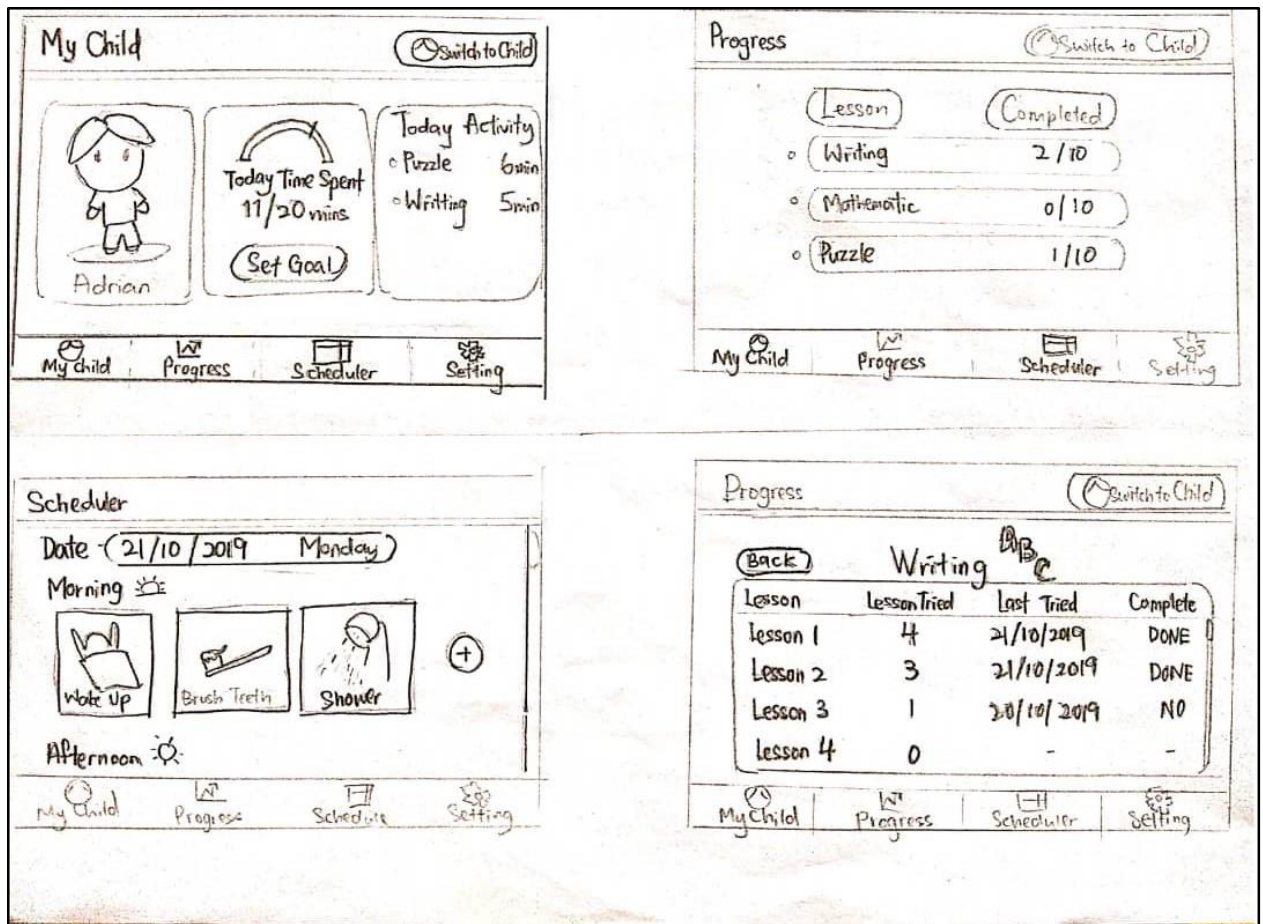


Figure 3: The parent interface

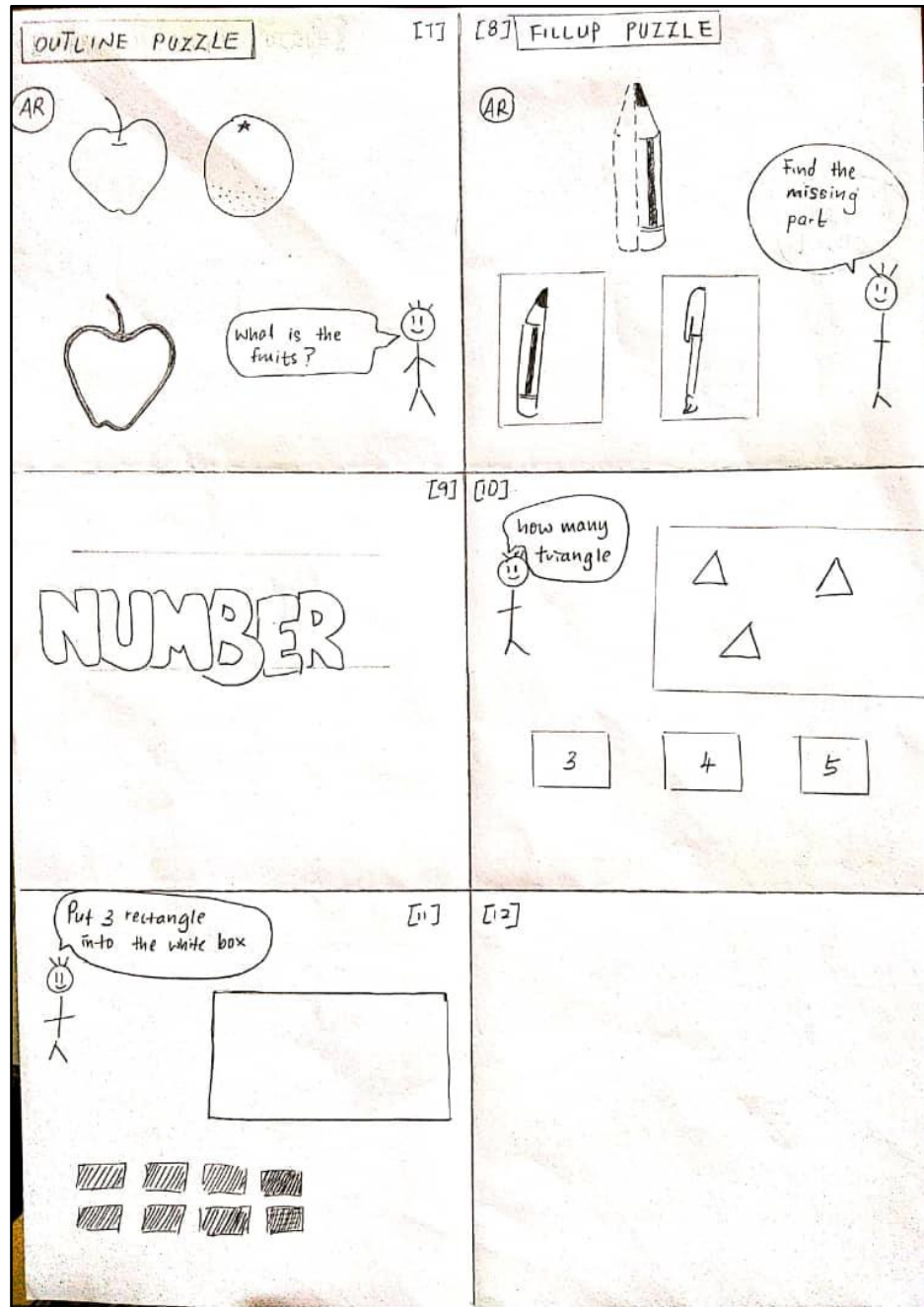

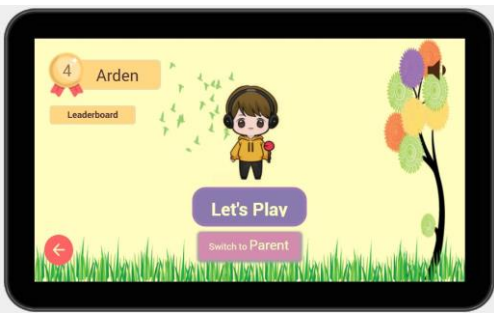




Figure 4: The lessons interface

## 4.2 Exact Prototype

The second version of the prototype is done by using JustInMind. In this version, the interfaces and the functionality are more to the actual application.

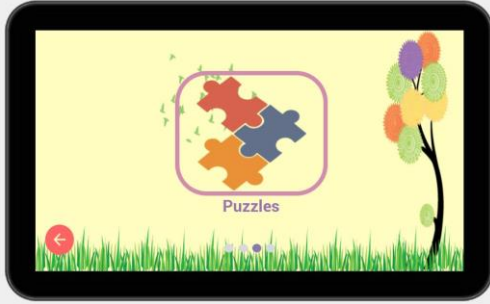
- The child interface (main)

	<p>The login page of Auducation Application. User has to enter their id and also password.</p>
	<p>The main interface of this application. In this application, user-mode can be switch between child and parent.</p>
	<p>Gamification part. The child can earn more badge or sticker by collecting the points by completing lessons.</p>
	<p>Gamification part. There have a leader board which compare all the users ranking.</p>

- The child interface (lessons)



There have different lessons for the child to practice.



This is the lesson's main page. Each lesson has a different colour tone.





Instruction is given to ease the learning process. Cute and interesting interfaces are designed.



	<p>After the child completed the lessons, congratulation praise will be show and points that the child earn.</p>
---	--

- The parent interface

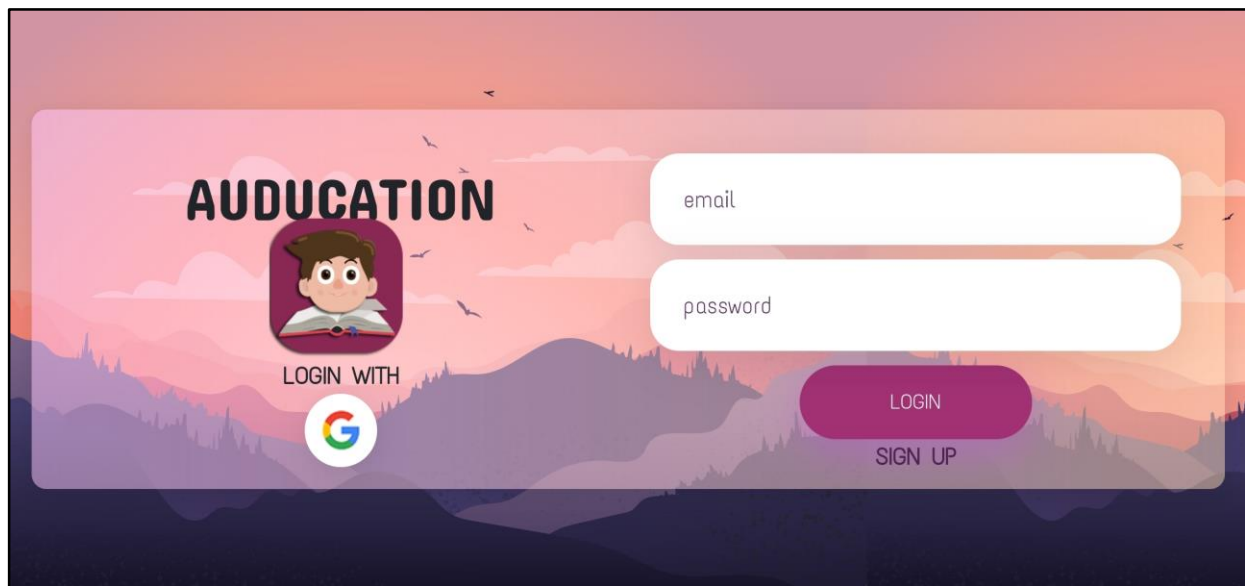
	<p>In this interface, the child's parent can switch to the parent's interface.</p>
	<p>In this interface, the parent can check their child's progress and set a suitable learning duration for the child.</p>

## 5.APPLICATION INTERFACE

The complete interface of the application was developed with Cordova by using web HTML and CSS.

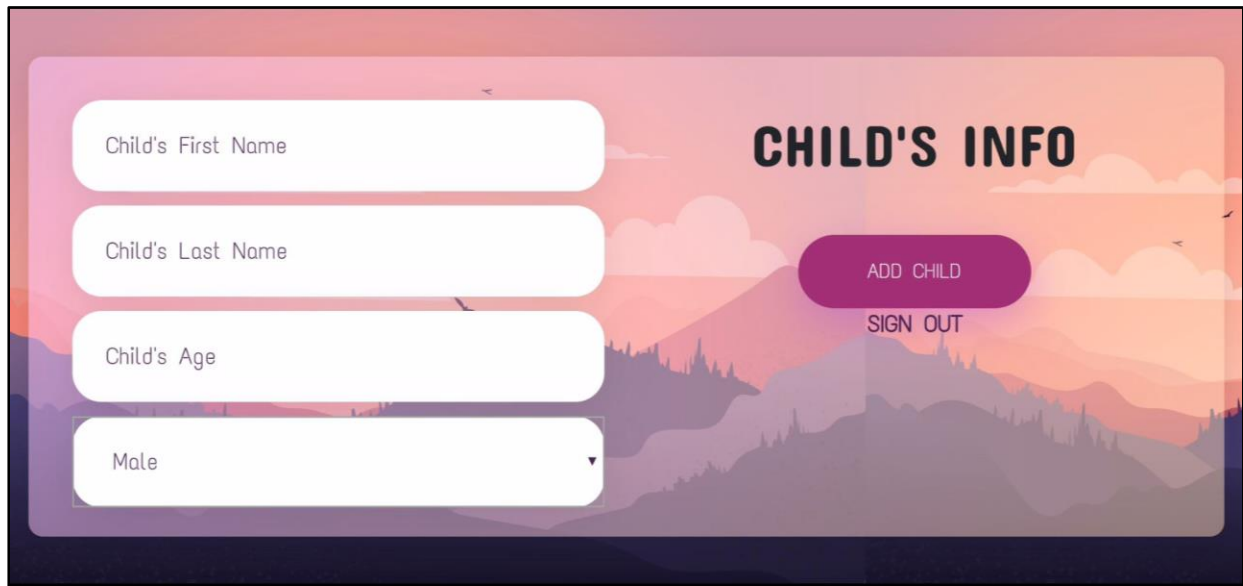
### 5.1 Login -Sign Up

#### 5.1.1 Login Page



This interface will appear when the user opens the Auducation application. For the first time user, they have to register, while for the current user, they only have to insert their Gmail and password. Besides, the user can also use their google account to log in as well.

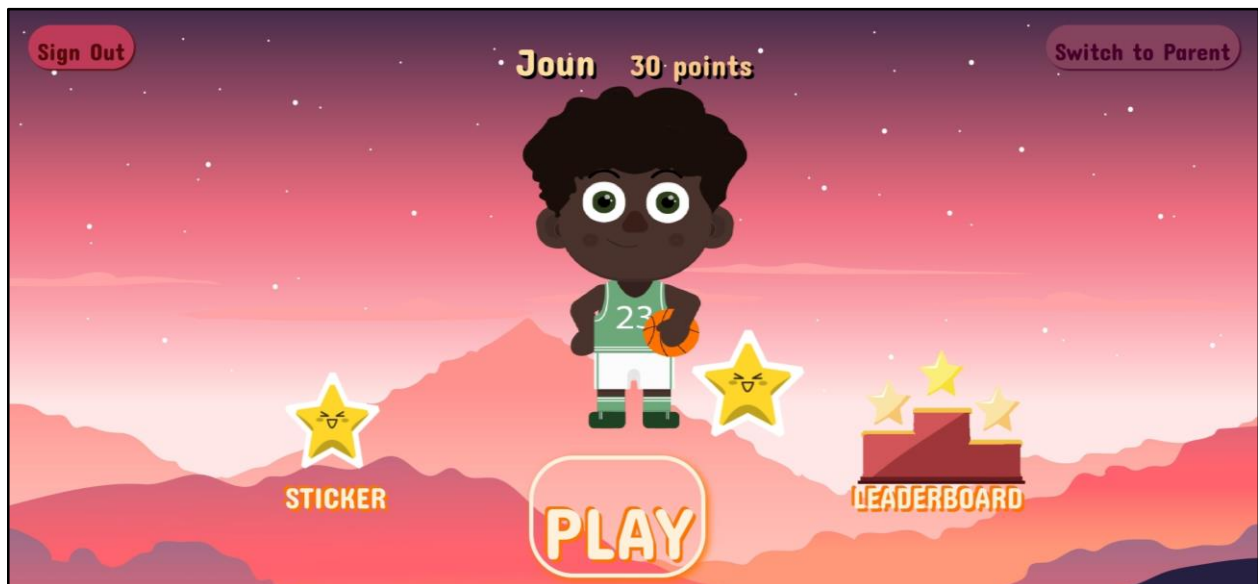
### 5.1.2 Sign-up



The sign-up form is titled "CHILD'S INFO" and is set against a background of a sunset over mountains. It contains four input fields: "Child's First Name", "Child's Last Name", "Child's Age", and a gender dropdown menu currently showing "Male". To the right of the fields are two buttons: "ADD CHILD" and "SIGN OUT".

This interface is for the user to sign up. User needs to enter their child's basic information in order to create their account.

### 5.2 Child Interface (Main)

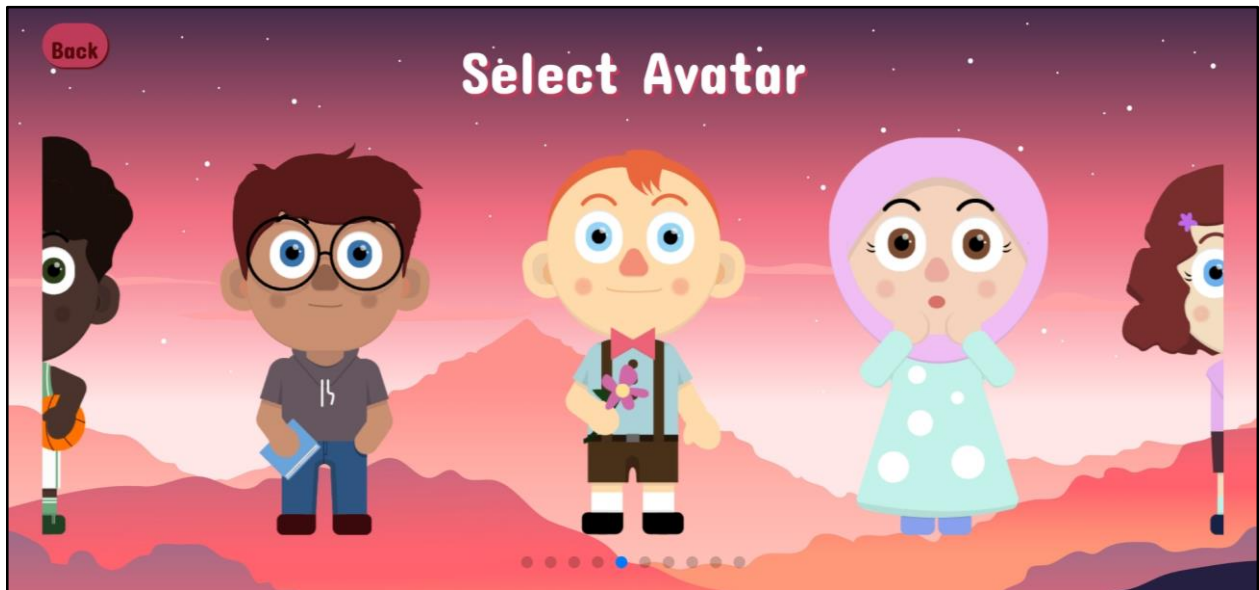


When the user successfully login into the application, the main interface will be shown.

- Top-left- **SignOut** button: for the user to log out.
- Top-right- **Switch to Parent** button: to switch the user mode to parent.

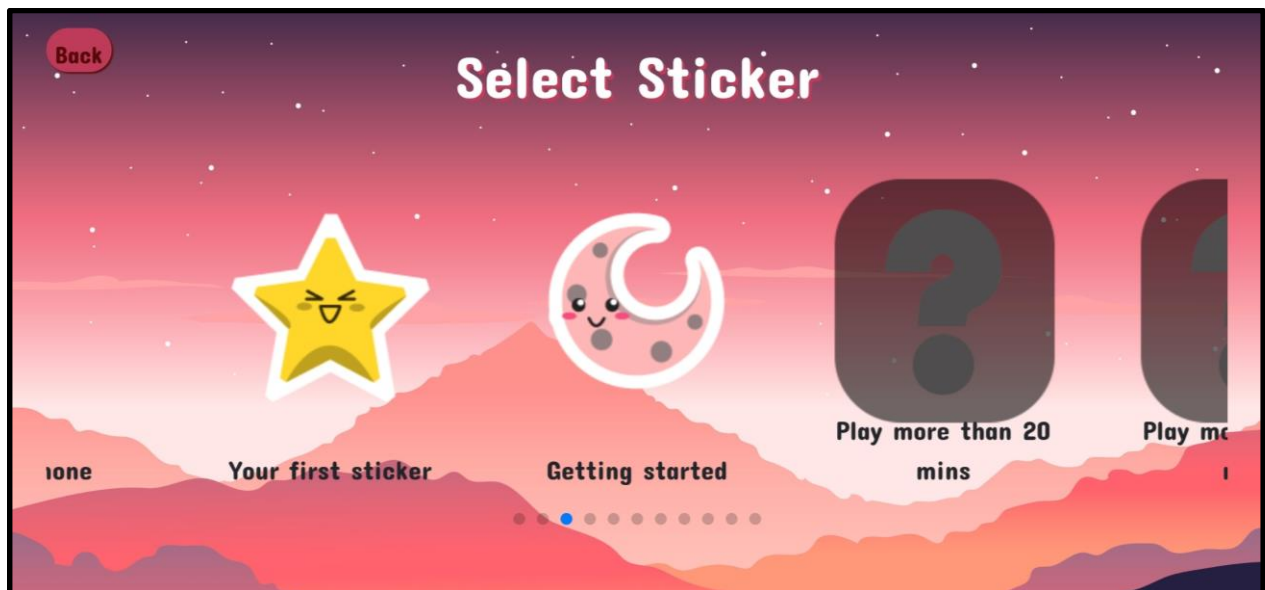
- Middle- **Avatar** button: can click on the avatar to change to a different avatar.
- **Leader-board**: Check the child ranking in among all the users.
- **Sticker**: Click to change to a different sticker.
- **Play**: Click to start the game.

### 5.2.1 Avatar interface



This interface allows the child to change to their own avatar.

### 5.2.2 Sticker interface (Gamification)



This interface allows the child to change to different stickers. However, different stickers have different points of requirement, the child has to earn enough points to unlock the sticker.

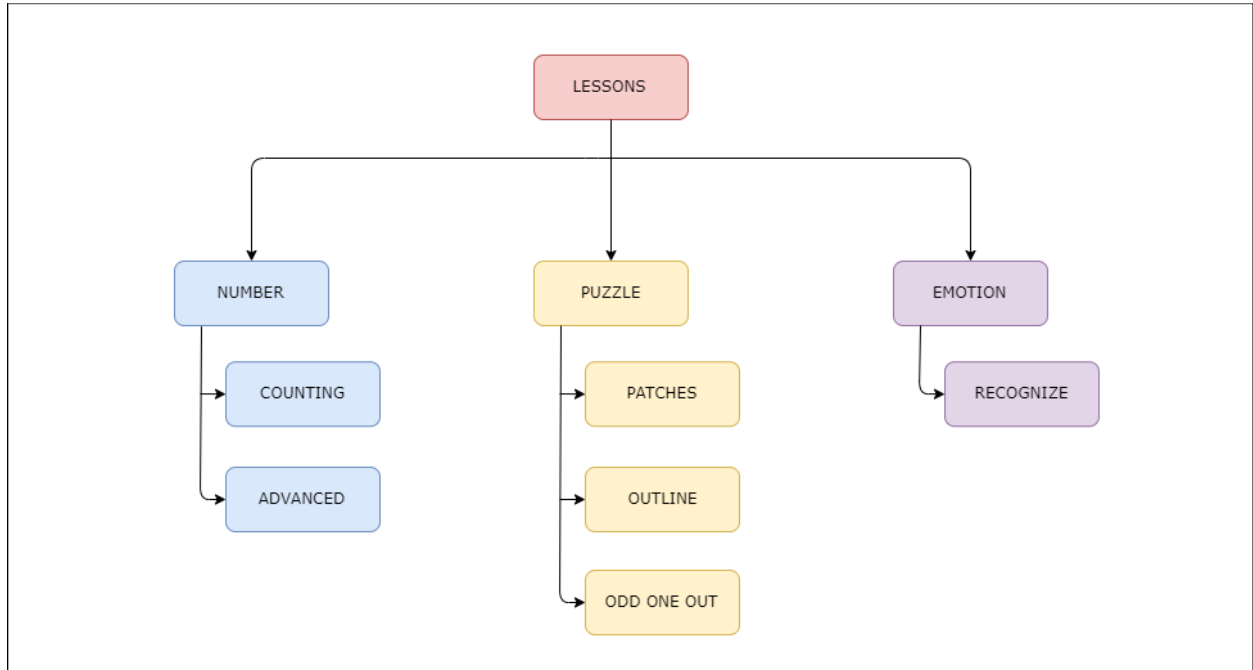
### 5.2.3 Leader Board interface (Gamification)



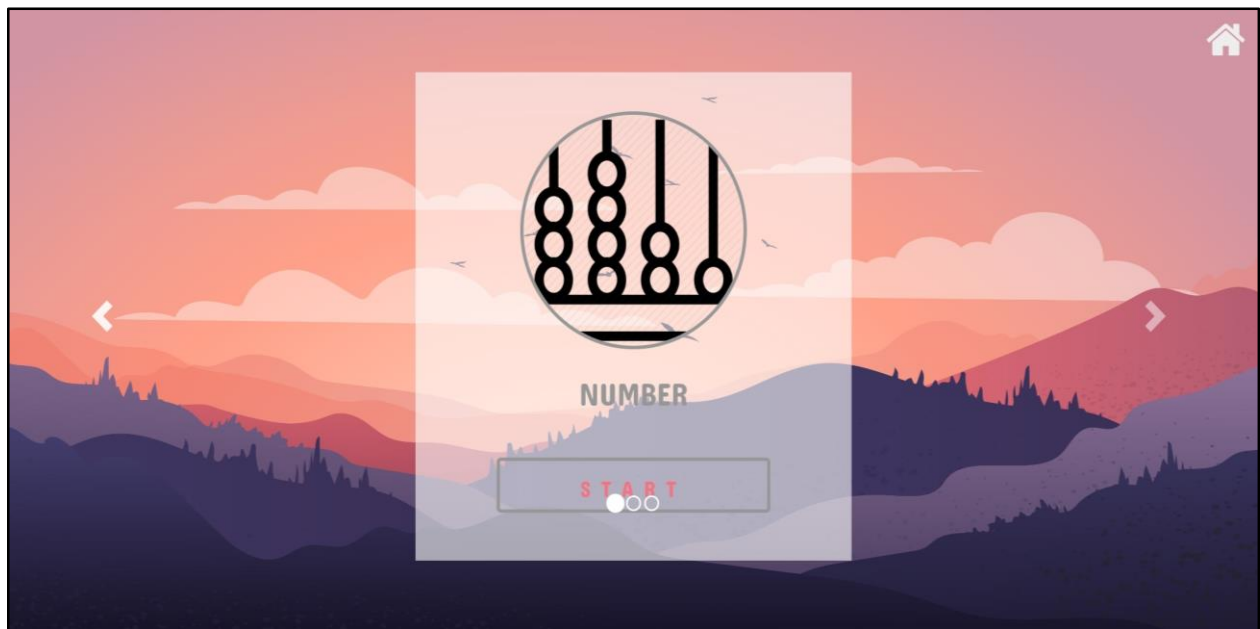
This interface allows the child to check their ranking among the other users. It will show the users's username, avatar, total points earned and the ranking.

## 5.3 Child Interface (Lessons)

For the main lessons interface, the user can choose the desired lessons and have a try. There are a total of 3 types of lessons, which included Number, Puzzle, and Emotion.

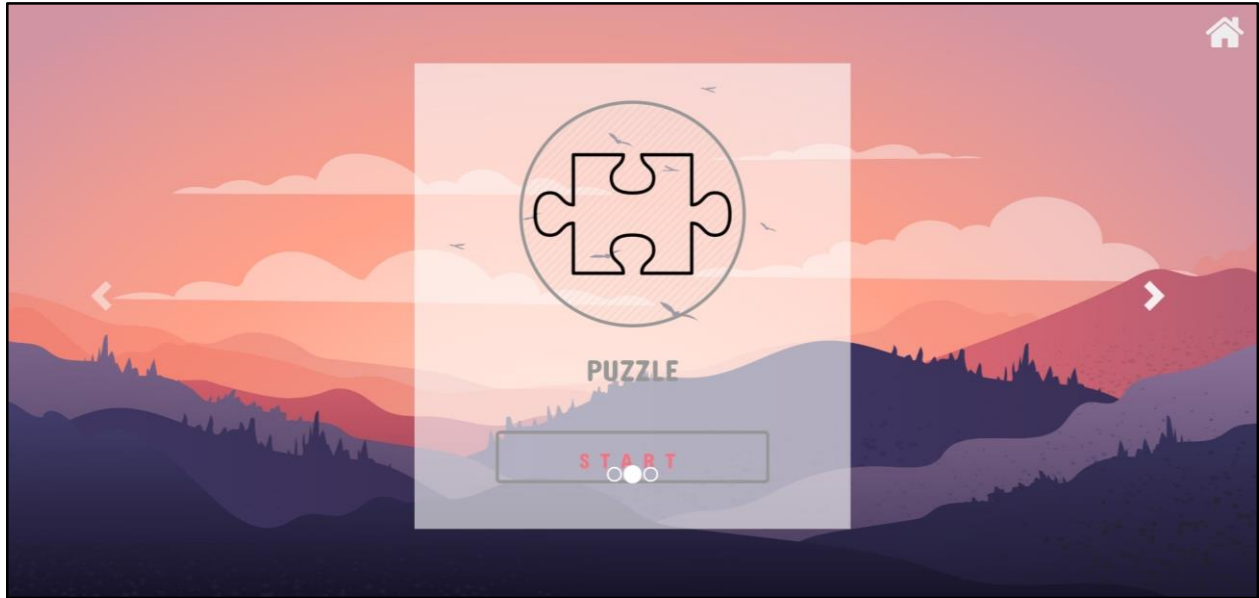


### 5.3.1 Lesson Selection Interface- Number

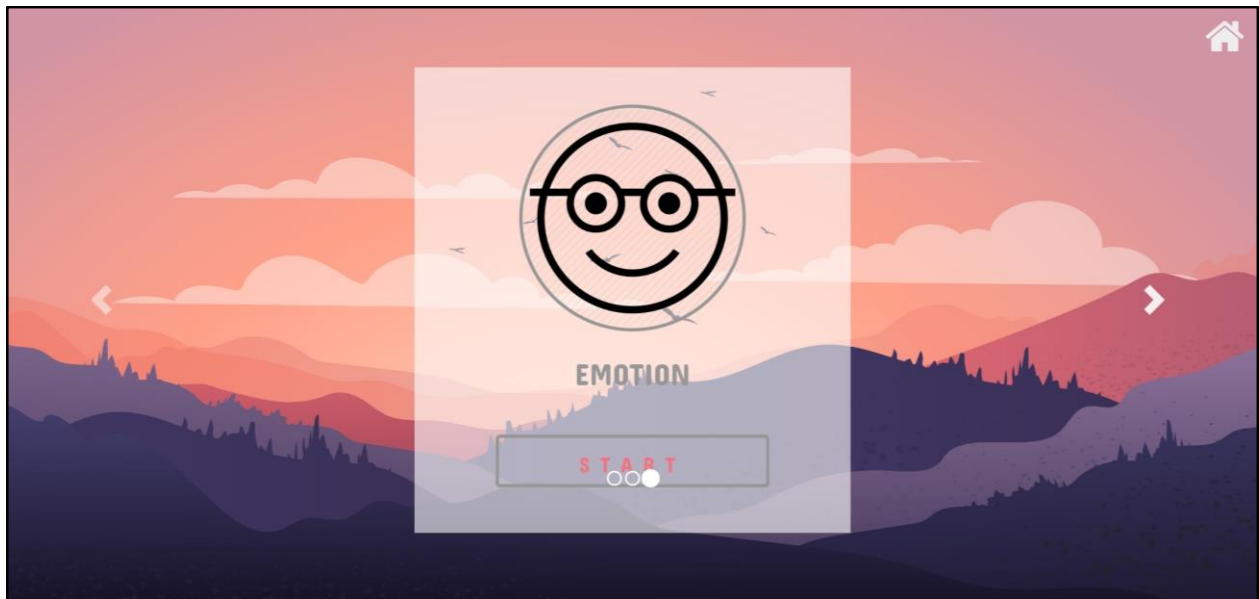


In lessons selection interface, user can choose either number, puzzle or emotion. Once user clicks start, it will display the lessons.

### 5.3.2 Lesson Selection Interface- Puzzle



### 5.3.3 Lesson Selection Interface- Emotion



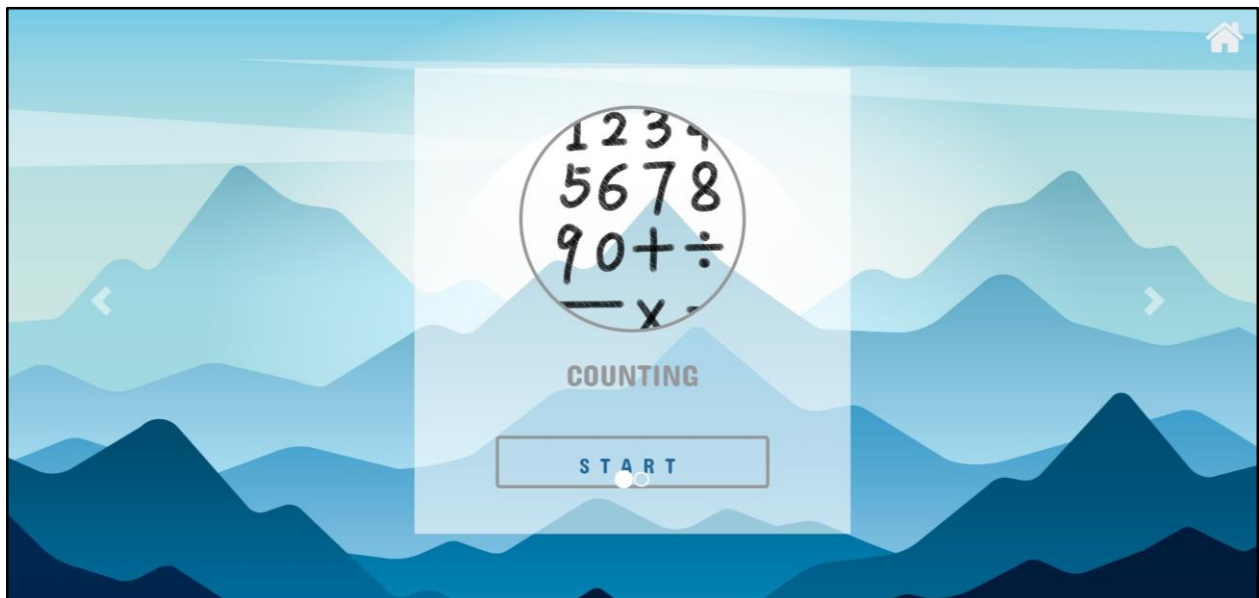


## 5.4 Lessons- Number



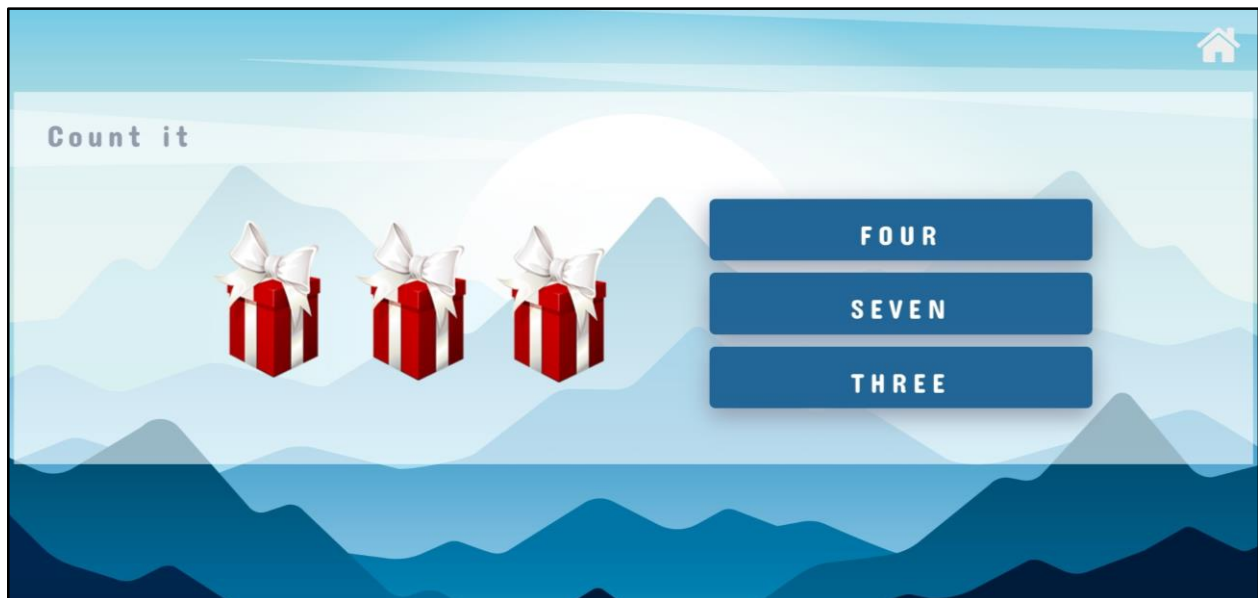
This interface is the Number Lessons interface. User has to click “CLICK ME” to start. For NUMBER lessons, it contains two subtopics, which is COUNTING and ADVANCED.

### 5.4.1 Counting Interface



This is the COUNTING subtopics interface. For this subtopic, the user only has to count the number of things.

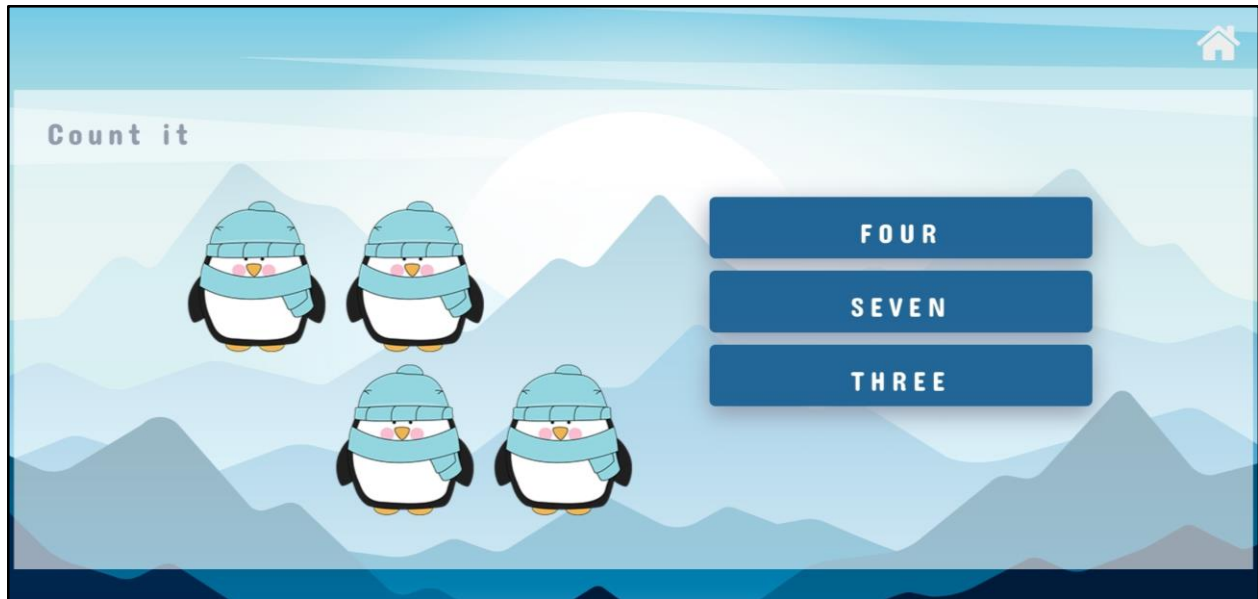




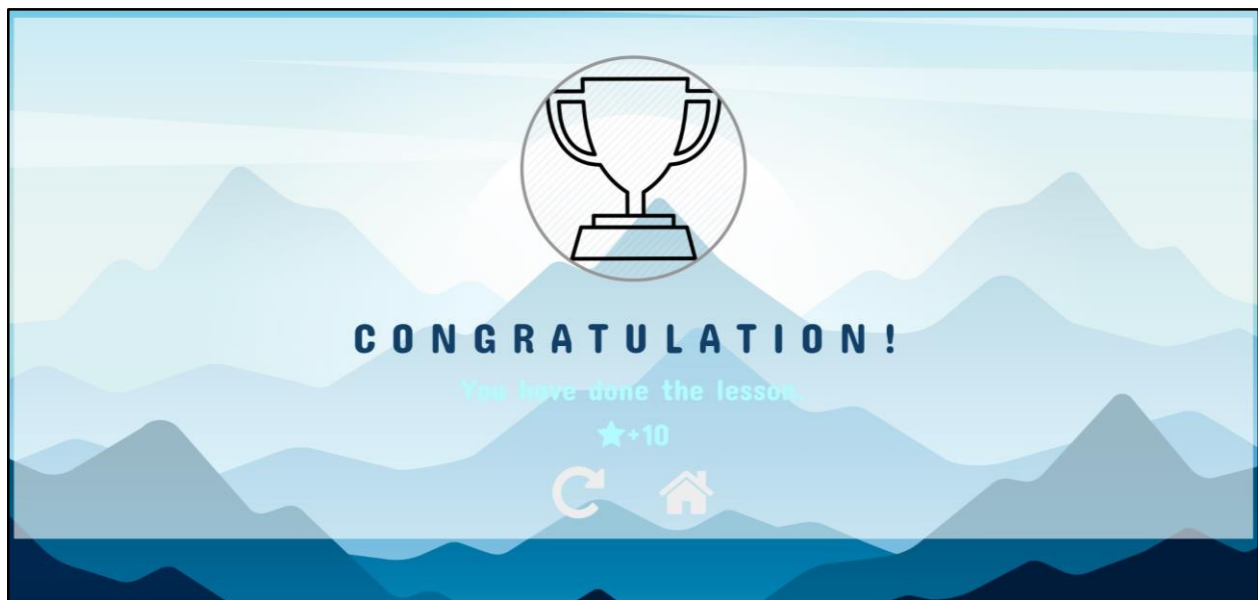
This is the interface for COUNTING. User has to count and click the correct answer.



If the user clicks the wrong answer, an error message will pop out and the user has to retry until correct answer is chosen.

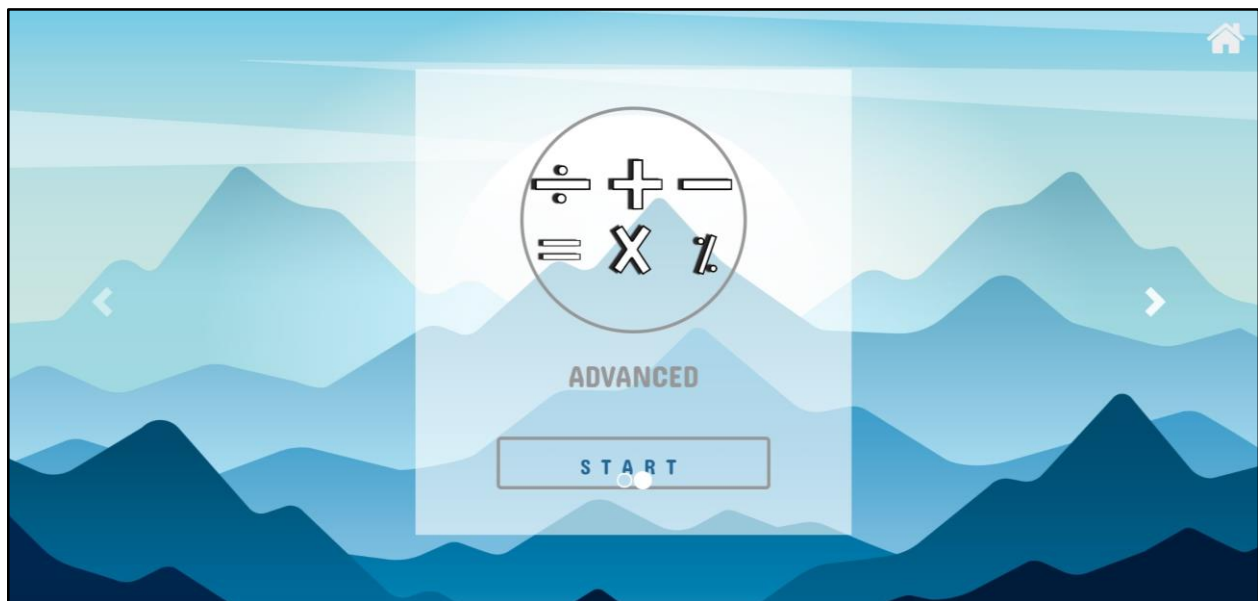


The question is random so that the user can have a different experience.

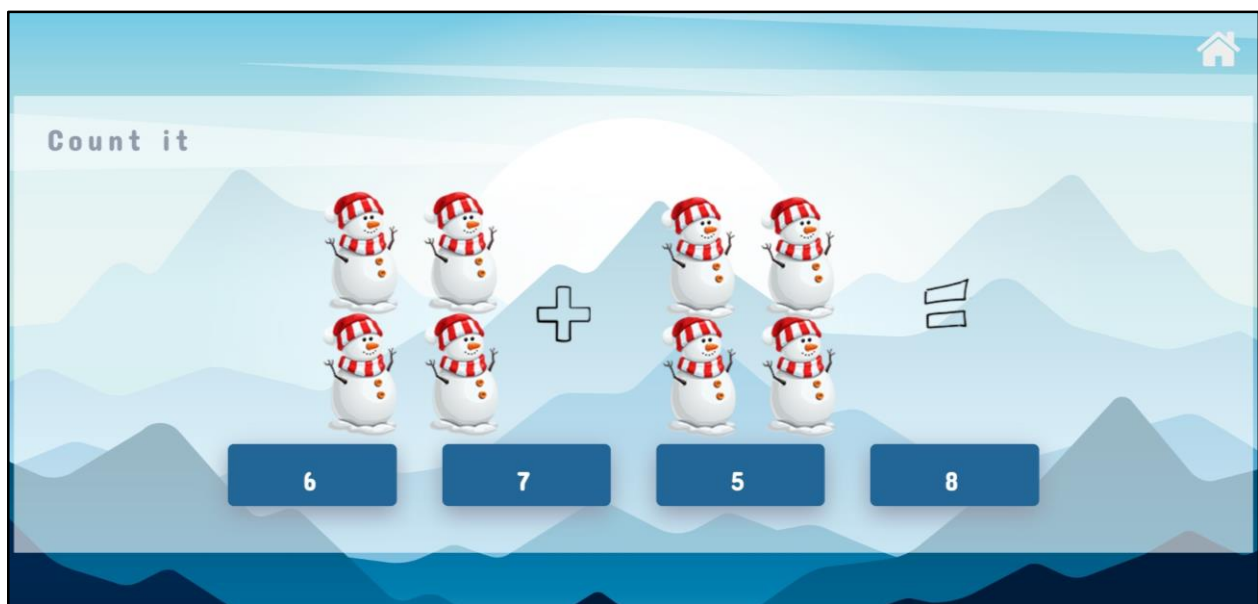


Once the user completed the lessons, congratulation interface will be shown. Besides, the total points the user had earned will be shown as well. If the user wants to retry the NUMBER lessons, he/she can click on the retry icon. On the other hand, if the user wants to go back to the home page, he/she only need to click on the home icon.

### 5.4.2 Advanced Interface

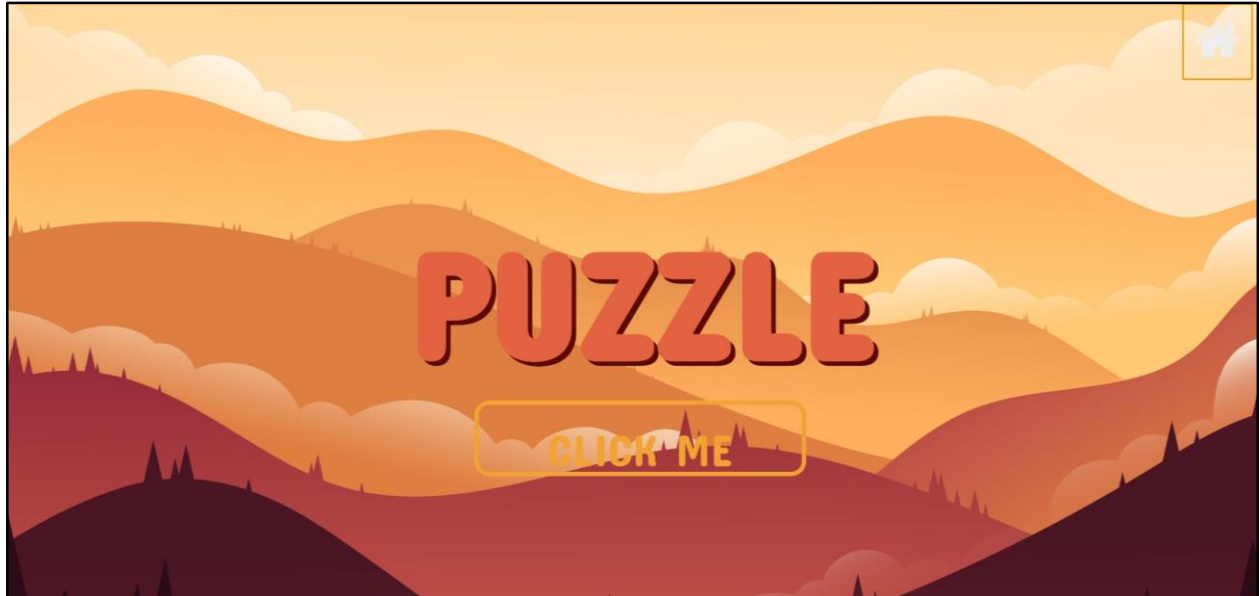


This is the ADVANCED subtopics interface. For this subtopic, mathematical addition has been introduced.



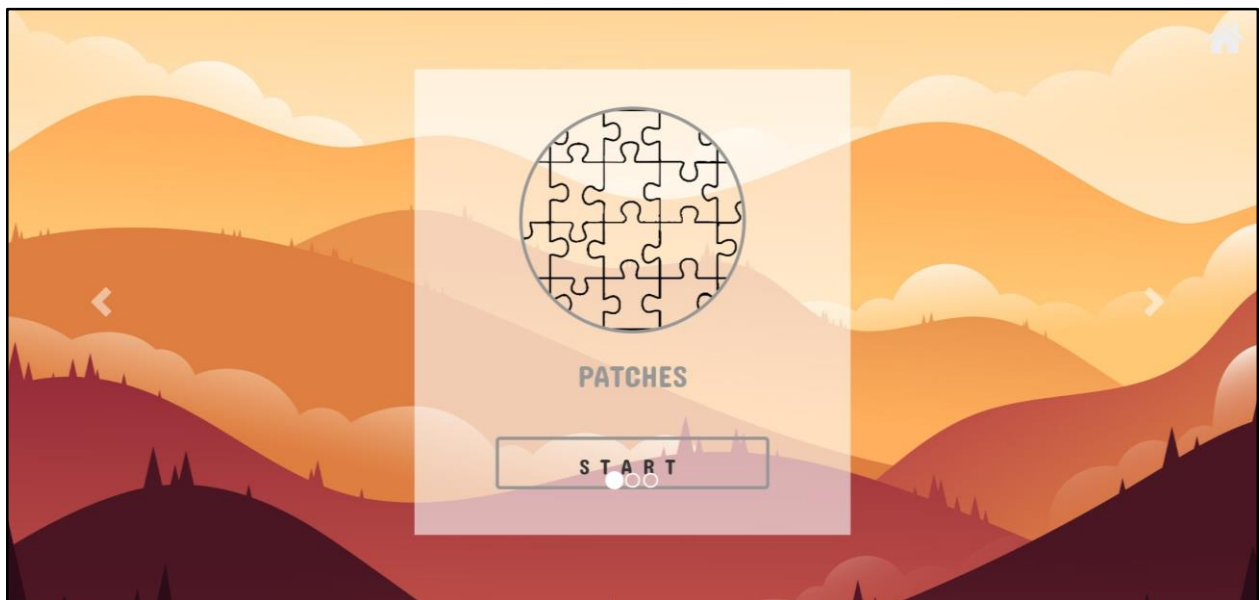
This is the sample question of ADVANCED NUMBER.

## 5.5 Lessons- Puzzle

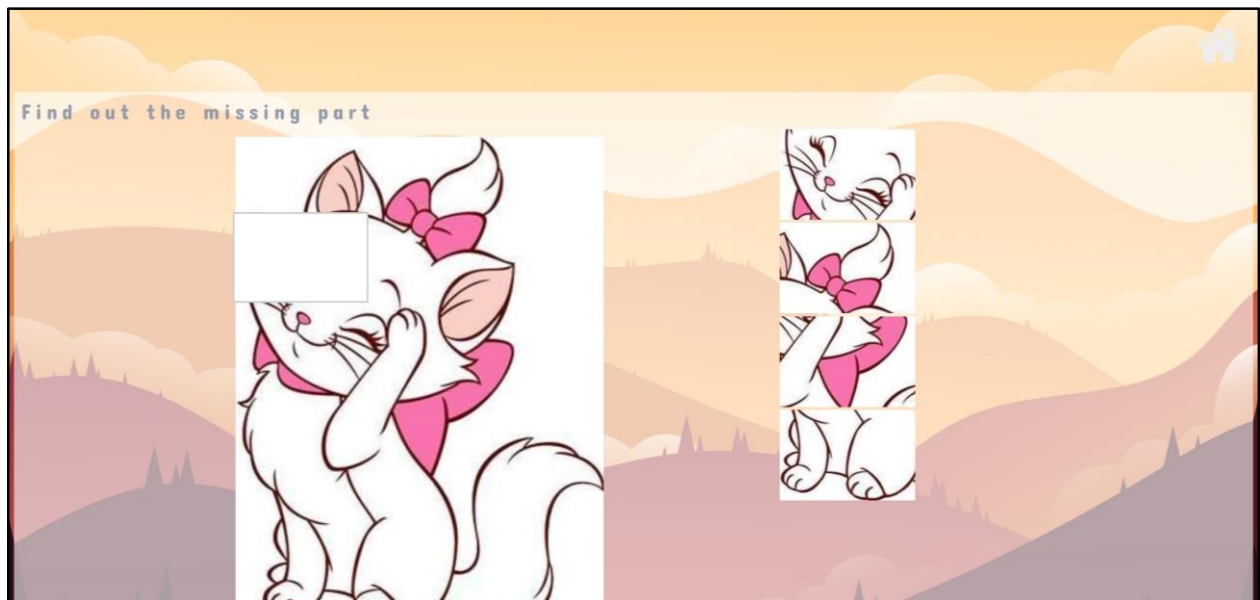


This interface is the PUZZLE Lessons interface. User has to click “CLICK ME” to start. For PUZZLE lessons, it contains three subtopics, which is PATCHES, OUTLINE and ODD ONE OUT.

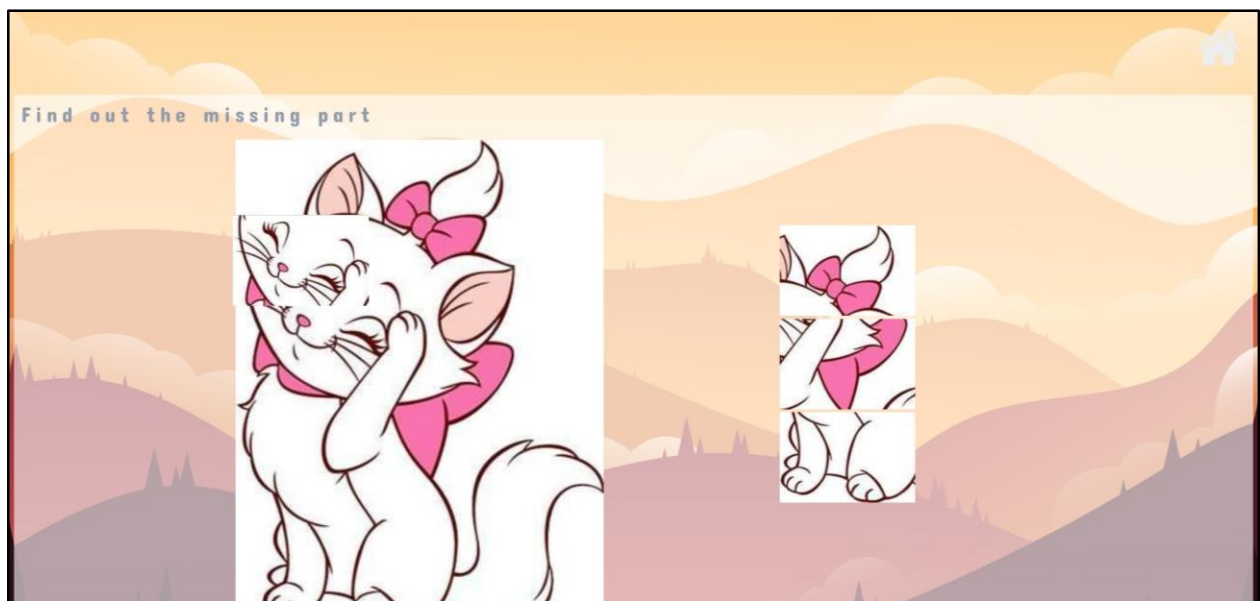
### 5.5.1 Lessons- Puzzle- Patches



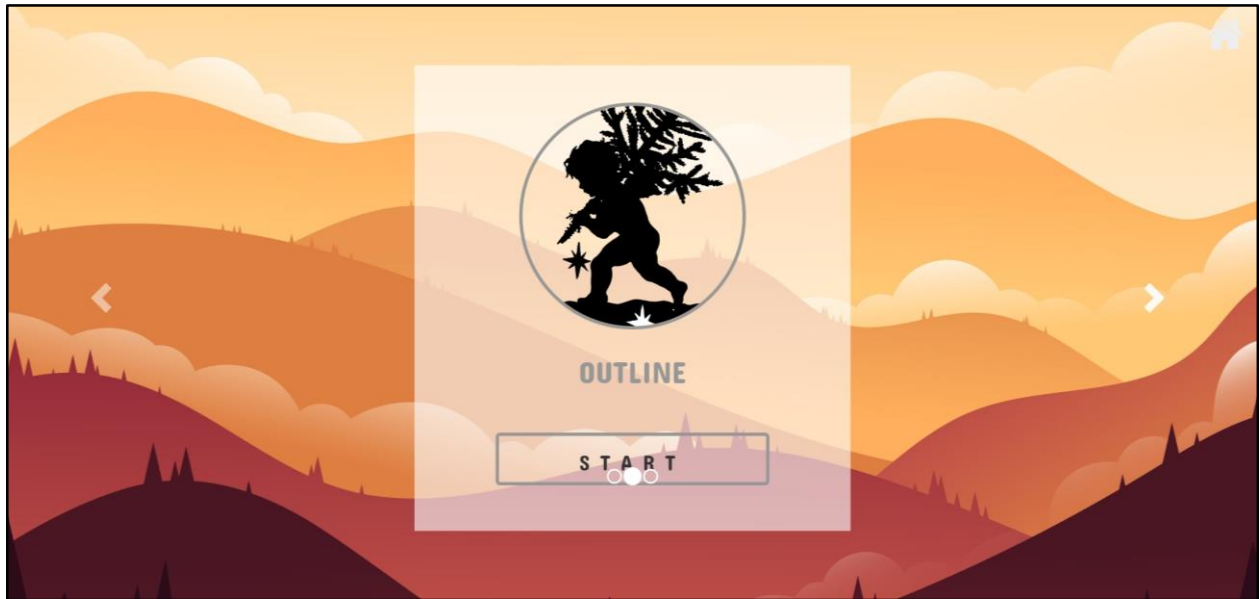
This is the PATCHES subtopics interface. For this subtopic, the user has to find out the missing piece to complete the puzzle.



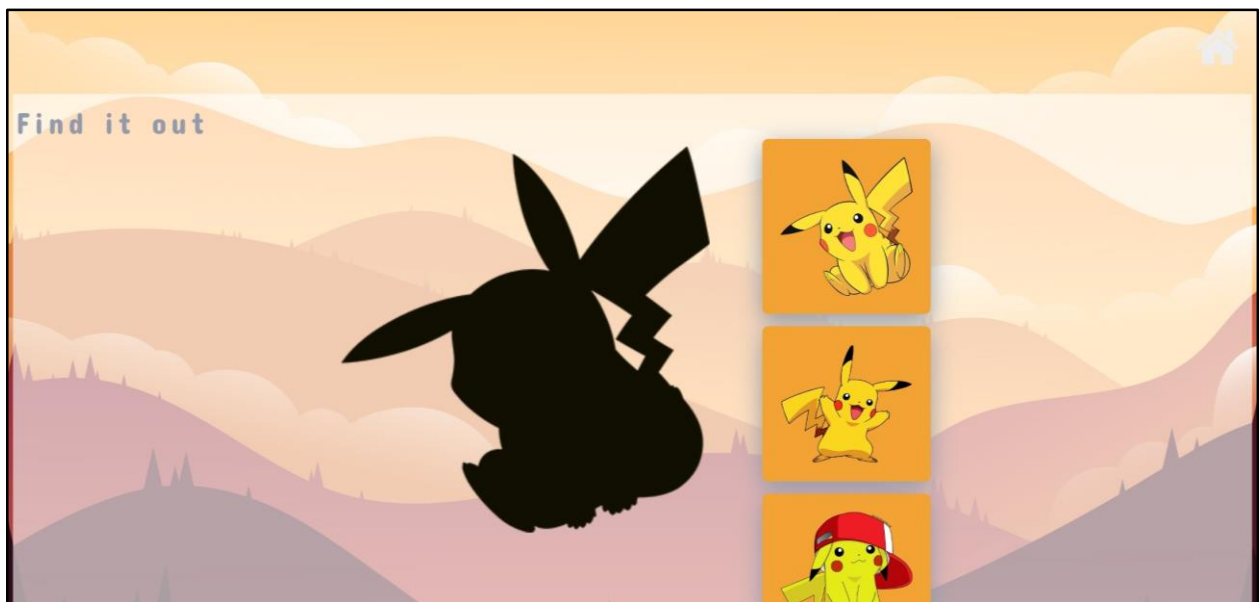
The user has to drag the missing part to the blank place.



### 5.5.2 Lessons- Puzzle- Outline



This is the OUTLINE subtopics interface. For this subtopic, the user has to find out the image that is matching the outline.



User has to analyse the outline and find out the image that is similar to the outline.



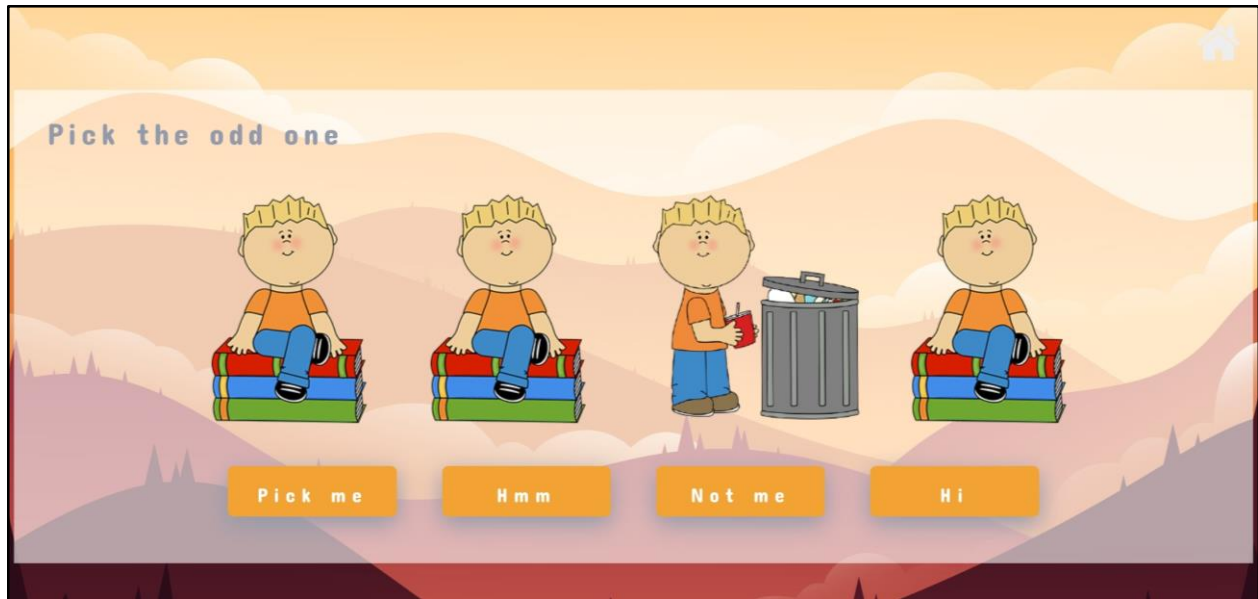


Different questions had prepared to increase the interest of the user.

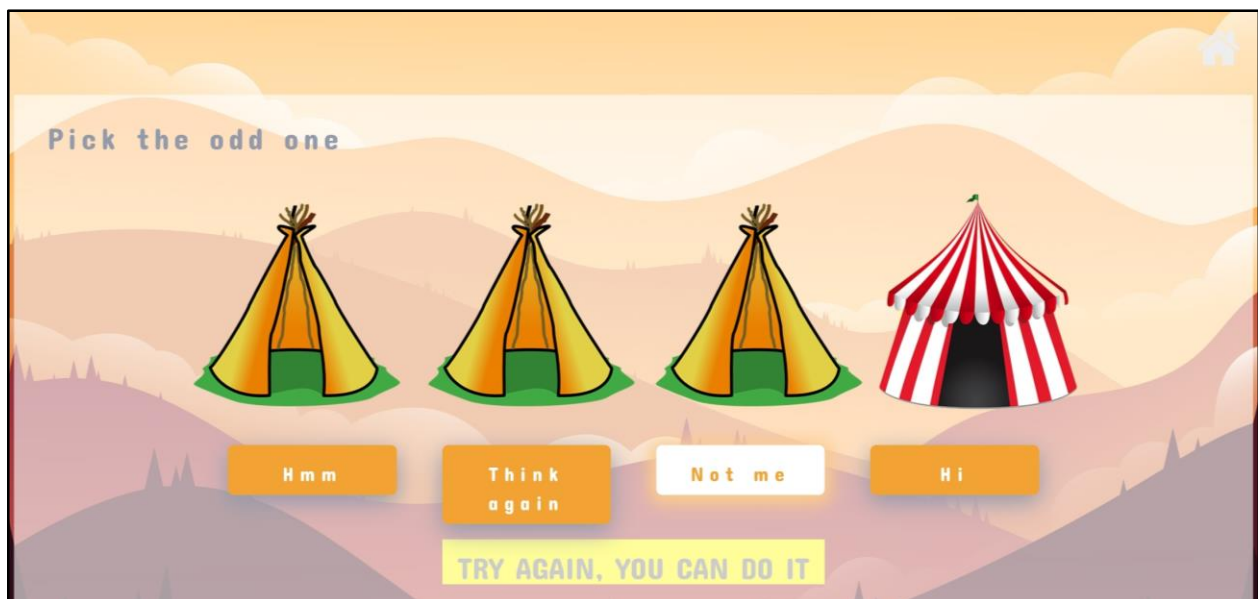
### 5.5.3 Lessons- Puzzle- Odd One Out



This is the ODD ONE OUT subtopics interface. For this subtopic, the user has to find out the image that is different from others.

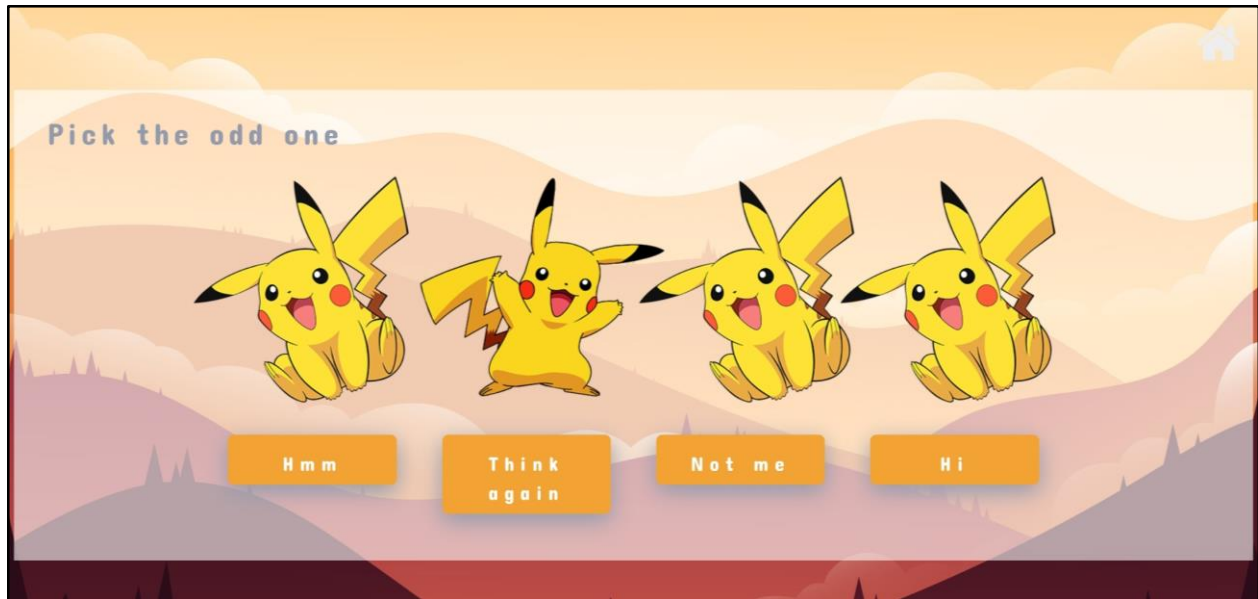


In this subtopic, the user has to analyse the differences between each cartoon and find the odd one out.



If the user clicks the wrong one, an error message will be displayed and has to try until the user choose the correct answer.





This is another type of question.



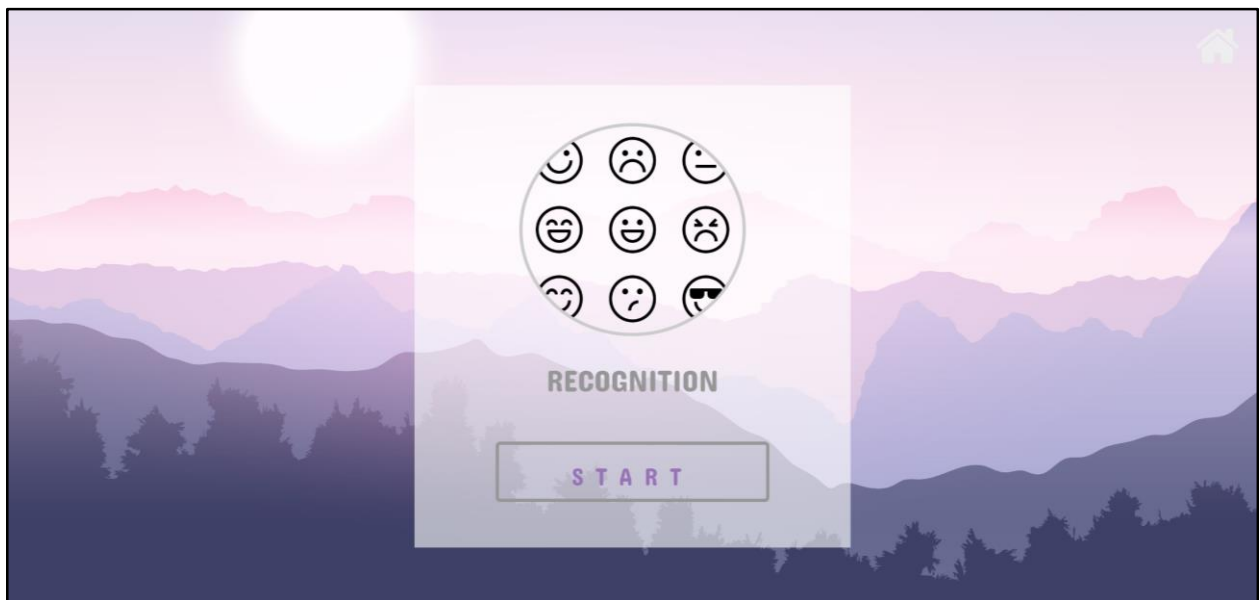
A different set of questions had been prepared to increase the interest of the user.

## 5.6 Lessons- Emotion



This interface is the EMOTION Lessons interface. User has to click “CLICK ME” to start. For EMOTION lessons, it contains only one subtopics, which is RECOGNITION. However, there is a lot of different question set had been prepared.

### 5.6.1 Lessons- Puzzle- RECOGNITION



This is the RECOGNITION subtopics interface. For this subtopic, the user can learn to recognize the emotion of others.



First type of questions is the user has to choose the answer according to the facial expression of the image.



If the user had chosen the wrong answer, an error message will be displayed. The user can only proceed to the next practice until he/she had made the correct decision.



Different sets of questions had been prepared for the users.



The other type of question is that the user has to understand the situation and make a choice.



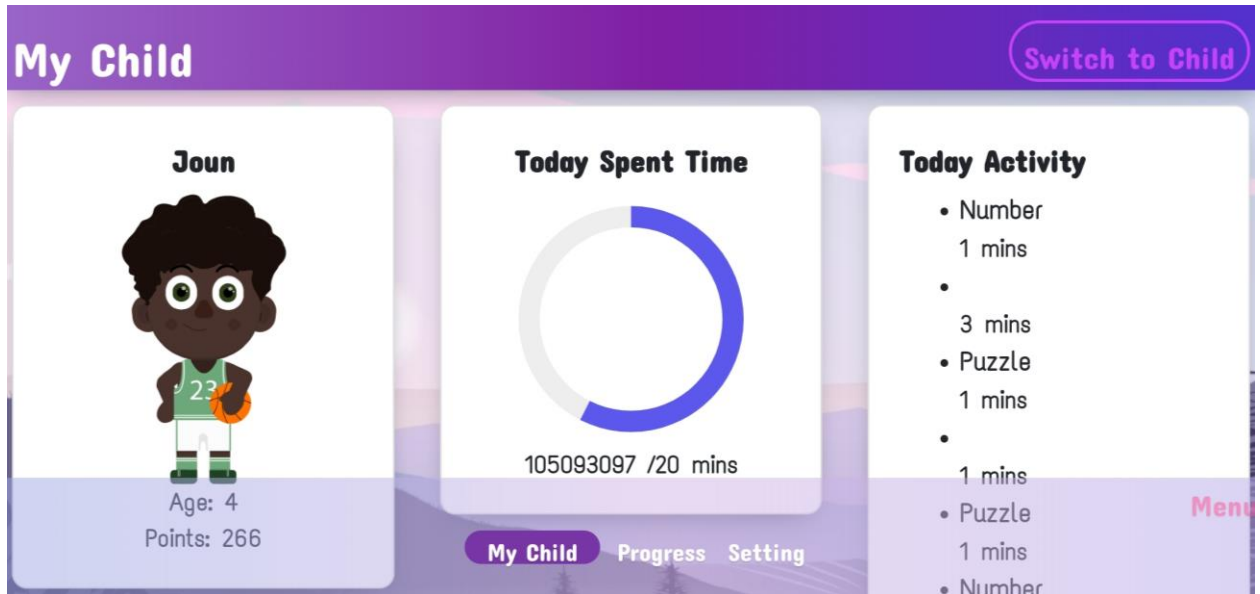
Different sets of questions had been prepared for the users.



Once the user completed the lessons, congratulation interface will be shown. Besides, the total points the user had earned will be shown as well. If the user wants to retry the EMOTION lessons, he/she can click on the retry icon. On the other hand, if the user wants to go back to the home page, he/she only need to click on the home icon.

## 5.7 Parent Interface

### 5.7.1 My Child

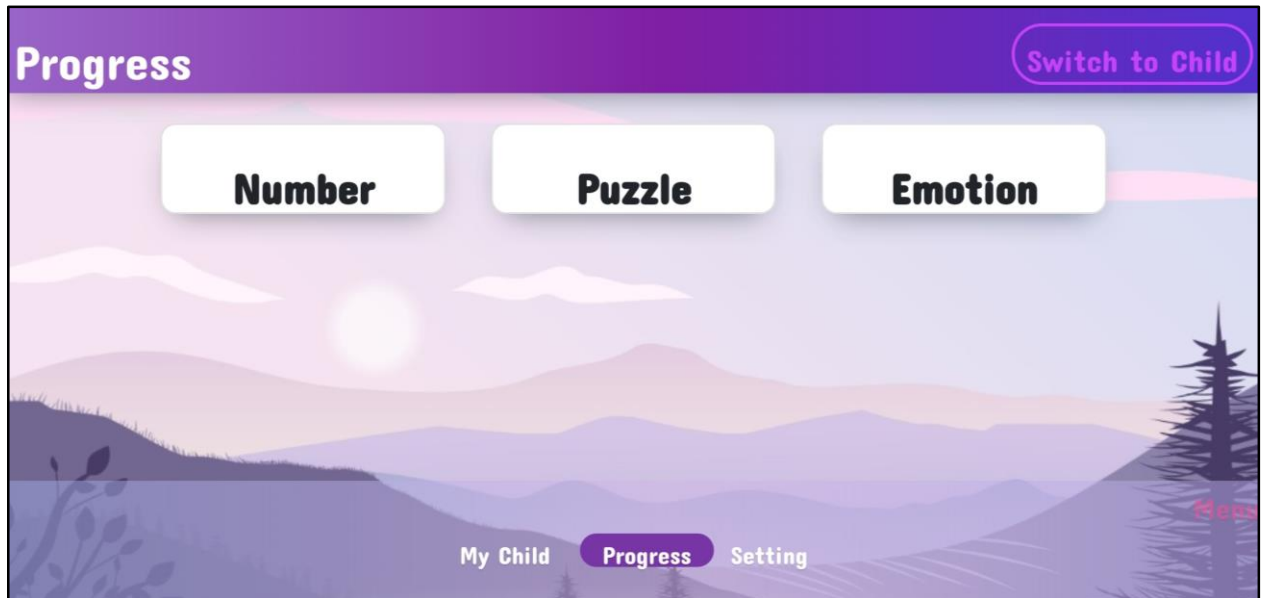


If the user tapped on the **Switch to Parent** button on the top-right of the child interface (see 5.2 Child Interface (Main)), this interface will be shown. Parents can see the summary progress of their child :-

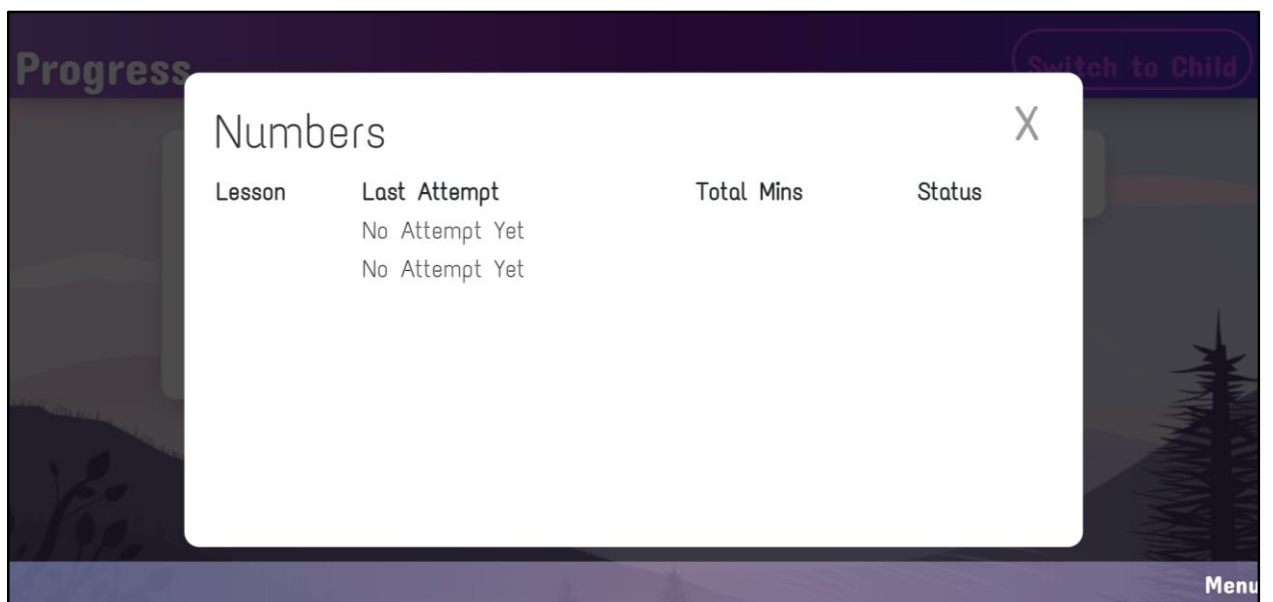
- On the left, the avatar of the child and points collected.
- In the middle, daily spent time on the application.
- To the far right, daily list of activities done.

Parent can switch back to child mode by tapping on the button at the very top on the right side.

### 5.7.2 Progress



Parents can check the progress of their child in details of each topic of the lessons such **Number**, **Puzzle** and **Emotion**.



This is the example of **Number** lesson progress. Parents can see the total time and status whether their child have completed it or not.



Progress Switch to Child

### Puzzle

Lesson	Last Attempt	Total Mins	Status
Patches	12/15/2019	2	Done
	No Attempt Yet		

Menu

This is the example of **Puzzle** lesson progress.

Progress Switch to Child

### Emotion

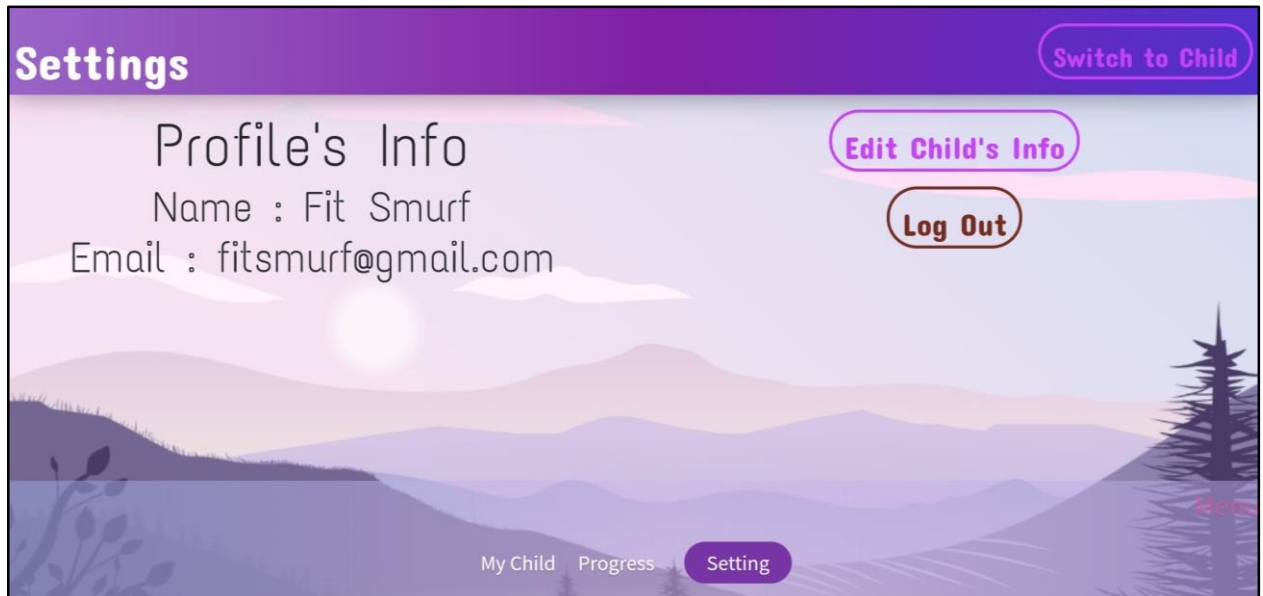
Lesson	Last Attempt	Total Mins	Status
Recognition	12/15/2019	3	Done

Menu

This is the example of **Emotion** lesson progress.

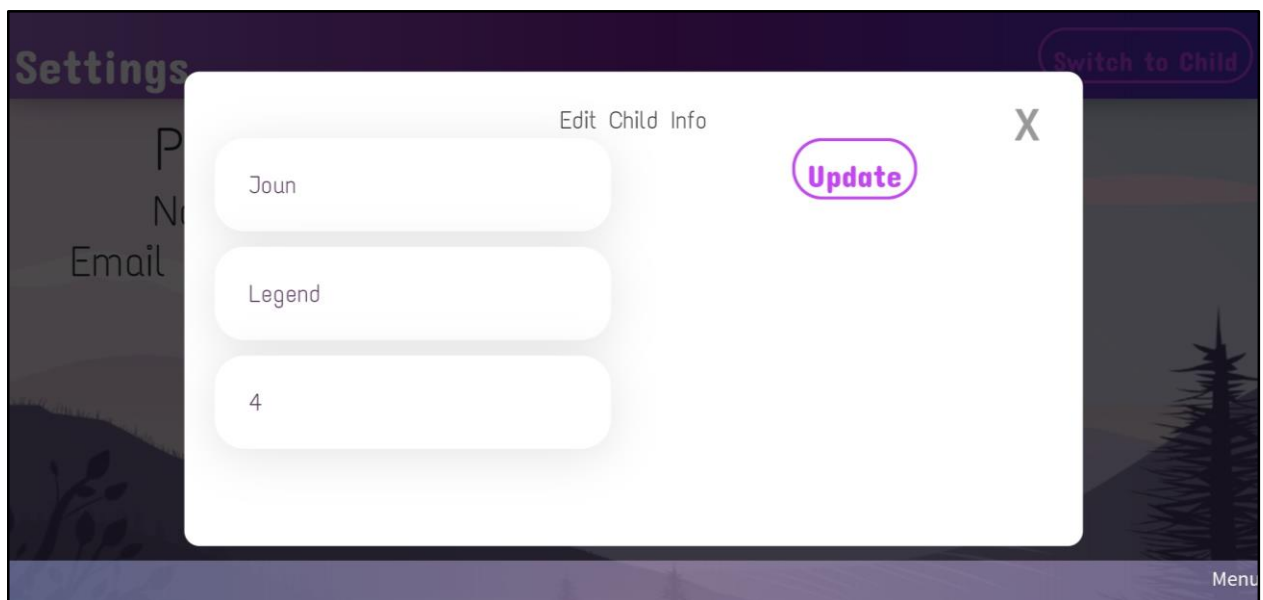


### 5.7.3 Setting



Parents can see their profile with this interface. They can also ;-

- Edit child's info by clicking the button **Edit Child's Info**
- Log out



When the user clicks the **Edit Child's Info**, this interface will pop-up and allows the user to update the child's info.

## 6.CONCLUSION

To review, the development of this project, Auducation, we have learned on how to develop and design a mobile application. With Apache Cordova, there is no big difference between web design and mobile application. Moreover, it is also easier to connect to the database with Firebase. We had learnt more in depth into app development. Beside only on developing, there is a phase where we require our soft skills. The first is being teamwork and communication, luckily our team has a lot of teamwork and a lot of commitment. Secondly is the communication with the client.

There are things that we found that might need some improvement, especially on the performance of our apps. By connecting with Firebase, the time to load slowed down the performance of our application. It took time to load the image and read the data every time the firebase api is being called. We hope to find a fix or a way to improve our app in the future.

## 7. APPENDIX



Photo 1: Our team discussion



Photo 2: Team meeting little user

## Meeting Log

<b>Log ID:</b>	L001		
<b>Date:</b>	10/10/2019		
<b>Time:</b>	4.00 pm - 6.30 pm		
<b>Location:</b>	Arked Angkasa		
<b>Meeting called by</b>	Ong Le Foo		
<b>Type of meeting</b>	Discuss on application's ideas		
<b>Note taker</b>	Tan See Jou		
<b>Attendees</b>	Ong Le Foo Tan See Jou Ahmad Fitri bin Abdul Razak		
<b>Absentees</b>	-		
<b>AGENDA TOPICS</b>			
<b>Discussion/Conclusions/Action Items</b>	<b>Person responsible</b>	<b>Deadline</b>	
<b><u>Project Objectives &amp; Scopes</u></b> - Find out about the ideas of application	All		
- Search for potential client	See Jou		
<b>[RISK/ISSUE]</b>			
<b>RISK/ISSUE UPDATE</b>	<b>STATUS</b>		
Potential client hard to contact	Solved		
<b>Prepared By</b>	Tan See Jou	<b>Approved By</b>	Ong Le Foo

<b>Log ID:</b>	L002		
<b>Date:</b>	17/10/2019		
<b>Time:</b>	4.00 pm - 6.30 pm		
<b>Location:</b>	Arked Angkasa		
<b>Meeting called by</b>	Ong Le Foo		
<b>Type of meeting</b>	Research and data analysis		
<b>Note taker</b>	Ahmad Fitri		
<b>Attendees</b>	1. Ong Le Foo 2. Tan See Jou 3. Ahmad Fitri bin Abdul Razak		
<b>Absentees</b>	-		
<b>AGENDA TOPICS</b>			
<b>Discussion/Conclusions/Action Items</b>	<b>Person responsible</b>	<b>Deadline</b>	
<u><b>Project Objectives &amp; Scopes</b></u> - Find out about the ideas of application	All		
- Search for the data	Le Foo		
<b>[RISK/ISSUE]</b>			
<b>RISK/ISSUE UPDATE</b>	<b>STATUS</b>		
There is too much data, hard to filter	Solved		
<b>Prepared By</b>	Ahmad Fitri	<b>Approved By</b>	Ong Le Foo

<b>Log ID:</b>	L003		
<b>Date:</b>	26/10/2019		
<b>Time:</b>	7.00-10.00pm		
<b>Location:</b>	Arked Angkasa		
<b>Meeting called by</b>	Tan See Jou		
<b>Type of meeting</b>	Creating first mockup and building application with wireframe		
<b>Note taker</b>	Ong Le Foo		
<b>Attendees</b>	1. Ong Le Foo 2. Tan See Jou 3. Ahmad Fitri bin Abdul Razak		
<b>Absentees</b>	-		
<b>AGENDA TOPICS</b>			
<b>Discussion/Conclusions/Action Items</b>	<b>Person responsible</b>	<b>Deadline</b>	
<u><b>Project Objectives &amp; Scopes</b></u> - Research on the suitable UI/UX	All		
-Research on the current application available	All		
<b>[RISK/ISSUE]</b>			
<b>RISK/ISSUE UPDATE</b>	<b>STATUS</b>		
<b>Prepared By</b>	Ong Le Foo	<b>Approved By</b>	Tan See Jou

Log ID:	L004		
Date:	5/11/2019		
Time:	10.00am-2.00pm		
Location:	Bilik Computer		
Meeting called by	Ahmad Fitri		
Type of meeting	Discuss on front-end technology, and improve UI design		
Note taker	Tan See Jou		
Attendees	1. Ong Le Foo 2. Tan See Jou 3. Ahmad Fitri bin Abdul Razak		
Absentees	-		
AGENDA TOPICS			
Discussion/Conclusions/Action Items	Person responsible	Deadline	
<u>Project Objectives &amp; Scopes</u> - Find out the suitable front end design	All		
-Enhance the UI design	See Jou		
[RISK/ISSUE]			
RISK/ISSUE UPDATE		STATUS	
UI hard to make as our potential user is autistic children		Solved	
Prepared By	Tan See Jou	Approved By	Ahmad Fitri

<b>Log ID:</b>	L005		
<b>Date:</b>	20/11/2019		
<b>Time:</b>	4.00 pm - 8.00 pm		
<b>Location:</b>	Bilik Computer		
<b>Meeting called by</b>	Ong Le Foo		
<b>Type of meeting</b>	Discuss on back-end technology		
<b>Note taker</b>	Ahmad Fitri		
<b>Attendees</b>	1) Ong Le Foo 2) Tan See Jou 3) Ahmad Fitri bin Abdul Razak		
<b>Absentees</b>	-		
<b>AGENDA TOPICS</b>			
<b>Discussion/Conclusions/Action Items</b>	<b>Person responsible</b>	<b>Deadline</b>	
<b><u>Project Objectives &amp; Scopes</u></b>	All		
-Discuss the back-end technology			
-Enhance the front -end technology	See Jou		
<b>[RISK/ISSUE]</b>			
<b>RISK/ISSUE UPDATE</b>	<b>STATUS</b>		
<b>Prepared By</b>	Ahmad Fitri	<b>Approved By</b>	Ong Le Foo



<b>Log ID:</b>	L006		
<b>Date:</b>	2/12/2019		
<b>Time:</b>	4.00 pm - 6.30 pm		
<b>Location:</b>	Bilik Computer		
<b>Meeting called by</b>	Tan See Jou		
<b>Type of meeting</b>	Discuss user experience and further testing		
<b>Note taker</b>	Ahmad Fitri		
<b>Attendees</b>	1. Ong Le Foo 2. Tan See Jou 3. Ahmad Fitri bin Abdul Razak		
<b>Absentees</b>	-		
<b>AGENDA TOPICS</b>			
<b>Discussion/Conclusions/Action Items</b>	<b>Person responsible</b>	<b>Deadline</b>	
<u><b>Project Objectives &amp; Scopes</b></u> -Testing the application	All		
- Search for potential user	All		
<b>[RISK/ISSUE]</b>			
<b>RISK/ISSUE UPDATE</b>	<b>STATUS</b>		
Potential client hard to contact	Solved		
<b>Prepared By</b>	Ahmad Fitri	<b>Approved By</b>	Tan See Jou

## 8.ACKNOWLEDGEMENT

In preparation for this application, we had to appreciate a few people who deserve our deepest gratitude. First, we would like to show our gratitude to our dearest lecturer, Prof Dr Mohd Shahrizal bin Sunar, for giving us a chance to have practical for application development. Through this assignment, we had the chance to explore a lot of application development tools, for example, Cordova, Laravel and so on. Besides, we also have the chance to have interaction with the outside world. We have the real experience of approaching the real stakeholder, communication with them, understanding the problems they are facing, analysis the problems together and trying to find the best and affordable solution for them. Throughout the whole project, our understanding of application development had been enhanced.

Besides, we would also like to thanks to the manager of Little Genius Center, Dr. Dayana Farzeeha Ali, for willing to have interviews session with us. We had learnt a lot especially the needs of the autistic children. Million thanks to the testing users for willing to spend their time with us for the testing sessions. Moreover, thanks to those who helped us directly and indirectly along with this assignment.

Last but not least, thanks to the teammates for spending so much time and full commitment to this assignment. The teammates give full responsibility and cooperation for everything they do. Without all the help, this assignment would not complete perfectly and on time.

## 9.REFERENCE

Azman, N, A. (2019) '*Occupational Therapy Helps People with Autism in Daily Life*'. *Star2.com*, 18 April. Available at:

<https://www.star2.com/health/2019/04/18/occupational-therapy-autism-daily-life/>

Nan Huai (2017). '*The Importance of Early Intervention in Autism Treatment*'. Available at:

<https://caramelautism.com/caramel-autism-insights/importance-early-intervention-autism-treatment/>

Autism Speak Inc (2019). *What is Autism?*. Availabe at <https://www.autismspeaks.org/what-autism>

Marine G (2016). *Atypical Color Preference in Children with Autism Spectrum Disorder*. Availabe at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5179595/>