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Human Computer Interface & User Experience Design

Universal Keyboard Project

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1. Introduction

A student is undertaking a design project for their human computer interface & user experience design module. The project will involve coming up with an innovative design for a piece of technology that includes creating user interfaces, taking into consideration how they are designed and how usable they are to achieve their purpose based on various audiences. The designs will then be tested by various individuals to identify traits which may indicate design flaws which could be improved upon. For this project, the researcher has chosen to design a concept for a more globally adaptive keyboard.

1.2. Product Overview

Keyboard technology has been around for decades with constant progress into making them more user friendly while improving design aspects although there is an enduring problem with them which is difficult to resolve. Since a keyboard is used to express a language, it means there will be multiple keyboards with various regional layouts for various parts of the world. Each region typically just sells their keyboards with these layouts as default on the keys which can cause confusion for people in specific scenarios. While there are defined language settings built into most operating systems now such as Windows that keyboards generally operate with, it doesn't help ease users that are using a foreign styled keyboard. While this is all possible on virtual keyboards, it currently isn't a reality with physical keyboards which many people still use or prefer.

1.3. Proposed Features

Based on their initial idea, the student intends to provide a keyboard concept that will allow individual keys to change their display to reflect characters or icons of other languages allowing a more comfortable and suitable experience. Users will also be able to create custom layouts if no typical regional template is suitable for their needs. To do this, the researcher has two proposed ideas which will be covered more later the first of which would be a touchscreen display on the keyboard itself. The second option would be to run a packaged or downloadable application which provides the same functionality although more suited for use on a computer. Both approaches would present users with interfaces guiding them through setup procedures before displaying a dashboard styled homepage which will allow them to customise their keyboard further or allow reconfiguration. Since the product is aimed for desktop users, the keyboard will be on a standard size and shape which will be simple yet comfortable to use. It's the researcher's belief that both methods would be implemented if the product was put into production hence there may be less functionality on the built-in touchscreen keyboard display compared to the downloadable/packaged application e.g. support for visually impaired users.

2. Design Strategy

To produce the documentation for this product the student will need to undertake some online research to come up with a suitable design strategy which will help them fully understand the preferences end users would want from a keyboard product. This will include utilising existing statistics or research in prior keyboard designs, types or styles and identifying relevant stakeholders for the product allowing a selection of personas to be created. These personas will come from different backgrounds and will each be given a scenario which can involve them using the product in different ways to help demonstrate the usability and benefits. To express how the personas would go through these scenarios, the student will create user journeys for each of them which will give a basic insight into the process and potential feelings at each step. Using this information, the student will then create user requirement list for the product before researching into similar products which may provide helpful insight on improving the design.

To get a better understanding of how to make this product appeal to end users, the researcher must identify relevant stakeholders. Doing this can be done by coming up with stakeholder questions which could be asked by the student to potential users in interviews or deployed in surveys or questionnaires. The questions the student has come up with are:

<u>Keyboards</u>

Do you prefer full sized keyboards or compact keyboards?
What type of keyboard suit your needs? E.g. Virtual, Gaming?
How do you feel about chunky keys compared to slim keys?
Does the price of a keyboard mean a lot to you?
Does the colour and shape of a keyboard mean a lot to you?
Do you tend to look at keys on a keyboard to locate certain characters?

<u>Interfaces</u>

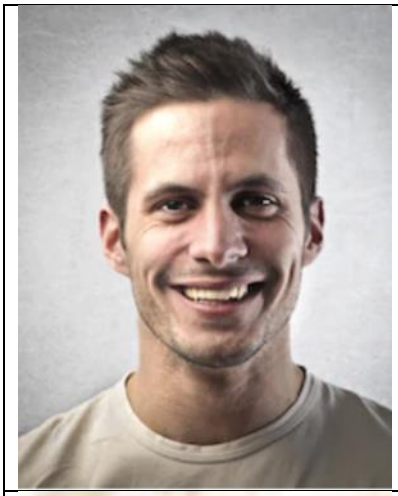
When using a new product such as a new tablet, are the setup interfaces clear and efficient to complete?
Do you ever have any problems initially configuring language preferences in new device interfaces?
Do you prefer simple interfaces or elaborately styled interfaces?
Do you prefer clear feedback from an interface to indicate it has registered your input? e.g. a selection has a darker background than other options.
Do you prefer touchscreen, traditional mouse/keyboard or voice navigational methods?

Using these questions, the student can narrow down user preferences and identify example stakeholders which the product would relate to. Narrowing the target audience down has allowed the researcher to shortlist some eligible stakeholders e.g. Accountant, Developer, Writer, Gamer, Tourist, User (Casual), User (Visually Impaired), User (Suffers an RSI) etc.

Since the product is aimed to be a global, marketing stakeholders may benefit from this due to its focus on global usability making it a product of potential in many global markets while the end user would benefit due to the proposed features.

2.1. Personas

The researcher has created three personas from reviewing existing research into keyboard and interface preferences while ensuring each fits a different demographic:

	Persona 1: John Smith John is a computer IT expert working for a local company which employs people from foreign backgrounds. The business has just requested new keyboards for all the computers. • Will find the product simple to use • Will have experience in setting up new equipment • Could use both touchscreen or application options
	Persona 2: Zhang Wei Zhang is a Chinese Tourist visiting the UK. He needs to use a computer to send an email in the hotel he's staying after having problems with his laptop. • Will be confused at foreign pre-configuration. • Will need to configure another preference for use. • May tend to look at keys due to lack of familiarity.
	Persona 3: Joe Bloggs Joe is a PC Gamer who enjoys playing online titles. He has had issues with his gaming keyboard and needs a replacement. • May find simple structure less appealing. • Will have adequate familiarity in configuration. • Can make use of a custom layout preference.

2.1.1 Persona 1 User Journey

Phases	Initial Interaction		Configuration			Testing
Steps	Unboxing	Setup Method	Choose Device Language	Choose a Keyboard Language	Choose a Keyboard Language Region	Attempt to type with the keyboard
Thoughts & Emotions	"I should take these new keyboards up to the computer room, this shouldn't take long"	"It would be quicker to use the touchscreen method, but the desktop method would be better and would save time later"	"I know my way around this interface so selecting English won't be a problem"	"Some employees here prefer to type in their native languages, I should ensure I pick the correct one"	"Different languages have different regional settings, which applies to this employee?"	"The keyboard is displaying different icons now, but I roughly know what most mean"
Actions	Deliver the boxed keyboards to the computer room before carefully unpacking and connecting to each computer.	Must decide on using the built-in touchscreen on keyboard or run the downloadable/packed application to being configuring the keyboard.	Default language will be dependent on factory settings. Must navigate to select a new device language before configuration.	Keyboard languages will display in a drop-down menu which can be dragged or scrolled through for selection. Click or tap the selection to apply.	Keyboard regional languages may vary per language, regions will display in a drop-down menu which can be dragged or scrolled through for selection. Click or tap the selection to apply.	Test the configuration was successful by typing and looking at the key displays. Reconfiguration may be required if incorrect via interface options menu.
Key Points	Should ensure enough keyboards are delivered and carefully handled to avoid potential damage.	While the device has a touchscreen display, it will need the computer to be turn on to be powered.	Knowledge on setting up factory set devices isn't always obvious. Language menu should be in clear sight.	Keyboard language is different from device language Keyboard language is what language will be used when typing and what will be displayed on the keys.	Important to select the correct region even if the language is correct to avoid minor but confusing differences in layouts.	Configuration can be quick, but testing is important. Option for reconfiguration is vital in case of mistakes or new users.

2.1.2. Persona 2 User Journey

Phases	Initial Interaction		Configuration			Testing
Steps	Initial Viewing	Setup Method	Choose Device Language	Choose a Keyboard Language	Choose a Keyboard Language Region	Attempt to type with the keyboard
Thoughts & Emotions	"This keyboard is in a different language, I hope I can change it"	"Touchscreen seems easier and I just want to change the keyboard characters to use the PC"	"Dashboard has an options menu with a reconfiguration option, excellent!"	"Menu seems easy to use, I can tell this is for changing languages"	"Hong Kong and mainland China use different languages, hopefully mine is here"	"The keyboard is displaying different icons now, this makes it much easier to type for me"
Actions	Sits down at the desk with the computer and looks at the keyboard and views the physical shape and layout.	User uses the touchscreen display to reconfigure the keyboard.	Default language will be dependent on previous user. Must navigate to select a new device language before configuration.	Keyboard languages will display in a drop-down menu which can be dragged or scrolled through for selection. Click or tap the selection to apply.	Keyboard regional languages may vary per language, regions will display in a drop-down menu which can be dragged or scrolled through for selection. Click or tap the selection to apply.	Test the configuration was successful by typing and looking at the key displays. Reconfiguration may be required if incorrect via interface options menu.
Key Points	Should be able to see roughly a similar keyboard structure to most other keyboards to find familiarity despite initial language issue.	Since the user may be unable to log into the computer due to language issues, touchscreen solution should be instantly available.	Must find and navigate the dashboard to begin reconfiguration. Can be done using icons to bypass the language barrier.	Keyboard language is different from device language Keyboard language is what language will be used when typing and what will be displayed on the keys.	Important to select the correct region even if the language is correct to avoid minor but confusing differences in layouts.	Configuration can be quick, but testing is important. Option for reconfiguration is vital in case of mistakes or new users.

2.1.3. Persona 3 User Journey

Phases	Initial Interaction		Configuration		Testing	
Steps	Unboxing	Setup Method	Choose Device Language	Choose a Keyboard Language/Region	Attempting to type with the keyboard	Configuring a new layout
Thoughts & Emotions	"Keyboard looks basic and should be suitable as a cheap temporary replacement"	"Quicker for me to use the desktop application to configure this"	"I know my way around interfaces like this so selecting English won't be a problem"	"This is a simple interface to use, I must find British English in this list"	"The keyboard is displaying different icons now, excellent!"	"I need to setup a new configuration which will help in gaming scenarios"
Actions	Open the keyboard from its packaging and connect to the computer.	Must decide on using the built-in touchscreen on keyboard or run the downloadable/packed application to being configuring the keyboard.	Default language will be dependent on factory settings. Must navigate to select a new device language before configuration.	Keyboard languages will display in a drop-down menu which can be dragged or scrolled through for selection. Click or tap the selection to apply.	Test the configuration was successful by typing and looking at the key displays. Reconfiguration may be required if incorrect via interface options menu.	Navigates to the settings tab to create and save a custom layout.
Key Points	Should ensure enough keyboards are delivered and carefully handled to avoid potential damage.	While the device has a touchscreen display, it will need the computer to be turn on to be powered.	Knowledge on setting up factory set devices isn't always obvious. Language menu should be in clear sight.	Keyboard language is different from device language Keyboard language is what language will be used when typing and what will be displayed on the keys.	Configuration can be quick, but testing is important. Option for reconfiguration is vital in case of mistakes or new users.	Should be easy to navigate to from the dashboard and should be fully customisable in relation to current language settings.

2.2. User Requirements

Based on some of these user journeys, the student has been able to identify important factors that are vital to the design.

Main Requirement	Functionality Requirement/Comments
1. Users should be able to configure the device efficiently	1.1. Access either the touchpad/software quickly to not deter users 1.2. Select device language, keyboard language and region with minimal steps to avoid user becoming bored or tired 1.3. Device may require updates to ensure newer selections become available 1.4. User feedback and ability to reconfigure should be accessible e.g. Persona 2's scenario 1.5. Ability to add new custom configurations e.g. someone with a disability may prefer specific setups not commonly available or Persona 3's scenario.
2. Controls on the interfaces and device should be clear	2.1. Can be done using colour schemes and icons 2.2. User feedback can be indicated e.g. Darken background of input 2.3. Icons can provide accessibility e.g. cog icon indicates settings 2.4. Physical keys can be lit in different colours to provide general visibility or usability in darker environments
3. Physical Design should be practical yet comfortable	3.1. Using existing generic layouts will provide these requirements since existing statistics and knowledge are in line with user preferences 3.2. Being comfortable to the user is vital for health and safety e.g. user may develop an RSI or injury from bad posture while using the keyboard 3.3. Keys should feel responsive as users tend to find some types of keyboards unresponsive which causes annoyance 3.4. Touchscreen device should be large enough to read but compact enough to fit onto the keyboard
4. Interfaces should be practical but modern	4.1. Modern and practical designs attract users and keep their attention 4.2. Can be done using responsive layouts, shapes and colours

2.3. Existing Products

Due to technology moving more toward compact or mobile devices, it seems the intention to create a more modernised keyboard for desktop users isn't a focus for people today who seem to be more invested in creating keyboards for devices such as tablets. Some desktop keyboards designed today include some aspects of the students design but there are no products that have the same aims. Some ideas that inspired the user are the colourful lighting on many gaming keyboards such as the GXT 830-RW Avonn Gaming keyboard by Trust.

Figure 1. GXT 830-RW Avonn Gaming Keyboard by Trust

This keyboard is wired although this sometimes provides better integrity in performance compared to wireless devices. The main aspect the student took from this keyboard is how the keys are lit in various colours which is likely more for visual appearance in this product rather than functionality. The student was inspired to take this lighting functionality and apply it to their design to provide better usability in darker areas and gives off a more modern appeal to the product. Having lighting on the keys also allows users who may be used to physical different layouts than expressed on the product may be able to find what their looking for easier. An aspect this product wouldn't feature in the student's design would be the shape which while modern appears more premium than it should for a more universal and affordable keyboard.

Other basic keyboards are more in line with what the student has in mind as a physical product while the interface and software take inspiration from initial setup screens on phones or tablets as shown below in Figure 2.

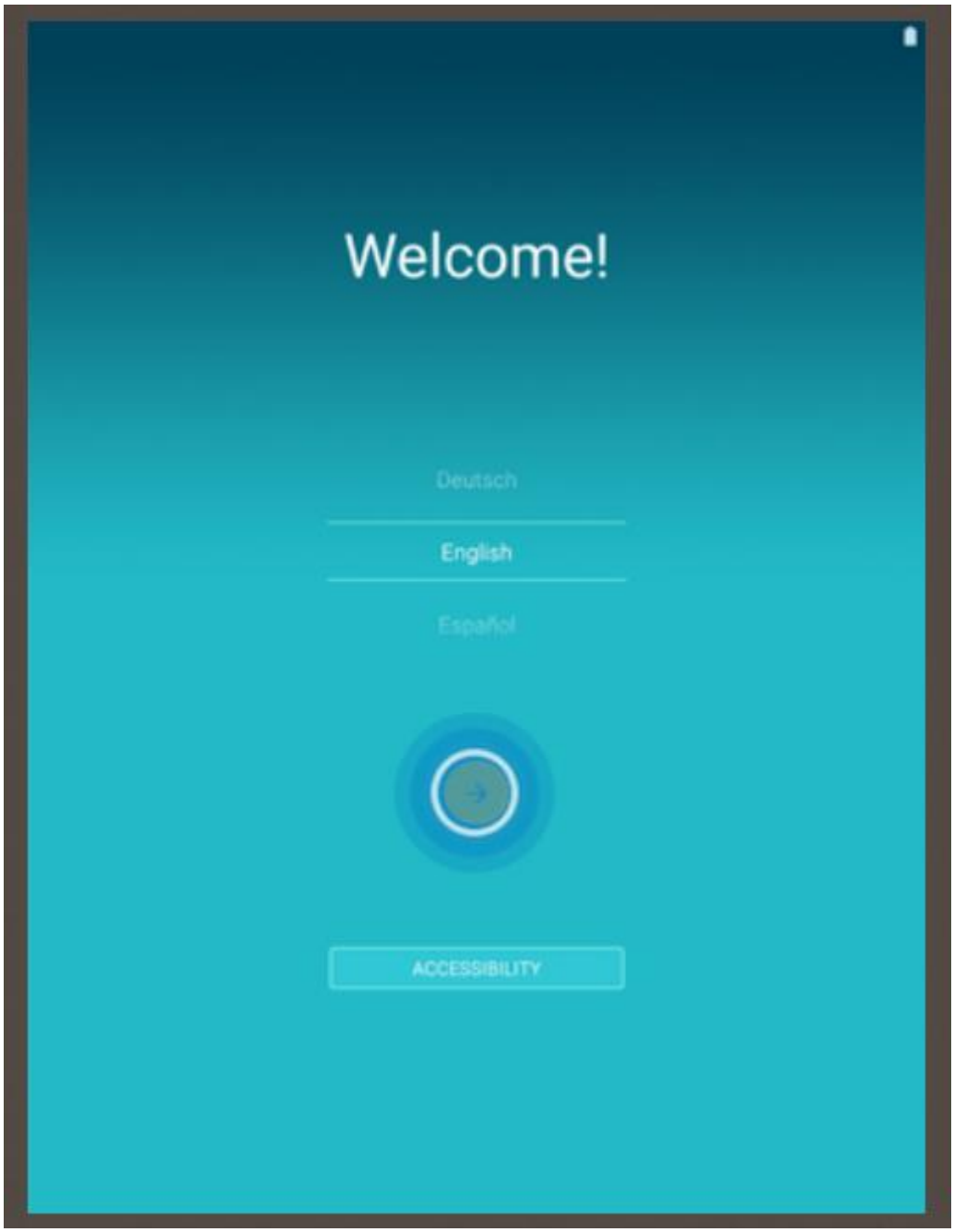


Figure 2. Setting up a Samsung Tablet

The above image shows a welcome screen which instantly allows for device language to be configured while also provided accessibility options. The colours are cool yet have a modern feel while allowing the text to be eligible along with the scroll option to select a language giving a modern feel. The next icon is displayed with an arrow pointing right to signal progress toward the next phase like writing always goes left to right which provides good indication of the icon's intention. Using the white border on the circle around the icon also catches the eye of users plus its position on the screen is hard to miss being in the centre.

3. Designs

3.1 Touchscreen Design

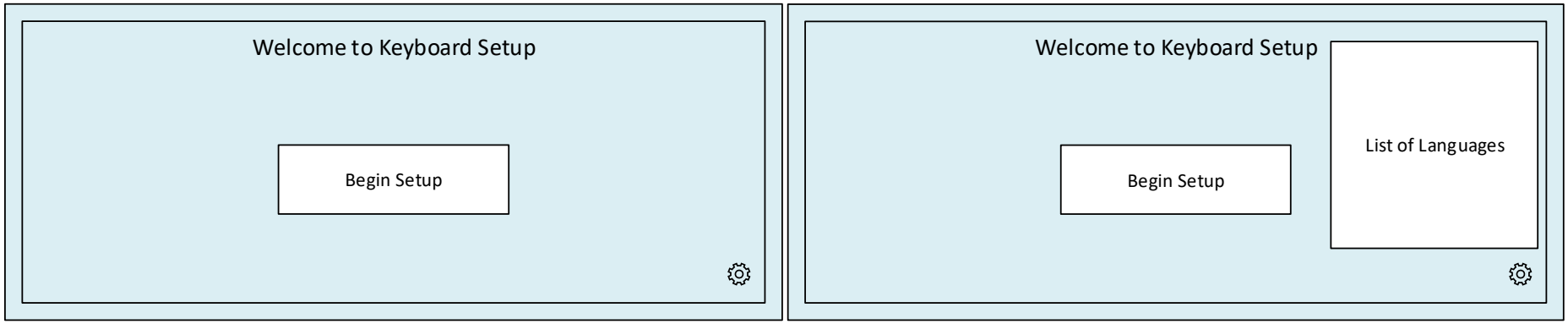


Figure 3. Initial Configuration Screen (Touchscreen)

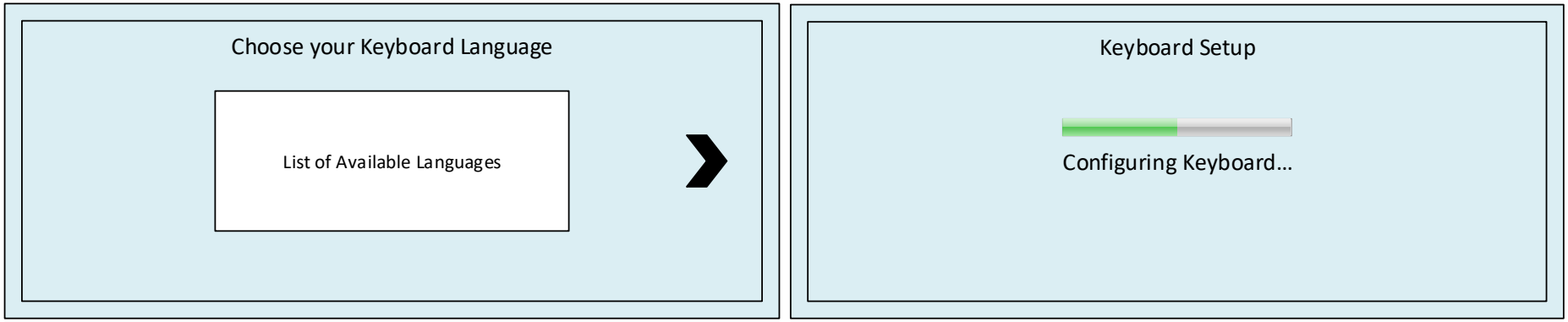


Figure 4. Choosing a Language and Processing of Input (Touchscreen)

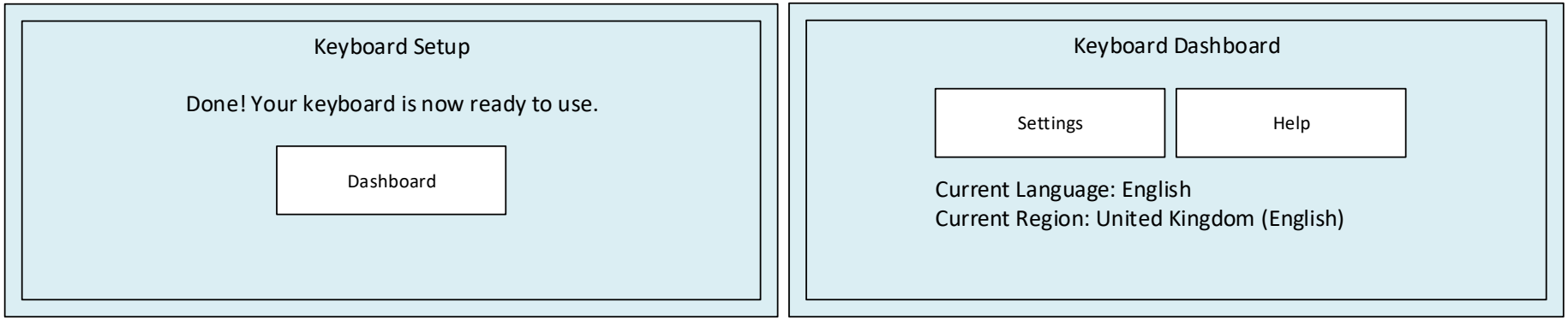


Figure 5. Feedback on Configuration Completion and Dashboard Display (Touchscreen)

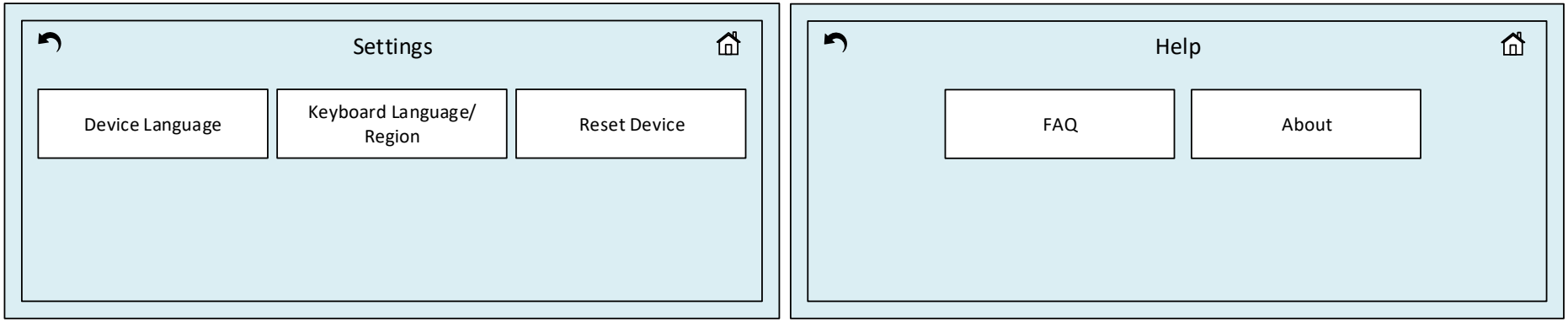


Figure 6. Dashboard Settings and Help Displays (Touchscreen)

The first image is the display users will first encounter in persona 1 and 3's scenarios due to them being first time setups although this design is more suitable for Persona 2's scenario. The student has adopted a compact screen size which ensures its small enough to fit onto the physical keyboard while being large enough to interact with. This was based of using phone screen sizes as a reference to ensure the text and icons would be large enough to be eligible for users to understand which a tougher problem could be if the device isn't yet configured to use their native language. The cog icon at the bottom right of the screen allows users to know this is a settings indicator which will allow language changes. This was chosen to not clutter the screen up before the user has even began their configuration which would be distracting and may cause confusion. The user would then be able to tap a selection from the list and the device would automatically switch the onscreen language for easier use.

Once the user taps the "Begin Setup" box they will be taken to the next display asking them to choose their keyboard language which will alter the physical keys appearance. The user taps their selection and taps the arrow to the right of the selection box to apply the choice which would then apply the correct letters and icons to the physical keyboard. To provide onscreen feedback that the input is being processed, the screen will display a loading bar with accompanying text before displaying a display implying the configuration is done. The user will then be presented with a box to be taken to the dashboard which will be their home display from this point onwards.

The dashboard will have some options and display current settings on screen for ease which prevents users needing to go through numerous screens to find the current settings. From here the user will be able to go into their settings and change their preferences whenever they wish and do a complete reset if required. The help box will also provide some frequently asked questions about the product and provide some basic information about it. It's also important to notice when users select the settings or help boxes that in the top corners of the screen appear new icons indicating a back button and a home icon. These icons are also more suitable for a small touchscreen interface since there is limited screen space, it's easier to express information with small icons rather than words which will take up more space and are more likely to clutter the screen.

The position of the boxes and headings throughout the displays also promotes a uniform apparel which keeps consistency going combined with the light blue background making it have more of a professional appearance. This will allow businesses to approve of the product along with being clear and basic to those who may have little technical knowledge or experience in configuration. The simple process of configuration will also work best for tourists or those merely wishing to change the language.

3.2. Application Design

The next design is the software application that would run on the desktop. This would be either pre-packaged with the keyboard or downloaded from an online source.

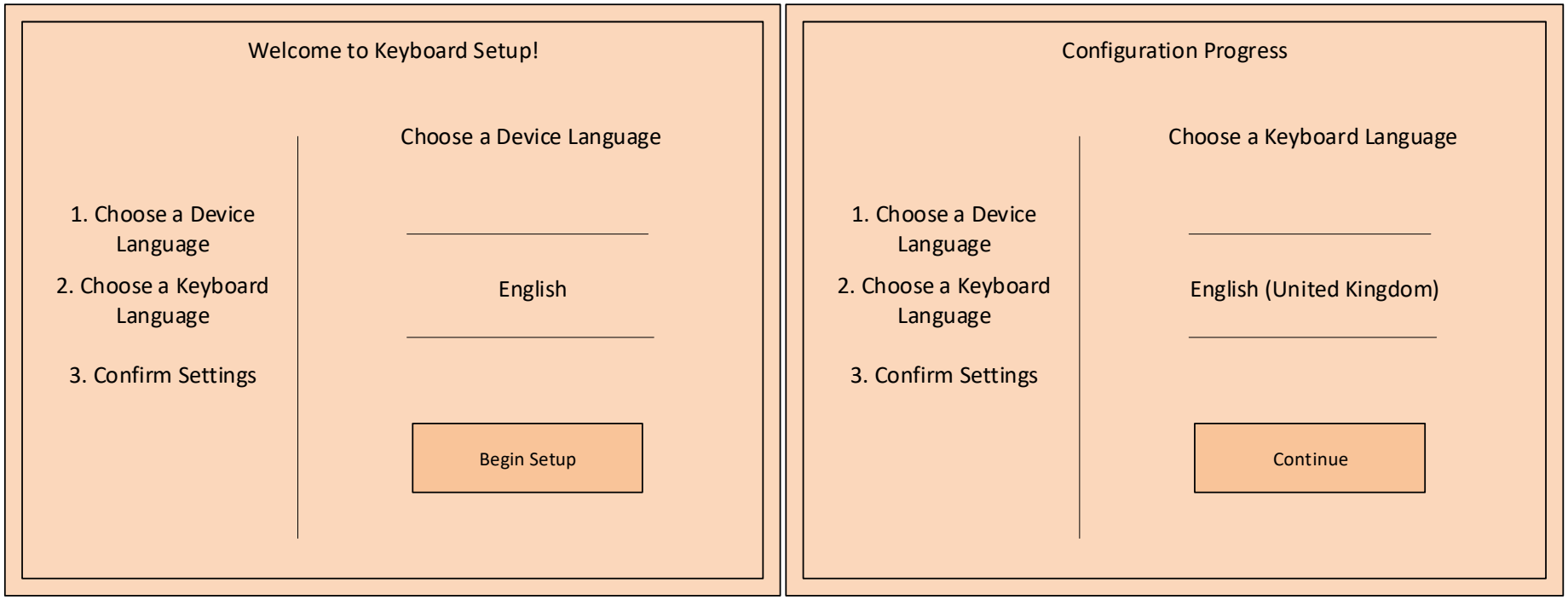


Figure 7. Initial Configuration Screen (Application)

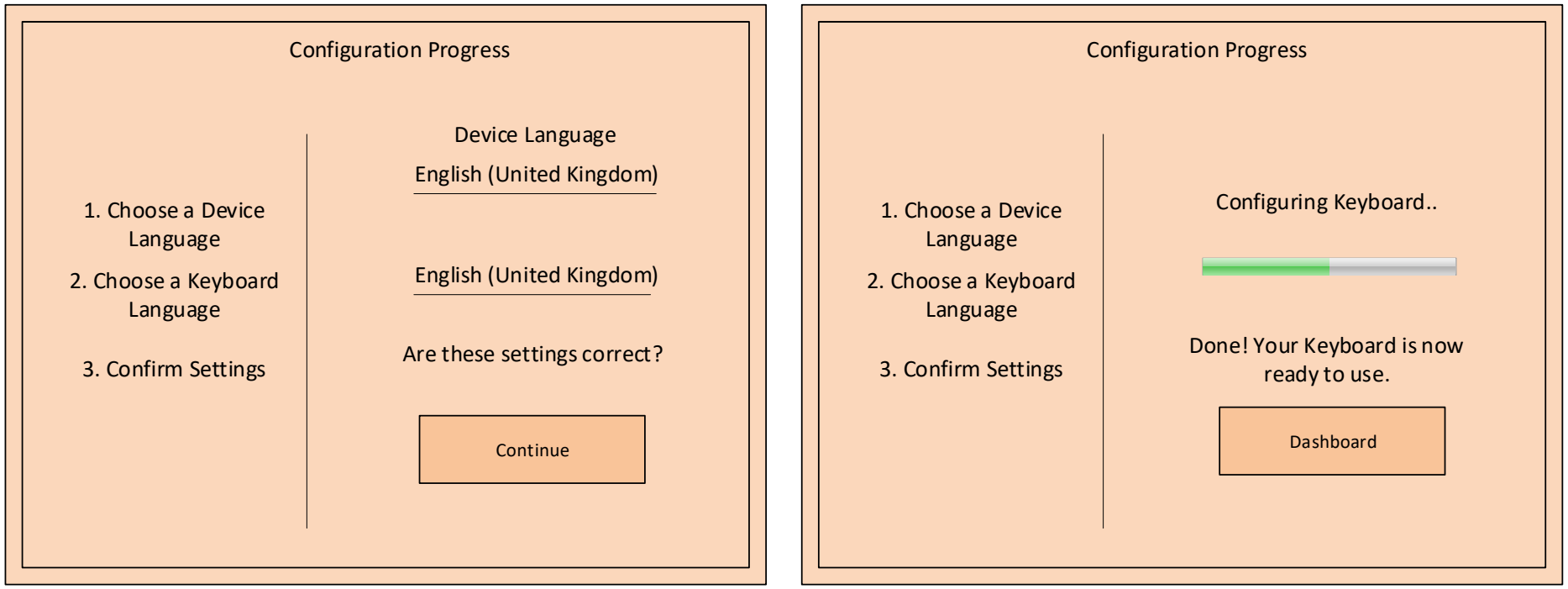


Figure 8. Choosing a Language and Processing of Input (Application)

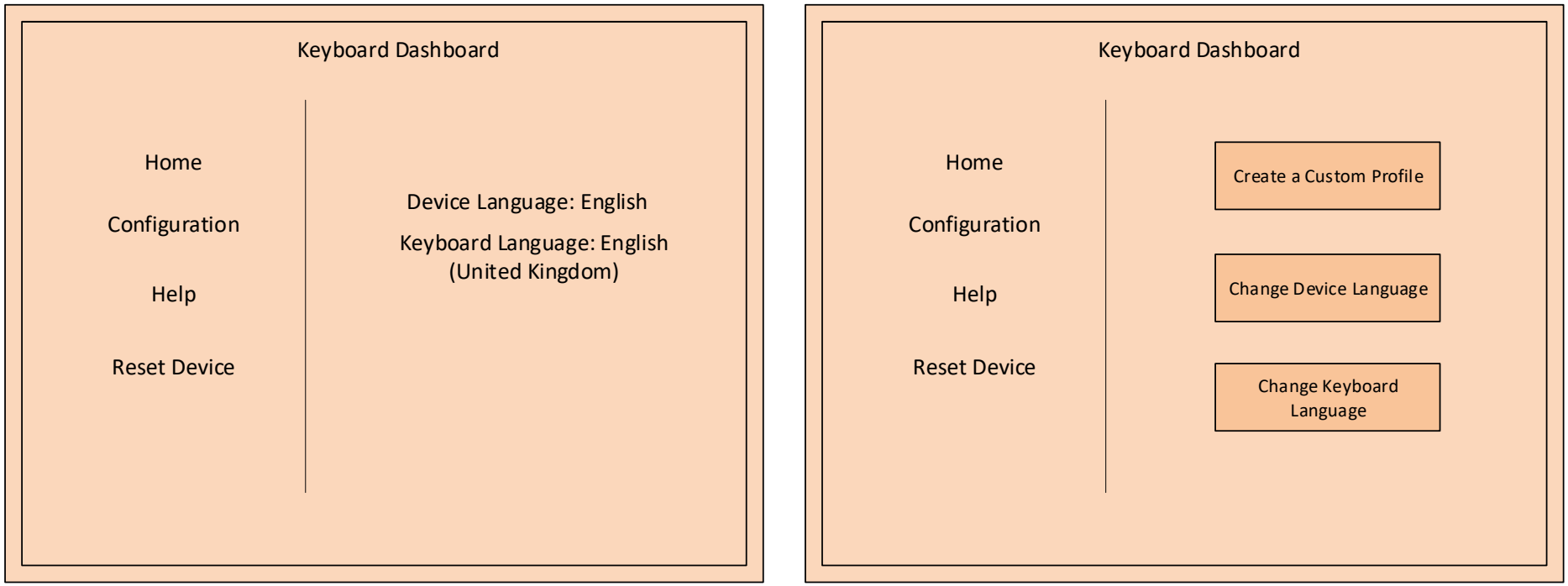


Figure 9. Dashboard Display and Configuration Area (Application)

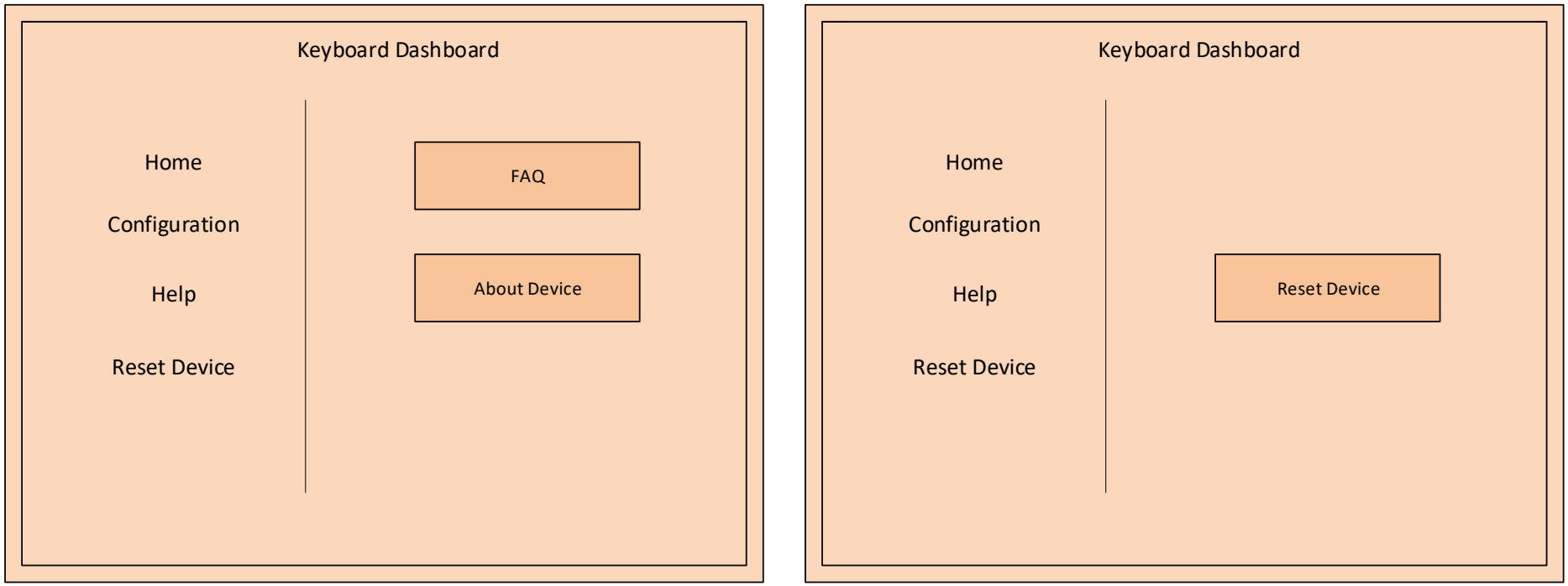


Figure 10. Help Area and Reset Device (Application)

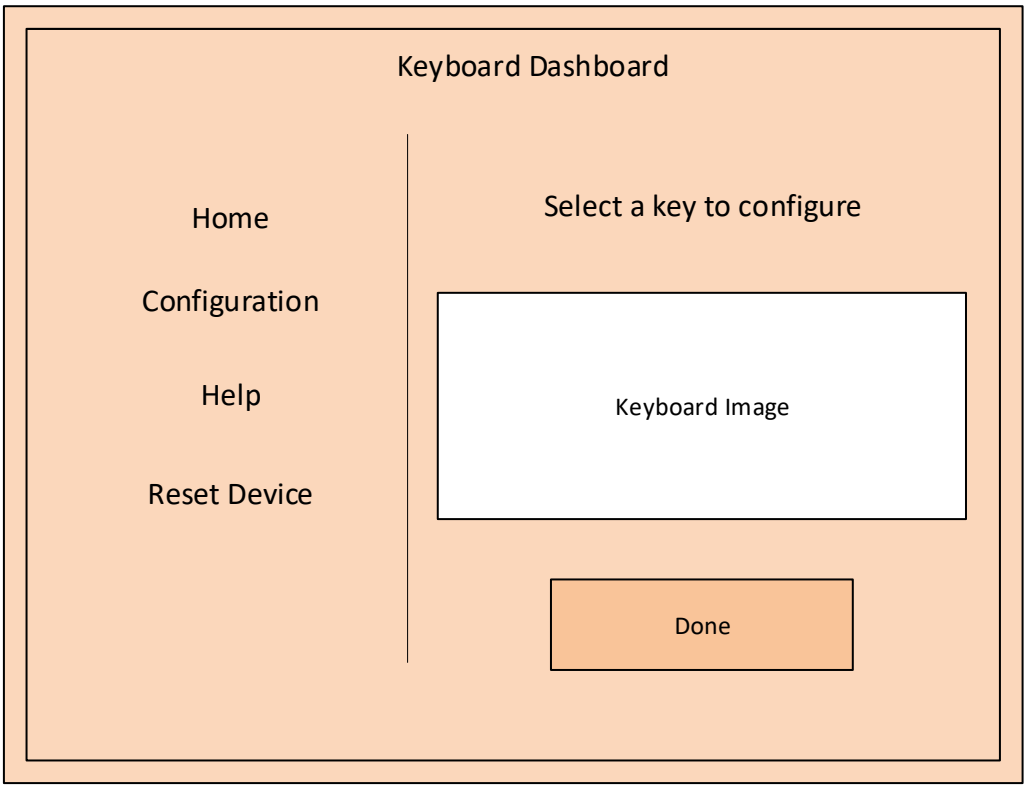
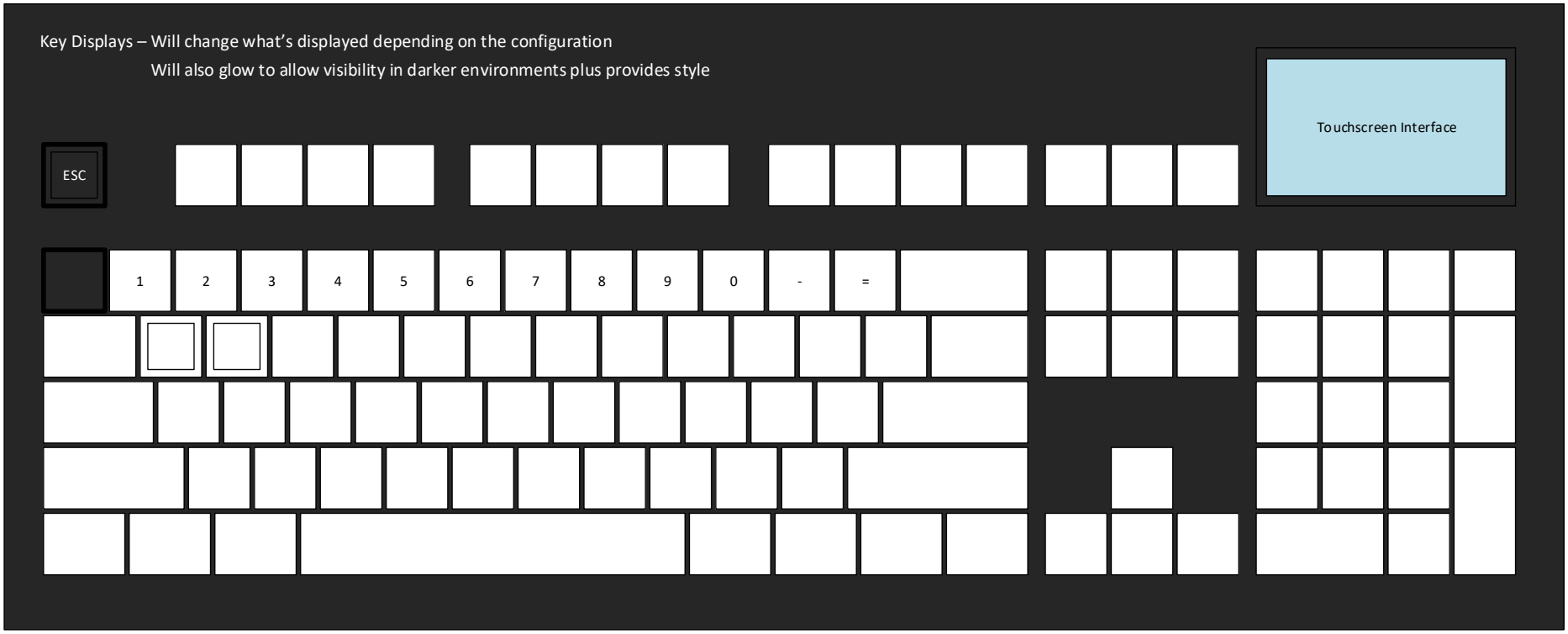


Figure 11. Custom Profile Interface

This alternate solution to configuration takes a different approach in expressing the same information in the prior design. Instead of making every display seem unique, the student has chosen to give the effect the user isn't leaving the same display but promotes the illusion that various info is accessible within a single display. This is done via the constant side menu in both the configuration and the dashboard which maintains display consistency despite their different purposes. The initial purpose is to provide steps for the configuration to give users an idea how long it will take to complete which reassures them that the process will not take too long. The second use is to act as a menu allowing reconfigurations, viewing the same help options or for device resetting. The main difference in this design is that the custom configuration option is available when it wasn't on the touchscreen. The student decided that to display a keyboard on screen within a small screen already would result in being too small to read and would be too crapped to use practically. The colour scheme here is different and promotes a warmer orange while still allowing text to be read. The buttons display a darker accent of the colour to highlight them more to the user and this effect would apply whenever the user selects a specific menu on the dashboard. The buttons are completely dominated by text in this design since the menu is constantly available meaning there is no need for icons or extra navigational buttons. The uniform appearance and layout of text and buttons makes tidy and good use of the available screen space while giving off a modern feel.

3.3. Physical Wireframe



4. Cognitive Walkthrough

The student will now carry out a cognitive walkthrough using the persona user journeys as tasks e.g. Persona 3 must use each design and manage to setup a custom configuration if possible.

4.1. Touchscreen Walkthrough 1

Touchscreen Design Cognitive Walkthrough 1 Goal: User must configure the keyboard to use the keyboard language: English (United Kingdom)	Q1: is the correct action available in the interface and will it be made sufficiently evident to the user?	Q2: Will the user connect the correct action's description with what they are trying to do? i.e. how well does that action's description match the user's goal?	Q3: Will the user interpret the system's response to the chosen action correctly - does the system's response to the action show progress toward the user's goal?	Able to complete the task?
Configure the Keyboard				
Connect the Keyboard	No, this action is on the physical side which will be done via USB.	Yes, connecting the keyboard will be easily possible with identifying USB connectors with ports on the computer.	Yes, this task is binary as if the device isn't connected correctly, the touchscreen will not receive power and thus cannot be used.	Yes
Select a Device Language	Not initially, the selection of device language is accessed through the cog icon.	Yes, the required interface is available once the cog icon is selected, if it isn't the option isn't on screen for the user.	Yes, once a language has been selected, the device will automatically reconfigure itself to display the chosen language.	Yes

Tap “Begin Setup” button	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, the “Begin Setup” button is clearly labelled and displayed in the centre of the screen.	Yes, once the button is selected, the user will be taken to the next display.	Yes
Select a Keyboard Language	Yes, unlike device language, this selection has a display dedicated towards it. The user will be able to scroll through a list to find the correct selection.	Yes, since the display is dedicated to this task, the user will have no trouble understanding what the purpose is. The text will guide the user into knowing what is being asked.	Yes, once a language is selected, the selection will have a background colour to indicate it’s been selected. This gives feedback to the user that the input has been received.	Yes
Click the “Continue” button to reach the confirm settings display.	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, the wording continue is descriptive for users to read and understand the intention.	Yes, the continue box will initially be greyed out until a selection is chosen. Once one is selected, the box will change colour and become clickable showing the user their input has unlocked it.	Yes
Read and ensure settings are correct before clicking the “Continue” button to apply the settings.	Yes, this is only possible in a single way by tapping the button with the relevant text. Users can click the text of	Yes, the wording continue is descriptive for users to read and understand the intention.	Yes, once the button is selected, the user will be given a loading bar display to show their selections are being implemented.	Yes

	their prior selections to change them before continuing.			
Testing the Configuration				
View the physical product to check if English (United Kingdom) is correctly configured.	No, since this is again a physical aspect, the user will be looking at the physical keys to see if they reconfigured themselves to the relevant language.	Yes, the user will be able to look away from the interface toward the keys without much issue.	Yes, the keys will likely go blank during configuration and reappear once done. The keys are also lit and will draw the user's attention. Reading the letters or icons on the keys will let the user know wither the task was done properly or not	Yes
Attempt to type with the keyboard to test the correct letters or characters appear	No, the user would do this physically, but the result would appear on screen.	Yes, the task is very descriptive and precise in what is being asked.	Yes, the on-screen output will display a character for every key pressed, if the letter or icon displayed on the key appears on the screen, then the user has got the correct result and feedback.	Yes

4.2. Touchscreen Walkthrough 2

Touchscreen Design Cognitive Walkthrough 2 Goal: User must reconfigure the keyboard from English (United Kingdom) to use Chinese (Traditional Hong Kong)	Q1: is the correct action available in the interface and will it be made sufficiently evident to the user?	Q2: Will the user connect the correct action's description with what they are trying to do? i.e. how well does that action's description match the user's goal?	Q3: Will the user interpret the system's response to the chosen action correctly - does the system's response to the action show progress toward the user's goal?	Able to complete the task?
Reconfigure the Keyboard				
Access the Keyboard Dashboard	Yes, this is done by physically tapping on the interface to show the display.	They may be initially confused until they find the interface location on the keyboard and tap it. The display will not be lit to save electricity if not in use.	Yes, the user will know they are in the correct place because the dashboard is the homepage for the device after initial configuration	Yes
Select "Settings"	Yes, the menu option is clearly defined by a button on the screen.	Yes, the text in the button indicating settings is descriptive enough to know this area is for actions in relation to the overall goal.	Yes, tapping the box will take the user to the settings interface showing them the next task.	Yes

Tap the “Keyboard Language/Region” button	Yes, although could be confusing with the Device Language option on the same display.	Yes, the “Keyboard Language/Region” button is clearly labelled and displayed in the centre of the screen with other buttons for configuring.	Yes, once the button is selected, the user will be taken to the next display.	Yes
Select a Keyboard Language	Yes, although it may be easier for the user to change the device language first, so they can understand the interface text	Yes, since the display is dedicated to this task, the user will have no trouble understanding what the purpose is assuming they can read the current device language. The text will guide the user into knowing what is being asked.	Yes, once a language is selected, the selection will have a background colour to indicate it’s been selected. This gives feedback to the user that the input has been received.	Yes
Tap the arrow to continue	Yes, the arrow is clearly position on the screen and coloured in black to make it stand out.	Depending on the user’s experience, the arrow may confuse less experienced individuals in its meaning.	Yes, regardless of the true understanding, the arrow will be animated and point toward the next screen after a selection is picked.	Yes
Testing the Configuration				
View the physical product to check if English (United Kingdom) is correctly configured.	No, since this is again a physical aspect, the user will be looking at the physical keys to see if they reconfigured	Yes, the user will be able to look away from the interface toward the keys without much issue.	Yes, the keys will likely go blank during reconfiguration and the user will know the change has been applied seeing Chinese characters replacing the English ones.	Yes

	themselves to the relevant language.			
Attempt to type with the keyboard to test the correct letters or characters appear	No, the user would do this physically, but the result would appear on screen.	Yes, the task is very descriptive and precise in what is being asked.	Yes, the on-screen output will display a character for every key pressed, if the letter or icon displayed on the key appears on the screen, then the user has got the correct result and feedback.	Yes

Since the student decided not to allow the custom keyboard profiles features on the touchscreen display, the 3rd persona would overall fail the task since this feature is only included in the application design.

4.3. Application Walkthrough 1

Application Design Cognitive Walkthrough 1 Goal: User must configure the keyboard to use the keyboard language: English (United Kingdom)	Q1: is the correct action available in the interface and will it be made sufficiently evident to the user?	Q2: Will the user connect the correct action's description with what they are trying to do? i.e. how well does that action's description match the user's goal?	Q3: Will the user interpret the system's response to the chosen action correctly - does the system's response to the action show progress toward the user's goal?	Able to complete the task?
Configure the Keyboard				
Connect the Keyboard	No, this action is on the physical side which will be done via USB.	Yes, connecting the keyboard will be easily possible with identifying USB connectors with ports on the computer.	Yes, this task is binary as if the device isn't connected correctly, the touchscreen will not receive power and thus cannot be used.	Yes
Select a Device Language	Yes, the screen displays the action in the centre of the interface before beginning the setup.	Yes, the user will notice languages are on selection indicating a configuration list. The text above the list also provides instructions assuming the user can read them.	Yes, once a language has been selected, the device will automatically reconfigure itself to display the chosen language.	Yes
Tap "Begin Setup" button	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, the "Begin Setup" button is clearly labelled and displayed in the centre of the screen.	Yes, once the button is selected, the user will be taken to the next display.	Yes

Select a Keyboard Language	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, since the display is dedicated to this task, the user will have no trouble understanding what the purpose is. The text will guide the user into knowing what is being asked.	Yes, once a language is selected, the selection will have a background colour to indicate it's been selected. This gives feedback to the user that the input has been received.	Yes
Click the "Continue" button to reach the confirm settings display.	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, the wording continue is descriptive for users to read and understand the intention.	Yes, the continue box will initially be greyed out until a selection is chosen. Once one is selected, the box will change colour and become clickable showing the user their input has unlocked it.	Yes
Read and ensure settings are correct before clicking the "Continue" button to apply the settings.	Yes, this is only possible in a single way by tapping the button with the relevant text. Users can click the text of their prior selections to change them before continuing.	Yes, the wording of the task is descriptive enough and the text on screen is instructive to the user asking a question while displaying their prior choices.	Yes, once the button is selected, the user will be given a loading bar display to show their selections are being implemented.	Yes

Testing the Configuration				
View the physical product to check if English (United Kingdom) is correctly configured.	No, since this is again a physical aspect, the user will be looking at the physical keys to see if they reconfigured themselves to the relevant language.	Yes, the user will be able to look away from the interface toward the keys without much issue.	Yes, the keys will likely go blank during configuration and reappear once done. The keys are also lit and will draw the user's attention. Reading the letters or icons on the keys will let the user know wither the task was done properly or not	Yes
Attempt to type with the keyboard to test the correct letters or characters appear	No, the user would do this physically, but the result would appear on screen.	Yes, the task is very descriptive and precise in what is being asked.	Yes, the on-screen output will display a character for every key pressed, if the letter or icon displayed on the key appears on the screen, then the user has got the correct result and feedback.	Yes

4.4. Application Walkthrough 2

Application Design Cognitive Walkthrough 2 Goal: User must reconfigure the keyboard from English (United Kingdom) to use Chinese (Traditional Hong Kong)	Q1: is the correct action available in the interface and will it be made sufficiently evident to the user?	Q2: Will the user connect the correct action's description with what they are trying to do? i.e. how well does that action's description match the user's goal?	Q3: Will the user interpret the system's response to the chosen action correctly - does the system's response to the action show progress toward the user's goal?	Able to complete the task?
Reconfigure the Keyboard				
Access the Keyboard Dashboard	Yes and No, it depends on if the shortcut to the software is on the desktop for easy access.	This task may cause confusion since they may have no idea how to access the interface if they don't know they must open the application first.	Yes, if the user clicks on the application, the interface will open and load.	Yes
Select "Configuration"	Yes, the menu option is clearly defined in a menu on the screen.	Yes, the text in the menu also acts as a tab button which will show the relevant options for the user. The wording of configuration also simplifies what the purpose of the area is about.	Yes, tapping the box will change the displayed options showing them their next task.	Yes

Click the “Change Keyboard Language” button	Yes, although could be confusing with the Device Language option on the same display.	Yes, the “Keyboard Language” button is clearly labelled and displayed in the list of options along with other buttons for configuring.	Yes, once the button is selected, the user will be taken to the relevant display.	Yes
Select a Keyboard Language	Yes, although it may be easier for the user to change the device language first, so they can understand the interface text	Yes, since the display is dedicated to this task, the user will have no trouble understanding what the purpose is assuming they can read the current device language. The text will guide the user into knowing what is being asked.	Yes, once a language is selected, the selection will have a background colour to indicate it’s been selected. This gives feedback to the user that the input has been received.	Yes
Click the “Continue” button to confirm the new setting.	Yes, the continue button will become available when a new selection is made.	Users may be confused about selecting a new setting before they can click the button if they cannot understand the interfaces purpose.	Yes, once a new selection is chosen, the button will become clickable allowing confirmation showing the users input has been accepted.	Yes
Testing the Configuration				
View the physical product to check if English (United Kingdom) is correctly configured.	No, since this is again a physical aspect, the user will be looking at the physical keys to see if they reconfigured	Yes, the user will be able to look away from the interface toward the keys without much issue.	Yes, the keys will likely go blank during reconfiguration and the user will know the change has been applied seeing Chinese characters replacing the English ones.	Yes

	themselves to the relevant language.			
Attempt to type with the keyboard to test the correct letters or characters appear	No, the user would do this physically, but the result would appear on screen.	Yes, the task is very descriptive and precise in what is being asked.	Yes, the on-screen output will display a character for every key pressed, if the letter or icon displayed on the key appears on the screen, then the user has got the correct result and feedback.	Yes

4.5. Application Walkthrough 3

Application Design Cognitive Walkthrough 3 Goal: User must configure a custom keyboard profile.	Q1: is the correct action available in the interface and will it be made sufficiently evident to the user?	Q2: Will the user connect the correct action's description with what they are trying to do? i.e. how well does that action's description match the user's goal?	Q3: Will the user interpret the system's response to the chosen action correctly - does the system's response to the action show progress toward the user's goal?	Able to complete the task?
Configure the Keyboard				
Connect the Keyboard	No, this action is on the physical side which will be done via USB.	Yes, connecting the keyboard will be easily possible with identifying USB connectors with ports on the computer.	Yes, this task is binary as if the device isn't connected correctly, the touchscreen will not receive power and thus cannot be used.	Yes
Select a Device Language	Yes, the screen displays the action in the centre of the interface before beginning the setup.	Yes, the user will notice languages are on selection indicating a configuration list. The text above the list also provides instructions assuming the user can read them.	Yes, once a language has been selected, the device will automatically reconfigure itself to display the chosen language.	Yes
Tap "Begin Setup" button	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, the "Begin Setup" button is clearly labelled and displayed in the centre of the screen.	Yes, once the button is selected, the user will be taken to the next display.	Yes

Select a Keyboard Language	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, since the display is dedicated to this task, the user will have no trouble understanding what the purpose is. The text will guide the user into knowing what is being asked.	Yes, once a language is selected, the selection will have a background colour to indicate it's been selected. This gives feedback to the user that the input has been received.	Yes
Click the "Continue" button to reach the confirm settings display.	Yes, this is only possible in a single way by tapping the button with the relevant text.	Yes, the wording continue is descriptive for users to read and understand the intention.	Yes, the continue box will initially be greyed out until a selection is chosen. Once one is selected, the box will change colour and become clickable showing the user their input has unlocked it.	Yes
Read and ensure settings are correct before clicking the "Continue" button to apply the settings.	Yes, this is only possible in a single way by tapping the button with the relevant text. Users can click the text of their prior selections to change them before continuing.	Yes, the wording of the task is descriptive enough and the text on screen is instructive to the user asking a question while displaying their prior choices.	Yes, once the button is selected, the user will be given a loading bar display to show their selections are being implemented.	Yes

Creating a Custom Profile				
Select “Configuration”.	Yes, the menu option is clearly defined in a menu on the screen.	Yes, the text in the menu also acts as a tab button which will show the relevant options for the user. The wording of configuration also simplifies what the purpose of the area is about.	Yes, tapping the box will change the displayed options showing them their next task.	Yes
Select “Create a Custom Profile”	Yes, the menu option is clearly defined in a menu on the screen.	Yes, the wording of the task and the button tell the user this is what is required and that is the option they wish to click.	Yes, tapping the box will change the displayed options showing them their next task.	Yes
Customise the keyboard by selecting individual keys then save the profile	This interface may be overwhelming, but the user will have everything to customise their layout.	Yes, the keyboard image and the ability to click on the keys before being prompted to enter an entry indicates they are customising a keyboard layout.	Yes, Once one change has been applied, a save option will appear allowing the user to name and save their profile.	Yes
Select “Configuration”.	Yes, the menu option is clearly defined in a menu on the screen.	Yes, the text in the menu also acts as a tab button which will show the relevant options for the user. The	Yes, tapping the box will change the displayed options showing them their next task.	Yes

		wording of configuration also simplifies what the purpose of the area is about.		
Click the “Change Keyboard Language” button	Yes, although could be confusing with the Device Language option on the same display.	Yes, the “Keyboard Language” button is clearly labelled and displayed in the list of options along with other buttons for configuring.	Yes, once the button is selected, the user will be taken to the relevant display.	Yes
Select a Keyboard Language and apply the newly created saved custom profile.	Yes, although it may be easier for the user to change the device language first, so they can understand the interface text. Custom profiles appear in the list with the existing language options.	Yes, since the display is dedicated to this task, the user will have no trouble understanding what the purpose is assuming they can read the current device language. The text will guide the user into knowing what is being asked.	Yes, once a language is selected, the selection will have a background colour to indicate it’s been selected. This gives feedback to the user that the input has been received.	Yes
Click the “Continue” button to confirm the new setting.	Yes, the continue button will become available when a new selection is made.	Yes although users may be confused about selecting a new setting before they can click the button if they cannot understand the interfaces purpose.	Yes, once a new selection is chosen, the button will become clickable allowing confirmation showing the users input has been accepted.	Yes

Testing the Configuration				
View the physical product to check if English (United Kingdom) is correctly configured.	No, since this is again a physical aspect, the user will be looking at the physical keys to see if they reconfigured themselves to the relevant language.	Yes, the user will be able to look away from the interface toward the keys without much issue.	Yes, the keys will likely go blank during reconfiguration and the user will know the change has been applied seeing Chinese characters replacing the English ones.	Yes
Attempt to type with the keyboard to test the correct letters or characters appear	No, the user would do this physically, but the result would appear on screen.	Yes, the task is very descriptive and precise in what is being asked.	Yes, the on-screen output will display a character for every key pressed, if the letter or icon displayed on the key appears on the screen, then the user has got the correct result and feedback.	Yes

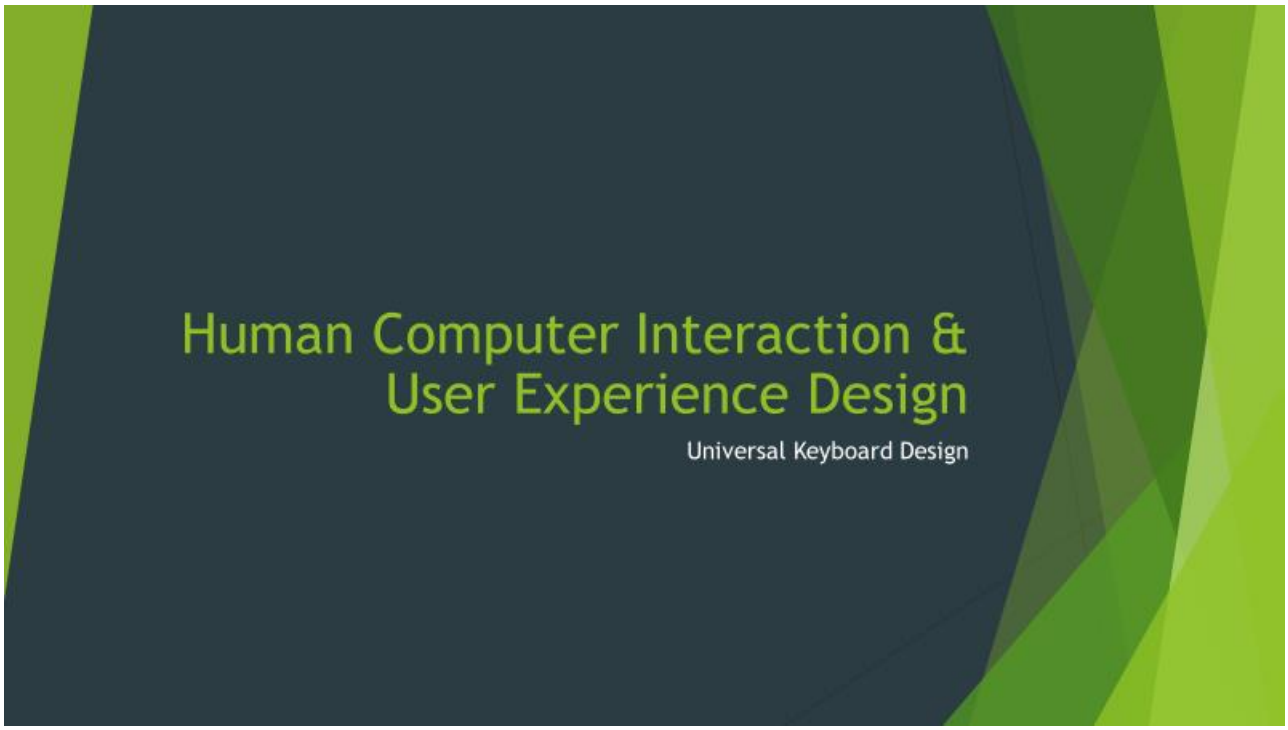
5. Conclusion

The student found it difficult to decide on choosing between one of these designs since both would be applicable to the final product to provide greater usability options e.g. the Application design could support visually impaired users a bit easier than the built-in touchscreen design. Despite the greater features of the Application display, the student has decided to go with the touchscreen design. This is because the goal of the product is to make a keyboard that supports most users and not minorities. The ability to create custom keyboard profiles is helpful, but it's a minority feature that majority wouldn't use. The keyboard would be better marketed toward hotels where many people from other parts of the world may stay and use the computers. Persona 2 would be a good example of this since the ability to change the physical keys display would benefit people in this scenario more than a casual or business user like personas 1 and 3.

The accessibility of the touchscreen is much greater than the application design since the user would need to first login to the computer then run the application on the desktop to access the interface. Using Persona 2's point of view for this, it would be pretty off putting to the user if they needed to first login to a computer using a keyboard configuration they don't understand. This is where the touchscreen design is much more accessible due to it being readily available to use if the computer is turned on and will result the user spending minimal time reconfiguring the keyboard for their usage. Even if the user just merely wants to understand the physical keys then this is possible which allows them to begin using the computer with more understanding despite the keyboard language perhaps still being set to another language.

To improve the design, the student could eventually adopt the custom profile settings into the touchscreen design assuming they could find a way to change the interface style. This is due to the number of keys available for individual reconfiguration which may be difficult to fit into such a small screen. This could also be done using technology such as scanning a QR code on the touchscreen to view the interface on a larger screen such as a tablet would be run through an app made for the keyboard. It would also be good if in the instance these keyboards were standard in specific places so if tourists or common travellers visited other countries and commonly used these keyboards. This would allow users to create accounts that store pre-set configurations, so the user could bypass the typical configuration process by applying their pre-saved preferences.

6. Presentation



Introduction

- Student is tasked with designing the user experience and interfaces of a smart product.
- The chosen product the student selected is a universal keyboard aimed for desktop users.

Proposed Features

- The keyboard would feature the ability to physically display various icons or letters on the keys.
- The keys would each contain small displays which allowed these changes and would emit a glow to light the device up in darker environments
- Users would be able to assign keyboard languages to their preference and create custom layouts for people with disabilities or gamers
- The keyboard would appear as a generic style to appear affordable and look suitable to the majority of desktop users.
- Student imagines the interfaces would be accessed with either a touchscreen built into the device or a downloadable/packed application.

Design Strategy

- The student will research the user requirements and existing preferences for keyboard technology.
- Stakeholders will also be identified via asking questions on their preferences.
- This will narrow down the user pool and allow the student to create some Personas.
- Using the personas, the student will design a suitable scenario for them to go through when using the device.
- Information gained from user journeys will help identify user requirements to consider for the designs.

User Requirements

Main Requirement	Functionality Requirement/Comments
1. Users should be able to configure the device efficiently	1. Access either the touchpad/software quickly to not deter users 2. Select device language, keyboard language and region with minimal steps to avoid user becoming bored or tired 3. Device may require updates to ensure newer selections become available 4. User feedback and ability to reconfigure should be accessible e.g. Persona 2's scenario 5. Ability to add new custom configurations e.g. someone with a disability may prefer specific setups not commonly available or Persona 3's scenario.
2. Controls on the interfaces and device should be clear	1. Can be done using colour schemes and icons 2. User feedback can be indicated e.g. Darken background of input 3. Icons can provide accessibility e.g. cog icon indicates settings 4. Physical keys can be lit in different colours to provide general visibility or usability in darker environments
3. Physical Design should be practical yet comfortable	1. Using existing generic layouts will provide these requirements since existing statistics and knowledge are in line with user preferences 2. Being comfortable to the user is vital for health and safety e.g. user may develop an RSI or injury from bad posture while using the keyboard 3. Keys should feel responsive as users tend to find some types of keyboards unresponsive which causes annoyance 4. Touchscreen device should be large enough to read but compact enough to fit onto the keyboard
4. Interfaces should be practical but modern	1. Modern and practical designs attract users and keep their attention 2. Can be done using responsive layouts, shapes and colours

Designs - Touchscreen

Designs - Application

Cognitive Walkthrough

- Student will use the created persona user journey goals as tasks for some cognitive walkthroughs on each design.
- The goals will have many sub-task required to complete the goal and the walkthrough will access if the user will be able to complete these tasks.
- Q1: is the correct action available in the interface and will it be made sufficiently evident to the user?
- Q2: Will the user connect the correct action's description with what they are trying to do? i.e. how well does that action's description match the user's goal?
- Q3: Will the user interpret the system's response to the chosen action correctly - does the system's response to the action show progress toward the user's goal?

Conclusions

- The student ended up deciding the touchscreen design was the most likely to be implemented.
- This is due to the goal of the product to be more universal for majority of users and thus sacrificing some functionality achieves this goal.
- While the Application Design has its merits, the student could implement them into the touchscreen design in future by:
- QR Code on the touchscreen linking to an app on a larger device e.g. Tablet
- Restructuring the interface in a design that allows a lot of information to be displayed and hidden at will to work with the smaller screen size.

7. References

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