

Prototype evaluation: KitchenHelper

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Introduction

Following the user engagement and product design process, one out of the three proposed product designs was chosen to be developed into a low fidelity prototype, based on the user responses gained from conducting interviews and questionnaires. Primary and secondary research have shown that university students do not prioritise healthy eating, as they have little time to plan and prepare meals, meaning that they end up opting for buying ready-made food. As such, the chosen product aims to aid university students in achieving a healthy eating lifestyle, by providing easy access to healthy recipes.

This report will contain a brief description of the prototype, the methodologies that were used to evaluate the product, the results of the evaluation, and some proposed improvements that could be made to the product, given the opportunity.

Prototype

The prototype, named KitchenHelper, is a tablet like device that aims to provide students with easy access to healthy recipes and it is designed to be used as a common device in student flats.



Figure 1 — KitchenHelper

Students can view the recipes available on KitchenHelper by clicking the “Get new recipe” button on the interactive screen and are able to filter these recipes by the estimated price

of ingredients, the preparation time or by ingredients - for example, the ingredients they currently have available. They can view the recipes saved on the local device by clicking the "Saved recipes" option. Students can log into their account on the device by using their university email or scanning their university card.

The stylus can be used to annotate the recipes; for example, to highlight any text, the user can do so by clicking on the button on the pen. Both the arrow keys and the pen can be used to navigate between different pages and make selections, meaning that the touch screen can remain clean when cooking.

Full navigation of the device by voice control is enabled by clicking the button with the microphone symbol. At each screen, the device reads the options available to the user including the option to go back to the previous screen and waits for a vocal response on the chosen option. It also reads lines of the recipes and waits for the users' vocal prompt to read the next line.

Methodology for evaluation

To evaluate our prototype, we selected a sample of two Interaction Design groups, each consisting of five participants, and this felt appropriate as our product is aimed towards university students. The sample consisted of one group of female students and one group of male students, all with varying degrees of interest in cooking. This ensured that we were able to gather a more varied set of responses.

The evaluation was conducted using two main methods: a think-aloud protocol and a written questionnaire. The think-aloud protocol was performed in a closed room where we described the purpose of our product to the participants, gave them our prototype and asked them to interact with it whilst giving verbal feedback throughout. The responses were jotted down.

Later, a more detailed, structured set of evaluation questions were asked by sending each group an open-ended questionnaire where the participants were able to write their answers. The questionnaire asked for feedback on things such as the overall aesthetic look of the prototype, the effectiveness or intuitiveness of the physical features such as the buttons and the stylus, and whether they think that the device will fulfil its intended purpose, and if they would use it.

To aid their evaluation of the functionality of the prototype, they were sent an additional video showcasing the software of the product and a step by step guide of how the device would be used. The questions focused on how easy the signing in methods were to understand and use, and whether they were satisfied with the filters that were available to them or if they would add or remove any of them. The highlighting and annotating functions of the stylus were also tested to see if they were intuitive to use. Our prototype was designed to be accessible to everyone by providing a list of settings that can be changed

to accommodate any impairment. We made sure to ask questions on how useful these additional functions were or if they would make any changes.

As our prototype comes with a mobile application to help personalise our product, we also got our participants to evaluate its usability. They were asked how useful the functionalities to personalise the account were and if they would make any changes.

We included some of the feedback from the demonstration that was given right away but we decided to focus mainly on the questionnaires which had more thought out and useful answers. The questionnaires were analysed one by one. All answers were categorised according to a particular topic or feature they were about. This data was further filtered through and divided into positive reviews, negative reviews and suggested improvements to the prototype.

Findings of evaluation

All our participants agreed that KitchenHelper fulfils its intended purpose as it makes preparing and cooking healthy meals easy. They also mentioned that it is especially useful for students who want more variety in their cooking while staying healthy. Those who like to cook agreed that they would use the product as it is convenient and well-designed. They would cook more often as there is a greater diversity in recipes which can be filtered according to the time available and cost. Those who prefer to buy ready-made meals, however, would not use this product as they do not want to invest time to look for a recipe and genuinely do not enjoy cooking. Even with the device they still need to set aside some time to plan the preparation of the dish. Hence, they prefer to buy their meals.

The appearance of the prototype was satisfactory. Our logo received the most praise. The device appeared clear and simple to use with many accessibility features. Most participants found the display screen easy to navigate and the menus nicely set up. Several participants stated, however, that the volume dial was too big. One participant suggested that header on the interface be smaller to show more of the recipe while another suggested to increase the size of the tablet screen so that menus could be more easily read.

The purpose of the stylus was very intuitive for all the participants as they could recognise its functionality immediately. Two people said that they would use it as the primary way of navigating. Opinions about the annotating feature of the stylus were divided. Some found it useful in keeping track of the step they are on or in annotating things for future reference, while others preferred to navigate using voice control instead of dirtying the stylus.

In general, the buttons were deemed unnecessary and the stylus was largely preferred. They did not understand their purpose when there already was a stylus. It would be better if they were displayed on the screen rather than being physical buttons. However, some did mention the buttons were a nice option in case the stylus is lost or broken.

The voice control feature was intuitive and thought to be useful in certain situations; for example, when both hands are busy. However, a few participants thought that it can be awkward or difficult to use in a communal kitchen.

The charging stand had mixed opinions. Some preferred it as it is easier to look at the tablet while cooking and it can be left to charge on as well, while others did not find it useful and would prefer a self-supporting stand and a charging cable because it takes a lot of space to carry around.

The functions to either log in to use a personal account or to use the device without logging in made sense to the participants as it can adapt to different situations where the product is being used by an individual, a flat or a guest. However, most of the participants highlighted that the ability to login using university credentials or student card was unnecessary. This would prevent the device from being accessible to a larger audience and would create a needless additional step to ensure that it works for different universities.

The filters were an important functionality according to the participants, but they all agreed that they could be improved, and more filters can be added. The filter that allows users to choose recipes according to available ingredients was the most appreciated as they thought that would make cooking very convenient and will help to prevent wastage of food.

Several participants liked the mobile application since it is on a phone which makes it portable. They liked the ability to add their own recipes, and that all recipes are in one place. If they were on a diet, the nutritional tracker on the app would be very convenient. Nonetheless, the rest agreed that this makes the tablet obsolete as they feel that the features can then be used on the phone directly. One of the participants was unsure as to why there is a mobile application when there is a dedicated device for cooking in the kitchen which provides a better overall experience.

Proposed improvements

For the physical improvements, the tablet screen would be made bigger and the empty space around the screen as well as the volume dial, smaller in order to use the space more efficiently. Many participants agreed that whilst the stylus is useful, they would prefer it to be designed waterproof so that it does not easily get damaged while cooking and can easily be cleaned with a wet cloth. Additionally, it would be physically connected to the device by a detachable wire to prevent it from being lost and making it easy to clean. One participant addressed the benefits of having a built-in timer in the device to aid the cooking process when following the recipe. Lastly, the charging stand would be replaced by a foldable extension to allow the device to stand while cooking and charging with a USB cable. Braille will also be added to the buttons for visually impaired users.

In terms of software improvements, currently the device works on the basis that either the user can save recipes locally on the machine or log in to save to personal account. An improvement suggested was being able to share recipes with friends who also have an

account. Recommending meals based on previous choices (using Artificial Intelligence) was another commonly suggested improvement. Furthermore, many participants voiced that they wished to see more options available to narrow down the search for easier planning. For example, more filters could include types of cuisine, type of meal, portion of meal, contents of certain nutrients and so on. As for the nutrition tracking feature, several voiced their confusion and stated that they would benefit from a video tutorial on how to use the feature. To remove the complexity of standardising the device across universities when students log in with university username or scan university card, a quick way to log in would be to first create a profile on the machine using a generic email, then click on the profile and log in with a four digit pin.

Finally, participants suggested several improvements that could be made to increase accessibility. The main concern was the hassle of having to change the accessibility settings every time a different user is on the device. To solve this, they suggested syncing each user's accessibility settings to their account, thereby saving them time and effort. A few participants also suggested having a screen-reader embedded into the device for visually impaired users. Whilst the voice control feature was met with positive responses, it was agreed that having a video tutorial to guide new users through how to use it would be immensely helpful. The video would go through key points such as how a user can keep interacting with the device using continuous voice commands, as well as all the key words and shortcuts available.

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Appendices

Evaluation Questionnaire (Group 1)

General questions

1. Do you think KitchenHelper fulfils its purpose? Please explain why/why not.
 - Yes, it provides low cost and quick options for healthy meals
2. Would you use this product?
 - Not really, as healthy recipes are already cheap and easy to find online.
3. Do you think this product and the display screens are visually appealing?
 - Display screen is very visually appealing
 - Easy to navigate
 - Aesthetically pleasing
 - Works well on different devices
4. Are there any aesthetic feature(s) that you particularly like or dislike? If so, please mention the(se) feature(s) and why.
 - Like handsfree speech control — useful for accessibility or if hands are occupied when cooking

Functionality (components)

1. Kitchen Helper can be navigated through a number of ways for the ease of access while cooking. For each of the following features please mention:
 - How useful you find the feature
 - Would you change/remove the feature?
 - Is it intuitive to you in terms of its purpose?
 - Stylus
 - Intuitive and would use
 - Keeps screen clean when cooking
 - Add a wire connecting the stylus to the screen so it won't be lost
 - Make stylus cleanable, perhaps add an outer casing or make it waterproof
 - Up, Down, Left and Right arrow keys
 - Intuitive but would not use as much as stylus is preferred. They would be used in case the stylus is lost.

- Back button
 - Useful to quickly go back but would prefer this option on the screen.
 - Intuitive but would not use often as stylus is preferred. It would be used in case the stylus is lost.
 - Accept and Decline buttons
 - Same as above
 - Voice control button (The voice control button has been added to be accessible to all users. The Kitchen Helper can be navigated entirely by pressing this button.)
 - Intuitive and useful if hands are full when cooking, for accessibility purposes
 - Basic commands such as scroll up or down start/timer or start stopwatch should be able to be given.
 - Should be able to read for each screen
 - Could be awkward to use voice control in a common area
 - Unclear how this feature exactly works, have video tutorial that explains this feature in more detail
2. Kitchen Helper comes with a charging stand so that it can be easily placed on it while cooking. This also means that the charger does always not need to be carried. Do you think this stand is useful?
- Intuitive, easy to keep the tablet upright when in use.
 - The detachable feature doesn't seem as useful — would most likely keep it docked.
 - Replace the stand with a foldable extension to keep device upright and allow charging through USB port.

Functionality (in terms of screens)

1. The device can be used both with and without signing in, so it is easier to use as a flat/individually or save recipes to the local machine/profile. Do you think it is sensible to have both options?
 - Seems to be a sensible option
 - Not signing in means that it would be able to be used by guests and no need for Wi-Fi as they won't have to log in to personal account.
 - Signing in means a more personalised experience, such as adding personal recipes, track previous choices as well as nutrient intake.
2. You can log into your account both by inputting your university account username and password, or by scanning your student card. What do you think about having both these options to sign in?

- Scanning the card can save time
 - But, logging in with university emails can limit the number of users that can use the device as well as add complexity for use of the device across students in different universities.
 - It would be better to create user profiles on the device, initially created using an email, then click on profile and sign in using 4-digit pin on the device.
3. The recipes can be filtered by time, cost and ingredients you wish to include/exclude OR the only ingredients you want the recipe to have.
- What do you think about these filters?
 - The filters intuitive and easy to use. Helps in planning.
 - Perhaps have a slider to set prices etc, when giving ranges to allow user to be more specific
 - Do you think that the time and price ranges provided are suitable?
 - Price filter is unclear — is this price for one serving or several servings?
 - Would you remove any existing filters or add any other filters?
 - Add a filter depending on how easy each meal is to prepare in terms of cooking skill.
 - Another that identifies preparation and cooking time (so university students can prepare ingredients first and come back later to cook)
 - Meals for different times of the day e.g. Breakfast, lunch dinner, healthy drinks e.g. Smoothies, juices etc.
 - Adjust the filters taking into consideration the number of people the meal is for
4. You can annotate/highlight the recipe using a stylus. Do you think this will be useful to you?
- Useful and intuitive
 - Useful for keeping track of the point of cooking user is at, highlighting important points and making notes
5. Do you think Kitchen Helper is accessible to everyone? Are there any accessibility features you would like to add?
- Product is accessible to all, but a screen reader can be added and Braille can be added to the buttons as well for easier access to the vision impaired.

Mobile Application

1. The main reason to have a mobile application is to make Kitchen Helper personalised for you. Do you find the mobile app useful/ would you use it?
 - App is useful to monitor nutrition, but the software can be used solely through the mobile app or the Kitchen Helper device.
 2. Are there specific functionalities about the mobile app that you find/do not find useful?
 - The nutritional tracker can be quite beneficial for monitoring eating habits.
 3. Would you like to add any features to the mobile app?
 - AI that suggests meals based on previous choices
 - Add a timer
 - Login using email and a 4-digit pin, as suggested for the KitchenHelper device.
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Evaluation Questionnaire (Group 2)

General questions

1. Do you think KitchenHelper fulfils its purpose? Please explain why/why not.
 - Definitely fulfils the purpose. Makes it super convenient to make easy, healthy recipes.
 - Such a great idea, not over-the-top would definitely use and perfect to find and make healthy food.
2. Would you use this product?
 - Yes, it is very interesting and useful for students.
 - 100%, well designed and convenient.
3. Do you think this product and the display screens are visually appealing?
 - Yes, especially the logo!
4. Are there any aesthetic feature(s) that you particularly like or dislike? If so, please mention the(se) feature(s) and why.
 - The volume button seems a little clunky and large. With a smaller volume button, this might help to make the product look more compact and simple.
 - The alternative for touch screen which is the pencil and buttons are particularly useful as it helps to keep the tablet clean whilst you are cooking.

- The filter feature is very useful especially for students. We almost always have a very limited amount of ingredients available. With the filter feature, the product can help us to cook something using our current ingredients.
- Annotation/markup feature is very interesting. It is also useful for students to make some notes on the recipes in order for them to refer to it again

Functionality (components)

1. Kitchen Helper can be navigated through a number of ways for the ease of access while cooking. For each of the following features please mention:

- How useful you find the feature
 - Would you change/remove the feature?
 - Is it intuitive to you in terms of its purpose?
- Stylus
 - The stylus is a good idea, it prevents the screen from getting dirty, maybe have an optional casing to place around the stylus for people who don't want to dirty the stylus either.
 - Up, Down, Left and Right arrow keys
 - Nice idea, very useful, especially if you've got dirty hands from cooking and don't want to mess up the screen. Just make sure it's easy to be cleaned (i.e. if a damp cloth is used to clean it, it doesn't cause any electrical failures). Pretty intuitive how to use it.
 - Back button
 - Useful the same as the arrow keys.
 - Accept and Decline buttons
 - Useful for the same reason as the arrow keys, also intuitive.
 - Voice control button (The voice control button has been added to be accessible to all users. The Kitchen Helper can be navigated entirely by pressing this button.)
 - Great idea, useful for those who couldn't use the buttons etc. but also helpful if while cooking you've got your hands full.

2. Kitchen Helper comes with a charging stand so that it can be easily placed on it while cooking. This also means that the charger does always not need to be carried. Do you think this stand is useful?

- Useful in the sense that it can be used while charging without using up sockets that can otherwise be used for kitchen appliances.

- Makes it easier to look at while cooking than a phone or a cookbook.

Functionality (in terms of screens)

1. The device can be used both with and without signing in, so it is easier to use as a flat/individually or save recipes to the local machine/profile. Do you think it is sensible to have both options?
 - We think signing in is better in any case. From your individual profile, you can then have groups with different people. So you don't just have to share with your flatmates. You can also have groups where you share recipes with friends who aren't living with you.
 - Not having to sign in is useful if multiple people are using it.
2. You can log into your account both by inputting your university account username and password, or by scanning your student card. What do you think about having both these options to sign in?
 - It is very useful and flexible. It makes logging in much easier for students.
 - The easier the better!
3. The recipes can be filtered by time, cost and ingredients you wish to include/exclude OR the only ingredients you want the recipe to have.
 - What do you think about these filters?
 - The ingredients filter is very useful for getting recipes without having to plan, and so is the timing one.
 - The cost filter would be useful for planning meals if you have to stick to a budget.
 - Do you think that the time and price ranges provided are suitable?
 - The time ranges are good but the price ranges aren't very specific, is it price per portion or the price for the whole dish?
 - Would you remove any existing filters or add any other filters?
 - Maybe a filter sorting by different types of dishes would be good, like breakfast dishes or Greek food etc.
4. You can annotate/highlight the recipe using a stylus. Do you think this will be useful to you?
 - Very useful for extra info one might add or changes someone makes to make the recipe personalised to his taste
5. Do you think Kitchen Helper is accessible to everyone? Are there any accessibility features you would like to add?
 - Is there a read aloud feature?

- Could accessibility settings be linked to an account so they don't have to be changed every time someone logs in?

Mobile Application

1. The main reason to have a mobile application is to make Kitchen Helper personalised for you. Do you find the mobile app useful/ would you use it?
 - Yes. With the mobile app, people will be able to take a look at the dishes anywhere without having to bring the product (tablet). For example, the user will be able to go for my groceries shopping and refer to the ingredients he or she needs for specific dishes using the app.
 - With the app, our flatmates and we will be able to access the app simultaneously. Without it, we will need to take turns to use the tablet which is not very efficient.
2. Are there specific functionalities about the mobile app that you find/do not find useful?
 - Useful : Being able to add your own recipes is very useful so all the recipes you use are in one place.
 - Not useful : Not sure how useful the nutritional track would be, especially for students, depending on what nutritional information it tracks.
3. Would you like to add any features to the mobile app?
 - Sharing feature. We would like to be able to share certain dishes to our friends if I found it beneficial for them too.