

Part 4: Food Waste in the Foodservice Industry

Team Eco-Eaters

Jacob Amin, Rithvik Rajavelu, Deborah Cho, Juan Caicedo, Hyeran Park, Roni Ruadap

CS 3750

Table of Contents

Evaluation Description.....	2
Task 1.....	2
Task 2.....	3
Task 3.....	4
Overall Methods & Evaluation Rationale.....	6
Results Description.....	7
Results Analysis.....	8
Design Implications.....	10
Design Improvements.....	12
Critique of Evaluation Plan.....	13
Team Reflection.....	14
References.....	15
Appendix.....	16

Evaluation Description

We conducted our evaluation session using 9 customers that we met at local restaurants. The customers were usually between the ages of 18-35 and we had 5 men and 4 women respond. The users that we used for the evaluation process are representative of a portion of our demographic as there were varying ethnicities as well including White, Asian, and American Indian/Alaskan Native. However, we would have liked to see more people of varying ages as well represented in our user evaluation. All of our users believe that food waste was an issue in the foodservice industry to some extent, and many of our users also said that menu design was important to their dining experience. With the given time constraints and the willingness of restaurant-goers to help us complete our project, we found that this was an acceptable sample for our project.

Tasks

Task 1: What do you receive for being an eco-eater?

Scenario: You are a customer eating at a casual restaurant. You've heard about the Eco-Eater program, but are curious about why you should be an Eco-Eater. Please navigate through the menu and locate the incentive for being an Eco-Eater.

Starting Page: Front Side of Menu

Probing Questions:

- Mandatory (once task is completed): Did you find the navigation to locate the incentive for being an Eco-Eater confusing?
- Mandatory (once task is completed): Did you find the location of the incentive for being an Eco-Eater easy to miss?

Task 1 Subtasks:

1. Locate the front of the menu
2. Locate section containing incentive for becoming an Eco-Eater
3. Read out loud information concerning the task (i.e the incentive)

Evaluation Techniques:

- The time it takes to complete the task
- The time it takes to complete the sub-tasks
- The task is either successful or unsuccessful
- Comments about whether they found the incentive confusing or hard to miss

Rationale

The Eco-Eaters menu is meant to convince people to try and mitigate and reduce food waste as much as possible. One of the best ways to do this would be to offer them some kind of incentive as to why they should do what we want them to do. By testing how quickly users find the incentive, we can determine how quickly the average user would likely find and then comply with the actions necessary to receive the discount on their meal. This would then also help us determine how often a user is likely to complete those actions and actually receive the discount while reducing food waste.

Task 2: Answer the question: How much of all food produced globally goes to waste (In Tons)?

Scenario: You are a customer eating at a casual restaurant. You are familiar with the food waste concept, but not to an extent you can recall facts, nor it guides your menu choices when ordering. Please take a look at the placemat menu and find information about how much food produced globally goes to waste.

Starting Page: Front Side of Menu

Probing Questions:

- Mandatory (once task is completed): Did you find the content in the facts section quick and easy to understand?
- Mandatory (once task is completed): Did you find the font size and location of the 'foodie facts' section, convenient and easily accessible?
- Optional: (once task is completed): What information would you have liked to see in the food facts section?

Task 2 Subtasks:

1. Locate the front of the menu
2. Locate section containing information on food waste
3. Read out loud information concerning the task (i.e. answer the question)

Evaluation Techniques:

- The time it takes to complete the task
- The time it takes to complete the sub-tasks
- The task is either successful or unsuccessful
- Comments about the general look of the menu
- Comments about the content within the foodie facts section

Rationale

Another purpose of the Eco-Eaters menu is to dispense information about food waste so that people will be more informed about the issue in the hope that they will then want to reduce food waste. The Eco-Eaters menu has a specific section dedicated to food waste facts and it is important that we determine whether users will actually read the facts and find them interesting or inspiring. Once again, time is a factor here as we do not want the facts to be overly dense and difficult to read. By testing for readability and also asking for users' opinions on what type of facts should be in that section, we open ourselves up to a menu design that contains more user input on the "entertainment" portions of the menu.

Task 3: Order a small, medium, or large portion menu item based on your level of hunger.

Scenario: You are a customer visiting a local casual restaurant to grab some lunch. You are not too hungry, but it is lunchtime and you need to eat something. You would like to order something just the right size for your hunger level. Please look through the menu and order an appropriate amount of food fit for your level of hunger.

Starting Page: Front Side of Menu

Probing Questions:

- Mandatory (once task is completed): Was the menu key confusing when referencing for ordering?
- Optional: (once task is completed): Do you think this type of menu helped you find an item fit for your level of hunger?

Task 3 Subtasks:

1. Determine the desired entree, appetizer, or lunch special
2. Locate the Menu key size reference of symbols next to items listed
3. Determine if the advertised size for the plate fits your needs
 - a. Ask for a smaller or bigger portion for the selected item (if applicable)
4. Communicate order to the server

Evaluation Techniques

- The time it takes to complete the task
- The time it takes to complete the sub-tasks
- The task is either successful or unsuccessful
- Comments about the menu key and portion guide

Rationale

The final use of the Eco-Eaters menu is to provide the customer with an accurate understanding of how large the portions are for each item on the menu. We hoped to do this via specific symbols denoting small, medium, and large portion items as well as including a portion guide on the back that provides more in-depth information about the item itself. By testing how long it takes for a customer to order a meal that they believe will fill them for a period of time, we can determine whether the menu key is easy to understand and actually effective at its job. By receiving the input of customers we will also be able to determine a layout that will be most effective at helping them understand the menu.

Overall Methods & Evaluation Rationale

We decided to complete our evaluation sessions utilizing a think-aloud protocol because of the abundance of both quantitative and qualitative information obtained. We were able to dissect important quantitative information related to 4 out of 5 of our non-functional requirements and all of our functional requirements. In addition, our qualitative measures helped us to discover underlying problems that the quantitative data overlooked. We chose this method of data collection because it gave us a large amount of flexibility in each of our sessions. This type of evaluation was also valuable for our group as part of the prototype's purpose was to also influence the behavior of our customers so that they would take action against causing more food waste in the foodservice industry. The think-aloud protocol allows us to listen to our users as their thoughts change to reflect what we wanted them to think based on the menu. We included multiple probing questions to allow for our evaluation session to be semi-formal; from previous interviews conducted in part 1, we found this to be the most effective way to interact with users & stakeholders. In tandem with this style of evaluation, because of our detailed script, we were able to make our sessions repeatable and consistent.

Results Description

The main criticism of our initial design of the Eco-Eater placemat menu was that the portion sizes remained unclear to the customers. Alongside that, the “Foodie Facts” section was not personally relatable to the individual (Cooper, 2021) (FAO, 2021) (Troitino, 2018). To fix this, we redesigned the menu and *added a “Portion Guide” section that succinctly describes the approximate caloric count of each portion size, small to large, to further help a customer’s behavior in reducing food waste.* In addition, we *modified and improved the design of the foodie facts section to have a more personal impact on the viewer.*

Our study consisted of Think Aloud Protocols with nine different participants ranging from ages of 18 to 35. It collected quantitative data, such as completion speed, task completion rate, as well as qualitative data such as comments and feedback.

For task one, the average completion speed was 40s. It had a task completion rate of 88% showing that most users had success in performing the task. One participant had trouble with this task due to interacting with a digital menu, but once the menu was switched to a physical one, the participant had a much easier time. Three participants mentioned that the section “Become an Eco-Eater” could be put in a better spot as it does not catch the eye at first glance and can be easy to miss. This shows that there could be an improvement in the design of the menu for future iterations of the prototype. All the participants (9 total) mentioned that being an Eco-Eater is beneficial for both the restaurant and the customer: reducing food waste costs for the restaurant, and motivating the customer to eat responsibly.

For task two, the average completion speed was 11.17s. It had a much better completion rate compared to task one, having a 100% completion rate. Two participants critiqued that in addition, they would like to see facts about food waste in restaurants specifically. Another participant mentioned that having a more positive fact, for example how much percentage of food waste is reduced when a customer becomes an Eco-Eater, would make the “Foodie Facts” section much more appealing and memorable. All the participants found the “Foodie Facts” section to be interesting and easily accessible.

For task three, the average completion speed was 74.17s. Similarly to task two, had a completion rate of 100%. The participants found that the menu key and the portion guide were informative and easy to read and found that it was useful in determining what to order according to their desired portion size. Participants commented that the menu was successful in making them more conscious about their food decisions, commenting that they thought more about the portion sizes of the menu items, considered using a to-go box for the food they have not finished, as well as to save money. All participants mentioned that completing the task was straightforward and the menu was easy to navigate during the ordering process.

In the follow-up pre-questionnaire, the results reported that 62.5% of the participants responded yes regarding if the Eco-Eaters menu changed their opinion on food waste, with 62.5% giving it a 4 and 37.5% giving it a 5 (very well) for how well the menu informed them on the issue of food waste. In addition, 100% responded yes on the issue if the menu successfully encouraged them to make conscious decisions during their dining experiences.

Results Analysis

We measured our functional requirements and four out of five of our non-functional requirements; **inform, incentivize, accessibility, speed, transparency, and effectiveness**. It is important to note that we did not measure the non-functional requirement, flexibility, in this evaluation because our evaluations focused on customer feedback and behavior, whereas an accurate measure of flexibility would require different restaurant settings.

We decided to calculate **accessibility** by taking the total success rate of all tasks, which came to 95.8%. Our result indicates that the menu is accessible to the vast majority of dine-in customers.

For **speed**, we calculated the average time it took to complete each task and added the averages up. Our calculated average was 125.34 seconds. Our goal was to keep this time under 180 seconds, as to not interrupt the dining experience by adding additional time when looking through menus.

For **transparency**, we utilized the post-survey question asking participants how well the menu informed them of food waste on a scale of 1-5. The average rating for this across all participants was 4.375. We saw that there could be an improvement in this functional requirement, as our goal was to have an average of 4.5 or higher. As reflected earlier, there was some critique over the incentive of the menu. A common consensus was that the incentive was not nearly as appealing enough and did not catch users' attention. Another critique was on the portion guide, although a favorable concept, could be improved on to give a more accurate representation of portion sizes small, regular, and large.

Finally, for **effectiveness**, we measured this by taking the post-survey question, "Did the menu encourage you to make conscious decisions during your dining experience?" with 100% of participants agreeing that the menu did encourage them to make conscious decisions and be mindful of food waste while dining in. Most participants agreed that the design of the menu was appealing and easy to navigate, making non-functional requirements easy to deliver.

For functional requirements, we measured how well the menu **informed** and **incentivized** participants. We used success rates of tasks to calculate how well the menu informed and incentivized users. The success rates of tasks 2 and 3 combined were used to indicate how well the menu informs and the success rate of task 1 indicates the menu's ability to incentivize customers. The results, 100% and 88% respectively, suggest that the menu meets non-functional requirements, with slight room for improvement in the menu's ability to incentivize. This is reflected in participants' complaints of a lack of reason to look for an incentive if not prompted.

Overall, the evaluation results reflected a successful prototype in regards to meeting our non-functional and functional requirements.

Design Implications

The results of our evaluation testing indicate that improvements can be made related to both our functional and non-functional requirements. Although our testing demonstrated relatively high levels of success with both of these requirements, further qualitative analysis revealed numerous flaws. A prominent theme derived from our thematic analysis is “bad display and or location.” Despite the fact that our users generally completed all of our tasks, there were issues with clarity, location, and aesthetic aspects of our design. This in turn, caused confusion and deviation throughout the tasks. I will outline these below.

Many users encountered confusion with our first task, “Locate the Incentive for being an Eco-Eater.” Many users claimed that the task question was either not clear or that the incentive did not stand out on the page (Appendix, Evaluation Results Spreadsheet). One user stated that they would definitely have missed it if they did not give their full attention to the menu. This implies a potential issue; if a user is out with a group of friends, how likely is it for them to give their full attention to the menu? In most situations, users will not give their full attention. This affects our non-functional requirements of **accessibility** and **speed**. It also affects the prototype's ability to **incentivize** users. This is an important consideration in future iterations of this menu prototype.

In addition, our users demonstrated hesitancy with our third task involving ordering food based on our menu key and portion guide. Although our prototype encouraged users to look at the back of the menu for more in-depth portion guidelines, many users did not refer to this portion guide until after their order was completed. We suspect that this is due to the menu key and portion guide being separate sections on different sides of the menu. This implication inhibits our prototype's ability to **inform users of the portion sizes** and decreases its overall **effectiveness**. Users also found the color scheme chosen for the menu key to be monotonous and led to the menu key being less visible in the context of the whole menu. This limits the menu key's **accessibility**. This implies that our prototype could potentially be improved with an updated version of our portion guide and menu key.

There was also positive feedback related to our menu prototype. All users found the Foodie Facts section helpful and insightful. The users enjoyed the fact that the facts had justifiable quantification and helped to understand the effects of food waste from an individual's perspective. The placement of this section, at the top left of the front side of the menu, caused it to generally be the first thing read on the menu. This section succeeded in filling the requirement to **inform users about the detriments of food waste** and our non-functional requirement of **transparency**. Although, some users suggested the inclusion of food waste facts pertaining directly to the foodservice industry. This is an important consideration as our problem space directly involves the foodservice industry.

In addition to the specific design implications, we came across issues using two separate versions of our menu prototype. During testing, we utilized both a FIGMA digital prototype and a traditional paper-based menu. We decided to move forward in the evaluation sessions with this strategy due to time constraints as we were unable to get traditional paper-based menus for every evaluation. We found that many users had more trouble in general understanding and utilizing the menu through FIGMA. We believe that we could have developed more succinct and specific implications through the consistent use of the traditional paper-based menu. This situation does shed light on our non-functional requirement of **flexibility**. It is important to consider that our menu performed worse in a digitized version. This implies that our menu may have issues pertaining to its flexibility of use and implementation.

As stated in Part 2, our problem space deals with the issue of food waste in the foodservice industry and we made our design to fit the unique requirements of that **problem space**. We decided that the placemat menu was the best possible option since a restaurant would have numerous customers of varying ages and backgrounds. By keeping the menu style simple and more traditional rather than technologically advanced, we would be able to allow more of the users to be able to easily understand an updated menu style while also not changing the restaurant itself.

Our design itself seems quite **sustainable** over a long period of time. The cost to implement and change the menu is relatively cheap, and over time the restaurant can receive customer input about what they think the meal portion sizes should actually be.

This would help improve the menu itself as more user input would always help improve the user experience. In the end, thanks to the flexibility of the menu, any restaurant that partners with the Eco-Eaters team will be able to employ this design for a long time to come.

Design Improvements

In light of the implications, we saw that our prototype design could be improved in many ways. We used both the positive and negative feedback to outline various improvements we would like to make to our prototype.

1. The first change that we would make is to make “be an Eco-Eater for a surprise! Tell a server” more visible to the users. During the evaluation testing, many participants expressed confusion on completing the task of locating the phrase for an incentive. Hence, making the phrase stand out more will make it more visible to the users. We would edit the phrase so the text would be bigger and even bolded. This way, our users can read through the foodie facts and easily locate the incentive.
2. The second change would be to put the menu key and the portion guide next to each other. Although our prototype was originally designed so that the menu key was at the front of the menu and encouraged users to look at the back of the menu for more in-depth portion guidelines, many participants did not refer to this portion guide as much as we had hoped.
3. Last but not least, the third improvement we would like to make is to change the font of the menu to another style. A few of our users mentioned that the dollar sign looked like the letter S. Since this was a problem stemming from the type of font we were using, we would solve this problem by using a different font to prevent possible confusion for the users.

Critique of Evaluation Plan

One major critique of our evaluation plan comes from not gathering as much early research on 'Customers' because we initially believed we would work more closely with the restaurant and its staffing. This could have given us more time to brainstorm other ideas with the focus on customers, and perhaps lower the number of iterations we went through after receiving feedback.

Another critique of our evaluation comes from not having as much variety of stakeholders being evaluated. Having directed our evaluations exclusively towards customers, we ended up preventing ourselves from gaining additional insight and/or ideas from other stakeholders (i.e. business owners, servers) to further improve the dine-in experience and raise awareness on food waste as an issue.

In addition to these critiques, it is also important to keep the tasks within a think-aloud protocol as simple and understandable as possible. A portion of our participants had difficulty in understanding our first task related to locating the incentive for becoming an Eco-Eater. Participants specifically were confused as to whether they were looking for something more tangible rather than just an arbitrary discount. It would have been beneficial to make this task more specific. For example asking, "Please locate the discount on this menu and how to obtain it."

Team Reflection & Lessons Learned

Throughout this project, we gained important experience in the field of user-centered design. As a group, we learned a few major lessons: The pitfalls of tunnel vision, the importance of initial field research, and the importance of synthesizing our ideas in person. In addition, we are interested in how this process may be different when working with a more interdisciplinary group.

As a group, we had tunnel vision in the sense that we became very constricted by our usability goal of accessibility. We shied away from designing software and technologically based prototypes because we wanted our product to be accessible to our whole demographic range, we were worried about excluding the older less technologically savvy generation. This in turn inhibited our creativity and innovativeness in our ideas and design. As a group, we wished that we didn't hone in on this usability goal as much.

Additionally, we also learned the importance of Field Research and Ethnography. Many of our general assumptions about the foodservice industry proved to be wrong after our field research in part 1. For example, we believed that a significant majority of food waste was derived by staff when in reality it was from the consumers. Also, our field research from p1 influenced our project across every iteration. Even now we are still referring back to interview data that we received. It was very important that we had extensive research early on in the process.

We also realized the importance of design synthesis activities such as affinity diagramming and concept mapping and the importance of performing these activities in person rather than in a digital space. As a group, we felt that online platforms such as miro made it more difficult to visualize our synthesis and we speculated that performing this in person would have helped us in the idea and theme generation aspects of our design.

Finally, as a group, we were curious to see what it would be like to work in a more interdisciplinary environment. Although each member of our group had unique benefits they could bring to the table, we all came from either engineering or computer science backgrounds. We believe that there may have been a possibility for more creative designs and ideas with teams consisting of a wider variety of backgrounds (such as business, psych, etc).

References

Cooper, R. W. D. M. A. O. R. L. (2021, July 21). *Food Waste in America: Facts and Statistics*.

Rubicon. <https://www.rubicon.com/blog/food-waste-facts/>

FAO. (2021). *Food Loss and Food Waste*. Food and Agriculture Organization of the United

Nations. <http://www.fao.org/food-loss-and-food-waste/flw-data>)

Troitino, C. (2018, April 23). *Americans Waste About A Pound Of Food A Day, USDA Study*

Finds. Forbes. <https://www.forbes.com/sites/christinatroitino/2018/04/23/americans-waste-about-a-pound-of-food-a-day-usda-study-finds/?sh=5f2929514ec3>

Appendix

[Folder Containing All Work from Semester](#)

[Evaluation Results SpreadSheet](#)

[Pre-Questionnaire Results](#)

[Post-Questionnaire Results](#)

[Work Assignment SpreadSheet](#)

[Updated Evaluation Script](#)