MAKE YOUR OWN ALPHABETBOOK

CSC2002S
Assignment 4

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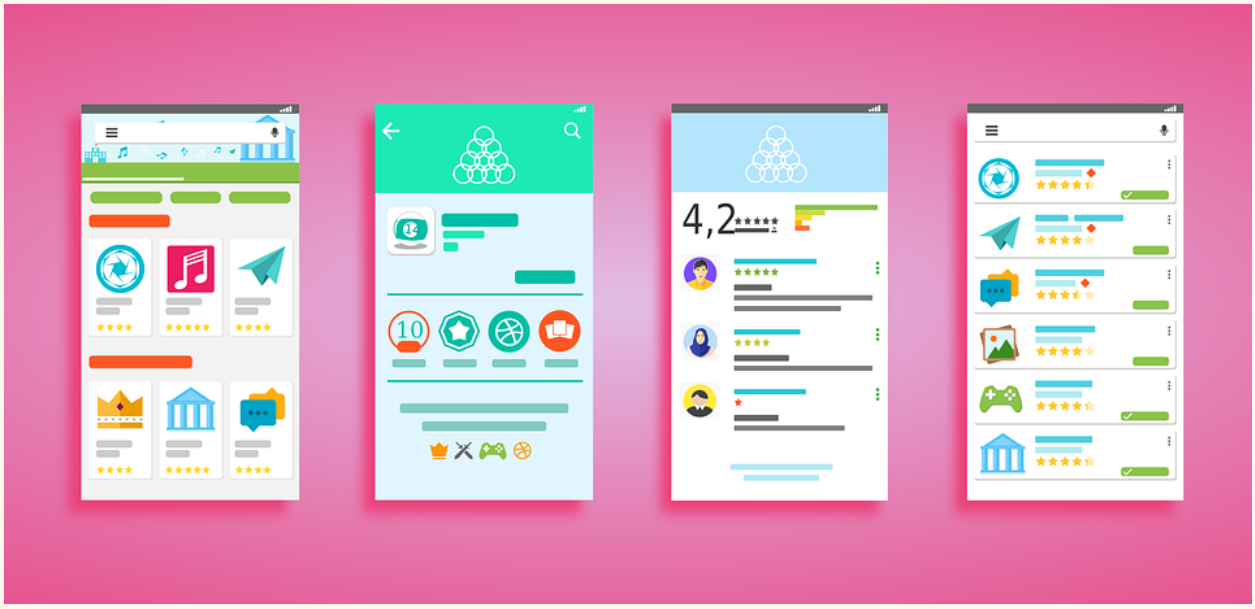


INTRODUCTION - DRAWBOOK

Overview

Drawbook is an extension of the Alphabet book app developed in the previous assignment. It is designed for touchscreen devices as it goes on to focus on education and allows the user to practice drawing the letters of the alphabet using the touch screen of their phone. This app is targeted at users, both young and old, who are learning a new language or character set. It allows users to practice writing characters by providing a drawing pad where they can draw different characters and allows them to upload their own images in different languages and uses an OCR (optical character recognition) algorithm to compare the image uploaded and what is drawn on the screen to determine whether the user has drawn it correctly. This app can highlight areas where differences are found and suggest improvements on the user's drawing so that the user can perfect the drawing of the letter. It also features a pronunciation aid which, provided the app recognises the character, will fetch the pronunciation from Google Translate and play it back to the user. It also has the option to translate it to a different language and suggest new characters based on previous characters uploaded or learnt. This works together with a feature called Talkback: Talkback provides a way for the user to practice the newly learnt pronunciation by saying the word back to the app and then receiving feedback on their pronunciation. Finally there is a "Check my progress" feature that generates a timed drawing quiz that randomly chooses a subset of the characters and gives it to the user to draw in a timed period and provides output in terms of the number of characters mastered out of the total characters on the user's profile.

I have undertaking the following steps in the development of the Drawbook app:

- Understand the requirements- this includes understanding the design and development requirements
- Enquire about users context through ethnography, surveys and data analytics.
- Analyse the requirements
- Develop a prototype (Low fidelity)
- Repeat the process until the app has been finalised. (Not applicable for this assignment)

Features

The features listed below build on the core alphabet book functionality designed in the previous phase of the assignment. Their implementation conforms to the golden rules of design and together provide a wholesome learning experience that is always accessible regardless of time or place. To save on data costs the features make use of data compression. This is vital given the economic circumstance of Africa where data is expensive and as a result the app takes longer to load as it needs to decompress the data. The features rely on technology that can be found on mobile device models from as early as 2010. This is to accommodate the fragmented distribution of mobile devices across the continent where the devices vary in screen size and hardware capability.

1. Upload your own characters

This feature allows users of the app to upload their own character set and extend and customise their learning experience to their needs and surpass language or locale restrictions. This increases the effectiveness of this app as a tool for learning as it can be used by people of various cultures or languages. It uses OCR to recognise characters or symbols in the image and creates a bitmap of the character to be used when comparing to what the user draws.

Rationale: This extends the app's usability to multiple languages and allows the user to customise their learning experience to their needs.

2. Drawing pad

This feature allows the user to practice drawing different characters and the app will be able to highlight mistakes and improvements to the user to allow them to perfect their drawing of the character.

Rationale: This feature takes advantage of the touch screen input provided by mobile phones and addresses the need for a quick, cheap and easy to use learning environment without the additional expense of paper or stationary and in some cases (with older users) also provides the teaching experience.

3. Audio Learning

The features below work together to facilitate speech learning:

a. Pronunciation Assist

This is a feature that searches Google Translate's database for common examples of the given character in words and plays a recording of how it would be pronounced. There is also the option to translate it into a different language using Google Translate API.

Rationale: This feature allows the user to learn how to say the character and also understand what it means and link it to a character in a language familiar to them through the translate functionality. This allows the app to be used by people of many different languages and completes the reading-writing-speaking pattern of learning a new language. It makes use of a reputable translation engine through Google Translate and therefore provides quality translation and pronunciation

b. Talkback

Talkback is similar to drawing pad but instead of replicating the character by drawing, you do so by saying an example word containing the character. The app listens and determines whether your pronunciation was accurate or not and gives suggestions based on your voice input.

Rationale: This feature allows the user to practice talking and saying specific characters and aids in the language learning process by providing feedback on mistakes and suggests improvements to be made. This also saves the user from feeling insecure when talking in a new language and allows them to build up confidence. It takes advantage of the microphone that is found on every phone and uses it to record the user saying the word.

4. Check your progress

Check your progress provides testing mechanisms and feedback for users to measure their progress and identify the areas that they need to focus on most. It generates a subset of the characters on the user's profile and asks the user to draw them in a given time period. The characters to be drawn are either shown or their pronunciation is played.

Rationale: Check your progress provides informative feedback based on tests to allow the user to target their problem areas. It facilitates a pressured, real-world stimulating environment where the user should be able to read and write without hesitation. In the case of teachers using it for pupils, it allows the teacher to identify the areas needing

attention and provide a tailored and unique understanding and teaching experience to each pupil.

Design

Design Principles and Heuristics Followed

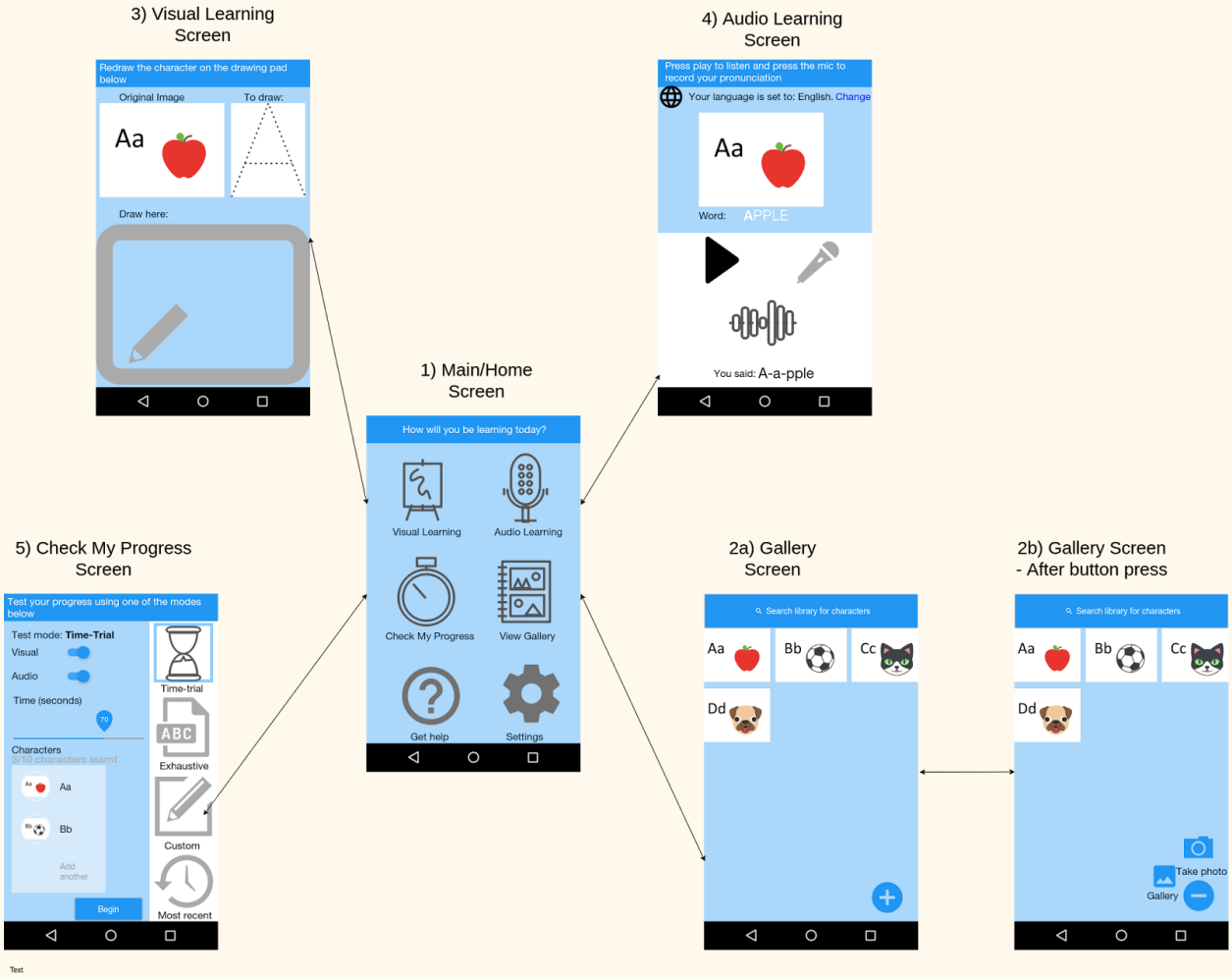
Design Principles Followed

1) Strive for consistency
2) Enable frequent users to use shortcuts
3) Offer informative feedback
4) Design dialogues to yield closure
5) Strive to prevent errors
6) Help users recover quickly
7) Allow Undo
8) Make users feel they are in control of a responsive system

Heuristics Considered

1) Recognition over recall - objects, actions, options and directions visible. User does not have to remember information from one screen to another. The user recognises familiar icons and associates them with actions.
2) Zipf's principle of least effort- Make frequent things easy, and unlikely things harder.
3) Aesthetic Usability Effect - An attractive UI is perceived to be better in terms of usability
4) Principle of Least Astonishment - The design should match the user's experience, expectations, and mental models.
5) Fitts's Law - The time to acquire a target is a function of the distance to and size of the target
6) Hick's Law - Describes the time it takes for a person to make a decision as a result of the possible choices he or she has.
7) Ben Shneiderman's Visualization Mantra - Overview, filter, details on demand
8) Colorblind users - The UI should be usable in greyscale so as to accommodate colorblind users

Prototype


3) Visual Learning Screen
Redraw the character on the drawing pad below
Original Image
To draw:
Aa
Draw here:
4) Audio Learning Screen
Press play to listen and press the mic to record your pronunciation
Your language is set to: English. Change
Aa
Word: APPLE
You said: A-a-pple
1) Main/Home Screen
How will you be learning today?
Visual Learning
Audio Learning
Check My Progress
View Gallery
Get help
Settings
5) Check My Progress Screen
Test your progress using one of the modes below
Test mode: Time-Trial
Visual
Audio
Time (seconds)
Characters
3/10 characters learnt
Aa
Bb
Add another
Begin
Time-trial
Exhaustive
Custom
Most recent
Text
2a) Gallery Screen
Search library for characters
Aa
Bb
Cc
Dd
2b) Gallery Screen - After button press
Search library for characters
Aa
Bb
Cc
Dd
Take photo
Gallery

Screens

General design principles and heuristics

The app makes use of a colorful but minimalist interface to appeal both to young kids and older users. It consistently uses visual clues and large icons so as to take advantage of Fitts law and provide recognition for those where recall is challenging.

The app avoids complex decision paths in accordance to Hicks law.

It makes use of colors that when grayscaled can still be differentiated to make the app accessible to the colorblind.

It follows a consistent layout throughout the app and follows the principle of least astonishment by following the material UI design and being as intuitive as possible.

All actions can be undone with ease by simply changing the setting back to what it was.

Informative feedback is provided through dialogue boxes (Not depicted)

Frequent actions are easily accessible and there is an easy flow between all app screens with help from the on screen back button.

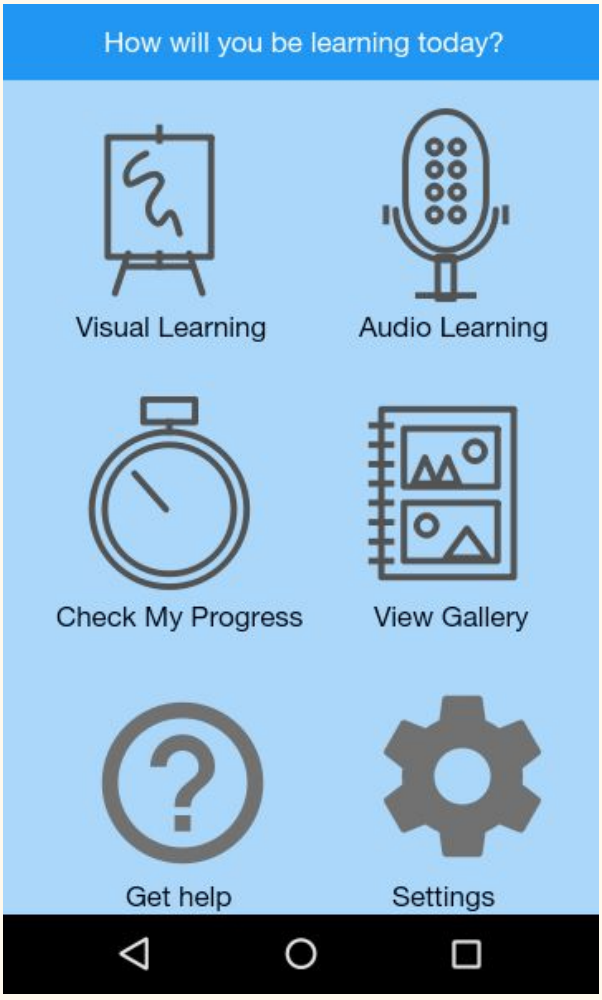
The UI used is inline with the Material Design put forth by Google and therefore helps it to be an attractive and eye catching UI.

Here below are the various screens of the app and screen specific elements:

1) Overview screen

This screen provides a layout of all the functionality provided by Drawbook

- Error handling:
  - The only errors that could occur is if there are no character images which the user can learn from (The user could perhaps have deleted the files from their gallery or renamed them). This is handled by prompting the user to add character files first.
- Design rationale:
  - The design used follows the 8 golden design principles and takes heuristics into account by using large icons to make recall easier but also has text underneath for manual recognition purposes in the case of children or elders.
  - It provides informative feedback right at the top (where the user's eye falls first)
  - It makes use of contrasting colors that would allow colorblind users
  - It takes Fick's law into account by using large icons and placing them near to each other

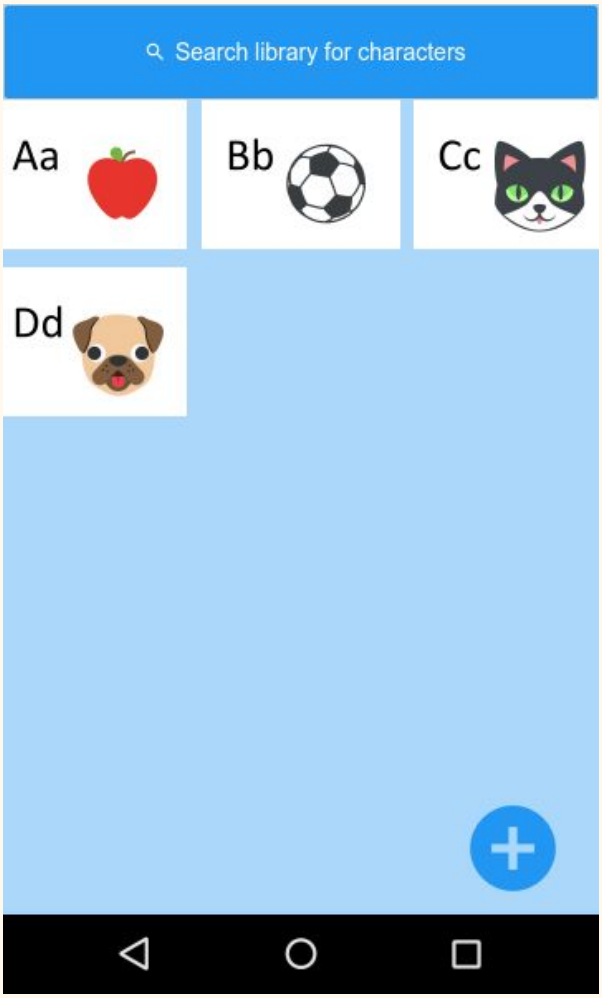


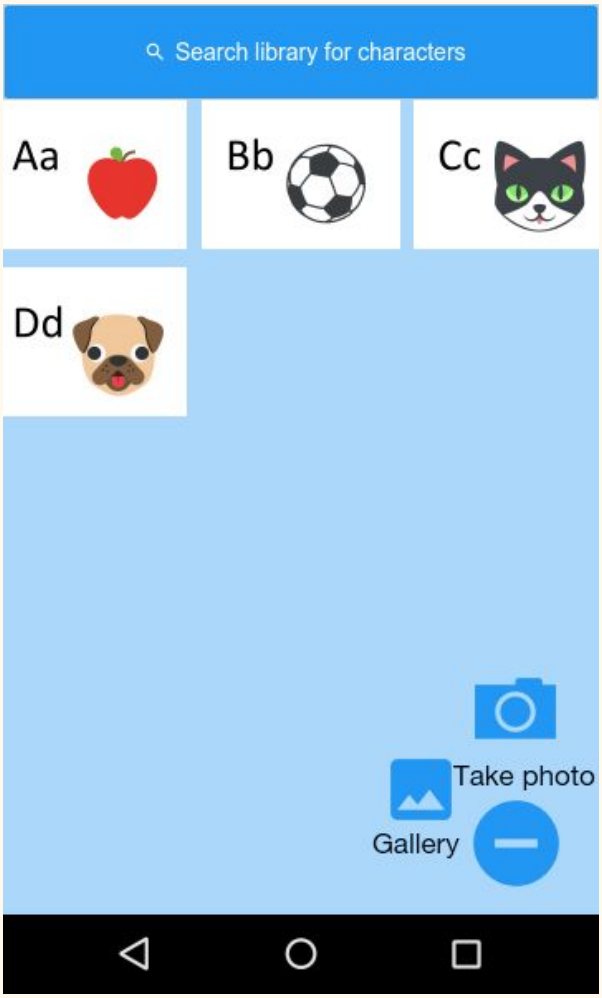
2a and 2b) View Gallery

This screen shows the characters in the library and allows the user to add more using the plus icon in the bottom right. The screenshot below the one on the right shows what happens when the plus button is pressed. The user then has the option of adding an image from their gallery or taking one with their camera. In addition to this a search function has been added via a search bar.

Error handling: Camera errors will show a message to the user that the camera is not available and that they should attempt to contact help via the start screen. Errors with retrieving files from the gallery are most likely due to the storage permissions being denied. The prompt will appear again asking the user to accept.

- Design rationale:
  - The design of this screen is coherent with the look and feel of android System UI (Material) and with the rest of the app.
  - The use of a plus bubbles in the bottom right is common practice from well designed android apps and therefore it will be easily recognizable.
  - Clicking the plus brings up another two well known icons in line with the Material UI: The “add from gallery” and “take photo” icons.
  - Adding a search bar in the top allows the user to easily search for a

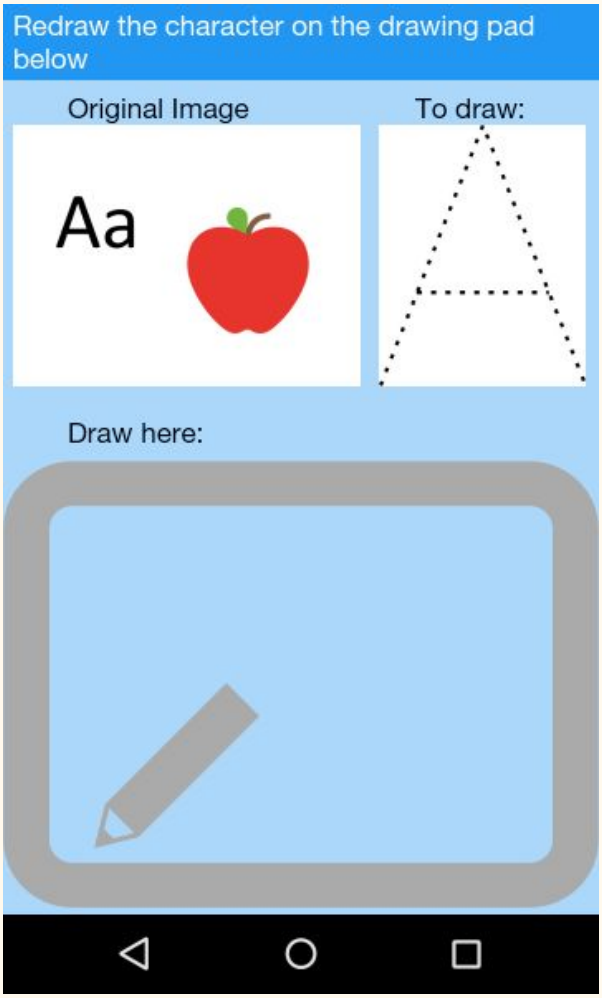


	character that they have loaded which is inline with Ben Shneiderman's Visualization Mantra by giving an overview and filtering or providing details on demand.	

3) Visual learning

This screen makes use of the drawing pad feature and provides the user with the interface to practice drawing various characters.

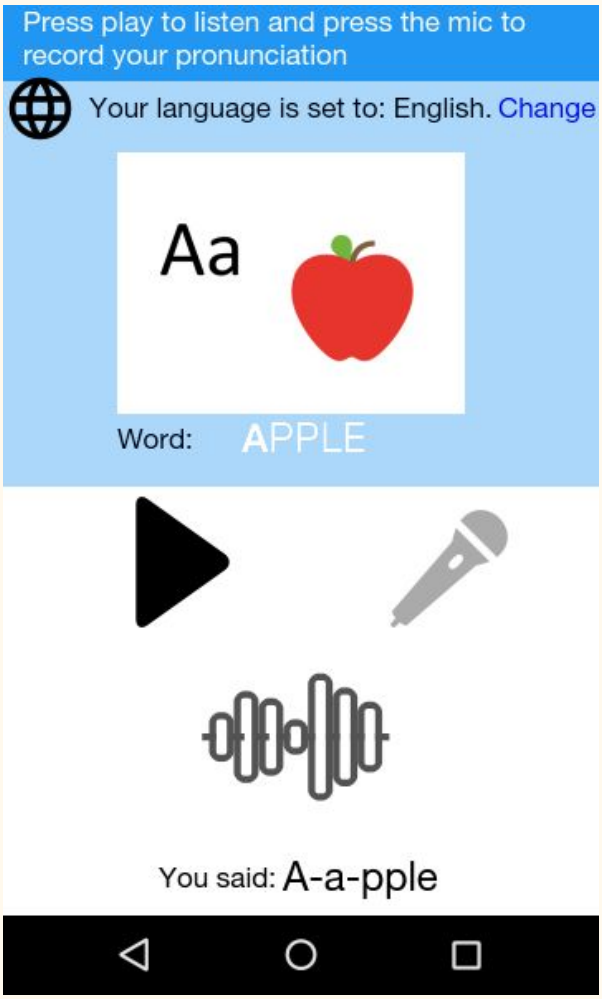
- Errors:
  - If the user makes a mistake or starts going off the track the app auto clears the drawing and provides a clean slate
- Design rationale:
  - The design continues the theme of the home page and provides clear instruction as well as visual clues as to what the user must do. This is to encourage recall over recognition.
  - The images and drawing pad are large to take advantage of Fitts law.
  - There are no complex decision trees that can be followed which takes Hicks law into account.



4) Audio learning

This screen is where the user practices their pronunciation of the characters they would like to learn by using the Talkback and Pronunciation assist features. They can also change the language that the example audio uses so as to open the app up to characters from various languages.

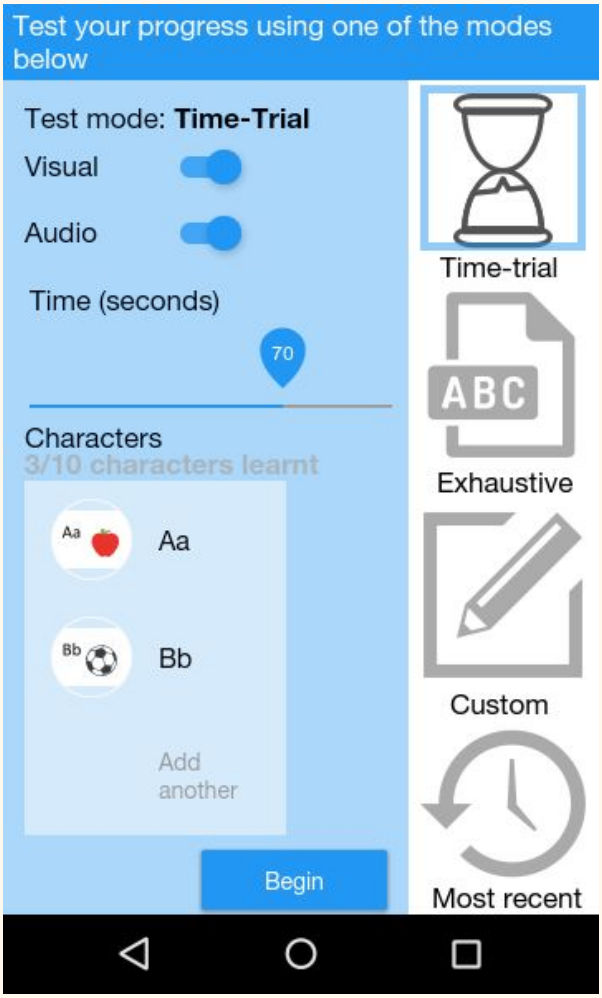
- Error handling: Once the user records their pronunciation the app either allows them to record again if they pronounced it wrong, and moves to the next letter if done correctly.
- Design rationale:
  - This screen follows suit from other screens and uses both visual clues and clear instruction on how to navigate and interact with the app.
  - The icons and symbols used are consistent with those used universally and easily identifies common actions to the user



5) Check your progress

This is the screen where the user can test their knowledge. It also provides the user with some feedback on their progress (How many characters they've learnt)

- Error handling: Errors in the form of switching off both visual and audio testing prompts the user to always have at least one of the toggles to on and disables the Begin button until at least one is on.
- Edge case handling: An edge case such as there is only one image to choose from causes the app to run as normal as it doesn't affect the main image or user sales of the app.
- Design rationale:
  - The design is both inline with the previous screens and also complies to Zipfs' principle of least effort in that it's very easy to switch between test modes and change settings
  - It uses text instructions and visual clues to inform the user on what to do.
  - It clearly provides feedback of the current state (Blue border around selected element)



CONCLUSION

Drawbook was prototyped with HCI principles in mind and using proto.io. These HCI principles as well as the features implemented were discussed in detail and a flow of app screens was also depicted.

Drawbook follows the trend of minimalistic and user friendly applications. It also adheres to the golden design principles and common heuristics. Therefore I assume it will be appreciated by all who use it