

SustainaBite

Final Design Report

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Project Proposition

Love cooking but short on time? Care about sustainability and making healthier choices? *SustainaBite* is here to help!

Discover a world of delicious, personalized recipes that match your preferences - whether it's diet, budget, or available time. Each recipe features ingredients with a low true cost of food, helping you make eco-friendly and health-conscious decisions with minimal effort.

With just a tap, add ingredients to your shopping cart and get a ready-to-use grocery list for your favorite supermarket.

Enjoy detailed, easy-to-follow instructions, complete with preparation and cooking times. *SustainaBite* makes cooking fun, simple, and sustainable for people who care about the planet and their health.

Context & Design Challenge

Our project was inspired by research highlighting the environmental, health, and social costs of Swiss food production, where we found that waste reduction was a key strategy for lowering true food costs [1]. Studies show that meal planning and the use of shopping lists effectively reduce household food waste by preventing the purchase of surplus foods [2]. Additional findings reveal a moderate willingness among consumers to pay more for sustainable products, especially those labeled organic or health-related [3].

Our initial survey, with 109 respondents, provided several insights: price was the most significant factor when purchasing food, followed by nutrition and quality. Students often struggle to find new meal ideas but express a clear willingness to adopt more sustainable choices if guided effectively.

One of the key challenges we faced was that the concept of true cost of food is not well-known. To address this, we designed score labels (A to E) to rate the true cost of each recipe, along with detailed impact analyses showing scores for health, environment, social impact, and biodiversity. By clicking on an ingredient, users can see its score and read a brief explanation of how its true cost was computed.

Given students' limited budgets, convincing them to choose slightly more expensive sustainable products was another challenge. We tackled this by enabling users to set a budget per meal and suggesting recipes within that budget. After adding ingredients to the cart, users can see the impact they are making by purchasing lower true cost products, as the total true pricing will be lower than the total price.

To encourage repeated use of the app, we personalized the experience by offering tailored recipe suggestions based on user preferences, a search bar for finding recipes by ingredient, and a feature to save favorite recipes for quick access.

Prototype

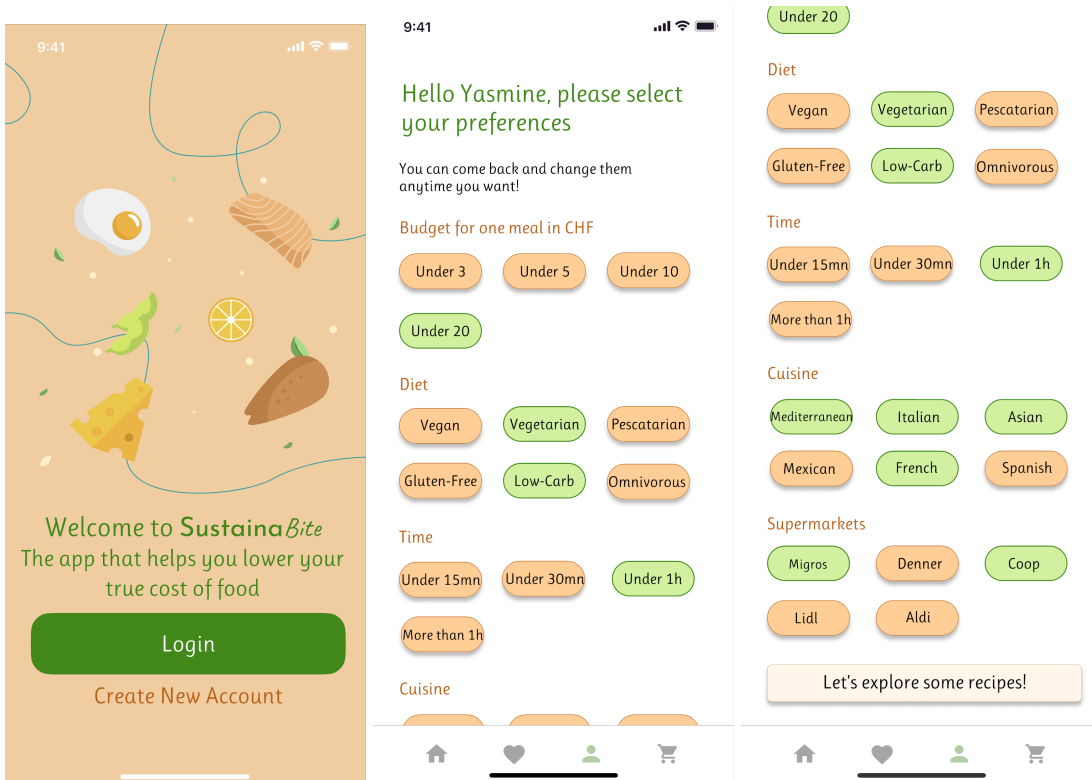


Fig. 1 Login & Preference Selection

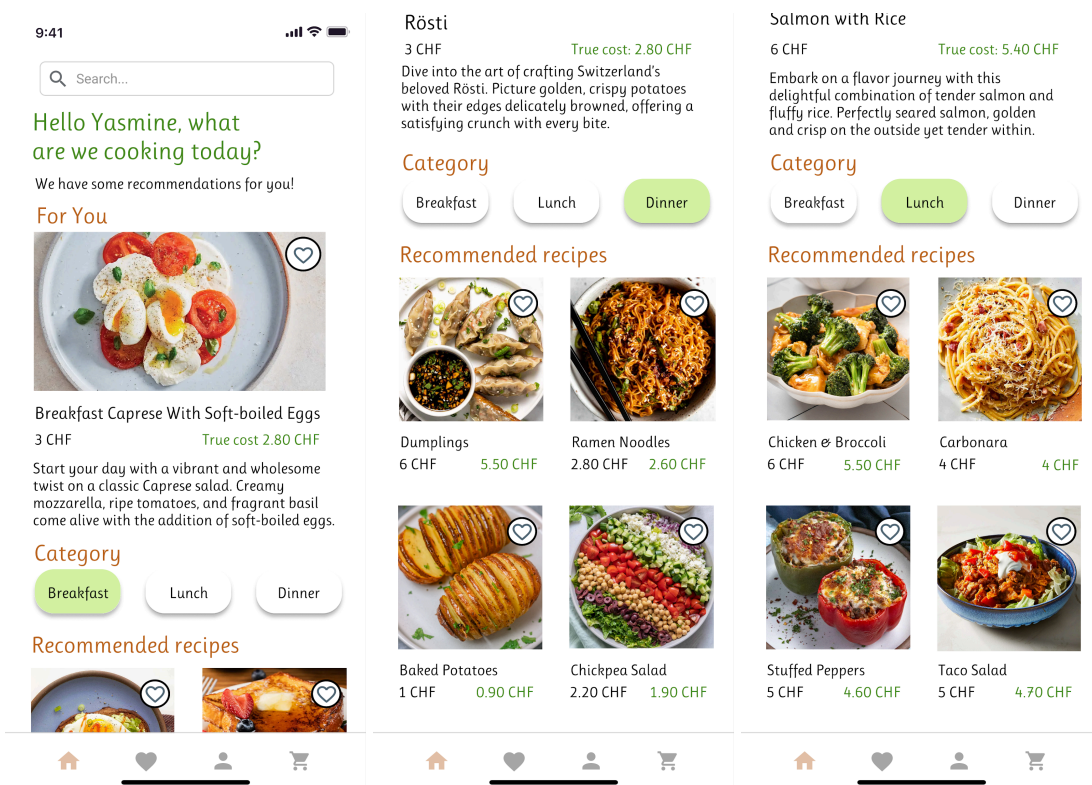


Fig. 2 Home Page: Personalized Recipe Recommendations

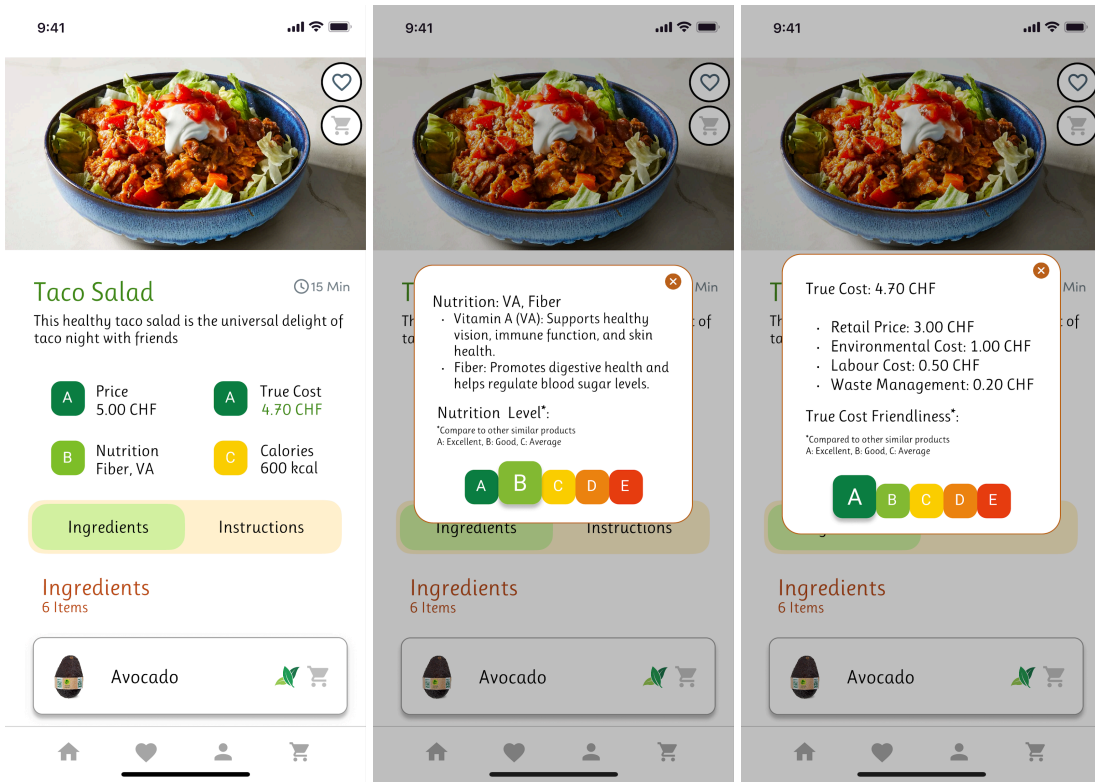


Fig. 3 A Suggested Recipe & Detailed Information: Both the price and the true cost are shown, with all relevant information color-coded for better clarity. Users can tap on each label to access additional details and a breakdown of its components.

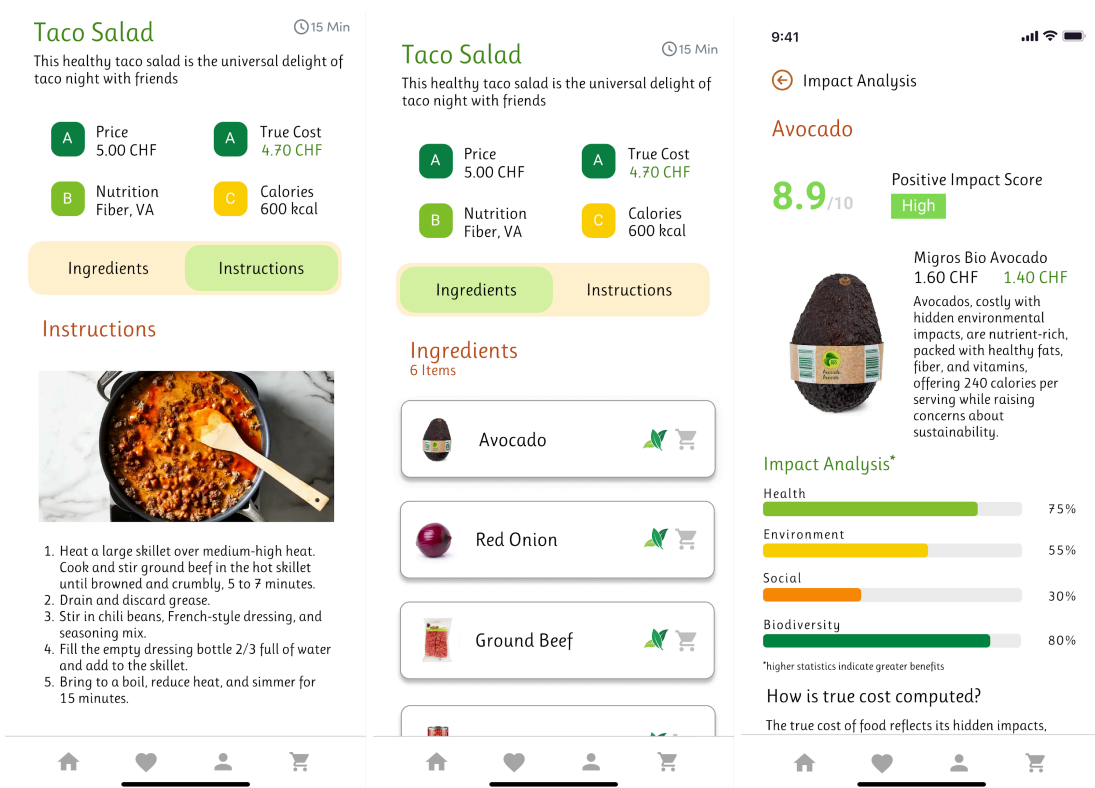


Fig. 4 Instructions & Ingredients: A fine-grained analysis for each ingredient that allows users to view the impact assessment and how it is calculated.

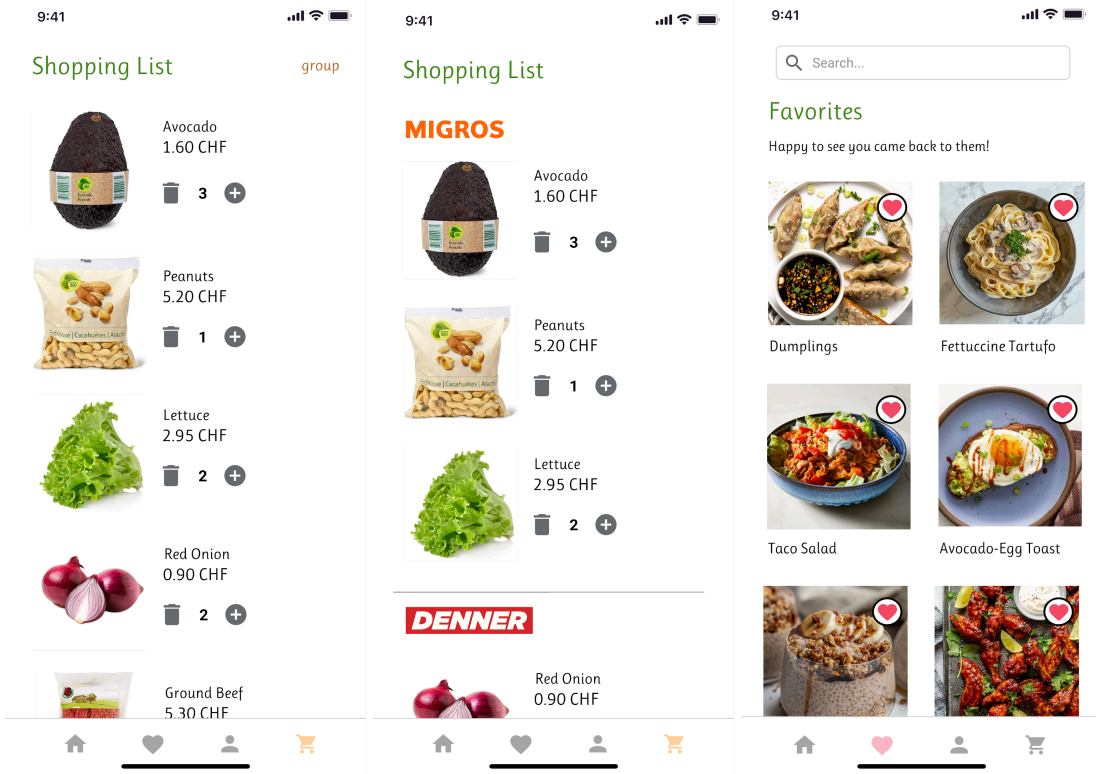


Fig. 5 Shopping List & Favorites List

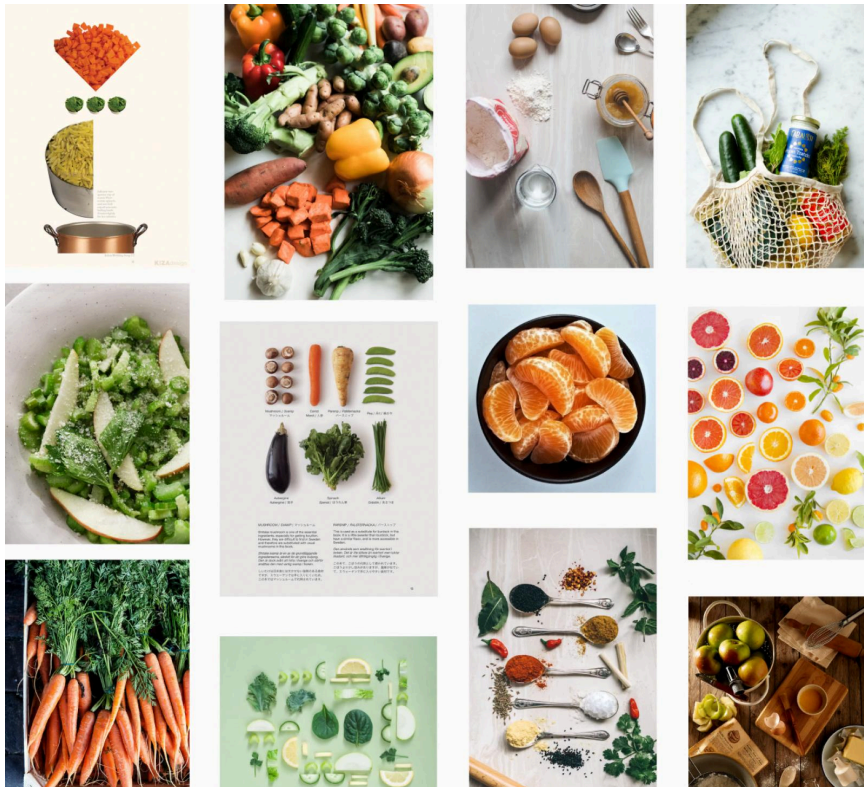


Fig. 6 Moodboard: Relaxed, Refreshed, Simple - evoking a sense of harmony with the environment

Research Questions

With our study we aim to answer the following research questions:

RQ1: Do users perceive **recipe-based recommendations as more effective** than individual ingredient suggestions in promoting the purchase of low true cost food?

RQ2: Does our app SustainaBite convey **the importance of the true cost of food** to its users?

RQ3: Are users willing to **stick to the recipes** and do they feel positive about **using the suggested ingredients**?

We have formulated affirmative hypotheses based on these questions and are using our app to validate them from the users' perspective. The questions were chosen to ensure they can be answered through measurable outcomes. Conducting the study over a longer period of time and with a larger user base, would make the results even more reliable.

User Tests

To answer the aforementioned questions and try to measure how users perceive our idea, we conducted both quantitative and qualitative tests. The results were collected from user interviews, where participants interacted with the app and answered a fixed set of questions.

Quantitative Results

For quantitative evaluation, we used three benchmarks: *User Experience Questionnaire-Short (UEQ-s)* [4], *VisAWI-S* [5], and *the Self-Assessment Manikin (SAM)* [6].

The UEQ-s benchmarked our app against existing solutions. The results are shown in Figure 7:

- (1) Pragmatic (usefulness and functionality): 1.75 (Excellent, top 10%)
- (2) Hedonic (design, excitement, aesthetics): 1.54 (Good, top 75%)
- (3) Overall (average of both scores): 1.65 (Excellent, top 10%)

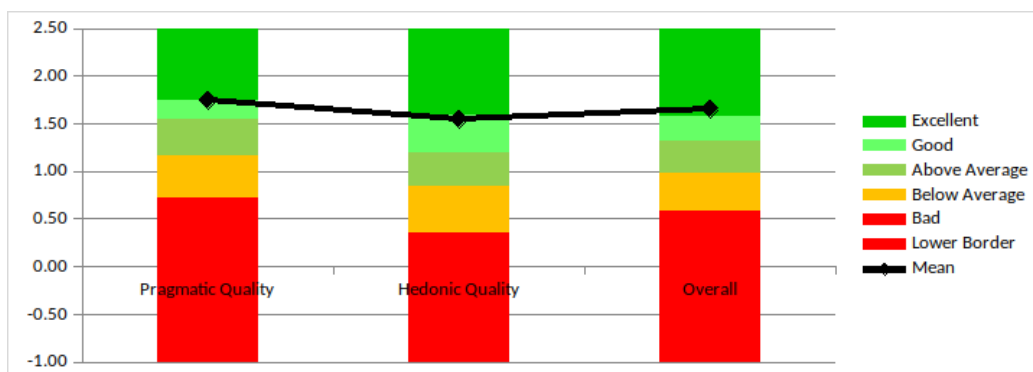


Fig. 7 User Experience Questionnaire - short (UEQ-s)

Next, VisAWI-S evaluated the overall visual appeal, with results shown in Figure 8. In general, users rated the app positively, with most scores between 5 and 7.

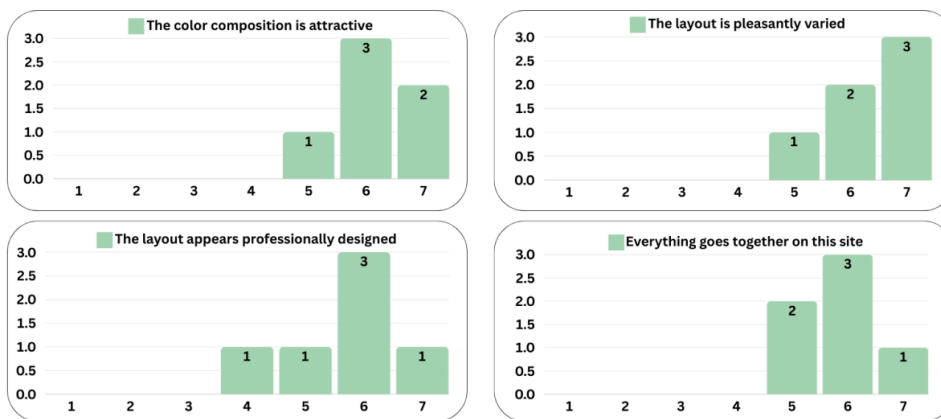


Fig. 8 Visual Aesthetics of Websites Inventory - short (VisAWI-S)

Finally, we evaluated our app with SAM - which measures a person's feelings in response to exposure to an object or an event, in this case our app. The results are shown in Figure 9 and can be interpreted as follows:

- (1) Valence (Positivity): Users liked the simplicity of the app.
- (2) Arousal (Intensity): True cost statistics could be made more intense.
- (3) Dominance (Control): Users felt in control, with some desiring more flexibility.

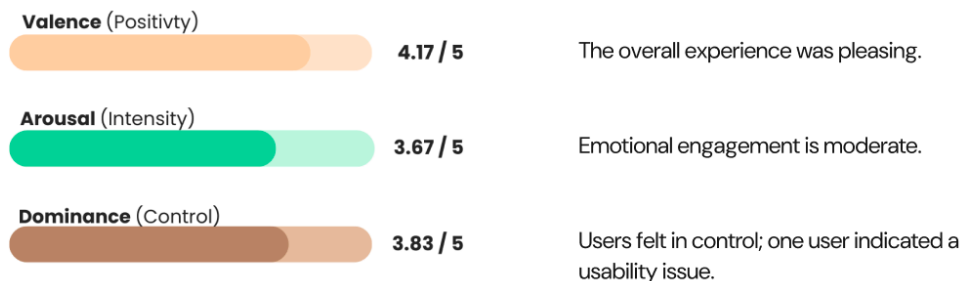


Fig. 9 Self-Assessment Manikin (SAM)

Qualitative Results

While having quantitative results is strong evidence of how our app performs, qualitative evaluation is equally important so the results can be strengthened even further. This includes analyzing the conversations with the users and identifying common themes that may not be fully captured through static predefined questions.

Three important observations were made:

- (1) All six testers agreed that displaying recipes instead of individual ingredients is a more effective way to choose sustainable options.
- (2) Most users appreciated how the app presents the true cost of food, with a few users requiring further explanation.
- (3) Most users expressed enthusiasm about the app, noting that it could help overcome a lack of motivation when deciding what to cook.

- **Quantitative results:** Practicality and visual aesthetics are rated very positively, while emotional intensity shows room for improvements.
- **Qualitative results:** General observations show that users had positive interaction with the design.

Discussion

Our app, *SustainaBite*, aims to empower users to make sustainable food choices effortlessly by integrating true cost-conscious recipes into their daily lives.

With our study, we explored several factors, including the effectiveness of recipe-based recommendations compared to individual ingredient suggestions, the clarity of true cost conveyance, and users' willingness to adopt our recommendations.

The findings from the study confirm that recipe-based recommendations simplify decision-making and increase adoption among users. All testers agreed that suggesting entire recipes instead of individual ingredients will make sustainable choices easier. Users highlighted that this approach provides implicit guidance and reduces the mental effort of evaluating ingredients individually. Additionally, this was further reflected in the high pragmatic score from the UEQ test which supports that this method is useful and convenient.

However, understanding the importance of the true cost of food through our app varied among users. Some found the grading system intuitive and engaging, while others confused true cost with the displayed price or desired clearer explanations for some terms. After thorough analysis we observed a correlation: users who were already familiar with the concept of true cost found the app clear and easy to understand. On the other hand, those unfamiliar with the concept felt the app needed more clarity to effectively communicate this idea, which indicates a need for more educational elements to bridge this gap and improve comprehension.

Finally, user willingness to follow recipe suggestions was mostly positive. Many users felt that the app aligned with their values and helped them overcome lack of motivation when choosing what to cook. However, practical barriers such as ingredient availability affected engagement. Some users expressed concerns about having to visit multiple stores to find suggested ingredients, while others wanted features like personal recipe uploads and alternative ingredient options.

Overall, *SustainaBite's* approach is effective, confirming that recipe-based recommendations encourage sustainable food choices. Refining educational content, improving ingredient accessibility, and enhancing personalization features will further boost adoption.

- **RQ1 Confirmed:** Users found recipe-based recommendations more effective than individual ingredient suggestions, simplifying decision-making and increasing adoption.
- **RQ2 Not Confirmed:** True cost understanding varied - users familiar with the concept found it clear, while others needed better explanations and more educational elements.
- **RQ3 Confirmed (stronger support needed):** Users were positive about following recipes, but ingredient availability and shopping convenience affected engagement.

Evolutions

If given more time, we would implement several improvements to enhance the project. Most of the evolutions are based on the user feedback. With these changes we aim to address usability, emotional engagement, and personalization.

First, we would empower users with greater control by introducing ingredient alternatives, allowing them to swap items in recipes. Additionally, enabling customizable serving sizes would improve adaptability to individual needs.

To enhance emotional engagement, we could introduce color coding for true cost shown in the recommendations page (currently all true costs are in green). This way we can visually indicate whether a recipe is good or bad in terms of sustainability. This would create a stronger sense of urgency and make sustainability insights more intuitive.

Another area for improvement is optimizing shopping convenience. While users can already select their preferred markets, some found it inconvenient to shop across multiple stores. To solve this, the app should prioritize ingredient selection within a single store when possible.

Lastly, adding the option for users to input their own recipes and receive a different version for them including ingredients with low true cost would make the app more personalized.

- Ingredient alternatives.
- Color code true cost in recommendations page.
- Prioritize ingredient selection in a single store.
- Allow users to enter recipes of their own.

Self-reflexion on the process

Stefan: For me, the most challenging part of the double diamond process was undoubtedly the first phase, particularly when we had to create the challenge map. This step required us to transition from research findings to abstract concepts and then consolidate these ideas into a single, coherent direction. It involved extensive communication, compromise, and deep thinking. However, as often happens, the most difficult tasks are also the most rewarding. In retrospect, this was our breakthrough moment - transforming chaos into order and arriving at a unique, creative, and fun idea. Surprisingly, the second phase felt much more intuitive and progressed faster than I had anticipated.

Before this semester, I had been working with a few friends on a startup idea - coincidentally, an app related to food, similar to Too Good To Go. We believed in the concept and wanted to bring it to North Macedonia, where no such service exists. While we managed to handle the technical aspects, business planning, and financial projections, we struggled when it came to pitching, prototyping, and conducting user research. Coming from a purely technical background, we had no idea how to navigate these steps and decided to just drop it. This course, however, filled that gap. It provided exactly the methodology I had been missing. While the funding window has closed for now (unfortunate timing :-)), the experience has equipped me with the skills to seize the opportunity when it arises again.

Matea: Looking back, the most challenging parts of the design research process was definitely figuring out 'the right thing to design'. Every day new products and apps are constantly being created, but only a few of them actually make a real difference. With just one semester, we had very limited time to explore ideas and choose one that was both useful and realistic. It was a challenge to make sure our idea wasn't just interesting but also something that people would actually want and use, so we really had to balance creativity with practicality.

The biggest breakthrough moments happened when we got real user feedback (both from our first online survey as well as for the final prototype testing). Up until those points we were mostly working based on our own opinions, which meant we could have been 'stuck in a bubble' and focusing only on our own perspectives and assumptions. Seeing how other people viewed and interacted with our app gave us a better perspective. It helped us notice things we hadn't thought about and made our design much stronger.

During this course, I saw how important it is to start with a solid foundation by reviewing literature and analyzing the current state of the art. For future work, instead of jumping straight into designing something new, I would take more time to pinpoint specific problems that haven't been fully solved and identify gaps that can be addressed. Another key takeaway for me is the iterative process of continuously improving a project based on feedback. This showed me that design isn't a straight path and revisiting earlier steps can lead to a much better outcome.

Ren Yi: I think the most challenging part of the double diamond is the challenge map. In this step, we need to integrate the literature review, cultural reference, concept cards, survey and interview into a story that makes sense for the true cost of food goal.

The breakthrough moments would be the time when we are preparing for the midterm presentation. Although we already had a story that makes sense, we still made a major modification to it (well I didn't quite remember the modification, but it's like waking up and an interesting thought bumped into your head) right before preparing for the presentation, because after looking through the whole story, we came up with an idea that could push the current design closer to the goal — the true cost of food.

The reason why I like this moment is that, maybe the story we first came up with was not perfect, but we were still trying to add new things to it in the process. Although making modifications midway requires more work for the parts already done, like literature review or cultural reference part, somehow I believe this is how things should go most of the time. Things may not be so perfect in the beginning and it's OK. We always have the passion and determination to make it better.

I like the course because it's not only about the principals of the design, but also about having hands-on experiences on a real project. Conducting the design by students themselves is a very valuable experience, and it could make the course more involving and bring the design theories into practice. I hope in the future, students could still make the design themselves in the course.

Yasmine: The most challenging part of the design research process was the cultural references search. It was unclear what could be considered a cultural reference and how directly it needed to relate to the theme. We struggled to determine whether references should be broad or specific and whether their primary purpose was to inspire our idea. Although we initially selected several cultural references in our group Figjam, we eventually used different material for the first presentation.

Another challenge was formulating research questions that were measurable through both quantitative and qualitative observations. We iteratively refined the questions based on the teacher's feedback until we achieved clarity and precision.

Breakthrough moments included conducting interviews and launching a survey that received 109 responses. These efforts revealed that students are genuinely interested in the subject, confirming our idea's potential and giving us a strong foundation for the design process. User testing was another pivotal moment, as it provided valuable insights into how users interacted with the design elements and helped refine our approach based on their feedback.

Looking forward, I would carry several key elements of the design research process into future projects. One is the "State of the Art" review, as understanding existing work is essential for differentiation and innovation. Another is the "Research Wall," which emphasizes asking the right questions to obtain insights that can effectively guide the project and lead to more impactful outcomes.

Beyond your project

With the increasing integration of digital tools into daily life, the issue of digital well-being has become an important area of research. Many users experience cognitive overload, screen fatigue, and decreased productivity [7] due to the overwhelming amount of notifications, rigid interface designs, and lack of personalization in digital experiences. A potential solution that can be explored is “adaptive interfaces” - these are systems that are adjusting based on how the user is feeling, what he is doing, etc.

Design research can investigate how digital environments can support users by modulating elements such as interface complexity, notification frequency, color schemes, or content presentation in real-time. For example, interfaces could detect when a user is in deep focus and automatically reduce distractions or shift to a dark mode to minimize eye strain.

To put it more concretely let's think about this in the context of digital books/reading. These systems could dynamically adjust the presentation of text and multimedia content based on assessment of user engagement (how much time they spend, is it day or night, etc). For instance, the interface could enhance readability by modifying font sizes and background colors based on the user's current lighting conditions and time spent reading.

This is a topic that can be measured - so meaningful research could be achieved in this direction that can potentially be very important. Ultimately, investigating adaptive digital experiences could lead to the creation of interfaces that are more intuitive, less overwhelming, and designed to enhance the focus of the users rather than worsen it.

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Appendices

A1. Reproducibility

All materials needed to reproduce our study and and results are available on the following links:

- [Figma Board](#)
- [FigJam Board](#)
- [Online Survey](#)
- [Prototype showcase evaluation](#)

A2. Prototype showcase evaluation

A2.1. Location and Dates

The final prototype evaluation was held at the EPFL+ECAL Lab on December 11th, beginning at 2PM. Each test had a duration of 20 minutes.

A2.2. Equipment

We used a smartphone with Figma installed that allowed us to present and test our prototype. We took notes on our laptop during the testing. Additionally, participants were recorded through an online survey which they completed using our laptop.

A2.3. Tasks and Scenarios

Users were asked to follow these tasks to interact with our app:

Task 1: Create a new account and select your preferences, after that navigate to the home page so you can explore the recipes.

Task 2: Please explore the lunch, breakfast and dinner suggestions, if you like something press on the heart to favorite that.

Task 3: Please navigate to Lunch and select the item with the highest true cost of food.

Task 4: Please navigate to instructions to see how to prepare this recipe.

Task 5: Find a way to add all ingredients to your shopping basket.

Task 6: Navigate back to ingredients and press on the first ingredient to inspect its statistics.

Task 7: Navigate to your shopping list and find a way to group the shopping list per market.

Task 8: Navigate to your shopping list and remove some items or all of them.

Task 9: Please navigate to your favorite recipes.

A2.4. Detailed answers of the open questions from the UX test

1. Does the app effectively convey the concept of the true cost of food and the accompanying statistics? What aspects of the app capture your interest?

- I think the percentage could be changed to cost, and I would like to see alternatives. It's interesting that two bananas from different countries don't have the same impact.
- I really like the concepts and think the app shows the true cost of food very nicely. The buttons should be more bold to improve visibility, but overall it's very intuitive.

- I like the concept of the app. Since I'm used to having my own recipes, I would be interested in being able to add my own recipes to receive healthier versions.
- This is a very unique idea. The design is eye-catching and professional. The concept of the true cost of food is clearly explained and nicely conveyed through the recipes.
- I really like the app, and from everything I've seen, I would only use this one. It really caught my eye, and yes, it perfectly conveys the concept of the true cost of food.
- I really like the app and find the concept well-explained, except for the biodiversity aspect—I want to know how it's calculated. The environment includes CO2, health affects me personally, and I'm a numbers person. It's very intuitive, but I would like to be able to click on environment and health to see detailed explanations. I also wonder how avocados compare to alternatives.

2. Are you willing to try out the suggested recipes in our app and why?

- Yes, why not? I'm not currently using any app, and I sometimes struggle to find new recipes that align with my preferences and values, though it's not part of my daily routine.
- I might try it if the app suggests more items that can be found in the same store, making it easier instead of going to different shops. Since I'm in a learning phase in my life, I'd be willing to try the suggested recipes.
- Yes, I would, but sometimes I prefer to stick to my own recipes. The idea of being able to search for a recipe really appeals to me, and I would use the app in that way more often.
- Yes, I would. Achieving my personal goal through this app would be interesting to me.
- Yes, I would use it. I'm not sure if I would go to multiple stores, but I might visit the one with the most ingredients. I would definitely follow the recipes.
- I'm always open to new things. I like the visualization of breakfast, lunch, and dinner—it looks appealing with the pictures. The app is very easy to use, with features like favorites and search for specific recipes.

3. Do you think it's better to recommend low true cost food through a recipe rather than suggesting individual ingredients?

- Yes, I think so. I appreciate the variety of cuisines. There were many choices, which is great. Sometimes it's difficult to cook something new.
- This is a very smart approach. In daily life, we have so many things to think about, and choosing every ingredient one by one is a bigger challenge. I like how the app combines ingredients to indirectly guide me toward sustainable recipes.
- Yes, it's definitely easier to choose a recipe as a whole rather than selecting ingredients one by one. It's also simpler to make a sustainable impact by focusing on recipes instead of individual ingredients, which can feel abstract when you don't know what to do with them.
- Absolutely, it's better and easier to take advice through recipes rather than per ingredient. This method is more accessible, and I believe more people would use it this way.
- That's really smart! I like how the app implicitly shows the true cost of food without me having to think about it too much.
- It makes sense to suggest recipes rather than individual ingredients.