Learn how to drive in Nova Scotia

(Nova Driving)

Heuristic evaluations and design modifications

Group members (ordered by A#)

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Contents

Functional requirements

Purpose

Based on the Design Thinking Workshop, online survey results and the requirement gathering process - the purpose of the Nova Driving learning platform has been refined and summarized as follows:

- Provide the necessary learning requirements to prepare the user for the different gates within the licensing process including the written and driven tests
- Provide an accessible learning experience through adjustable language preferences
- Provide the right level of information in a simplified, visual and interactive manner to help users understand and navigate the licensing process with a local frame of reference
- Provide lessons and learning materials in a visually interactive manner to teach users about driving in Nova Scotia outside what is covered in the local written and driven tests
- Provide resources for the user for additional support and learning

User and interface requirements

User (U) requirements: are defined based on the needs and pain points of the primary user group (international students in Nova Scotia) defined as part of the Design Thinking Workshop in addition to the user survey results.

U1. Interactive and dynamic content
U2. Language settings and preferences
U3. Account registration
U4. Progress tracking
U5. Simple and clear language and wording

User Interface (UI) requirements: are defined based on … and will function as the design principle of the prototype and ultimately the developed solution.

UI1. Conciseness: segment and divide information into sections to reduce cyclic navigation, scrolling and reference linkage
UI2. Minimize the number of clicks
UI3. Descriptive icons and buttons
UI4. Consistent and simple layout

Functional requirements grouping

The functional requirements are divided into two main groups which are listed below. Group 1 describes the system and general process requirements of how the system operates. Group 2 describes the three (3) features of the system and outline how each feature operates. Figure 1 shows the logical process flow of the system and how each screen, function and feature flows into and across each other.

1. **Functionality (Group 1)**
   A. Navigation
   B. Sign-up, login (including 3rd party registration, credential recovery)
   C. Settings
      - Account preferences
      - Language preferences
   D. Profile and progress tracking
   E. Search
   F. Help and FAQ
2. **Features (Group 2)**
   A. <u>Lessons:</u>
      - Rules and regulations
      - Vehicle basics
      - Vehicle advanced
      - Driving fundamentals
      - Driving advanced
      - Handy skills
      - Parking skills
      - Weather conditions (how to prepare)
      - Weather conditions (how to handle)
   B. <u>Tests:</u>
      - Mock exams
      - Driving test preparation (tips and tricks)
   C. <u>Resources:</u>
      - Licensing process
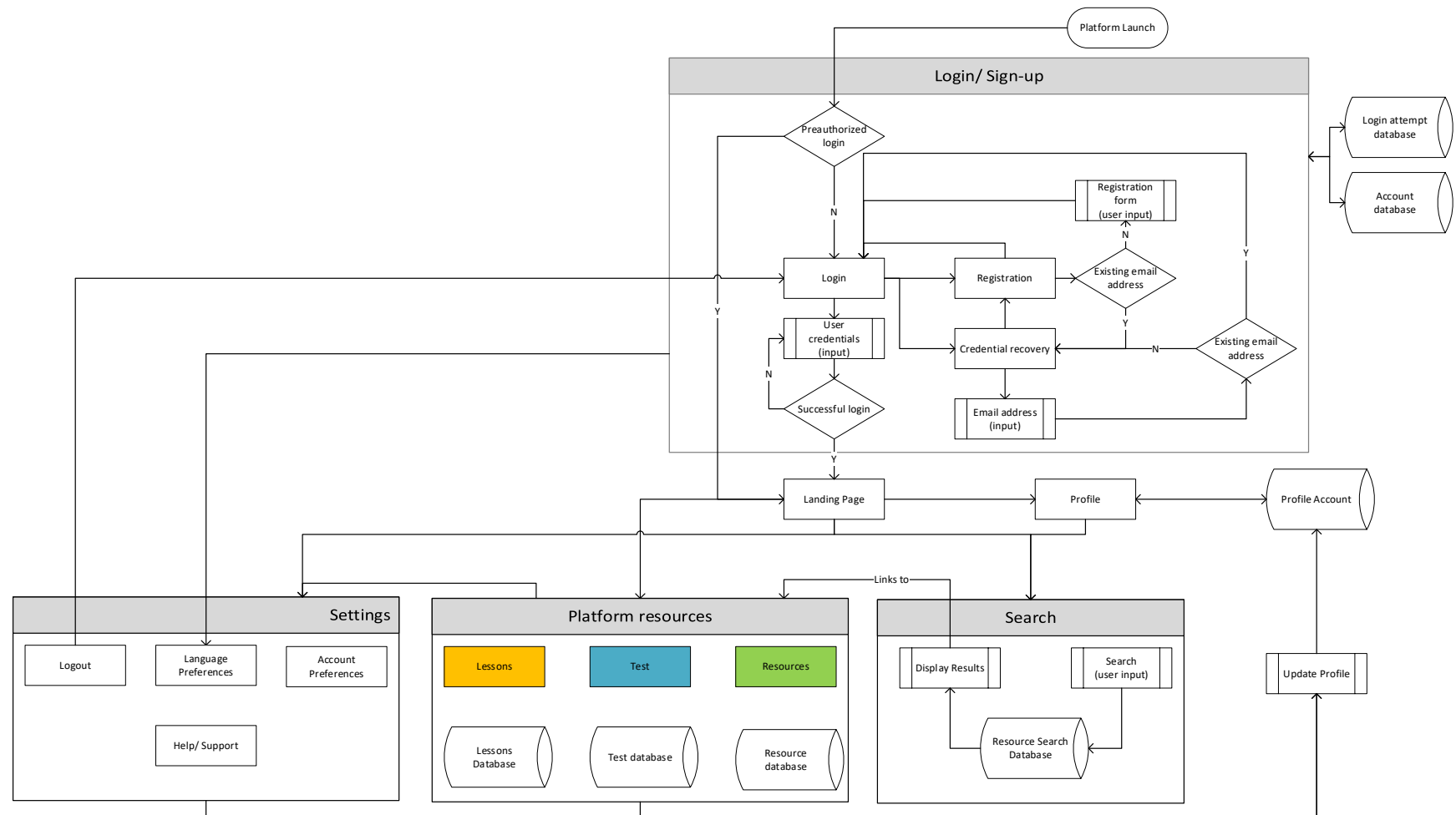   - Video repository

Group 6

Logical Process Flow

Figure 1 Logical Process Flow

Legend		
	Group 1	
	Group 2	
	Group 3	
	Group 4	

5

Group 1: Functional requirements

Group 1		
Functional requirement	**ID#**	F1
System must enable the user to login to their account		
Sub-functional requirements		
F1.1	Sign in operation must include user inputs: (1) username/ email and (2) password	
F1.2	Sign in operations must include pre-authorized login from the same device after the first initial login	
F1.3	Sign in operations must include an option for assistance with credential recovery in case the user is unable to access their account (refer to F2 for new user operations)	
F1.4	System must display an error and prompt users when incorrect credentials are entered	
F1.5	System must lock user account based on 10 failed login attempts within an hour of first and last attempt	
F1.6	Sign in screen must include language selection options to allow users to select their preferred language setting	
F1.7	Language preferences must be linked to the user's account and profile, such that with each successful login, the platform loads in the user's preferred language	
Data requirements		
F1-D1	Account data table should include account details for each user	
F1-D2	account data table should include user email addresses to allow credential recovery via email	
F1-D3	Account login attempt data table to track user login attempts	
F1-D4	Language preference must be included in the user profile data table	
User interface requirements		
F1-UI1	Flags should be displayed based on user language selection	
Functional requirement	**ID#**	F2
System must enable the users to sign-up for new accounts		
Sub-functional requirements		
F2.1	System must provide user with the option to 'sign up' from the sign in screen	
F2.2	Registration for new account shall be supported by Facebook and Google account registration	
F2.3	Registration operation shall prompt users to input the following fields: • Email (required field, input mask validation) • Name (required field, length requirement) • Password (required field, length and character type combination required)	
F2.4	System must display error and highlight issues with entry form	
F2.5	Sign in must include language selection options for allow users to select their preferred language	
F2.6	Language preferences must be linked to the user's account and profile, such that with each successful login, the platform loads in the user's preferred language	
F2.7	System must validate email address upon successful registration	

Group 1	
Data requirements	
F2-D1	Account data table should enable checking if user email address is already in use
F2-D2	Language preferences must be included in the user profile data table
User interface requirements	
F2-UI1	Required fields should have an asterisk with reference below
F2-UI2	Error messages should display the exact issue (e.g. password composition or complexity requirements not met, email already in use)
Security requirements	
F2-S1	Password composition requirements should include characters and numbers and a minimum length of 8 characters

Functional requirement	ID#	F3
System must start at the Home page (landing) on each "launch" after successful login or authorized access		

Sub-functional requirements	
F3.1	Home page must display button to link to platform settings, search function and profile
F3.2	Home page must include all the platform's features that are available for the user including (lessons, tests and resources) – refer to each group 2 sections below for detailed functional requirements on each feature
F3.3	User must be able to access and navigate to and across lessons, tests and resources from the side menu using navigation buttons (refer to user and interface requirement)
F3.4	User must be able to resume progress from any platform resource from their last access point (e.g. resume at the last lesson or question) – further details in each section of the feature's functional requirements.
Data requirements	
F3-D1	User progress should be tracked in the user progress table

Functional requirement	ID#	F4
System must allow users to access the platform's main sections from the platform's side menu		

Sub-functional requirements	
F4.1	System must include menu button to allow access to the pop-up side menu
F4.2	Log out button should be clearly displayed and easily accessible from the side menu
F4.3	System must maintain user preferences
Data requirements	
F4-D1	Data requirements: user settings should be linked to use profile table

Functional requirement	ID#	F5
System must provide access to a help and support page from the settings menu		

Sub-functional requirements	
F5.1	User must be able to get access to the support page and FAQ
F5.2	The support page should enable the user to submit tickets and report issues – optional

Functional requirement	ID#	F6
System must include and allow access to the search function		

Sub-functional requirements	
F6.1	System must provide a text input field when user clicks on the search icon
F6.2	User must be able to submit keywords or phrases for search
F6.3	System must provide a list of findings based on keywords using the device's resource search database

Group 1			
F6.4	System will display results based on keyword searches, each result should link to the appropriate menu or screen		
Functional requirement		**ID#**	F7
System must allow users to access their profile page from the platform's side menu or the profile button:			
Sub-functional requirements			
F7.1	Once a user logs in, a person icon is maintained at the top of every screen next to home button and search button.		
F7.2	When clicked on the icon, a window pops up displaying user's name, email address and progress level which represents a measurement of user's completed lessons and tests. In short, it displays the degree of knowledge that the user has gained from our application.		
Functional requirement		**ID#**	F8
System must allow users to access the platform's settings from the side menu or the profile button			
Sub-functional requirements			
F8.1	Notification – It will have the collection of all notifications addressed to the user. The user should be able to disable/enable notifications.		
F8.2	Sounds – User can enable or disable sound options or control the volume level for the application.		
F8.3	Language – User can set his/her preferred language.		
F8.4	Security – In this section, user can change password		
F8.5	Help & Support – It provides the help & support service, and the documents of the app.		
F8.6	About – It describes the development team of the app, and contact information		

Group 2A: Lessons functional requirements

Group 2A		
Functional requirement	**ID#**	F1
System must allow users to access the various lessons from the lessons menu based on progress		
Sub-functional requirements		
F1.1	System must display progress of each lesson based on two status types (reviewed materials and completed the lesson quiz)	
F1.2	Lessons past the current available lesson will be locked and greyed out, access to these lessons will be disabled	
F1.3	User must be able to navigate back from the current lesson to the lesson menu	
F1.4	Each lesson will contain 2-N pages	
F1.5	Each page will contain various information bubbles that will require the user to press each on to review	
F1.6	Bubbles will change color once reviewed (yellow to grey)	
F1.7	User will not be able to navigate to the next page within the lesson until all information bubbles are reviewed	
F1.8	Once all information bubbles and pages are reviewed, the system will provide the user with the option to (1) take the lesson test or (2) navigate back to the lesson menu	
User interface requirements		
F1-UI1	To minimize screen clutter and maximize usability, only one information bubble pop-up can be viewed at one time. The user can select the bubble's close button or press on the surrounding area to exit the current bubble	
Functional requirement	**ID#**	F2
System must allow users to access the lesson test from the 'lesson complete' menu		
Sub-functional requirements		
F2.1	At the end of every lesson, an user is given with two options – "Want to take a test?" (a link is provided), clicking on the link will take the user to the lesson test screen corresponding to the completed lesson. The other option is the "finish" button. If the user wants to skip the test and finish the lesson, he/she should click on finish button.	
F2.2	If the test option is selected, the user will be prompted with 5-N multiple choice questions related to the topic, user can select ¼ options (radio button) and then click the submit button to submit the answer	
F2.3	System will check the answer against the lesson test database. If the answer is correct, the user will be prompted with a "Correct" answer prompt, otherwise an "Incorrect" answer prompt will appear. If an incorrect answer is selected, the user will be provided with a 'skip question' option or have the ability to select a different answer	
F2.4	Once all answers are selected, the system will display a table containing the results of the lesson test based on user input.	
F2.5	System wi`ll display results based on incorrect, correct and skipped questions.	
Data requirements		
F2-D1	Data requirement: lesson test database will include questions and answer sets for each lesson	

Group 2B: Tests functional requirements

Group 2B		
Functional requirement	**ID#**	F1
System must allow users to access the test from the menu: To make the system worthy learning, it must be interactive from both ends – the system as well as the user. Therefore, a platform must be provided to the user where the user can test his/her knowledge that he/she has learnt though the system and access a feedback to evaluate his/her grasp about the "learning to drive" process. The knowledge test will be designed in the following manner to achieve the goal described aforesaid.		
Sub-functional requirements		
F1.1	When the user clicks on the "Test", two options must be provided to the user viz. "Practice Mode" and "Time mode".	
Functional requirement	**ID#**	F2
Practice mode – system must allow users to access the "Practice mode" from the test menu, there will be no time limitation for the user. The user is free to take as much as time to study and answer a question.		
Sub-functional requirements		
F2.1	There will be 3 options for the level of questions – easy, intermediate and hard.	
F2.2	Easy questions are meant for users who are novice to the system	
F2.3	Intermediate questions are useful for those users who are intermediate and have covered at least the first 5 lessons in feature #1.	
F2.4	Hard questions are useful for expert level of users who have studied at least 10 lessons in feature #1. These questions are similar to the real-life questions that are faced by Nova Scotia license seeking aspirants	
F2.5	Users have the freedom to move around any of the 3 options irrespective of the level of lessons, they have covered in feature #1(lessons).	
F2.6	For a particular question, the user has a right to look for solution without answering the question.	
F2.7	For a particular question, the user has a right to skip without answering the question. If the user exits a question (under any mode) without answering the question but later, while his/her login session is active and he/she clicks on the "Test" option, then he/she should be redirected automatically by the system to this unanswered question. This feature will be useful, if the user reads a question and want to look for the answer in the lesson (feature #1). He/she can go back to the lesson, fetch the answer, come back to this question as the system will preserve the state of the movement of the user and then the user can attempt to answer the same question. This will minimize user's efforts in looking for the same question. May be later, we can perform statistics on this feature as how efficiency increases for the sake of usability and make the system perform better when compared with other systems.	
Functional requirement	**ID#**	F3
Time mode – system must allow users to access the "Time mode" from the test menu, there should be a time limitation for the user. The user is bound to answer a set of questions within a stipulated time limit.		
Sub-functional requirements		

F3.1	There will be 3 options for the level of questions – easy, intermediate and hard. In addition, the system must ask for the length of time – options will be 10 mins, 30 mins and 60 mins.
F3.2	Easy questions are meant for users who are beginners to the system. The system will ask 10 questions under 10 mins option, 25 questions under 30 mins option, 40 questions under 60 mins option.
F3.3	When the user answers the question, there will be a countdown to remind the user of the remaining time.
F3.4	Intermediate questions are for those users who are intermediate and have covered at least the first 5 lessons in feature #1. A user cannot access this feature unless he/she has completed the first 5 lessons. The system will ask 8 questions under 10 mins option, 20 questions under 30 mins option, 30 questions under 60 mins option.
F3.5	Hard questions are for expert level of users who have studied at least 10 lessons in feature #1. A user cannot access this feature unless he/she has completed the first 10 lessons. The system will ask 5 questions under 10 mins option, 15 questions under 30 mins option, 30 questions under 60 mins option.
F3.6	Once the time or the test is over, the system must provide the feedback/statistics about the user's results such as – total no. of questions, no. of questions answered correctly, no. of questions answered incorrectly, no. of questions (out of total) completed, no. of questions (out of total) not completed (due to running out of time). The system will provide a link where all the solutions are provided to the set of questions answered by the user. In this link, the user will be given an option to rate each of the questions (1 to 5). This will help the system to build a popularity chart for all the questions in the database. In short, the difficulty level of a question will be influenced by the user's popularity ratings.
F3.7	The system should save the progress of answering the questions of the user for both test modes. The progress should be highlighted with a progress bar. the progress bar will consist of mix of green and white parts. The green part of the bar will represent the proportion of questions that an user has completed and the white part will symbolize the proportion of questions yet to be completed by the user.
F3.8	A user's progress level will increase as he/she completes answering the questions. The increments will be rapid with higher difficulty level of questions answered by the user in shorter frequency of attempts.
F3.9	Each question (under each mode) will be displayed along with a rating (1 to 5 represented by asterisks) showing the popularity of the question among the users.
F3.10	The database of questions under practice mode and that of time mode should have an intersection not more than 20 percent of the total (union) no. of questions.

Group 2C: Resources functional requirements

Group 2C			
Functional requirement		**ID#**	F1
System must allow user to access the additional materials either through internal or external resources within the platform resource menu.			
Sub-functional requirements			
F1.1	Once the resource option in the main menu is selected, the system will display the resource submenu.		
F1.2	The resource submenu will contain two main options, the "Licensing Process" and the "Video Repository", and a "Back" arrow.		
F1.3	Once the "Licensing Process" option is selected, the system will display a new page with a sub-menu, and a "Back" arrow.		
F1.4	The screen under the "Licensing Process" menu will contain all the procedures for applying for a driver's license, material preparation etc.		
F1.5	Once the user clicks on the external web link, a warning window pops up to inform the user that the link is navigating the user to content outside the app. This window will alert with the message "This content will navigate you out of the application. Do you want to continue?". If the user agrees then the system navigates the user to their default browser and open the link content they asked for, otherwise "Cancel" will keep the user interface in the page before they clicked the external link.		
F1.6	Once the "Video Repository" option is selected, the system will display a new page with a video classification menu, and a "Back" arrow.		
F1.7	The homepage of the "Video Repository" displays an input field located in the middle of the top of the page for search function.		
F1.8	This sub-page displays the most popular video categories for users, and the most popular videos for users which contains a thumbnail on the top of its title and description.		
F1.9	Once the user clicks on a video's title or its thumbnail, a warning window pops up to inform the user that the title and the thumbnail of the video is navigating the user to the Youtube application or external environment. This window will provide two button options, one is "Keep navigating" which will keep navigate the user to the Youtube application or its default browser, and the other is "Stay in the Nova Driving" which will keep the user interface in the page before they click on the video title or its description.		
F1.10	Users can see the history of recent viewings on every page of resources (limited to 5).		
Data requirements			
F1-D1	All provided videos are stored in the video database as external web links.		
F1-D2	Track and record the query history and viewing history of all users and save them in the database.		

Heuristic evaluation

Purpose of the heuristic evaluation is to improve design and performance of the platform by finding usability problems based on Jackob Nielsen's 10 Usability Heuristics for User Interface Design (Nielson J., 1994).

Each evaluator (n=5) ranked the prototype sketches individually based on the following scale and recorded the findings and design flaws.

Legend and scoring scale	
1	Requires significant redesign
5	Adequate design

The average of all evaluator's scores was calculated to arrive at the final results in addition to consolidating the recorded findings and issues summarized in the Table 1 below. The findings and insights will be used to guide redesigning the platform sketches and prototype.

Table 1 Evaluation scoring results

Average	2.6	1.8	2	4	1	4.4	4.4	4.6	1.8	1
Bijay	3	1	2	4	1	4	5	4	2	1
Ashit	3	2	2	4	1	4	5	5	2	1
Robin	2	3	2	4	1	4	3	4	1	1
Munmun	3	2	2	4	1	5	5	5	3	1
Rob	2	1	2	4	1	5	4	5	1	1
Evaluation Criteria Index	1	2	3	4	5	6	7	8	9	10
	10 Usability Heuristics for User Interface Design									

(Evaluators)

Group 6

Table 2: Heuristic Evaluation Results Summary

Evaluation Criteria		Overall Average Score	Consolidated Rationale
1	**Visibility of system status**	2.6	• Buttons are unclear • Registration screen does include the option to sign up using Google or Facebook accounts • Navigation and flow between screens is unclear
2	**Match between system and the real world**	1.8	• Lack of navigation buttons • Forum is no longer a feature of the platform • Missing account registration buttons
3	**User control and freedom**	2.0	• No exit from search function • Lack of logical links and clear navigation between functions and features
4	**Consistency and standards**	4.0	• Search button not consistent between screens, redesign based on unified and standardized format of each screen
5	**Error prevention**	1.0	• Registration required fields are missing • Information on password composition and requirements are missing
6	**Recognition rather than recall**	4.4	• Mostly simple layout but needs more simple and descriptive icons and buttons to guide users
7	**Flexibility and efficiency of use**	4.4	• Provides functionality to register using other accounts
8	**Aesthetic and minimalist design**	4.6	• Minimalistic and simple design, minor adjustments and redesign needed to side menu
9	**Help users recognize, diagnose, and recover from errors**	1.8	• Forget password function is missing
10	**Help and documentation**	1.0	• Help, FAQ and documentation is missing
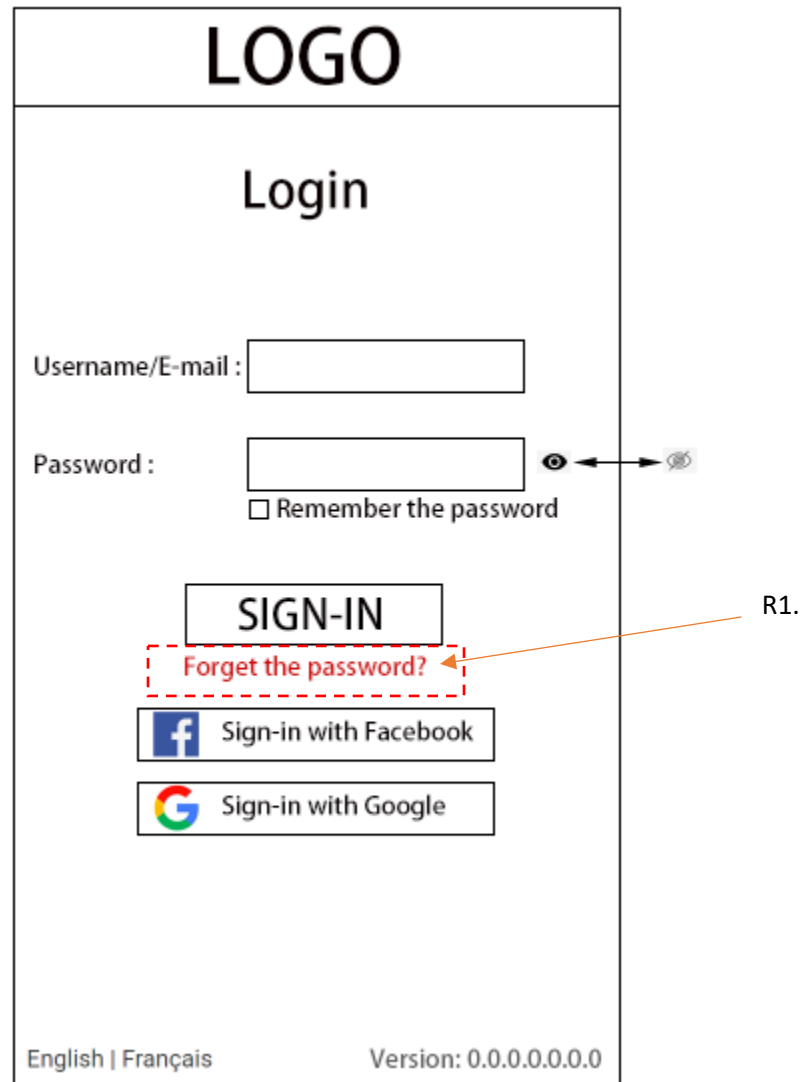
Redesign recommendations:

    R1. Design a 'forget password' function to allow user to recover credentials

    R2. Design Help, FAQ and documentation section

    R3. Redesign overall format and structure for consistency

    R4. Add required fields and password composition and complexity information to the signup screen

    R5. Redesign side menu navigation based on system logical flow

    R6. Add in Facebook and Google account registration into the sign-up screen

    R7. Redesign the main buttons using descriptive and simple buttons

    R8. Integrate logout button into side menu

    R9. Redesign main system feature

Modified sketches

Group 1 Functional Requirement

1. Login(F1.)

LOGO

Login

Username/E-mail :

Password :

☐ Remember the password

SIGN-IN

R1.

Forget the password?

f Sign-in with Facebook

G Sign-in with Google

English | Français   Version: 0.0.0.0.0.0.0

Figure 2-1 Login Page

2. Sign-up(F2.)

Figure 2-2 Sign-up Page

3. Landing Page ("Home")(F3, 4.)

Home

Main Menu("Home")

Lessons

Tests

Resources

Setting

Logout

Lessons

Tests

Resources

R9.

R5.
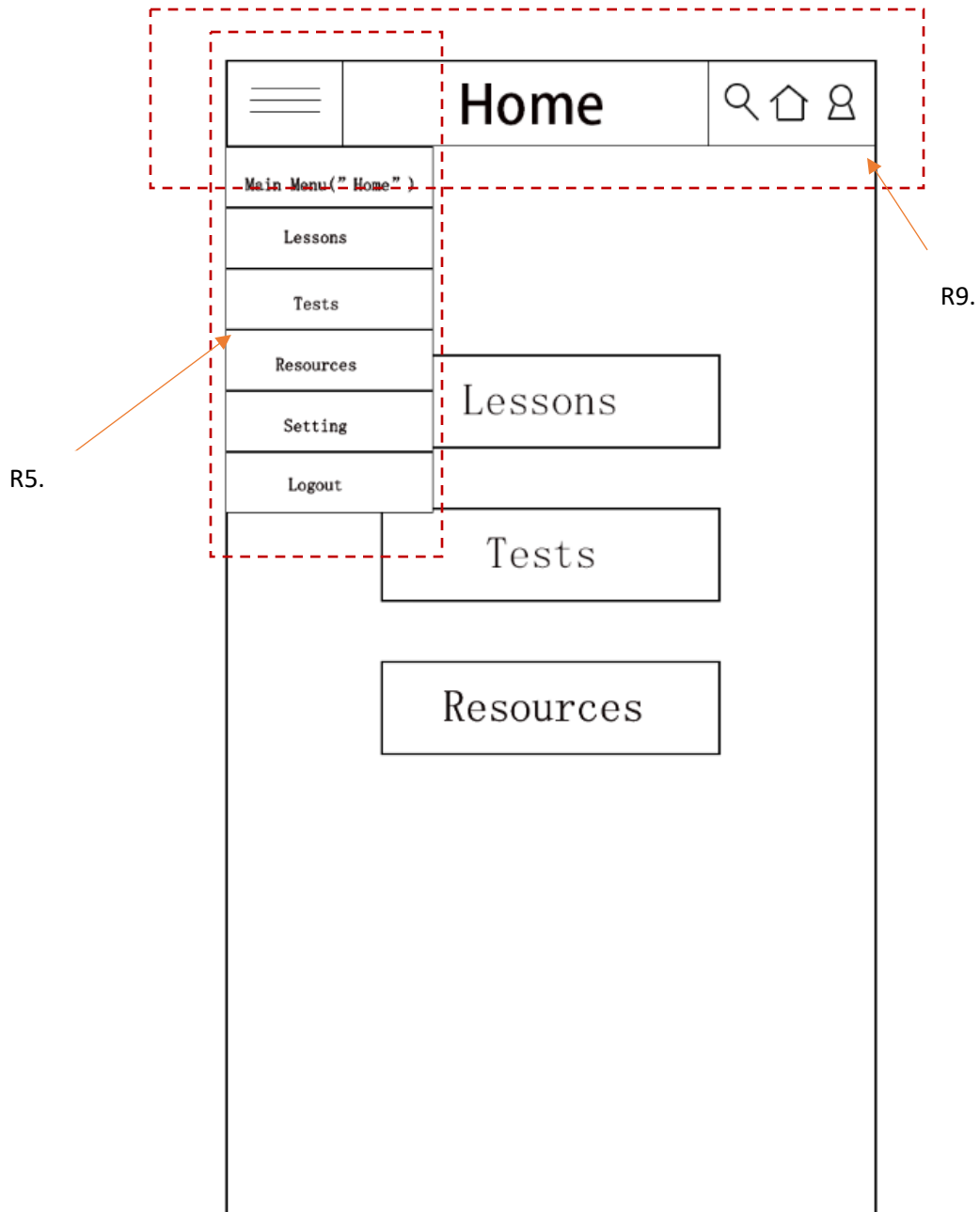
Figure 2-3 Landing Page

4. Side Menu & Setting Page(F5, 8.)
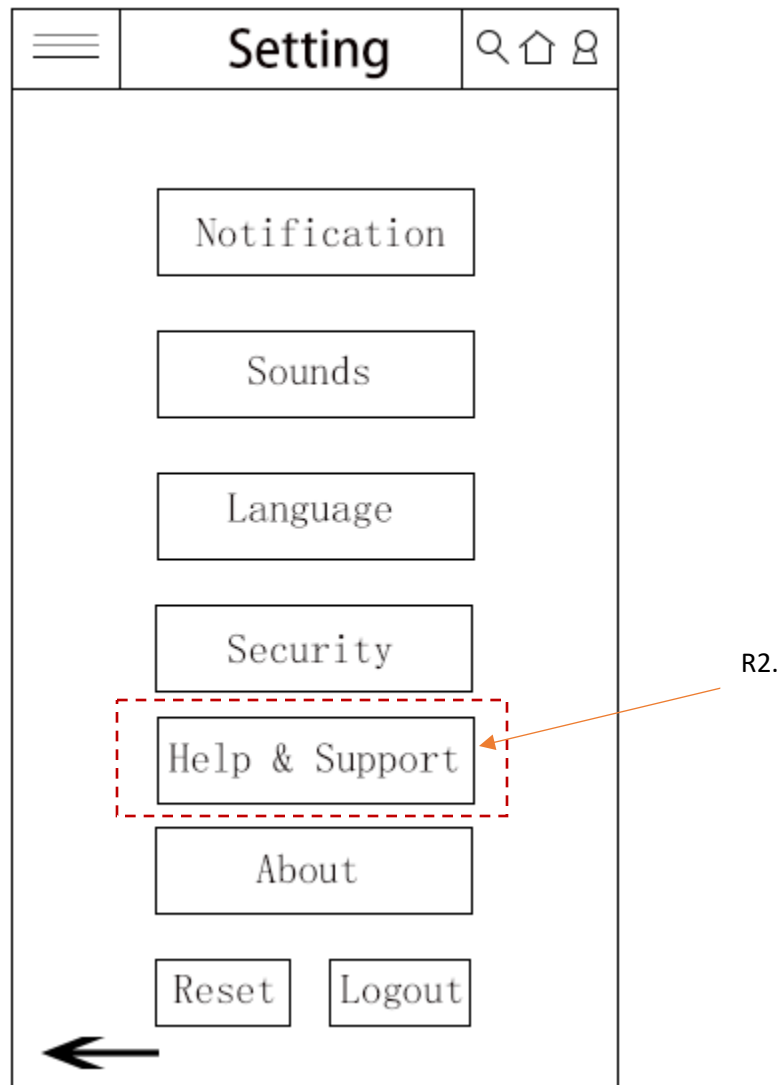
Figure 2-4 Setting page

5. Search Function & Profile Page(F6,7.)
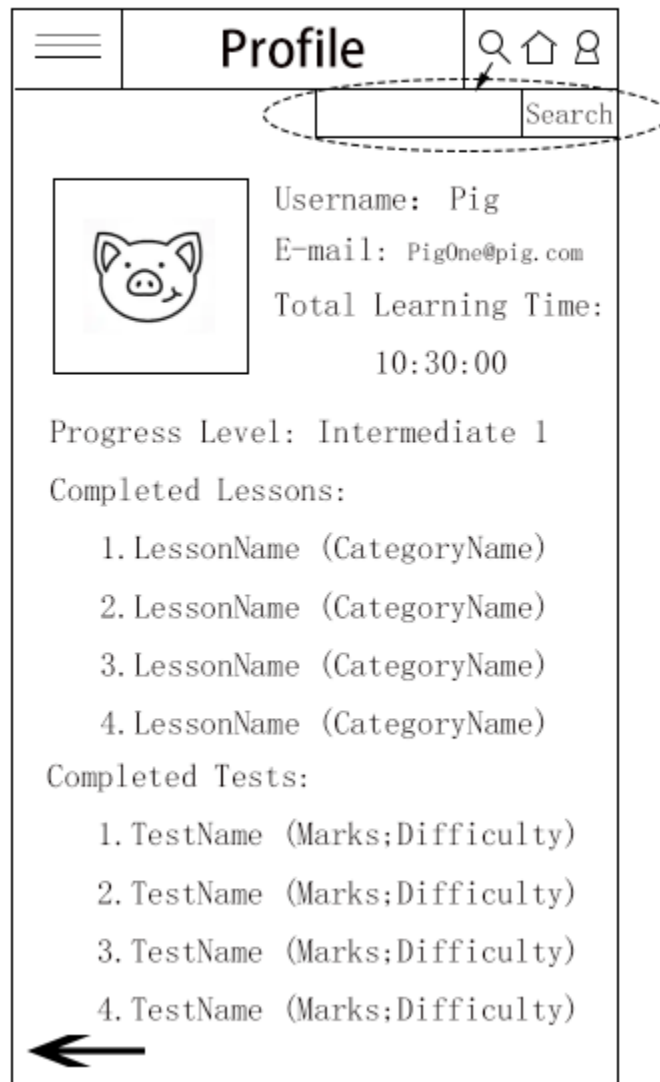
Figure 2-5 Profile Page

Group 2A: Lessons functional requirements

1. "Lessons" Homepage(F1.)
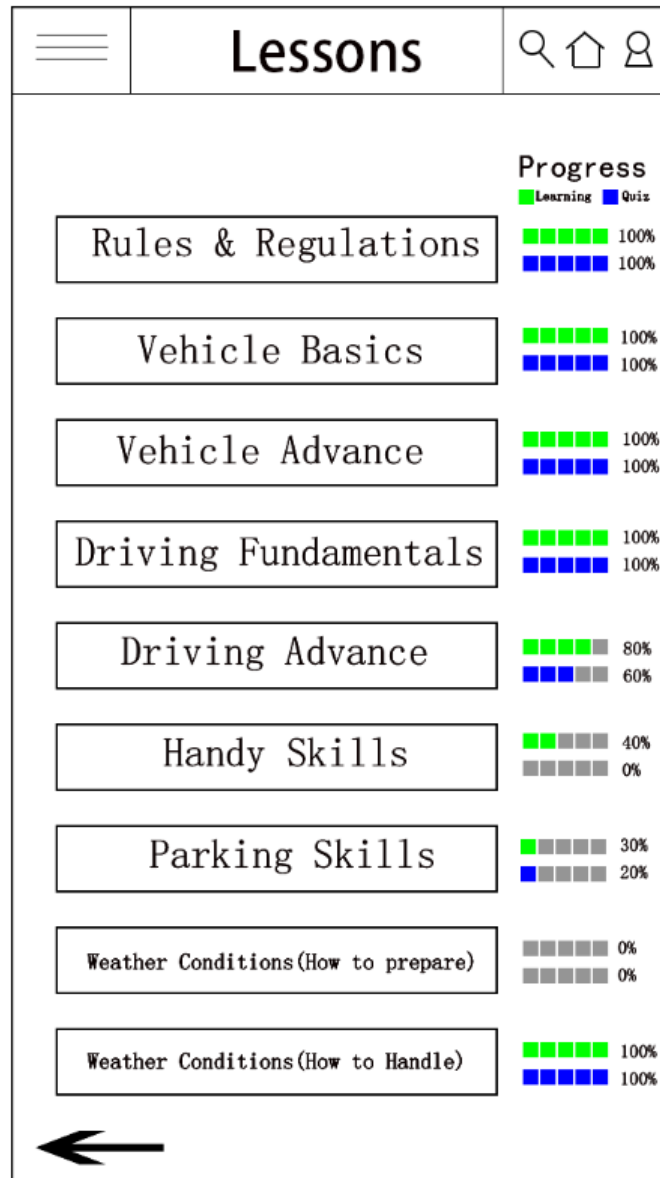
Figure 2-6 Lessons Page

2. Sample Lesson(F1.2.)
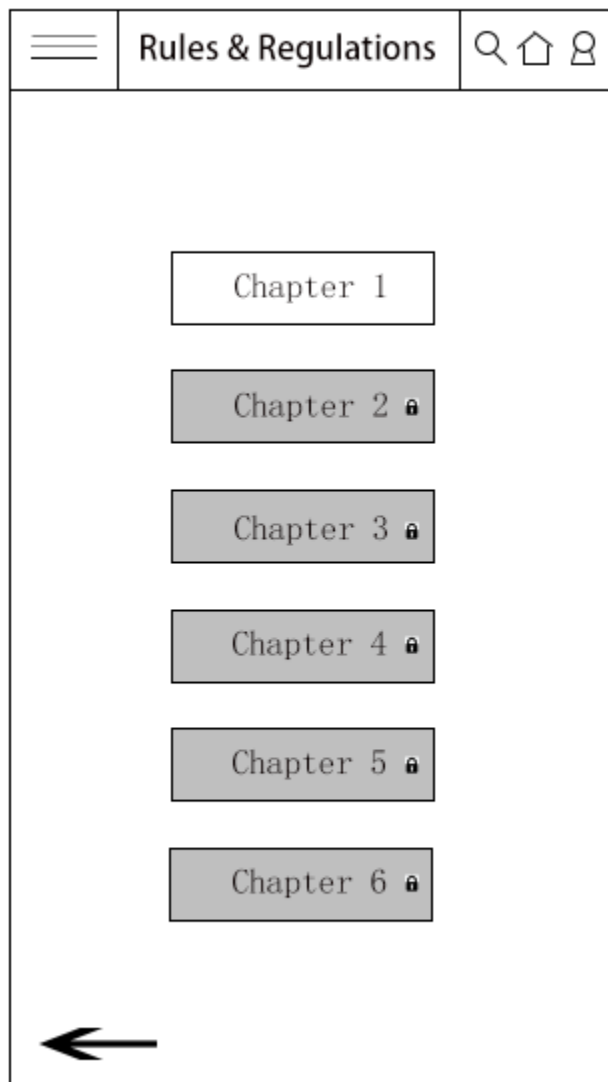
Figure 2-7 Sample Lesson Page

3. Lesson Test(F2.)
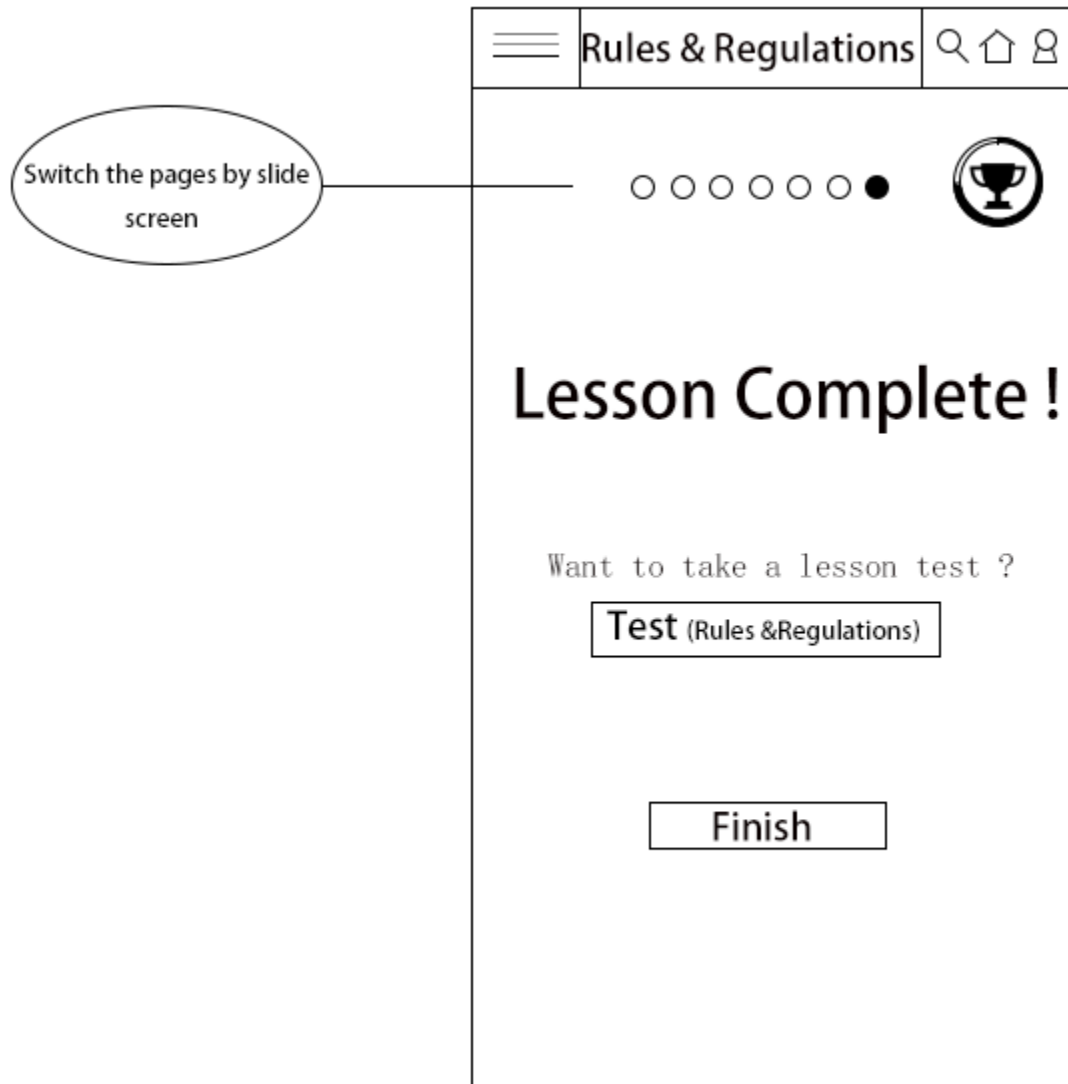
Figure 2-8 Lesson Test Page

4. Sample Lesson Test(F2.2)

Figure 2-9 Sample Lesson Test Page

Group 2B: Tests functional requirements

1. "Tests" Homepage(F1.)
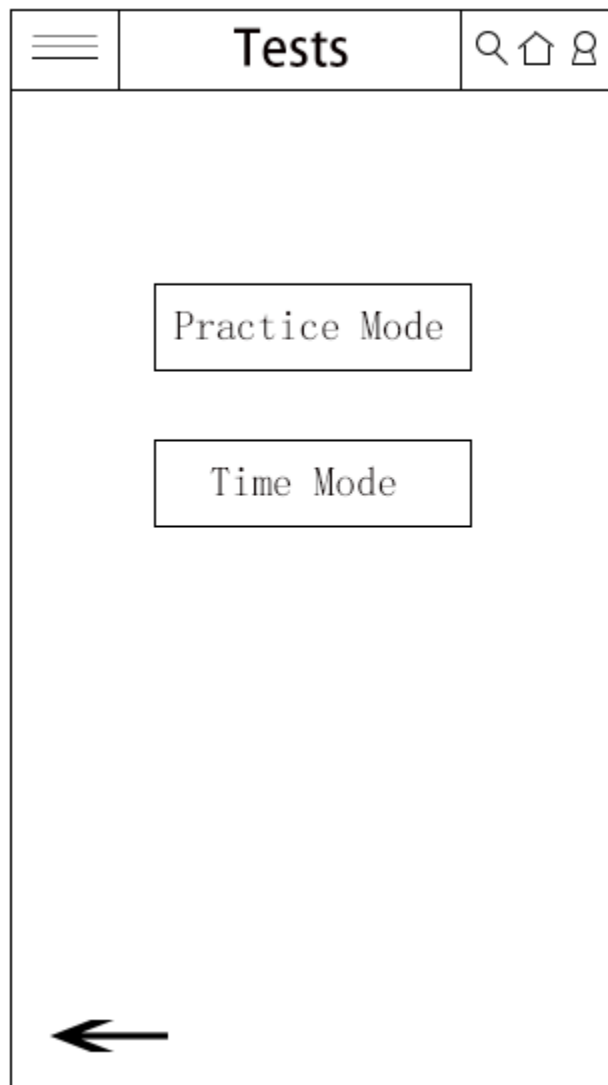
Figure 2-10 Tests Page

2. Difficulty Option in Practice Mode(F2.1)
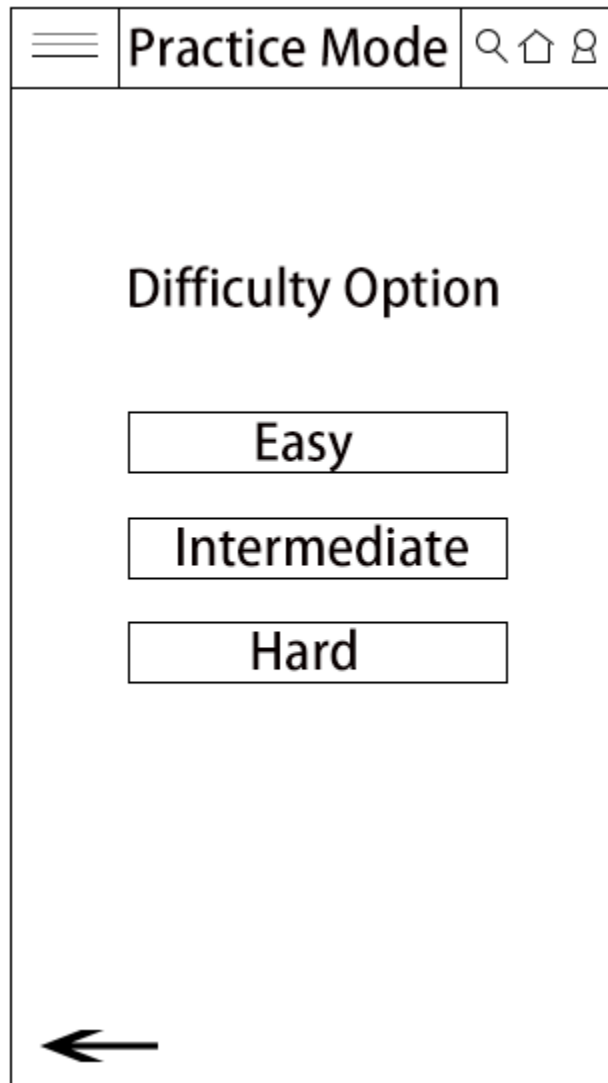
Figure 2-11 Difficulty Option Page

3. Sample Practice Mode Test(F2.7)
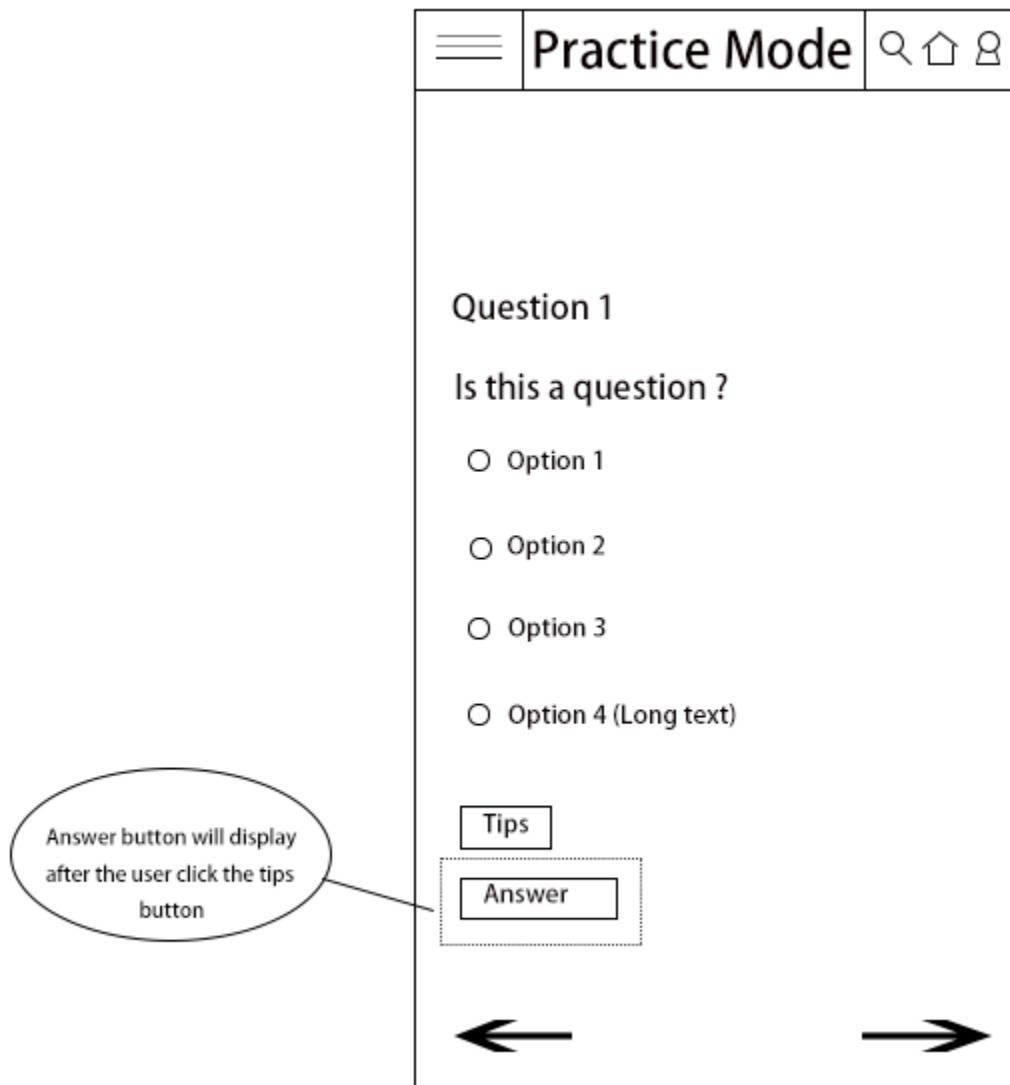
Figure 2-12 Sample Practice Mode Test Page

4. Time Selection in Time Mode Test (F3.2.)

Figure 2-13 Time Selection Page

5. Countdown in Time Mode Test(F3.3.)

Figure 2-14 Countdown Page

Group 2C: Resources functional requirements

1. "Resources" Homepage(F1.)
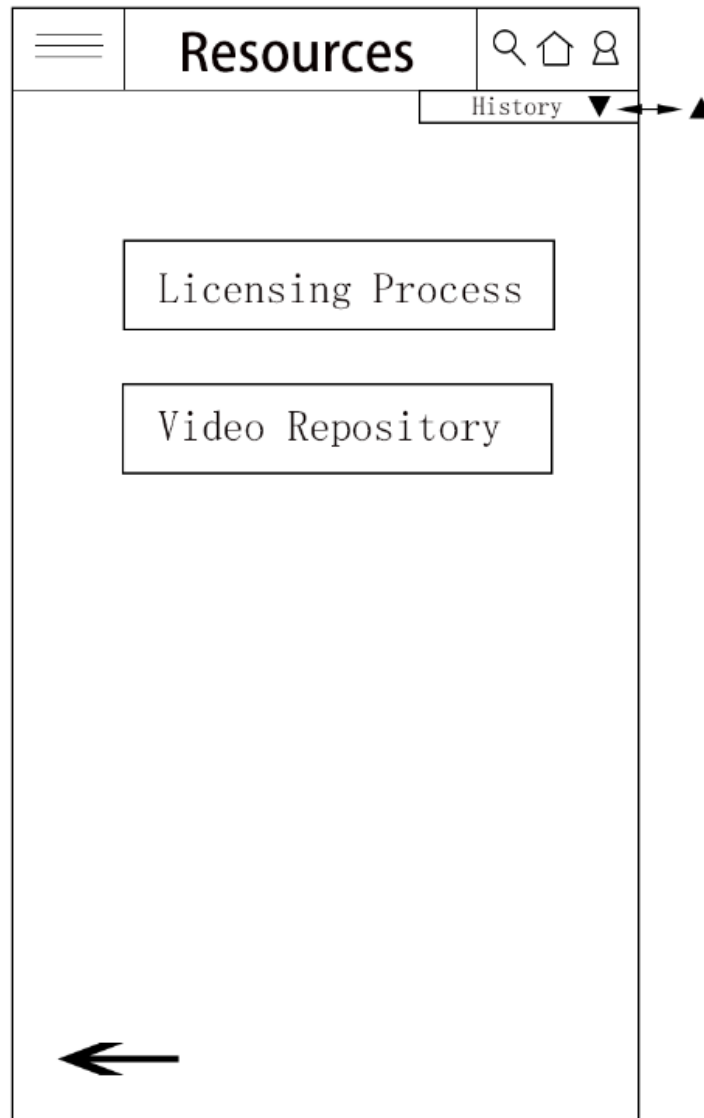
Figure 2-15 Resources Page

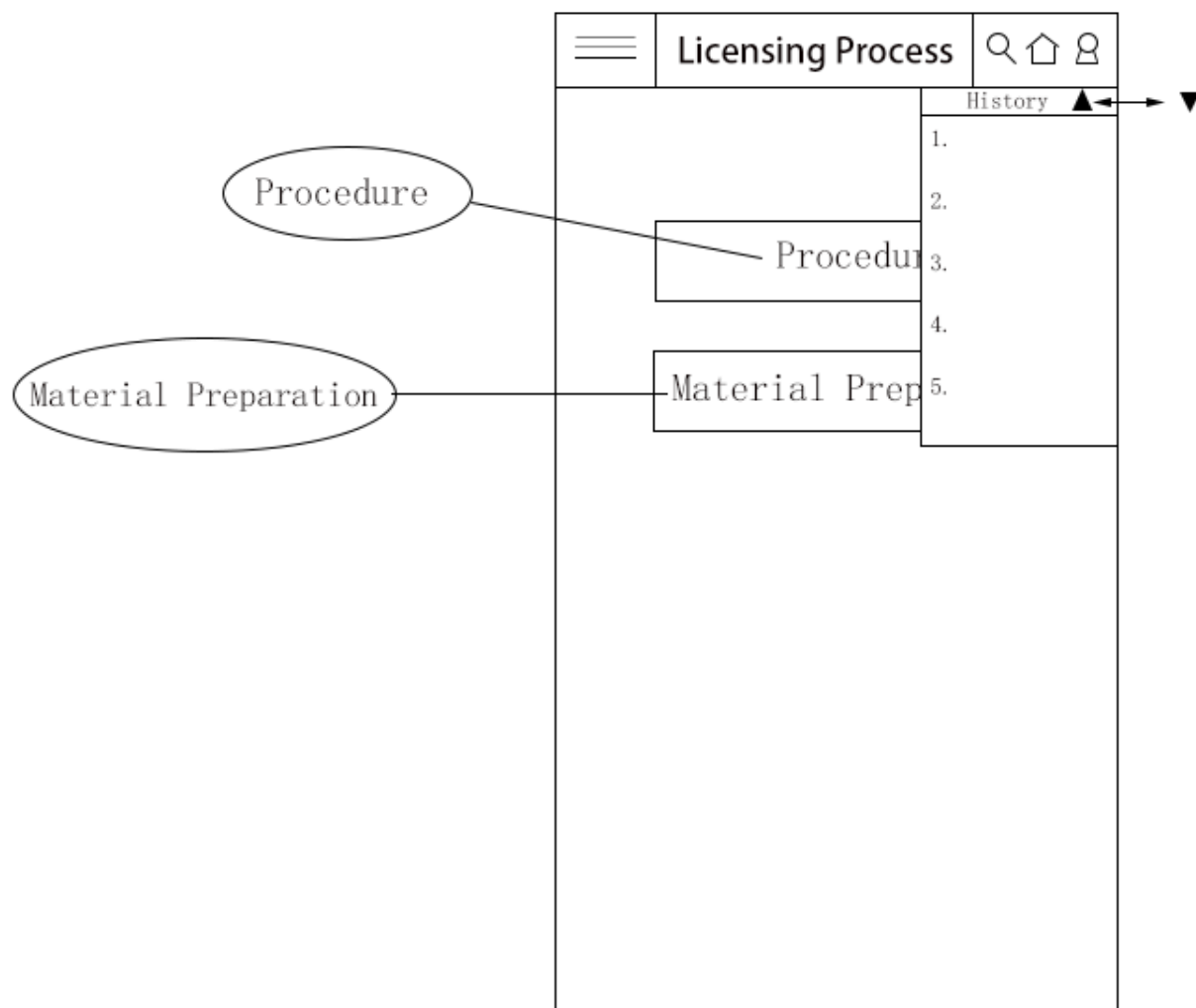## 2. "Licensing Process" Homepage & History Function(F1.3, 10.)

Figure 2-16 Licensing Process Page
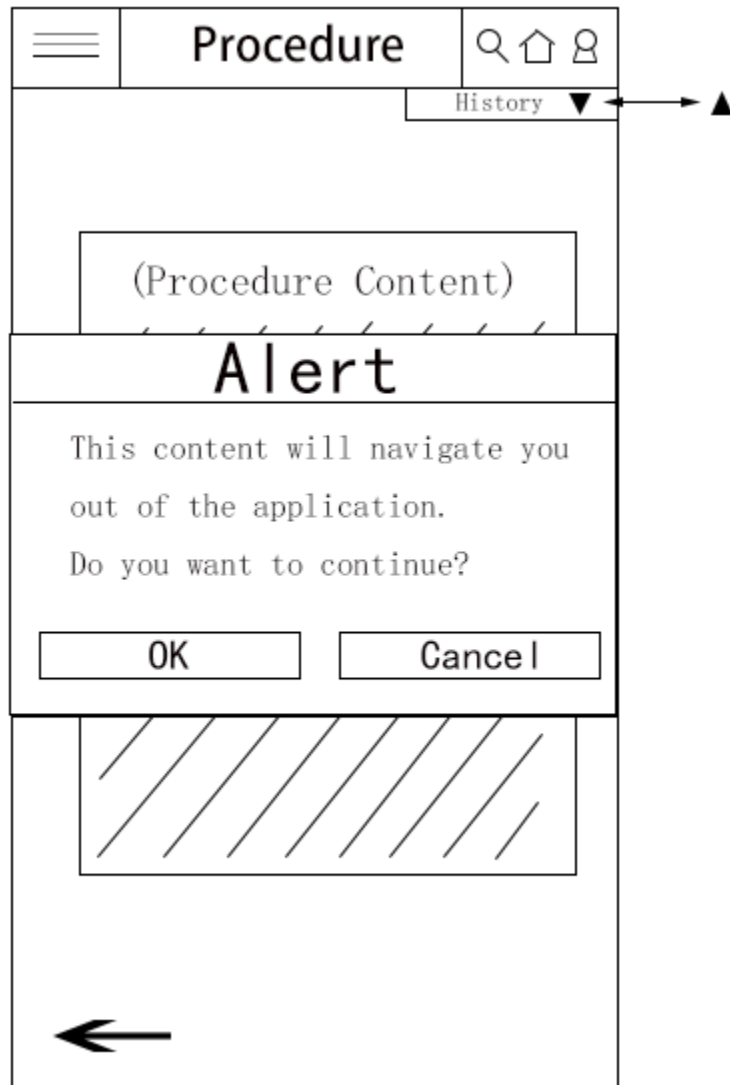
3. Alert Page(F1.5.)

Figure 2-17 Procedure Page

4. "Video Repository" Homepage(F1.6, 7.)

Figure 2-18 Video Repository Page

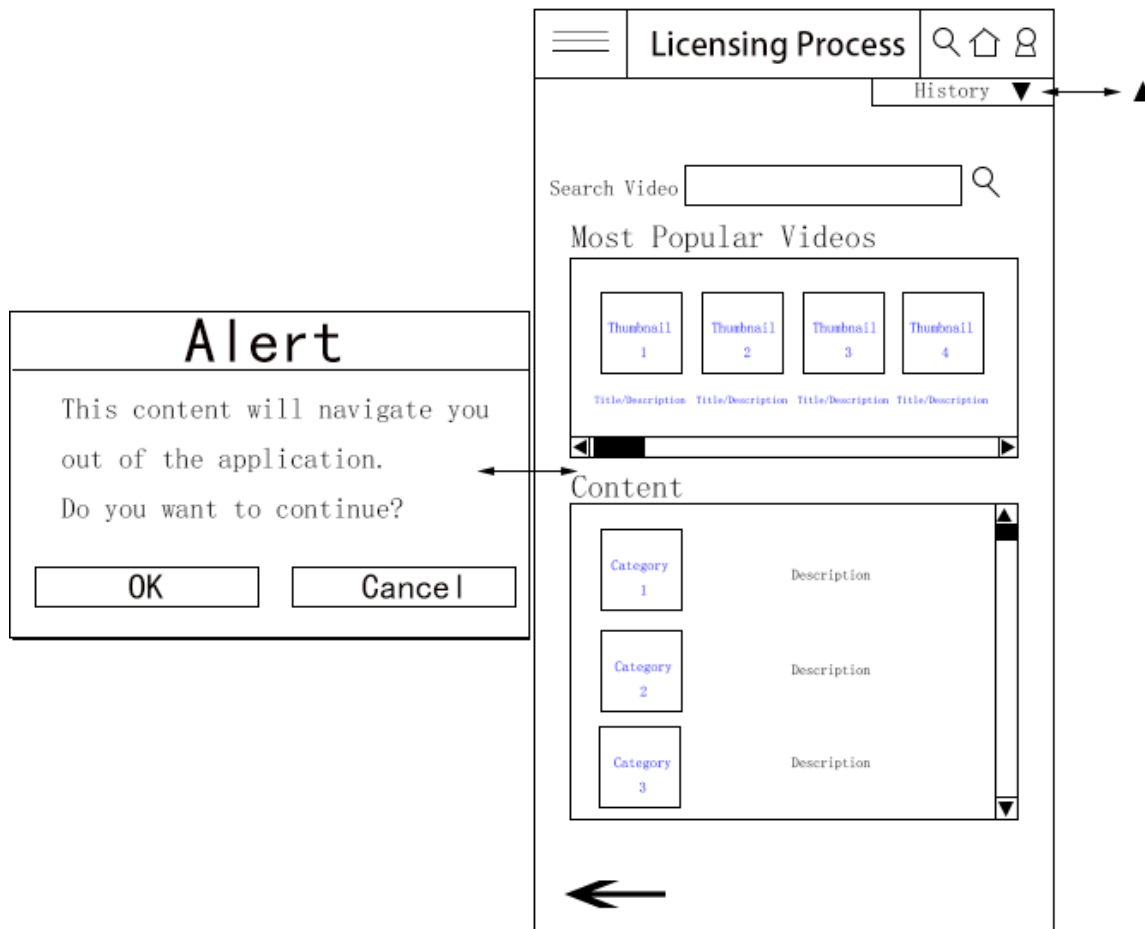## 5. Sample Sub-page in Video Repository & Alert Page(F1.9.)

Figure 2-19 Licensing Process Page in Video Repository

Appendix

Reference list

Neilsen, J. (1994). 10 Usability Heuristics for User Interface Design. Retrieved from
https://www.nngroup.com/articles/ten-usability-heuristics/

Old sketches