

Take Less: Reducing Food Waste in Grade School Cafeterias

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Problem

Food waste in the world is a severe issue and the United States is no exception. Per the USDA, approximately 30-40% of the national food supply was wasted in 2010, making up 161 billion dollars worth of food products. Additionally, the World Wildlife Fund finds that roughly 530,000 tons of school cafeteria food are wasted each year. Furthermore, in the US an average person wastes 238 pounds of food per year, costing them \$1,800 per year. The issue of food waste, specifically in school, drains resources from already underfunded districts.

There are many existing challenges and tracking systems to raise awareness on food waste and reduce food waste; however, most of them are short-term competitions or built for colleges and large enterprises. In 2014, the UN Environment Programme launched a two months-long student challenge named Think.Eat.Save. in which participants compete by writing entries on taking action to reduce food waste in the school or investigations on food waste and causes. Other attempts made by companies such as LeanPath software and Sodexo aimed to reduce food waste in college campuses by tracking food sales and discouraging tray overloading. However, such tracking systems are costly and hard to implement at elementary or middle schools. Our solution is aiming to be a long-term and more accessible attempt at food waste reduction in schools.

To an extent, the influence of the recently popularized consumer culture could be considered as one of the direct causes of the atrocious mountain of food we waste in the US. According to foodprint.org, major contributors to food waste include food

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spoilage, over-preparing, date label confusion, overbuying, and poor planning. For most schools, over-preparing has been a trend due to inconsistency in school lunch orders from day to day. For most students, over-buying school lunch is also a cause of the proliferation of waste due to the set amount of food on each styrofoam plate and not having enough time to finish their school lunch.

We are going to address the sustainable cities and communities' goal. Our design will be geared towards schools to help encourage students to waste less food in the cafeteria. Wasting less food helps communities as it keeps food out of landfills and helps the economy and community on a small scale. We are aiming towards a user-friendly and intuitive design; this app will be accessible by many users and they will easily be able to find the purpose of the application through different functions.

Solution

We chose to make our platform a website because our issue affects not only individual stakeholders, but also greater stakeholder groups such as schools, local districts, and even family members of the student. Our decision to gamify the process of reducing waste started with the realization that individuals lacked passion for this issue and opportunities to do something. We used a competition between schools and between school districts because we think it is the most effective way to provide incentives and motivation for students and family members to feel passionate about the issue. Through gamifying the process of reducing waste, our design team wanted to focus on a healthy competition while each individual pushes to produce less waste. Adding easily interpreted data visualizations to help non-mathematical thinkers effortlessly scrutinize and comprehend the data we collect about each school/district's food waste amount. (Include different stages)



We decided to place the navigation bar on the top portion of the webpage due to this being the most common convention seen on websites across the internet. This allows users who may only be familiar with the more common navbar conventions on websites to understand how to navigate the website quickly and easily. We chose a minimalist design for our navbar, removing the background from our previous version. It has four sections: Home, Food Waste Tracker, Feedback, and Login/Signup. We used black color for all section names to provide higher contrast with our light background color, allowing the website to be read by everyone, especially those who are visually

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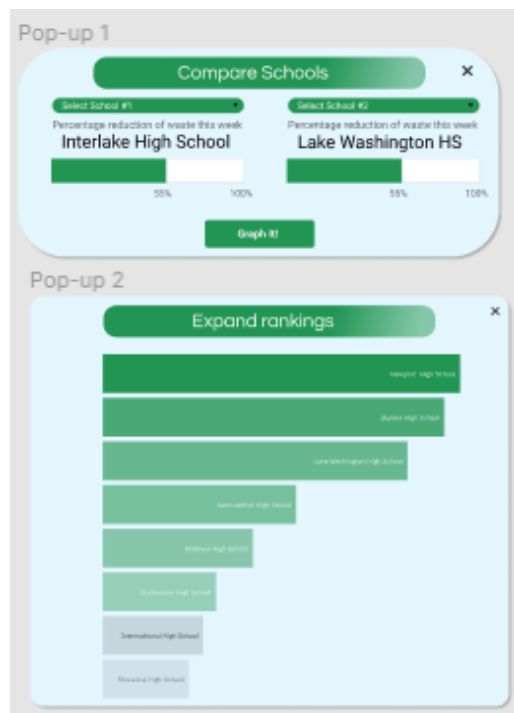
impaired. We placed the more important sections on the left side and the Login/Signup tab on the top right corner which again follows the common conventions of websites.

The section will be underlined when the user is browsing a page under that category.

This provides feedback to users when clicking and helps users to navigate through our website more easily.

[illegible]

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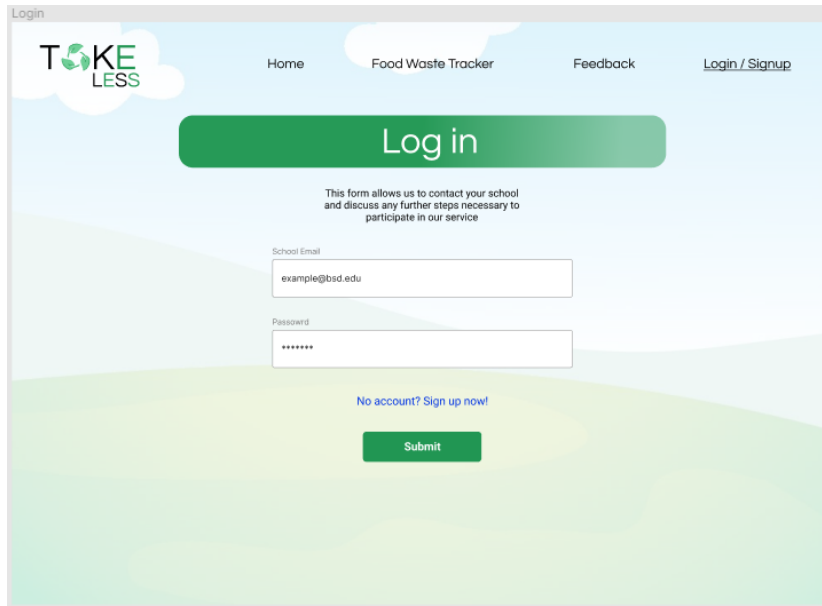


The “Dashboard,” or the main page, provides users with a summary of how their school is performing, rankings of schools in their district, and resources to inform them of ways to prevent food waste. We decided to split the “Dashboard” page into 3 distinct sections, each with unique informational value to the user. The first section is the Food Waste Tracker. This section shows the stakeholder’s schools percentage reduction of waste this week compared to the district average. This is presented in a progress bar tailored towards younger audiences with an unhappy face next to the 0% and a happy face for 100%, indicating that a larger percentage of reduction of waste is better. Additionally, we presented the current position on the progress bar as a cartoon trash can to be more tuned towards younger audiences. We have also placed a “Graph It!” button on the top right of the graph to allow the stakeholder to also view another option for visualizing their progress that week. This button will lead the user to a page with an enlarged line graph for which we will provide a rationale in later paragraphs. The

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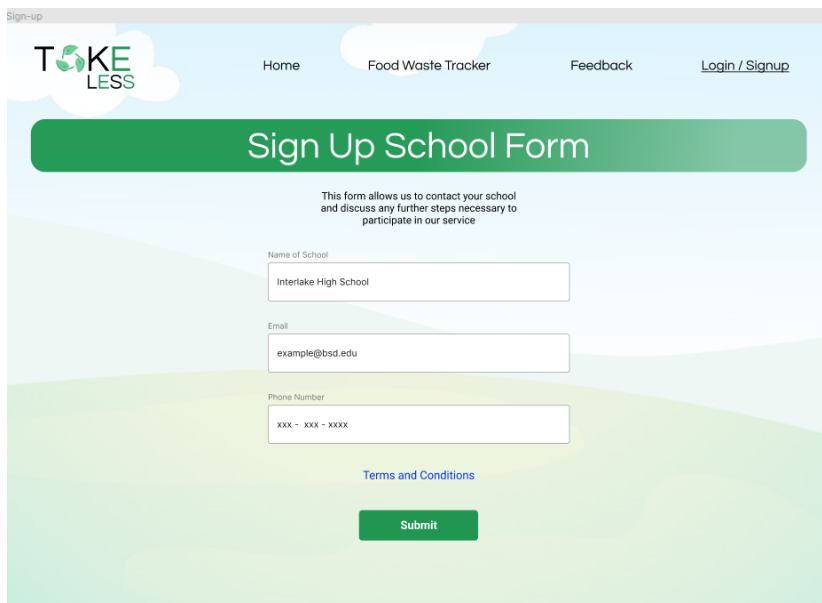
rankings portion of the web page provides users with a brief overview of not only the waste reduction of different schools in the local area but also a ranking of the top districts as well. The option to expand the rankings is provided by a button on the top of the rankings section. Expanding the rankings will lead to a pop-up that contains up to eight schools' ranking. We chose to present them in a bar chart to show how much percent waste reduction each school has relative to other schools. Additionally, we use the opacity of the bar to further emphasize the order of ranking. A "Compare More Schools" button is also on the top of the rankings section for the user to compare the percent waste reduction of more schools. This button will lead to a pop-up that will overlay the "Dashboard" page. This overlay presents the percentage reduction of waste this week for each of the two compared schools. We also added two drop-down buttons, signified by its down-pointing arrow, for the user to choose from the schools in our existing data. The next step after a side-to-side comparison in the pop-up is located at the bottom of the pop-up. The "Graph It!" button leads to a toggleable detailed statistics page that not only displays the two bars in a line graph but also provides the option to be displayed in easily comparable images for younger audiences. The "Additional Resources" portion of this page provides various website links that give the users information on improving food waste in their school. We added an image of the earth to reinforce our focus on younger audiences and also our drive towards the UN sustainable cities and communities goal. In addition to this, the bottom of the page gives users a daily tip on ways to prevent excess food waste.

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The screenshot shows the 'Login' page of the 'Take Less' website. The page has a light blue header with the 'Take Less' logo on the left and navigation links for 'Home', 'Food Waste Tracker', 'Feedback', and 'Login / Signup' on the right. The main content area features a large green 'Log in' button at the top. Below it, a message states: 'This form allows us to contact your school and discuss any further steps necessary to participate in our service'. There are two input fields: 'School Email' with the value 'example@bsd.edu' and 'Password' with masked characters '*****'. A blue link 'No account? Sign up now!' is positioned below the password field. At the bottom is a green 'Submit' button.

The “Login” page allows a user to log in by inputting their school email and school sign-in password. We also have a “No account? Sign up now!” button signified in blue to signal that it is a link to the “Sign up your school” page if the user does not have an account. The submit button which is at the very bottom finishes the login process.




The screenshot shows the 'Sign-up' page of the 'Take Less' website. The header is identical to the login page. The main content area features a large green 'Sign Up School Form' button at the top. Below it, the same message is present: 'This form allows us to contact your school and discuss any further steps necessary to participate in our service'. There are three input fields: 'Name of School' with the value 'Interlake High School', 'Email' with the value 'example@bsd.edu', and 'Phone Number' with the value 'XXX - XXX - XXXX'. A blue link 'Terms and Conditions' is positioned below the phone number field. At the bottom is a green 'Submit' button.

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The “Sign up your School” page allows a user to add their schools' information to our food waste tracker if they want to participate in our program and compete with other schools. This page asks for the name of the school, the email of an instructor, and a phone number. We chose these three pieces of information as it allows us to contact and connect with schools in a simple way. A user also knows exactly what they need to fill out as the form has specific instructions on what needs to be inputted. Underneath the form, a terms and conditions button is shown that displays the rules and guidelines of our website. We chose this as a hyperlink button that redirects a user to a new page. Finally, there is a submit button allowing the user to send the form to our program. The form section of the “Sign up your school” page is an example of a signifier, as instructors and faculty know why they need to be inputting their contact information and how we can use it to contact them if they want their school to be signed up for our service. Next, they also know exactly what they need to fill out, as the form provides instructions.


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[Home](#)

 [Home](#) [Food Waste Tracker](#) [Feedback](#) [Login / Signup](#)


Take Less, Waste Less

We are a dedicated team of students who are passionate about saving the planet one step at a time.



School of the Month

Sammamish High School



Sammamish High School reduced food waste by 85% since last month!

Rankings Explained


Each school's rank is determined by their percentage reduction of waste each week. Each district's rank is determined by the percent reduction of waste from all its schools each week.

Our Mission Statement

Our mission is to help motivate schools to reduce food waste in cafeterias, improving the environment and cities as a whole. We like to go by, "Take Less Waste Less"

How can schools help reduce food waste?

- Let students vote on new menu items to let you know if they liked it or not
- Educate your students about menu items
- Generate excitement among students with cooking demos or classes.

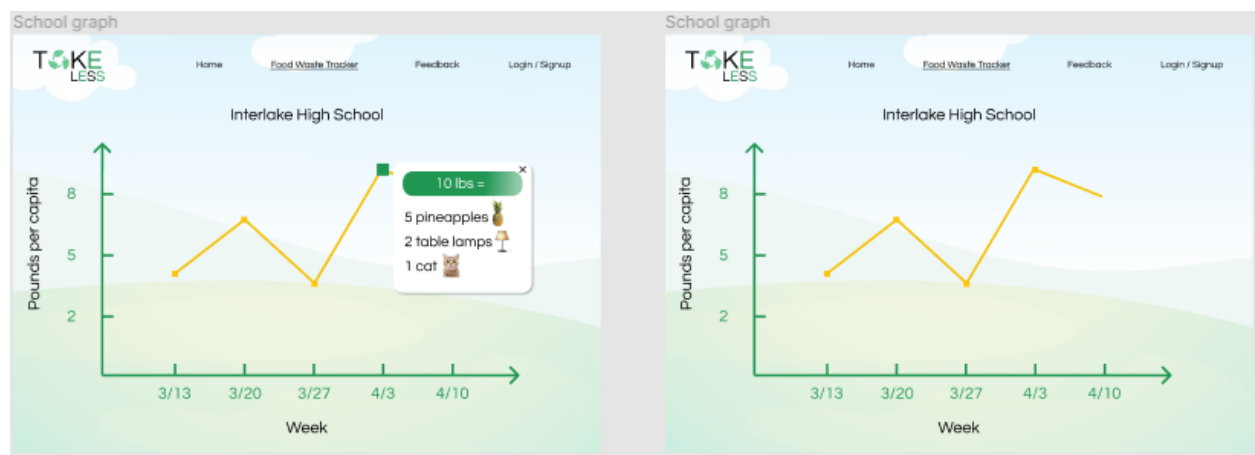


Stay connected

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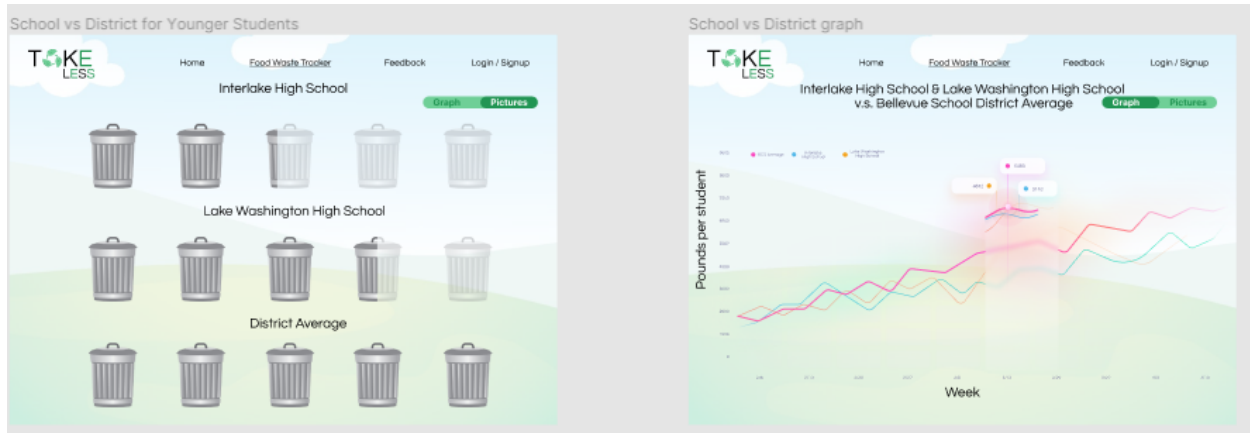
Our home page is a scrollable page consisting of our background information, a display of school of the month, an explanation of our school ranking, and our mission statement. At the top, we put background information about us next to our logo. Under it, the school of the month is displayed as an award for their incredible waste reduction performance and effort. This can help motivate students and intensify the competition, leading to more participation and raising awareness of the issue. The last two sections are the rankings explained and our mission statement. The “Rankings Explained” section explains the rules of our ranking, ensuring the competition is clear and fair. And finally, the “Mission Statement” section describes our mission and tips for schools to reduce food waste which can guide our stakeholders to start reducing waste by making small changes.



The “Detailed Statistics” pages provide a comprehensive visual representation of data on food waste to our stakeholders. We used a line graph to represent data for average food waste by a specific school. Since our stakeholders also include elementary and middle school students, we added a pop-up when clicking certain data points on the graph that converts weight in pounds to objects that they are familiar with,

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such as cats, pineapples, and table lamps. This pop-up can help students understand the amount of food waste better and realize the importance of reducing food waste.



Furthermore, we implemented another visualization for comparison on performances between schools and districts. We designed two versions of this visualization: a graph and a picture. Users can use the toggle on the upper right to switch between these two visualizations. The picture version is designed for younger students in order to help them understand the data more easily. Filling up more trash cans means more food wasted, mimicking a trash can in the real world. The graph version offers a side-by-side comparison between schools and districts. It gives more detailed information on the competition between schools and specific data on the graph. We added these visualizations because it not only offers easier performance tracking for waste reduction but also increases visibility for our users.

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The image displays two screenshots of a web application. The top screenshot is the 'Feedback' page, which features a header with the 'Take Less' logo and navigation links for Home, Food Waste Tracker, Feedbacks, and Login. A large green button labeled 'Submit Feedback' is prominent. Below it is a form with four input fields: 'Student Name', 'School Email', 'Subject', and 'Description'. A green 'Submit' button is located at the bottom of the form. The bottom screenshot is the 'Thanks For Feedback' page, which also has the same header. It features a large green checkmark icon and the text 'Thank You For Giving Your Feedback'.

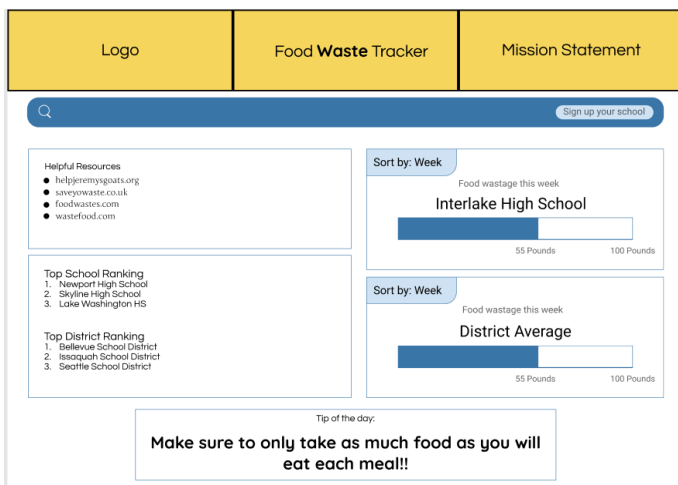
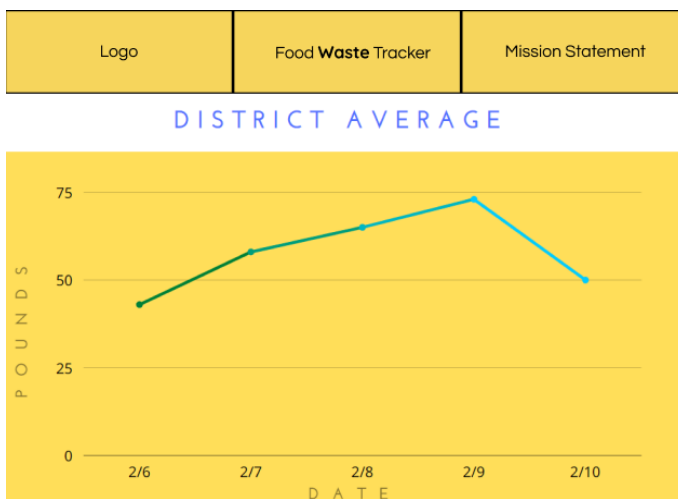
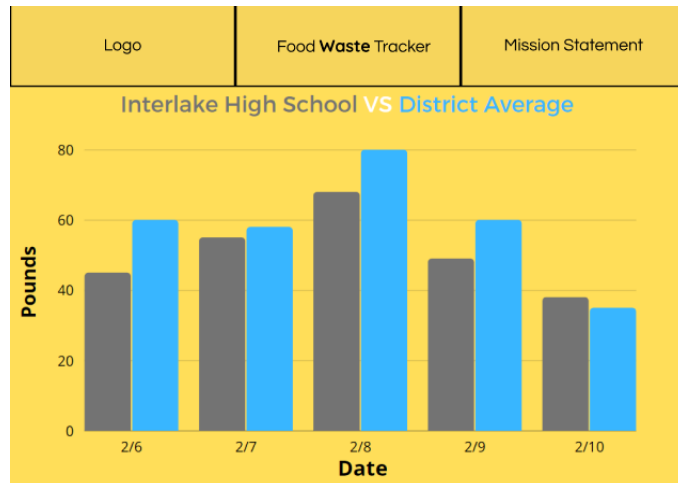
The “Feedback” page allows our students to give feedback on our website. With these direct feedback from our stakeholders, we can learn about what they want and what they are unsatisfied with. We can then make changes accordingly to keep the motivation of students and help them to get involved. Users are required to input their name, school email address, subject of their feedback, and detailed descriptions. Requiring school email addresses ensures that only students are filling out this form and allows us to follow up with them easily. At the bottom of the page, there is a submit button that allows users to send the completed form to us. When the user clicks the submit button, the website will go to the “Thanks for feedback page” which has a check

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and a sentence “Thank You For Giving Your Feedback” in the middle, giving users feedback on submitting the form successfully.

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Screenshots from our initial low-fidelity mockup:



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Logo	Food Waste Tracker	Mission Statement
<div><h3>Sign Up School Form</h3><p><small>This form allows us to contact your school and discuss any further steps necessary to participate in our service.</small></p><div><input type="text" value="Name of School"/></div><div><input type="text" value="Email"/></div><div><input type="text" value="Phone Number"/></div><div>Terms and Conditions</div><div><input type="submit" value="Submit"/></div></div>		

Evaluation

As we have multiple stakeholder groups that strongly correlate to our project, we decided to interview both of them — students and teachers — to learn more about the quality of our design.

In both of the student interviews, the first point of interest that was inquired was how simple our prototype was from a design perspective. The feedback we received tells us that our website is easy to navigate due to it being simple to understand what each page's purpose is. Next, while asking about the graphs and if they would be informative or not, both students said the percentages are confusing to understand, as pounds of waste is easier to visualize. The next two questions we asked focused on the rankings of every school in the district. Both the student stakeholders described that if their school was lower on the rankings, they would be motivated to waste less food. This trend remained true even if their school was higher on the rankings. And lastly, for any additional feedback, we received some comments on how the colors are clashing and how it could be hard for younger students to understand certain parts of our design.

From the teacher interview, we found out that some parts of our website need to be rearranged to be more appealing to users. For example, the “Helpful Resources” section shouldn't be on the top left of the main page, since it isn't the main focus of our design. We also found out that the graphs might be too technical for an elementary schooler. One thing that can help this is a function that converts the percentages on the graphs into pounds so that younger students can visualize this information easier. The last piece of advice we received from the teacher was that we need to show competition

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more on the main dashboard, as competition is the primary motivation to change poor habits.

Additionally, we invited an expert from TotalCtrl, a top global digital retail innovation company that helps companies prevent food waste, increase profit and improve overall efficiency, to facilitate our design, assess our progress, and provide feedback for the project. Summarizing the incredible feedback, the first crucial element that was mentioned was to make sure inputting information is easy for schools since inputting information takes time and is challenging to get schools to report data weekly especially when done frequently. In addition, schools pay different prices for different garbage, so our expert recommended us to encourage schools to use their food waste service cost divided by the number of students to determine pounds of waste which not only uses information the schools already have but also saves additional efforts in calculating the food waste weight. Another suggestion that was brought up was adding a measurement for the amount of waste produced such as putting numbers into context by displaying the information on how many families that much food waste could have fed. This not only accomplishes quantifying the amount of food wasted so that it is more relatable to everyone, but also provides this additional layer of motivation for competition on top of that information. As for incentivizing schools to use our service, our expert provided several terrific and noteworthy suggestions such as adding a reward for the best ranking school that's also cost-effective like giving a title for the school of the month, showing that wasting less food contributes massively in protecting against climate change and that reducing food wastes also saves the school money since the schools have limited budgets to spend on food waste services. Lastly, the

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expert suggested that we add a feedback tab on the website to get feedback directly from students. This way, not only could we get feedback from students and schools like what are they looking for? after we open the service to the public, but also let students explain what they want and how to help them get involved. Lastly, our expert ended with a quick tip about making sure to give the most valuable analytics first by keeping our website design simple to not overwhelm the clients.

Limitations

1. Our website may be difficult for younger students to understand. Although some of this is mitigated by using icons such as trash cans to make data easier to comprehend for students in earlier grades, they may still have problems completely understanding the website.
2. The feedback we received indicates that most students will be motivated to reduce food waste due to competition with other schools. However, this is still no guarantee that every student will care about reducing food waste. This could potentially result in a small group of students preventing schools from moving past a certain amount of food waste per week.
3. Equality issues. Certain schools in districts may have more access to funds and/or resources to improve food waste than others. Long term, there is a possibility that this will cause students in schools who have less access to these resources to lose motivation. If students feel that no matter how hard they work they are unable to catch up to better equipped schools, they are more likely to give up on reducing food waste in their school.

Appendix

High School Student #1 Interview Transcript

Eric Latham: Is the website easy to navigate? Why or why not?

Sophia L: Yes, it's very simple and there's not many options so it's easy to know what you're doing.

Eric Latham: Are the graphs informative? Why or why not?

Sophia L: Mostly, yeah. The only thing that's sort of confusing is the percentages. It would be easier to understand if there were just numbers there. Other than that they're helpful and easy to understand I think.

Eric Latham: Would you feel motivated to take steps to improve food waste at your school if you were at the bottom of the rankings?

Sophia L: Yeah, I think so. Because it makes our school look bad overall if we're at the bottom of the list.

Eric Latham: Similarly, would you feel motivated to improve food waste at your school if you were at the top of the rankings?

Sophia L: Yeah, but not as much, I think. Because when you're already doing well it feels like you don't need to change that much. The main thing that would make me want to improve is if my school started dropping lower on the rankings.

Eric Latham: Do you have any additional feedback or comments?

Sophia L: I like that it's easy to use but I don't really like the colors, they kind of feel like they're clashing. Also, the gradient thing looks kind of weird. Oh, and I don't really think the website being made for elementary schoolers really makes any sense because

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they're so young they probably won't really care or understand that much. Also, I really like the task bar.

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High School Student #2 Interview Transcript

Dhruv: Is the website easy to navigate? Why or why not?

Alex: The website looks like it would be fairly easy to navigate. Based on the prototype I can definitely tell what every page's purpose is.

Dhruv: Are the graphs informative? Why or why not?

Alex: The graphs are very informative as it allows us to see a comparison between other schools. However, many students don't like seeing graphs and it could be too complicated for elementary students.

Dhruv: Would you feel motivated to take steps to improve food waste at your school if you were at the bottom of the rankings?

Alex: I would feel motivated to go up the rankings as a school, I personally like working with numbers and the idea of seeing all the rankings.

Dhruv: Similarly, would you feel motivated to improve food waste at your school if you were at the top of the rankings?

Alex: Same thing, I would stay motivated to stay ahead of the competition.

Dhruv: Do you have any additional feedback or comments?

Alex: Personally, this would keep me motivated; however as a school it would be hard to motivate everybody in wasting less. I also really like how in the mission statement you all mentioned how schools can reduce food waste, so it's not just up to the students on wasting less.

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Teacher Interview Transcript

Max: How approachable do you feel the design is for K-12 students?

Tania:

Helpful resources should be in the bottom. The top left is the first thing the eye is drawn to on the page so it should be the most important information.

Graph might be too technical for an elementary schooler who doesn't have a solid grasp of basic math like percentages.

Other resources should not go on the tracker main site. They should be corollary to the dashboard. Make them supplemental, not a feature.

Display competition more on the main dashboard, as this is the primary motivation to change poor habits.

Competition will motivate grade schoolers. It's probably the best way to make a young kid or teenager care about an issue.

"Sort by:" should be the same on both panels. There's no need for both buttons, it only confuses the user.

Mention pounds instead of percentages on the graphs. A solid number is not that abstract ("As someone who lived through the Ort Report...")

Pounds are more concrete in terms of competition than a percentage (tangible, visual), but there could be a button to switch between percentages and pounds.

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