

Design Document

HCI & IV 2022

< Learning Platform for Sign Language >

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Theme D New Interaction

Introduction

As part of the course Human Computer Interaction & Information Visualisation, our team have been working on a project aiming to build a learning platform for sign language with a leap motion device.

Considering the inclusion of users and efficiency and effectiveness towards coming up with engaging ideas for the project under the limited timeframe, we chose the 'agile process' as our main strategy to work with throughout the project. As the first step of our design process, we started with understanding the target users and exploring other sign language learning applications. We believe that understanding users would guide the project more user-centred and getting inspired by other competitors would enhance our familiarity with our topic. After solidifying our understanding of users and the topic, we suggested relevant tasks and the platform structure we chose to work on.

This report will present our research data in more detail based on the given format for the design document.

Worked out the concept interface design

We have designed the interface according to a few criteria:

1. Be user-friendly. The users must not feel overwhelmed with too many features and should be able to intuitively know how and where they want to go based on the interface presented to them.
2. Be able to be accessed solely via the leap motion. We want the users to have a unique experience by allowing the user to use the application without the need for a conventional mouse to distinguish the application from similar ones.
3. Be engaging. Meaning, that we want the users to be able to learn sign language, which they are not familiar with, in an effective way through our design.

Based on these criteria, we have decided to incorporate a few key features into our design. These directions include the following:

- *Structured layout for the entire layout:* As our design direction entails multiple features at the same time for the sake of an engaging learning experience, information architecture needs to be taken into account. By having a clear hierarchy between each screen, users are expected to search and conduct our target behaviours- learning the sign language and exploring the application - with fewer hassles.
- *Interaction design:* To allow the user to achieve their objectives in the best way possible (learning sign language), we will promote the use of a leap motion device to use this application. This will force the user to be more engaged with the application, and therefore improve learnability. The interaction will be different from the experience with typical desktop applications, such as using a mouse or a keyboard as an input device, so we will accommodate these changes correspondingly.

We will also feature progress bars in varying parts of the application, to keep the user informed, and to persuade them to stay engaged.

- *Visual design:* The application will display different options in varying colours where applicable, to separate the choices and accentuate the need for the user to make a well-informed decision. Furthermore, as part of this feature, icons will be used actively to support user perception and guarantee a playful, engaging learning experience.

To improve the interaction with the interface, we thought it'd be ideal to have large UI elements. This idea was derived from Fitt's Law¹ and Steering Law². These elements will simultaneously change their hue while being hovered over, to accentuate the user's current selection.

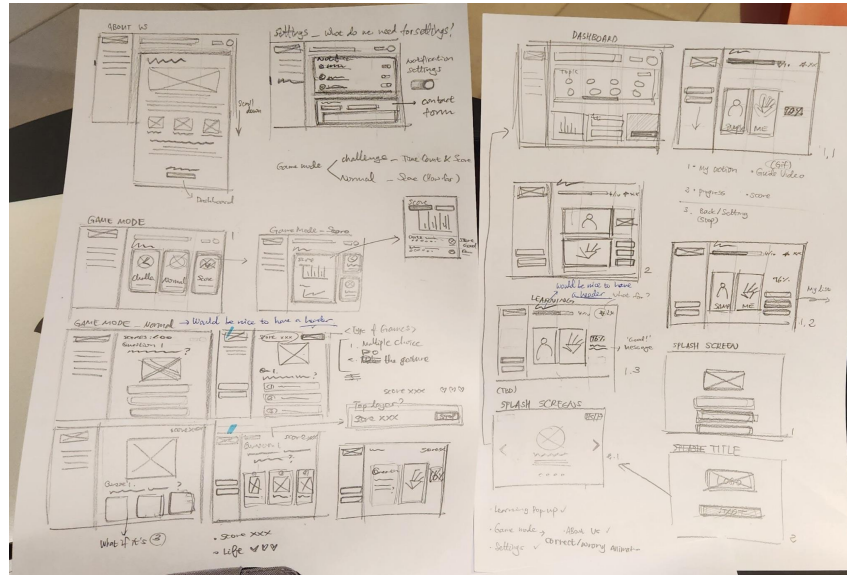
- *Enlarging most of the UI elements:* Considering the use of leap motion, the interaction would be different from the experience with typical desktop applications, such as using a mouse or a keyboard as an input device. This idea was derived from Fitt's Law and Steering Law. Therefore, we thought it'd be ideal to have large UI elements for a better, easier interaction to control the interface.
- *Highlighting important aspects of the UI:* The application will display different options in varying colours where applicable, to separate the choices and accentuate the need for the user to make a well-informed decision. Furthermore, as part of this feature, icons will be used actively to support user perception and guarantee a playful, engaging learning experience.

¹ <https://www.interaction-design.org/literature/topics/fitts-law>

² The Steering Law predicts the time necessary to steer a pointer (such as a mouse cursor) through a bounded tunnel (such as a menu, a scroll bar, or slider). The steering time depends on the length and the width of the tunnel: the longer and the narrower the tunnel, the more time will be required to successfully steer through it (source: <https://www.nngroup.com/articles/steering-law/>)

Sketches (paper) of your design

As the first step of our creation process, we came up with several paper sketches for our design. By suggesting multiple layouts for a specific feature, we were able to compare them and expand the ideas. Below shows an example of our sketches.



Detailed User analysis & Case studies

Considering the participant recruitment during our design process for research and testing, our project aims at people in their 10s or 20s and students, and who are not familiar with sign language and want to learn more about it.

Audience & Description

At the beginning, we categorised our target group and analysed their main characteristics based on our empathy. Furthermore, we conducted informal interviews with our target users and desk research to consolidate our understanding of them. Our group agreed to have several times of informal interviews, allowing us to explore user expectations or their behaviour. For this process, we tried to cover multidisciplinary information. The main topics that we aimed to explore and our motivation behind each topic were as follows.

- General behaviours
 - Daily routine: By understanding their routines, our team expected to see where our project can intervene during their daily lives. Also, this topic helped us to know their concerns in general and what makes them feel engaged or excited.
 - Digital experience: Within this topic, we aimed to check their familiarity with technology and their experiences with using technology in general. This is because our project requires a certain level of capability to use digital tools with fewer hassles while using the programme.

- American sign language
 - As this is the main topic of our project, we wanted to know their general impression and their familiarity with the learning process for sign language.

Based on the collected data, we could have a clear overview of the target audience. The chart below gives an overview of the characteristics of our target audience.

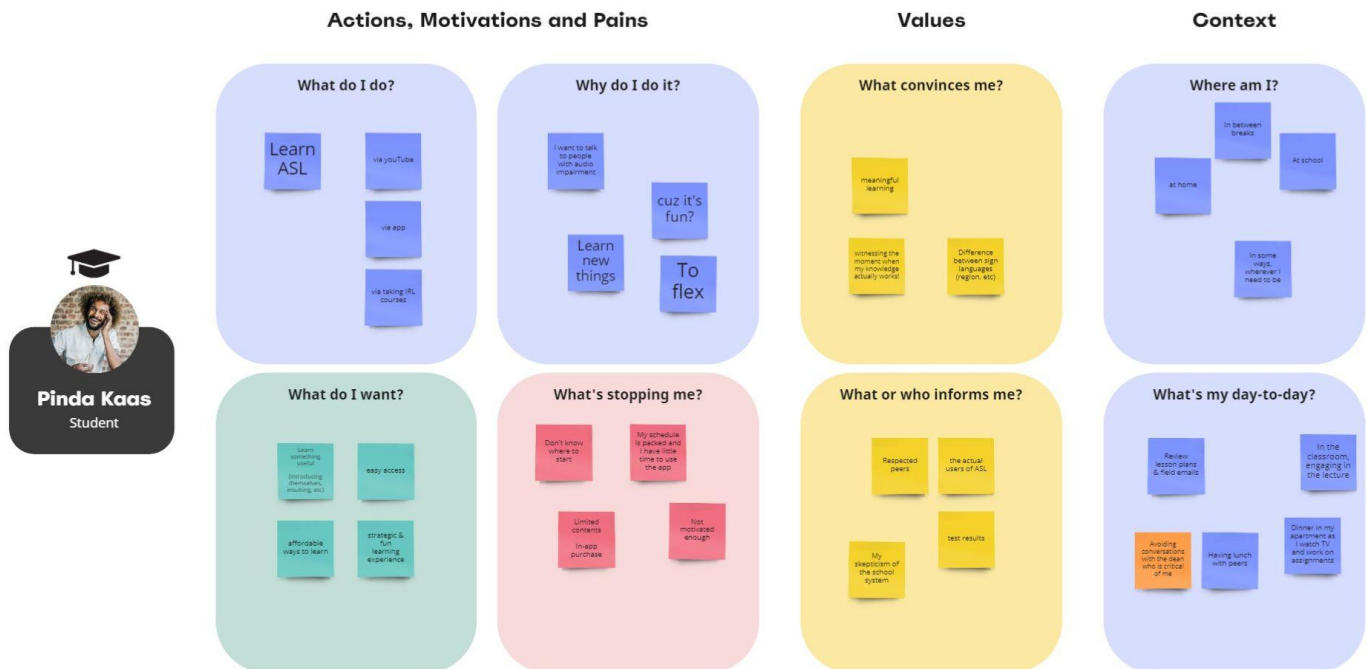
Audience	Description
people (16-27 years old)	Limited budgets
	digital natives
	seek stimulation
	Prefer short-form contents
	Not much experience with ASL or sign language in general
Students	do things with peers
	Trying out new things
	expect less-burdensome learning experience
Actual sign language users	Hearing or speech impairment
	not familiar with ASL (for those who are from different sign language cultures)

After then, we created a set of user stories based on the collected data and personal experiences. This chart presents the users' needs and expectations in a clear format. Through this data, our group was able to define the problem and point out which factors to consider to come up with a user-centred design in the field of a learning platform for sign language.

User Stories

NO	As a user, I want to.. (needs)	So I can...
1	Learn ASL	understand other people better
2		Tried out a new thing (some people just try out different things)
3	keep track of progress (see relevant statistics)	see how well I did
4	Follow the steps to start a valid instance	Learn better / Learn how to apply what I learned to IRL cases
5	Choose a game mode	engage myself with the interface (having fun)
6	choose a different theme/ subcategories	enjoy the learning material (feel less bored) / Feel more responsible (doing what I chose to do)
7	See previous learning material	remember what I learned yesterday
8	see if my gesture is correct	understand better and correct myself if there's a mistake
9	have a dictionary	can find when I want to search something

Later on, we created a concrete user persona clearly presenting their motivations and pain points, and other relevant supportive descriptions to enhance our understanding of the target users.



< Overview of User Persona >








Below you can see the details of the suggested user persona.

User persona: Pinda Kaas (student)		
Actions, Motivation, and Pains	What do I do?	Learn ASL via YouTube, app(s), or take offline courses
	Why do I do it?	<ul style="list-style-type: none"> - I want to talk to people with audio impairment - For fun/curiosity - Learn or try out new things
	What do I want?	<ul style="list-style-type: none"> - Learn something useful (introducing themselves, insulting, etc) - easy access - affordable ways to learn - strategic & fun learning experience
	What's stopping me?	<ul style="list-style-type: none"> - Don't know where to start - My schedule is packed and I have little time to use the app - Limited contents (In-app purchase) - Not motivated enough
Values	What convinces me?	<ul style="list-style-type: none"> - Meaningful learning - witnessing the moment when my knowledge actually works! - Difference between sign languages (region, etc)
	What/Who informs me?	<ul style="list-style-type: none"> - Respected peers - the actual users of ASL - test results
Context	Where am I?	<ul style="list-style-type: none"> - In between breaks - At school - At home - In some ways, wherever I need to be - Traffic (commute)
	Day-to-day routine	<ul style="list-style-type: none"> - Review lesson plans & field emails - In the classroom, engaging in the lecture - Having lunch with peers - Dinner in my apartment as I watch TV and work on assignments

Our team was also not familiar with sign language so we started by consolidating our understanding of the chosen topic. As a first step, we conducted case studies to inspire ourselves and see how different approaches to learning sign language through mobile or

desktop applications. Eventually, we could see the pros and cons of each example and we were able to learn from the examples.

How other sign language teaching/learning app work

 <p>ASL Tutor</p> <p>Home Projects ASL Tutor featured on the Leap Motion blog. Deaf people have significant things to offer to society, yet they are often left out of critical dialogues because of communication barriers. ASL Tutor is a Reverse Store for sign language. It is...</p>	<p>ASL tutor (Leap Motion)</p> <p>Advantages</p> <ul style="list-style-type: none"> • Very simple • Moves to the next part automatically <p>Disadvantages</p> <ul style="list-style-type: none"> • Outdated layout (gamification is not clearly visible) • Time limit (is this good for learning setup?) <p>Idea</p> <ul style="list-style-type: none"> • The use of Leap Motion <p><i>If we are having a quiz before, how do users choose an option? How to go to the next lesson?</i></p>	 <p>The ASL App</p> <p>Advantages</p> <ul style="list-style-type: none"> • Clear overview of the course structure • ASL & American Sign Language • Take colour diversity • Videos with diverse actors (only hands, shoulder, whole body) • Features • Slow-motion availability • Free sign (Phonics / Spelling) • Hand exercises <p>Disadvantages</p> <ul style="list-style-type: none"> • In-app purchase • Only mobile-based • Keep pressing the refresh button to replay • Not many exercises • Memory volatility? • Am I doing right? <p>Idea</p> <ul style="list-style-type: none"> • Slow motion availability • Displaying innovative video clearly enough • How can we support memory volatility of users? • Hand exercises as a cultivating process for learners 	 <p>IRL course</p> <p>Advantages</p> <ul style="list-style-type: none"> • Direct feedback • Structured learning experience • Social interaction (activities with other people/social factor) <p>Disadvantages</p> <ul style="list-style-type: none"> • Too expensive • Depending on time/place • These make the content less accessible to students/our target audience <p>Idea</p> <ul style="list-style-type: none"> • Social factor • Direct (immediate) feedback
 <p>Fingerspelling</p> <p>Available via Chrome/Edge</p>	<p>Fingerspelling.xyz</p> <p>Advantages</p> <ul style="list-style-type: none"> • Nice branding & UI design • Easy to use (using only gestures & drawings) • Fingerspelling (no ASL) provides a good starting point • Clearly show what is being (showing progress) • Connective Rate • My progress • What to learn <p>Disadvantages</p> <ul style="list-style-type: none"> • Can't go back to where you left • Sometimes need to calculate (what you can't detect) <p>Idea</p> <ul style="list-style-type: none"> • Branding (catchy colours) • Copy others and try doing • Alphabet, repetitive learning 	 <p>ASL Pocket Sign</p> <p>Advantages</p> <ul style="list-style-type: none"> • Traditional gamification • Self-learning method • Exercise themes • Repetitive learning • GIF to repeat the gestures • A Clear Overview & Progress <p>Disadvantages</p> <ul style="list-style-type: none"> • Is my gesture right? • Free Daily Lesson • Not full practice (demonstrating users) <p>Idea</p> <ul style="list-style-type: none"> • Repetitive teaching to enhance memory • Open as a learning method • A Clear Overview & Progress 	 <p>YouTube Contents</p> <p>Advantages</p> <ul style="list-style-type: none"> • Easy access • No need to sign up or pay • Follow the course anywhere/anytime • Not too long contents (short-form) • Diverse contents / theme • Universal (for personal/customised) • Light but not overrated • Hard to see personal progress (overall) • Am I doing right? <p>Disadvantages</p> <ul style="list-style-type: none"> • Short-form contents → making the course more algorithmic • Interaction with other people? (having social factors in the app would be fun) • Answering & replying • Showing feedback is essential <p>Idea</p> <ul style="list-style-type: none"> • Showing feedback is essential
 <p>Lingvano: Sign Language - ASL Apps on Google Play</p> <p>Helpful for sign language learning for beginners, learn ASL, all designs & all activities</p>	<p>Lingvano</p> <p>Advantages</p> <ul style="list-style-type: none"> • Camera (direct) to see my action • Not identical (it's camera not real) • Progress bar • Repetitive video gift • Sequence Learning video + quiz • Daily lesson • Showing extra tips (i.e. descriptions in all capital letters, word family) • Good platform screen with a nice illustration • Activity fill the dialogue <p>Disadvantages</p> <ul style="list-style-type: none"> • Slippy process at the very beginning • Slippy process • Missed content • Too much white space • Not too bad • Next button is at the bottom <p>Idea</p> <ul style="list-style-type: none"> • Branding (catchy colours) • Sequence learning video + quiz • Daily lesson • Good platform screen with a nice illustration • Activity fill the dialogue 		

< Overview of Case Studies >

The following shows the details of our case studies.

In real-life course	
Advantages	<ul style="list-style-type: none"> • Direct feedback • Structured learning experience • Social interaction (activities with other people/social factor)
Disadvantages	<ul style="list-style-type: none"> • Too expensive • Depending on time/place <ul style="list-style-type: none"> ◦ These make the content less accessible to students/our target audience
Idea	<ul style="list-style-type: none"> • social factor • Direct (immediate) feedback

YouTube Contents	
Advantages	<ul style="list-style-type: none"> • Easy access <ul style="list-style-type: none"> ◦ No need to sign up or pay ◦ Follow the course anywhere/anytime • Not-too long contents (short-form) • Diverse contents/theme

	<ul style="list-style-type: none"> • checking YouTube comments is also fun
Disadvantages	<ul style="list-style-type: none"> • Universal (Not personal/customised) <ul style="list-style-type: none"> ◦ Users feel less connected • Hard to see personal progress (overall) • Am I doing right?
Ideas	<ul style="list-style-type: none"> • short-form contents > making the course more digestive • Interactions with other people? (having social factors in the app would be fun) • Anywhere & anytime • Showing feedback = essential

The ASL app https://theaslapp.com/	
Advantages	<ul style="list-style-type: none"> • Clear overview <ul style="list-style-type: none"> ◦ the course structure ◦ ABC & numbers • Skin colour diversity • Videos with diverse shots: only-hands, shoulder, whole • Features <ul style="list-style-type: none"> ◦ Slow-motion availability ◦ Play again / Share / Save • Hand exercises
Disadvantages	<ul style="list-style-type: none"> • In-app purchase • Only mobile-based • Keep pressing the refresh button to replay • Not many contents • Memory volatility! • Am I doing right?
Ideas	<ul style="list-style-type: none"> • Slow-motion availability • Displaying instructor video clearly/big enough • How can we support the memory volatility of users? • Hand exercise: as a calibrating process & for learners

ASL Pocket Sign https://play.google.com/store/apps/details?id=com.mobireactor.signlanguage&gl=US&pli=1	
Advantages	<ul style="list-style-type: none"> • Dictionary • Gamification • Quiz: learning method • Diverse themes • Repetitive teaching • GIF to repeat the gestures • A Clear Overview & Progress

Disadvantages	<ul style="list-style-type: none"> • Is my gesture correct? • Free 'Daily Lesson' <ul style="list-style-type: none"> ◦ Not full access: demotivating users
Ideas	<ul style="list-style-type: none"> • Repetitive teaching to enhance memory • Quiz as a learning method • A Clear Overview & Progress

ASL tutor (Leap Motion) https://www.samuelstaylor.org/projects/asl-tutor.html	
Advantages	<ul style="list-style-type: none"> • VERY SIMPLE • Moves to the next part automatically
Disadvantages	<ul style="list-style-type: none"> • Outdated layout (gamification is not visible) • Time limit (Is this good for learning setup?)
Ideas	<ul style="list-style-type: none"> • The use of Leap Motion

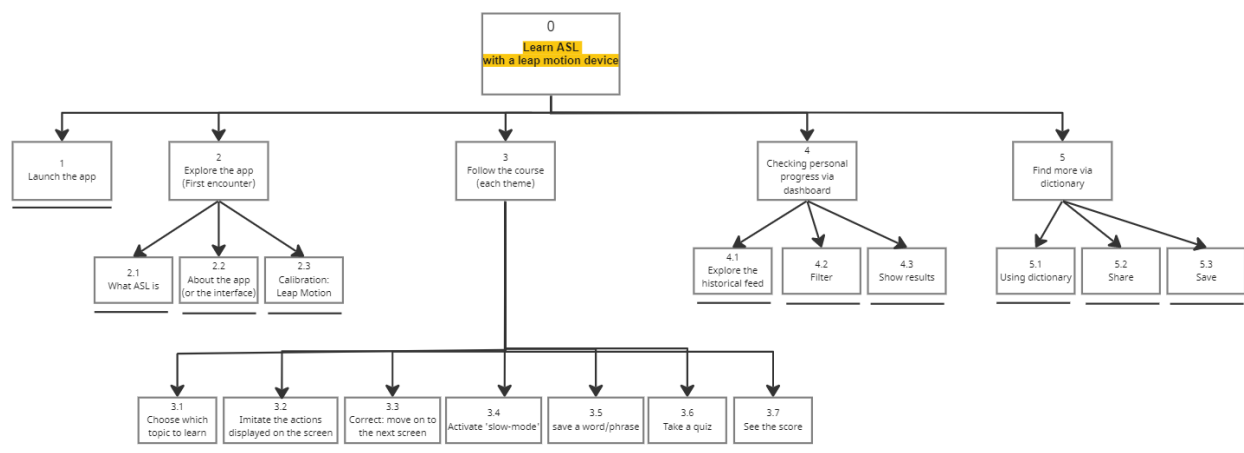
Fingerspelling.xyz https://fingerspelling.xyz/	
Advantages	<ul style="list-style-type: none"> • Nice branding & UI design • Easy access (using only webcam & desktop) • FOCUSING ON ALPHABETS: REPETITIVE • Clearly show what I'm doing (showing progress) <ul style="list-style-type: none"> ◦ Correctness Rate ◦ My gesture ◦ What to learn
Disadvantages	<ul style="list-style-type: none"> • Can't go back to where you left • Sometimes need to calibrate (webcam can't detect)
Ideas	<ul style="list-style-type: none"> • Branding (catchy colours) • Clearly shows what I'm doing • Alphabet: repetitive learning

Lingvano https://play.google.com/store/apps/details?id=com.lingvano.app&gl=US	
Advantages	<ul style="list-style-type: none"> • Camera (mirror): to see my action <ul style="list-style-type: none"> ◦ But doesn't tell if it's correct or not • Slow-mode • Progress bar • Repetitive video (gif) • Sequence Learning video > quiz • Daily Streak • Sharing extra tips (I.e. descriptions in all capital letters, word order)

	<ul style="list-style-type: none"> • Good job/finish screen with a nice illustration • Activity: Fill the Dialogue
Disadvantages	<ul style="list-style-type: none"> • SignUp process at the very beginning • In-App purchase • Mobile Based • Too much white space <ul style="list-style-type: none"> ○ Font is relatively small ○ next button is at the bottom
Ideas	<ul style="list-style-type: none"> • Branding (catchy colours) • Sequence learning: Video > Quiz • Daily Streak • Good job/finish screen with a nice illustration • Activity: Fill the Dialogue

Task analysis (hierarchical diagram), Storyboard & Sitemap

By working on the task analysis activity, we could see which tasks the user needs to go through to perform a specific task and experience the whole application.



< Hierarchical Diagram >

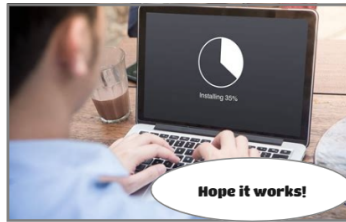
In this application, there are five main tasks- launching the application, exploring the application with the leap motion device, following the course, checking the personal progress via 'Dashboard' and finding more information via dictionary. Instead of immediately guiding users to take the lessons, the task 'Explore the app' has to be the second task during the entire user journey. Based on a study, we found that a lack of familiarity with the tool and the topic reduces user engagement (O'Brien et al., 2018). Therefore, we thought it'd be nice to inform users through a simple set of screens. After getting used to the interaction on the application, users will be guided to follow the learning process and explore other features. Ideally, our approach contains extended approaches. However, considering the given time and the skills we have, we decided to focus on the MVP (minimal viable product) part. The flow of the tasks that are

mentioned in this chart will be used as inspiration for us to formulate the setup of evaluation phases.

The storyboard is aimed at presenting the entire experience of the user- from the problem status to the moment after experiencing the suggested application. Also, by showing the emotions and thoughts of the user while interacting with the application, our team could have a better understanding of our project direction.



Pinda Kaas (student, 19) wants to learn something new, such as sign language.



Pinda Kaas goes to a website and download the app and its toolkit (leap motion).



Pinda Kaas starts to understand how the app works & the basic of ASL.



Pinda Kaas is learning ASL within different themes and how to interact with Leap Motion. The feedback from the app makes him feel he's on the right track.



After passing the small test with a good score, Pinda Kaas is proud of his daily achievement.



Pinda Kaas feels more achieved after checking his progress.



Pinda Kaas is searching for sign language he wants to know more about through an in-app dictionary. Whenever he finds something interesting, he shares it with his friends.



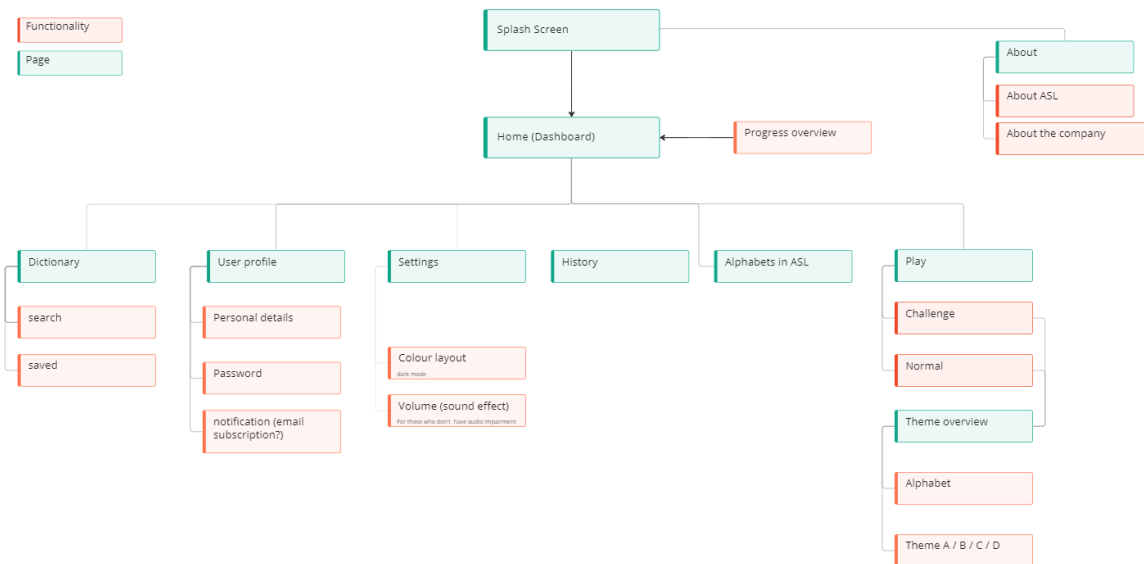
A friend of Pinda Kaas, Kip Kerrie (student, 18) thinks the app & ASL are interesting.



Pinda Kaas looks forward to learning more ASL tomorrow.

< Storyboard >

The following chart, a sitemap, shows the structure of our application. This helped us to understand the connections between each feature and the screens from the perspective of information architecture. Briefly, it starts with a set of splash screens presenting the instructions and moves to the first landing page- the homepage. On this page, users can easily navigate six features, and each entails further actions.



< Sitemap >

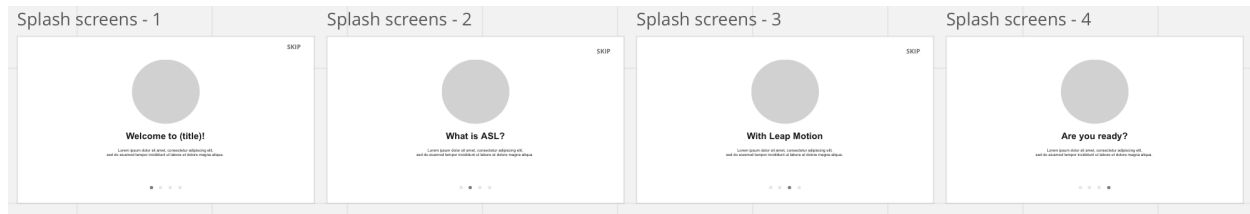
Sketch of your interface/information display (Wireframes)

Below shows the wireframes of our interface step by step. The descriptions for each design element are based on the book 'Designing Interfaces 3rd edition (2020)' written by Jennifer Tidwell.



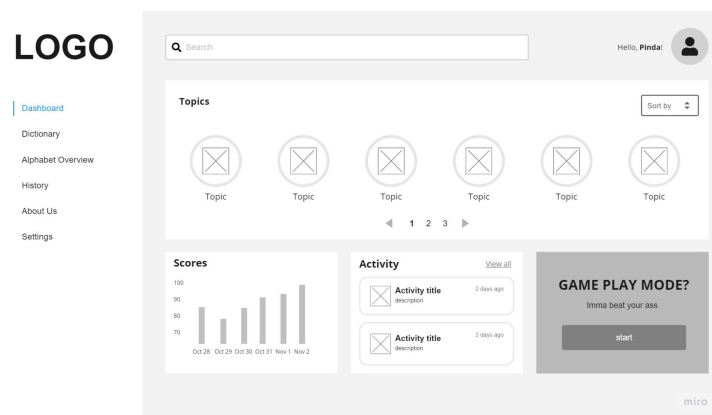
< 1. Title Screen >

This is the first screen when the user launches the app for the first time. This clear entry point welcomes the users. They can move to the next screen easily by pressing a big CTA (call-to-action) button, which seizes the attention of users effectively.



< 2. Splash Screens >

Formulating a positive initial impression links to how well users perceive an application (Lindgaard et al., 2006; Zhou, 2012). Therefore, the app does not only start with a catchy visual but also it should convey informative instructions at the beginning for users so that they can grasp the whole context of the interface. Experienced users can skip this step by pressing a small 'skip' button at the right top corner for the sake of efficiency.



< 3. Home/Main >

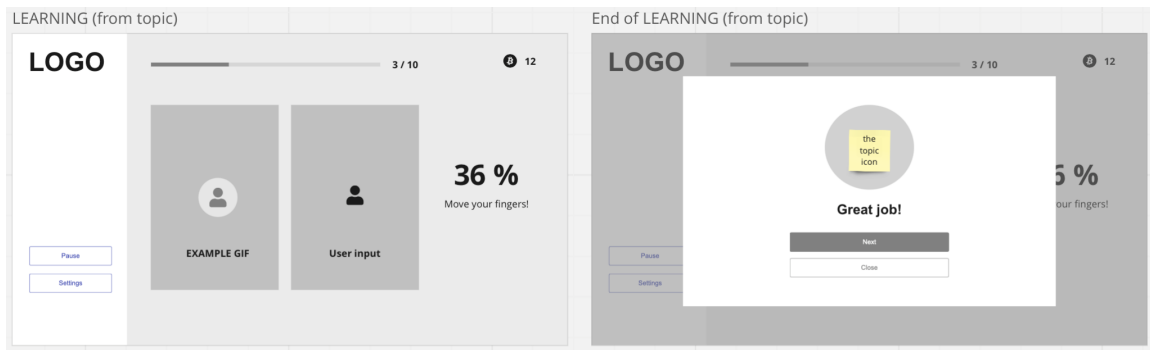
Considering the information hierarchy and the consistency of the interface design, the application offers a split view layout for two main contents- *navigation (menu)* on the left side and the *main screen* on the right side. This split layout helps the users to be free from the visual cognitive load, their memory burden and physical efforts. Meaning that users do not need to scroll up/down or click different buttons or tabs to find a specific feature that they want.

On the right side, multiple cards containing different features are placed. By having this box format, users can distinguish different items at a glance. The contents are based on the core tasks we pointed out throughout the previous documents- taking the lessons, checking the progress and the activities and playing the game. Through the tiny details, such as a pagination³ and 'view all', we can save space while intriguing users by offering snippets of information.

³ For instance, Google has 'Goooooogle' at the bottom to break a lot of information into several pages. This list of numbers is called pagination.

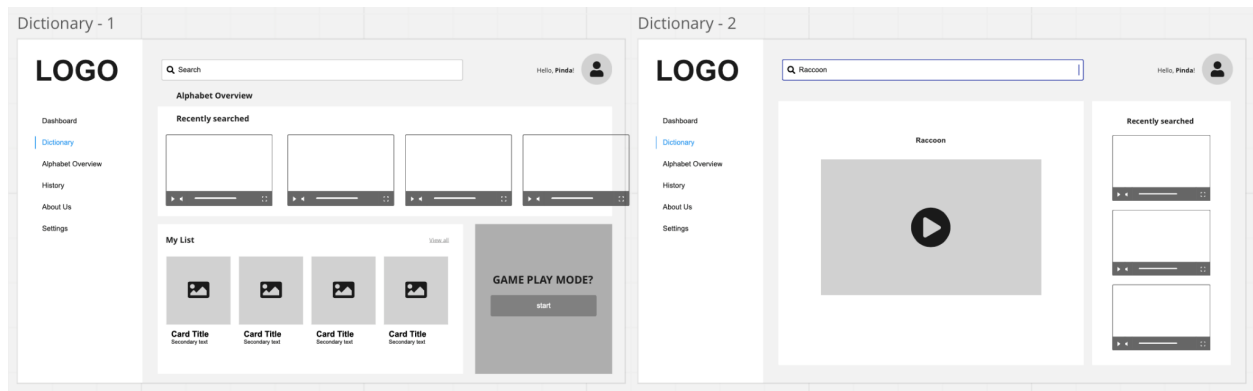
Two of the boxes are showing the progress of users. Users feel more involved and evoked in the system when it displays their progress clearly (Nah et al., 2014).

One of our main highlights in the application is the 'game mode'. Our eye gaze starts from the top-left corner and ends at the right bottom corner. And we thought it'd be ideal to place the 'gameplay' asset at the right bottom corner since where our gaze ends.



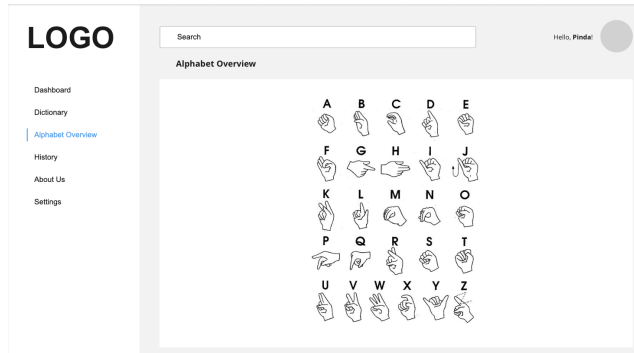
< 4. Learning Sign Language >

As mentioned in the previous part, letting the user know what they are doing well matters to user performance. This became the reason why the system shows the user input and the success rate of the user performance. In the end, there is a pop-screen concluding the lesson with a motivating message. There are two buttons allowing users to choose whether they want to continue the lesson or stop it.



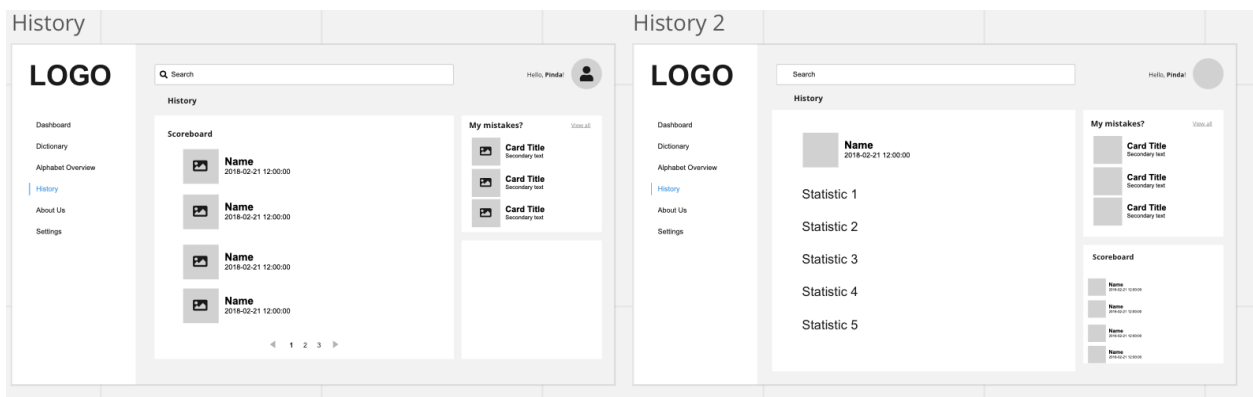
< 5. Dictionary >

Besides taking courses or playing games, the 'Dictionary' page will help users who want to learn more about sign language. To reduce the memory load of users and allow users to find needed items, the system offers 'recently searched' and 'my list' on the first page of the Dictionary. The following page presents a gif or video content to convey the textural and visual information of the searched word. Similarly to the first page, the 'recently searched' option is available.



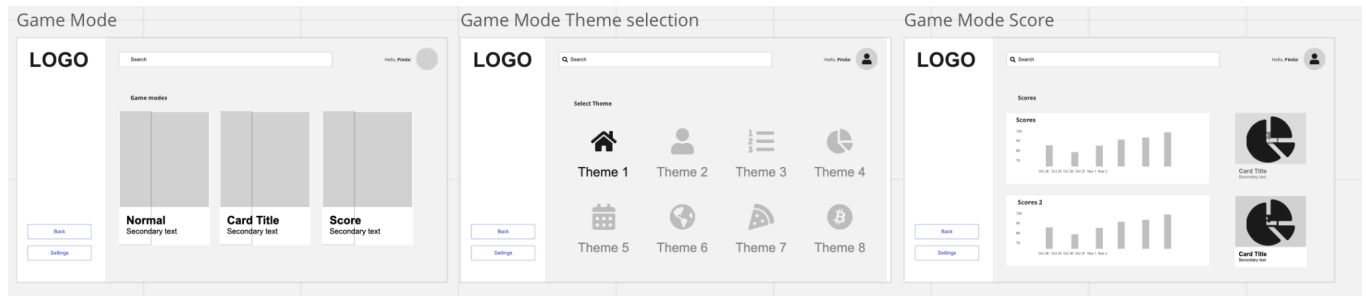
< 6. Alphabet Overview >

Instead of letting users type in each alphabet, which requires multiple actions to go through and a mental process, we decided to display a simple overview of the alphabet of American Sign Language. This is expected to enhance the learning experience of this application.



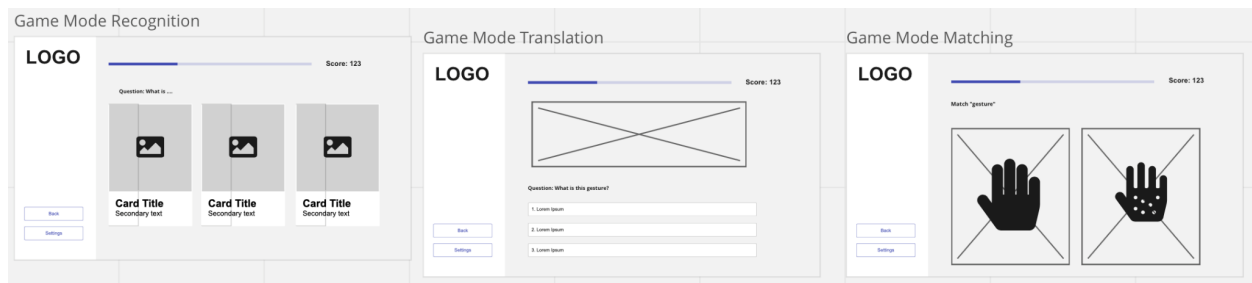
< 7. History >

To give constructive feedback on user performance, the system offers this page. Considering the fact that the amount of information will increase as time progresses, a clear organisation would be required. As a solution, we included the pagination we used for the main page to make good use of the given space.



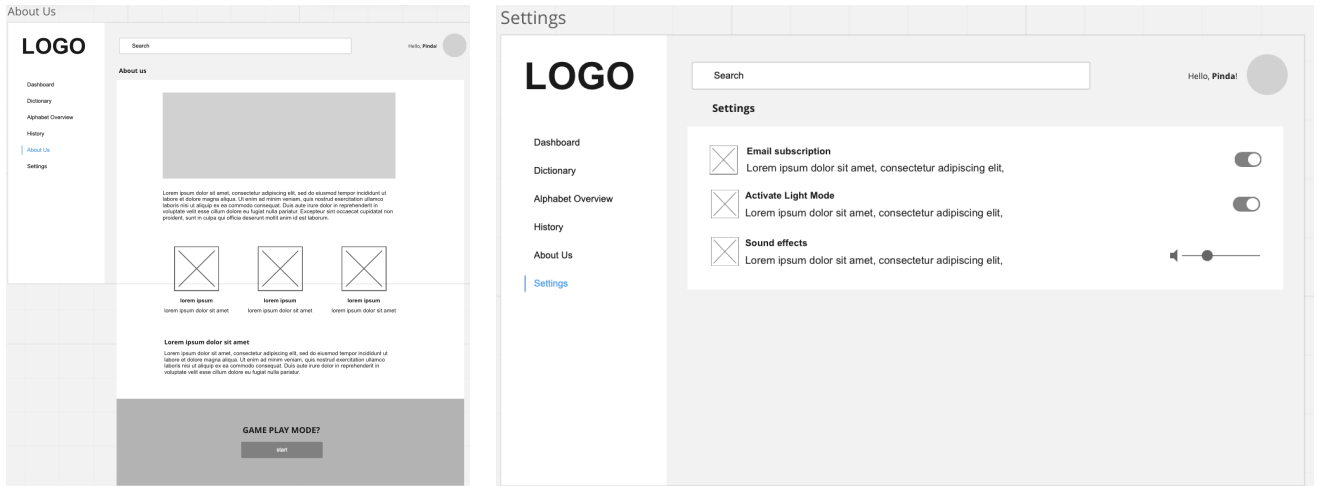
<8. Game Mode- Overview (left), Theme selection (middle), Score overview (right) >

One of our main features is 'Game Mode', multiple screens will be followed. On the overview page, the users will be asked to choose which game mode they'd like to proceed with. To guarantee visibility and understandability, each stage or category is displayed on three separate cards with a bigger font for each title. Once they choose a theme, they need to choose one of the categories to challenge, and these are presented in different icons. There will be a page showing an overview of scores as well in two main formats- bar graphs presenting the gradual progress of users and pie charts indicating the rates of correct answers and wrong answers during the game mode. For those who would like to go back to the previous screen, there are several escape hatches- the logo and the button connected to the main page.



<9. Game Mode- Three different activities for the game >

In the actual game mode, the system offers three different ways of game formats. The first one is asking the users to choose the right sign language based on the given vocabulary. The second direction is to choose the right vocabulary based on the given sign language that will be played in a gif format. The last style is imitating the displayed sign language. By having these dynamics in quizzes, we expected to guarantee excitement and stimulation in this mode. No matter which format the users would play, the progress bar at the top will show them how far they are until the end of the quiz. This will bring more clarity in terms of the entire process in this quiz and will motivate them to accomplish their task. Since the user would use the application with the leap motion device, having a big touch zone became part of our consideration during the design process. Considering the whole layout and the ratio between the left menu part and the right main contents, the maximum number of choices is three.



< 10. About Us (left) & Settings (right) >

Although these are not part of our MVP approach, we thought it would be nice to have wireframes for pages with potential. The 'About Us' page is less interactive, rather its main goal is to deliver information about the project and what American Sign Language is. Therefore, we used a clear layout for text-heavy elements. On the other hand, the 'settings' page contains less information while changes in each functionality have to be visible. To support readability and understandability, suggested key factors of Gestalt principles⁴ were actively utilised- proximity and common region.

Usability Specifications for testing of your prototype

Usability specification table

Task	Issue	Measured	Current	Worst	Planned	Best
Installation	Benchmark #1	Time until successful launch of the application	TBD	30s	10s	5s
Initial performance	Launch game	Time until the launch of a valid game	TBD	30s	30s	15s
Initial performance	Find a gesture in the dictionary	Time until gesture found	TBD	30s	10s	5s
Learnability	Error rate	Amount of errors made per game (out of 50 questions)	TBD	38	<38	0
Throughput	Completion of a gesture	Average amount of time spent to perform a correct gesture	TBD	10s	5s	2s
Initial Impression	Questionnaire	Average score [1-5]	TBD	1	4	5
Long-term satisfaction	Questionnaire	Average score [1-5]	TBD	1	4	5

Benchmark table

Benchmark	Description
#1	Run the script start.sh to start the application

Furthermore, we would like to include the following system usability scale questionnaire during our testing phase. This will allow us to collect the data quantitatively, giving us a clear overview of the user's response. The tasks in the chart are based on our task hierarchical diagram

⁴ Todorovic, D. (2008). Gestalt principles. *Scholarpedia*, 3(12), 5345.

pointing out the most important tasks in this design. The details will be discussed in the evaluation paper. Eventually, our group agreed to use the following form, the system usability scale, for our evaluation phase, considering the relevancy of its contents.

System Usability Scale

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	Strongly disagree					Strongly agree
1. I think that I would like to use this system frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
2. I found the system unnecessarily complex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
3. I thought the system was easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
4. I think that I would need the support of a technical person to be able to use this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
5. I found the various functions in this system were well integrated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
6. I thought there was too much inconsistency in this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
7. I would imagine that most people would learn to use this system very quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
8. I found the system very cumbersome to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
9. I felt very confident using the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	
10. I needed to learn a lot of things before I could get going with this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4	5	

Conclusion and Further Direction

With our outcomes, we are planning to conduct testing sessions with 5 users who match our user profile and revise our prototype based on their feedback and our insights. If possible, we would like to expand our project direction; from a new interaction to service design.

To access the detailed information and/or have a clear overview of our design process, please check this link: https://miro.com/app/board/uXjVPMUO8PM=?share_link_id=569855726426

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