



barefoot
one step at a time

Team Members

Katrina Liou - Product Designer

Grace Zhang - Mobile developer

Rachel Leou - Product Designer

Anthony Xie - Mobile developer

Problem and Solution Overview

Technology has made it incredibly easy to live a sedentary lifestyle and lose awareness of the environment around us. This lack of environmental education and care makes it difficult for individuals to take action to live sustainably. With this platform, users can seamlessly interact with nature and learn about the flora, fauna, and history of their surroundings while strengthening their appreciation and awareness of nature. We hope this in turn promotes more sustainable living.

Needfinding Interviews

Throughout our process of needfinding, we were able to extrapolate incredibly useful information across a wide range of individuals. We began with people who had limited familiarity with the topic of sustainability, namely a 4th grader named Andrew. From this interview, we were able to see that there is a willingness and excitement toward learning about sustainability in school, but a disconnect between the classroom and everyday life. We then moved onto individuals who are more familiar with sustainable practices, such as Julia and Dennis. From these, we were able to gain insight into the challenges and barriers that prevent people from adopting more eco-friendly habits. We extrapolated that when environmental issues are more apparent to them and the solutions are attainable through simple actions, people are far more likely to be the change that the environment needs. And finally, we were able to reach an audience of “experts”, or individuals whose lifestyles and livelihoods revolve around the planet—Ellie, Joe, and Dennis. These interviewees’ goals were to spread their knowledge and their sustainable practices to the lives of others and widely encourage people to practice mindfulness in their actions. From their personal experiences as educators and entrepreneurs of all different backgrounds, we were able to see common struggles across all fields.

“Kids really care about this stuff--they just need direction and action to take”

“In science I just learned about renewable energy”

“It’s no longer okay not to know about environmental issues”

“Fashion should be more cyclical”

“I had no idea just how bad the fashion industry has been for our environment”

“Sustainable has no definition in the fashion industry”

“How do you find that line of creating a product that people want that is sustainable and ethical and knowing that it will be priced higher, and also respect the rest of the market”

“A lot of the time, you have to search for the information because it’s not readily available for you”

“Being zero waste is really overwhelming, so it’s more about just trying to *reduce* your waste”

“I think it’s important to keep the earth healthy so we can live on it longer”

“Younger people better understand the issues at hand, and are much more inclined to engage”

“Waste has become part of our culture”

“We’re terrible at recycling”

say

do

Excited to offer the help that she was able to

Recited very specific statistics relevant to the conversation

Shows pictures taken of students participating in trash sorting

Uses solar power at home and actively composts

Encouraged me to check out his website and talks online

She is very positive and smiles a lot, while encouraging our questions

He showed us his textbook with all of the sustainability content he is currently learning

She was being humble about her knowledge and her habits

He was very shy and pauses a lot to think

She seemed slightly agitated when talking about sustainability habits in the US

Furthered her capstone and started a company

Became excited when talking about his projects



think

I'm frustrated with human behavior

I want to preserve the Earth so my grandkids and their grandkids can also enjoy what I did

Younger people better understand the issues at hand, and are much more inclined to engage

Much more important to target individuals as an audience vs industry as a whole

Believed in the importance of targeting individuals as opposed to targeting industry

How am I going to juggle all of this? What should I prioritize?

There are many resources to "get into sustainability"-- people just need to take the initiative

How can we educate our audience/ consumers while making them feel good about what they buy?

she is very realistic about the bounds of living sustainably

seeing your contribution is a good incentive

How big of an impact do I make?

thinking about her own personal experiences to living more sustainably and the problems that she runs into

people must be willing to DOWNSIZE to make a difference

I am excited to learn from this cool textbook



Frustrated about industry bottlenecks in making sustainability more accessible and widespread

Love and care for the planet's well being

Excited to learn more in school



Happy that she gets to work on what she loves and dreams about

Anger that the fast fashion industry produces so much waste

Passionate about the growth of his Lunch out of Landfills initiative

slightly frustrated



Exhausted from juggling so much from design to business

Excited to give more talks at conferences in the future

inspired by the sustainable lifestyles of bloggers and youtubers

eager to be helpful and provide insight

Shy because he doesn't know what sustainability means

laid back & comfortable

Enthusiastic about directing me towards other organizations and resources

POVS and Experience Prototypes

Final 3 POV's:

POV 1: **We met** Conrad, a middle aged physical therapist and triathlete from New Zealand who now lives in the Bay Area. **We were amazed to realize** that Conrad uses kitchen graywater and biodegradable soap to water his garden and plants in order to save water and eliminate the need for sprinklers. He also doesn't own a dryer because California weather is good enough to air dry clothes. **It would be game-changing** for people to recognize and address more avenues to repurpose and reduce our waste like Conrad

Top HMWs:

1. Put people in others' shoes to experience a different lifestyle pertaining to sustainability?
2. Create online communities that take action in pandemic environments?
3. Build incentive through community/ build community through incentives?
4. Expand existing communities (like book clubs, sports teams, etc)
5. Create opportunities for people to explore different mindsets
6. **How might we get people to integrate repurposing into their lives?**

POV 2: **We met** Dennis, a Stanford sophomore who cares deeply for animal life and was a camp counselor for many years. **We were amazed to realize** that children are more engaged, receptive, and passionate about the subject their learning about when they are immersed in interactive activities. **It would be game changing to** Create more opportunities for people to learn about sustainability through interactive activities.

Top HMWs:

1. Make activities interactive and engaging for people of all ages?
2. Make sustainability fun?
3. Make activities that translate to real skills?
4. Create passion around sustainability?
5. **How might we increase individual and community connections with nature and sustainability?**

POV 3: **We met** Andrew, a 4th grade male student living in the Bay Area. **We were amazed to realize** that even though he didn't know what "sustainability" was, he was eager to take action and share what he learned in school about renewable energy. **It**

would be game-changing to give children more of a voice when it comes to living sustainably in their home life. This could lead to a domino effect from the influence of an unsuspected age group.

Top HMWs:

1. Introduce sustainable behaviors into the lives of children, which is often controlled by their parents?
2. Give kids a platform they can communicate through/with?
3. Create compelling content so that kids listen and absorb?
- 4. Inspire kids to lead by example?**
- 5. Break the barrier/ age gap between adults and kids (how might we get adults to see kids as their equals)?**

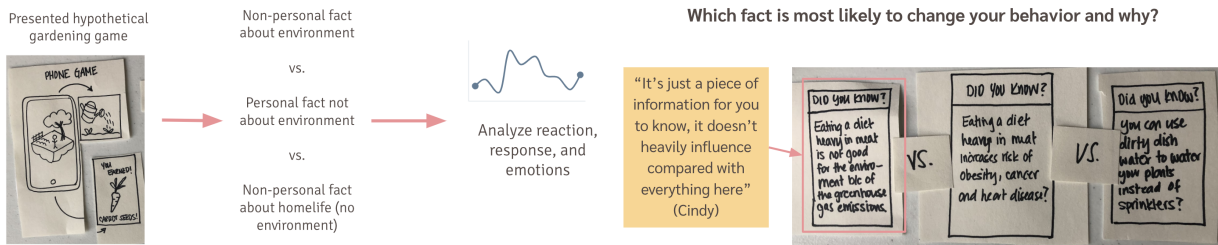
Solutions

Solution 1:

- **How might we** inspire kids to lead by example (while breaking the barrier between adults and kids)?
- **Idea:** Learn about sustainability through a game that incentivizes environmentally friendly living

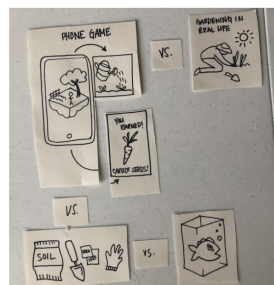
Experience Prototype: What kind of educational information would influence behavior in a game?

- **Assumptions:**
 1. Users would apply knowledge learned from the game in their real lives: **Not validated**
 2. Users will be interested to learn and garden through an incentivized game: **Not Validated**



Asked about:

1. Gardening phone game vs. gardening in real life
2. Incentivized phone game with physical gardening-at-home component
3. Gardening at home vs. community garden
4. Interest in gardening vs. aquaponics



Things that worked

"I like how whatever I've invested time in virtually also has a real counterpart; it'd definitely make me want to garden more." (Tianzhen)

"For home growing, if it's easy to grow, you feel like you are accomplishing things" (Cindy)

Things that didn't work

"Will parents take their kids seriously if their kids are showing them something from a game?" (Tianzhen)

"I'm definitely not really looking to start fish and plant empire right here in my house" (Dylan)

"I'm not interested in gardening because I'm not good at it" (Cindy)

Surprises:

- "What if someone's allergic to plants or fish, or some species don't interact well together" (Tianzhen)
- "Everyone knows what traditional gardening is [but not everyone knows about aquaponics.]" (Cindy)
- "If the game benefits other people, then I'm more interested in the game."

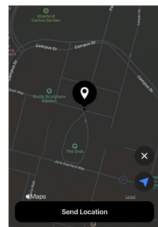
(Cindy)

Solution 2:

- **How might we** increase individual and community connections with nature and sustainability?
- **Idea:** Incentivize exploration and discovery of the outdoors in order to foster individual relationships with nature

Experience Prototype: Can people be incentivized to go outdoors and explore nature?

- **Assumptions:**
 1. People can be incentivized to explore nature: **Validated (backfired)**
 2. People believe it's safe enough to explore in their area: **Validated**
 3. Perceive value in establishing a connection with nature: **Validated**



Using Facebook's maps, interviewee was sent a few possible locations to walk to



Each location had different "points" assigned to it, which corresponded to a real life rewards



Interviewee was left to walk for as long as or as short as they wanted

Key feedback:

"I think it's ironic that I'm going out in nature, but I'll be looking at my phone the whole time still."
(Tianzhen)

"What if people start trashing the environments they're exploring?"
(Tianzhen)

"The first thing that I thought of was 'how can I possibly get the most points as quickly as possible?'"
(Dylan)

Things that worked

"I do take walks, but it's always the same routes... It's fun to have a reason to explore new places."
(Dylan)

vs.

Things that didn't work

"Are my movements being sold to some mega corporation company?"
(Dylan)

Insight: We realized the contradiction between wanting to get people outdoors, while utilizing a medium that is inherently sedentary

Solution 3:

- **How might we** get people to integrate repurposing into their lives?
- **Idea:** A platform that makes repurposing old clothes an easy and fun activity

Experience Prototype: Would our service incentivize people to steer away from the fast fashion industry?

- Assumptions:
 1. People are interested in repurposing old/thrifted clothes: **Validated**
 2. People want to digitally visualize and plan the changes that they will be creating: **Validated**
 3. People have the time and artistic skills and dexterity to create wearable pieces: **Not validated**



Presented the concept of being able to upcycle old clothes into new pieces

Gauged the interest and the effect it would have on shopping behavior.

● **Key Feedback:**

“I could see this bringing a community together with the core value being sustainability”
(Marlee)

“In theater, you have to reconstruct and repurpose costumes to adapt them for new shows fast”
(Marlee)

“In a dressing room and u cant have a second opinion”
(Tianzhen)

Insight: We found that this service would be able to unite different audiences with one another, but would cater to a specific audience

Things that worked

“Customers like being special. They love specialized experiences and showing up somewhere knowing that nobody’s gonna be wearing the same thing as you.” (Marlee)

“I like the component of getting to design everything beforehand and see how it’d look -- It would make me want to thrift more.” (Tianzhen)

Things that didn’t work

“If I buy or have someone make something, you know, I want to be sure that it’s good quality.” (Dylan)

“I’d want to do all these cool things to my clothes, but I’d end up limiting myself because I know I don’t have the skills to do it for myself.” (Marlee)

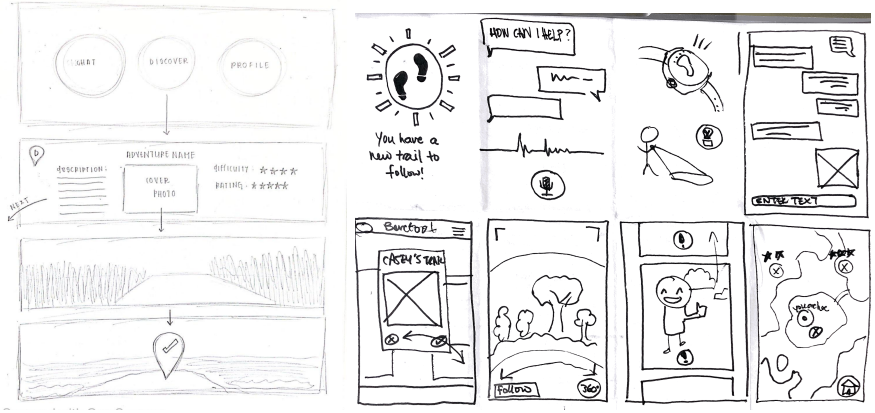
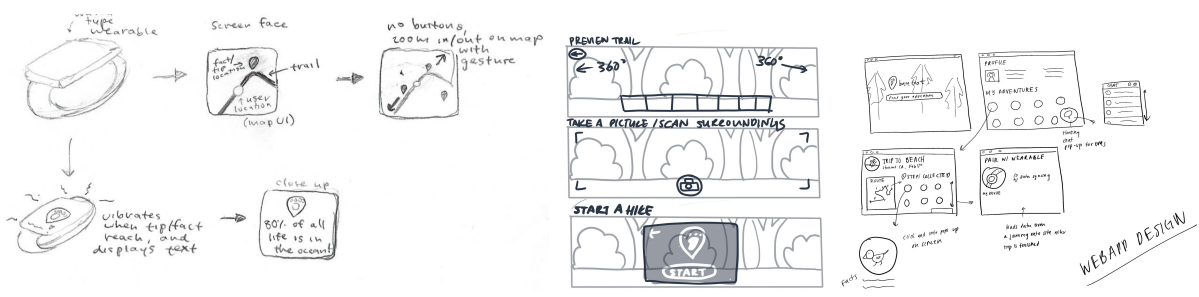
VS.

Design Evolution

Final Solution: We decided to create a mobile application that encourages users to engage with the outdoors and learn about sustainability and their environment through contextual learning.

1. **Task #1:** (simple) explore and learn about nature in context
2. **Task #2:** (simple) follow previously published trails
3. **Task #3:** (complex) create and publish your own trail
4. **Task #4:** (moderate) invite a friend directly to follow a trail

Choosing a platform: We explored and sketched 5 different platforms (virtual reality, mobile application, web application, augmented reality glasses, wearable (watch) application). We narrowed our options to the wearable watch and mobile and explored further.



TOP 2 STORYBOARDS

Wearable (Watch)

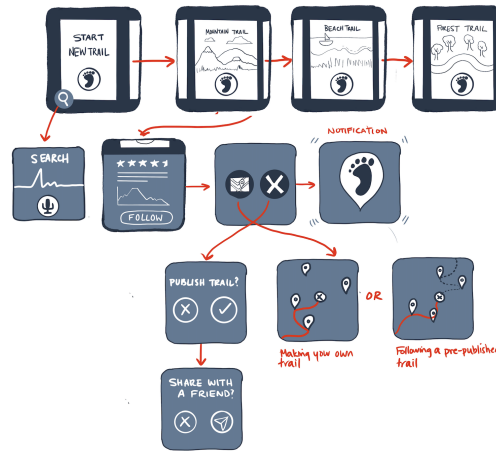


Figure: Reiterated Wearable UI Design

Pros	Cons
<ul style="list-style-type: none"> ● Balance between immersion and having tech for guidance ● Facts given in context ● Primarily synchronous: focus is on the adventure 	<ul style="list-style-type: none"> ● Hard to navigate on such a small screen ● Minimal functionality outside of hiking -- no interactivity or community or caching ● Need to buy a watch

Mobile App

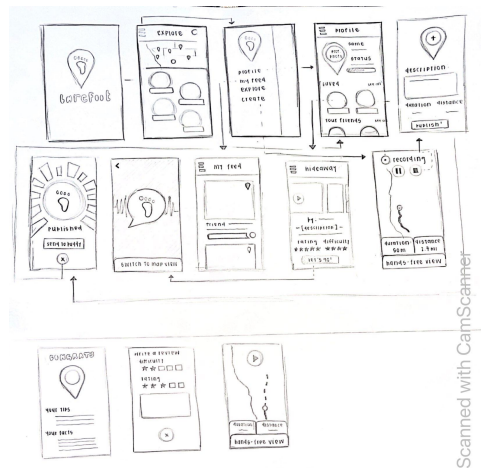


Figure : Reiterated Low-fi Prototype Sketches

Pros	Cons
<ul style="list-style-type: none"> • Can be used anytime/anywhere • Includes sharing / social media component • Can view all other components of platform easily (larger screen size) • Familiar interface • Easily accessible with smartphone • Better for long-term use 	<ul style="list-style-type: none"> • Must actively be using app while on adventure to navigate/hear facts • Want to avoid becoming too "social-media-esque"

SELECTED INTERFACE: MOBILE

Rationale: We ultimately decided to move forward with the mobile interface because it is familiar and accessible to many users. It also integrates both the *synchronous* (interaction and contextual learning while on trail) and *asynchronous* (seeing posts, sharing with friends, creating community, tracking progress, viewing fact history) components of our platform, making mobile a more robust option than a watch app. We felt that having a balance of both these forms of use would provide a more comprehensive and engaging experience, as well as encourage more long-term usage.

Low-fi prototype

We drew a low-fi prototype on paper, took pictures and transferred the screens into Figma to prototype.

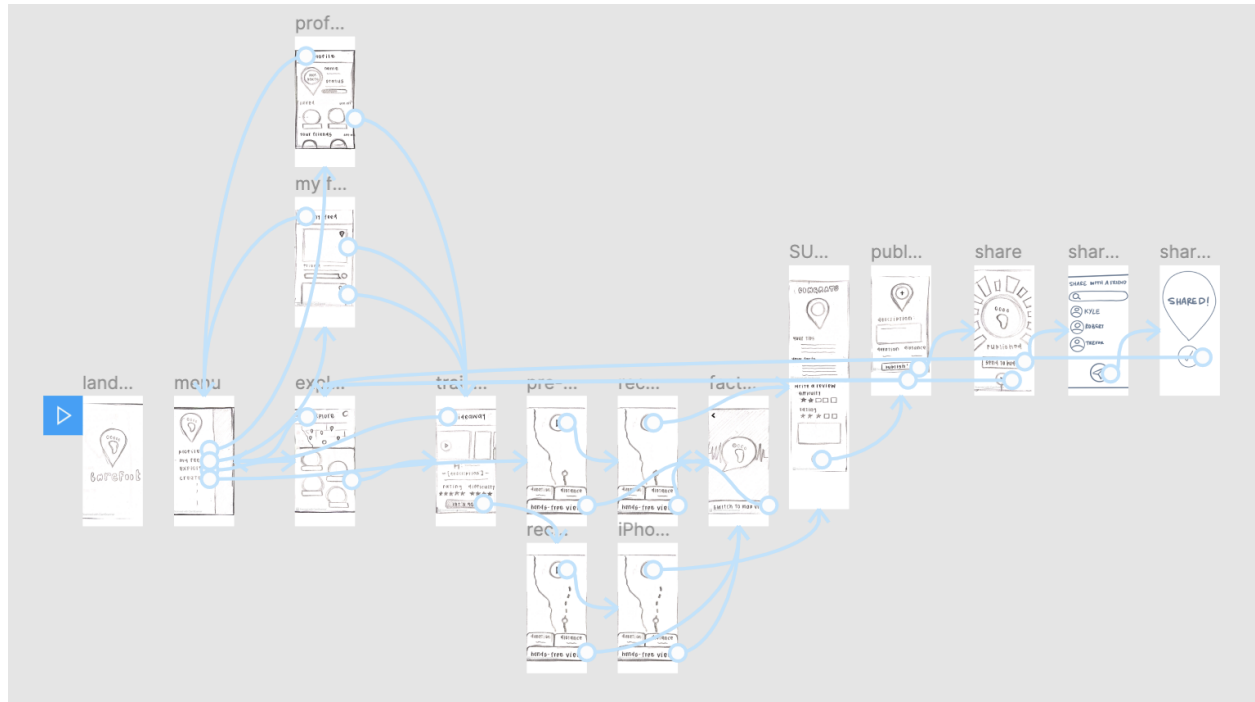


Figure : Finalized Low-fi Prototype

Low-fi prototype testing

Participants and demographic:

1. Middle-aged stay-at-home mom from the Bay who loves to take her family and dogs for outdoor activities
2. Stanford student from Boulder who is an avid hiker, mathematician, and physicist.
3. Introverted college senior who doesn't use social media or like going outdoors.
4. Active, young woman who enjoys hiking, biking, running, and exploring.

Environment: Remote interviews via Zoom

Findings: Overall, we felt that the interviewee successfully completed the tasks we asked of them. It became clear to us that the largest issues with our design were

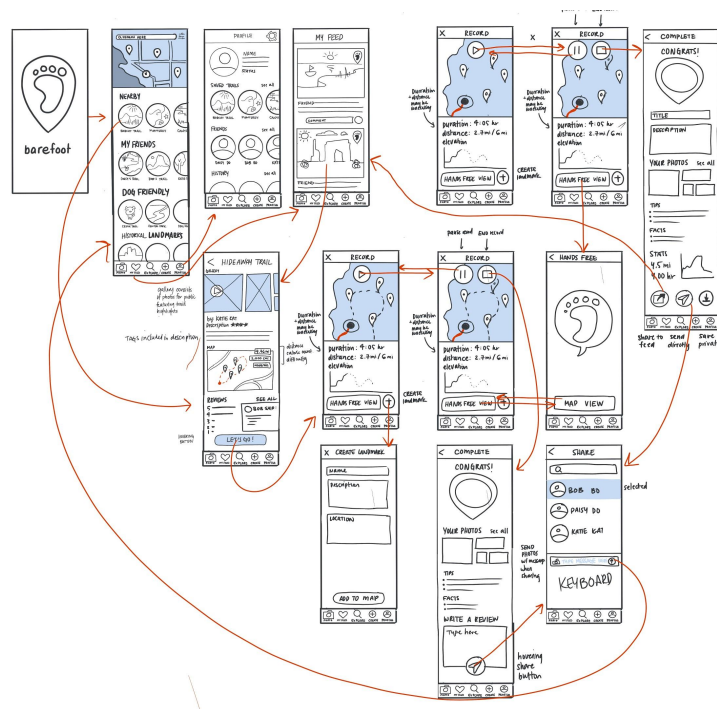
1. Users were confused with the function of the play button
2. Users could not access the menu when they wanted to during a hike

Our users also suggested adding in useful features like adding landmarks as you hike, different sharing options, and adding tags to trails.

Changes:

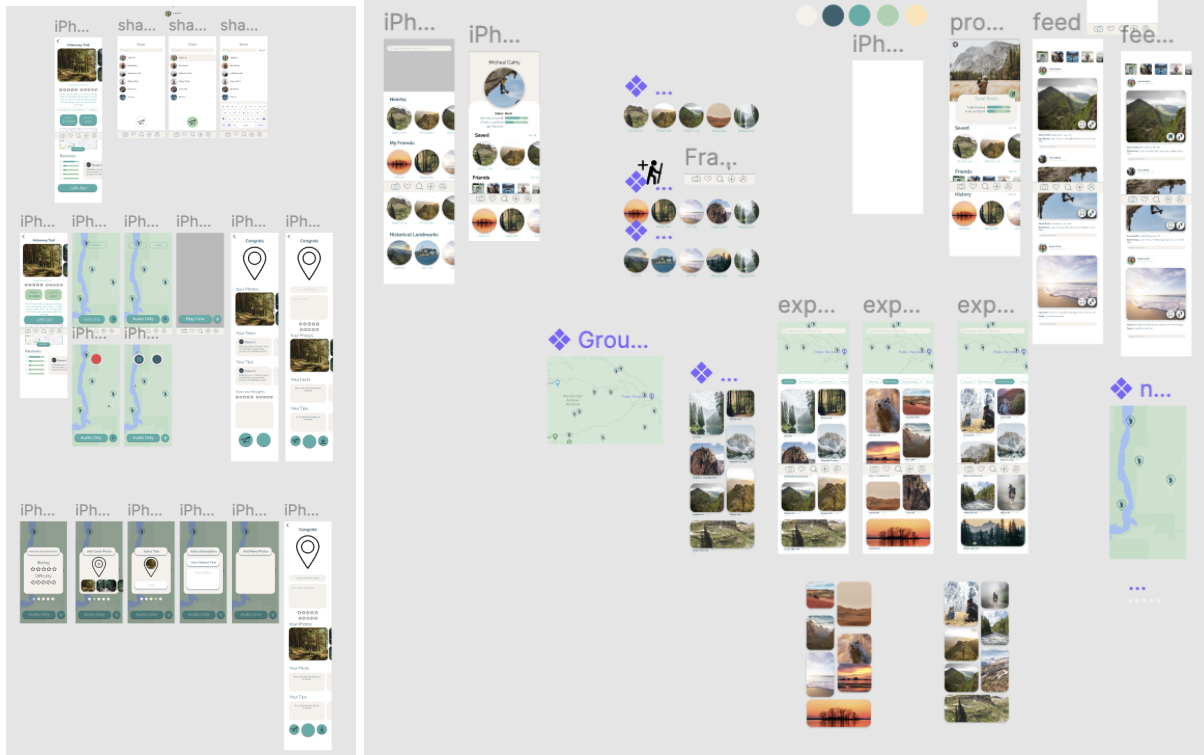
1. Add in a static menu bar instead of hamburger slideout menu, so navigation is accessible at all times.
2. Change play and stop button to record, pause, and stop buttons which allows users to be in control of how much of the trail they want recorded
3. Define publish button to be publish, save, and send privately and minimized # of screens after finishing trail

Revised storyboard:



Med-fi prototype

Using a revised storyboard we created a medium fidelity prototype in Figma, focusing on our 4 defined tasks.



<p>Limitations:</p>	<ul style="list-style-type: none"> • Couldn't store published trails in memory (including associated pictures, ratings, reviews, tags, etc.) • No access to location or camera functionality native to device • Viewing a specific friend's posts and other profiles • No audio built in for education component • After publishing, no posting functionality
<p>Hard coded features:</p>	<ul style="list-style-type: none"> • Landmarks and facts shown on map were hardcoded (because no access to location) • Trails shown in discover page, (should be based on location) • Initial profile info pre-loaded • Reviews pre-loaded • Map


Wizard of Oz:

- Upon starting a trail, facts would “pop up” based on the user’s location and movement
- Upon sharing with a friend, the trail is assumed to be sent directly to the friend through the platform
- For trail preview, app curates certain pictures for trail advertisement
- Filter trail by category

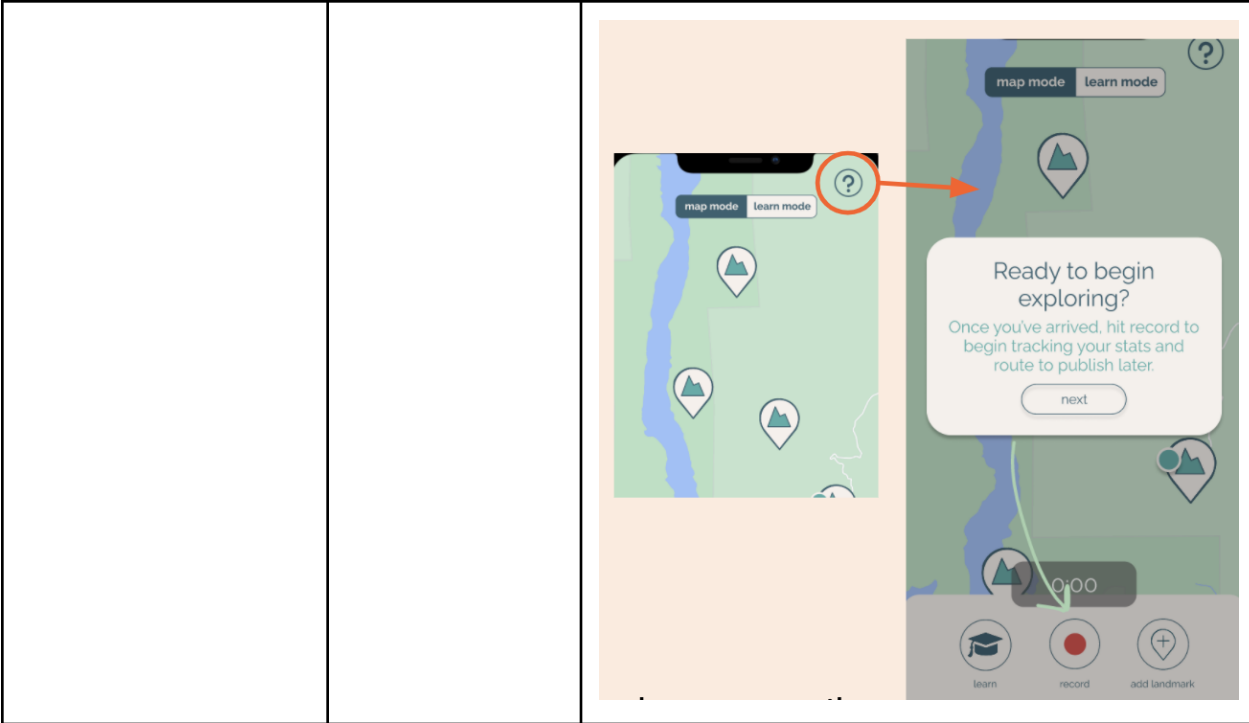
Heuristic evaluation results

19 total 3-4 violations: resulted in 9 changes

36 total 1-2 violations: resulted in 9 changes

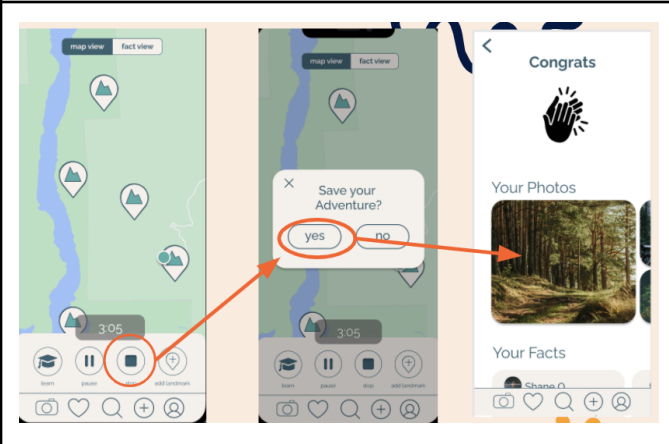
Problem	Fix	Image
<ol style="list-style-type: none">1. Creating landmark location is unclear2. Unclear what feed content is3. No option to not record trail4. Recording doesn't continue when accessing rest of app	Related Med-fi prototype limitations: intended to work in high-fidelity prototype / hardcoded content	N/A
<p>5. Unclear which page of menu is currently selected</p>	Bold icons on current page!	

<p>6. Unclear function for heart icon on menu</p>	<p>Changed icon to signify social media feed</p>	
<p>7. Unclear what profile photos on top of feed are for</p>	<p>Labeled stories with usernames</p>	
<p>8. Unclear what recording button is for</p> <p>9. Unclear what pause and stop buttons are for</p> <p>10. Confusion surrounding overall purpose of recording</p> <p>11. Unclear if record button is the same as record for those who didn't create the hike.</p>	<p>Onboarding tutorial and reconfigure recording pages</p>	



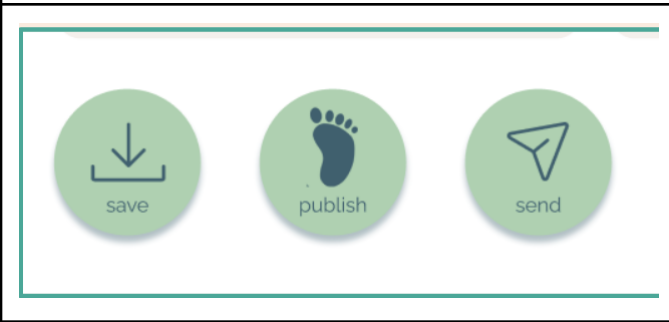
12. No option to delete recording

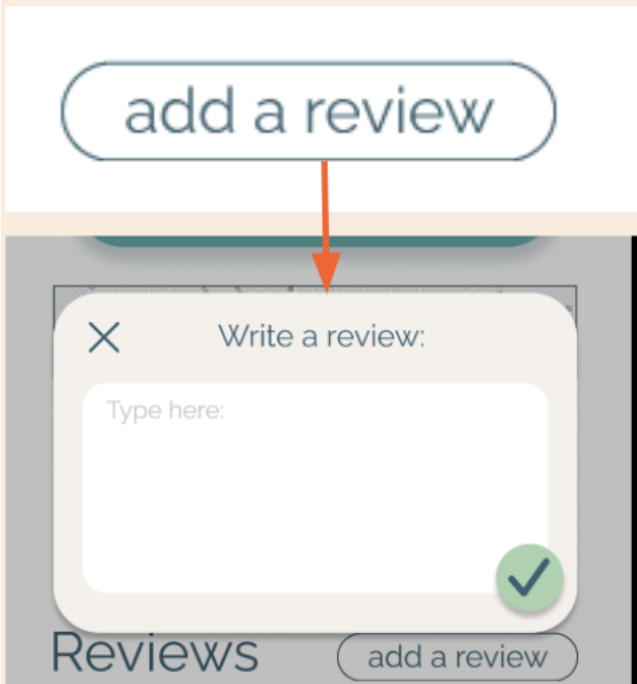
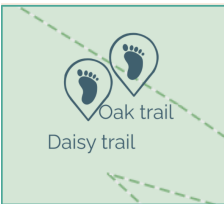
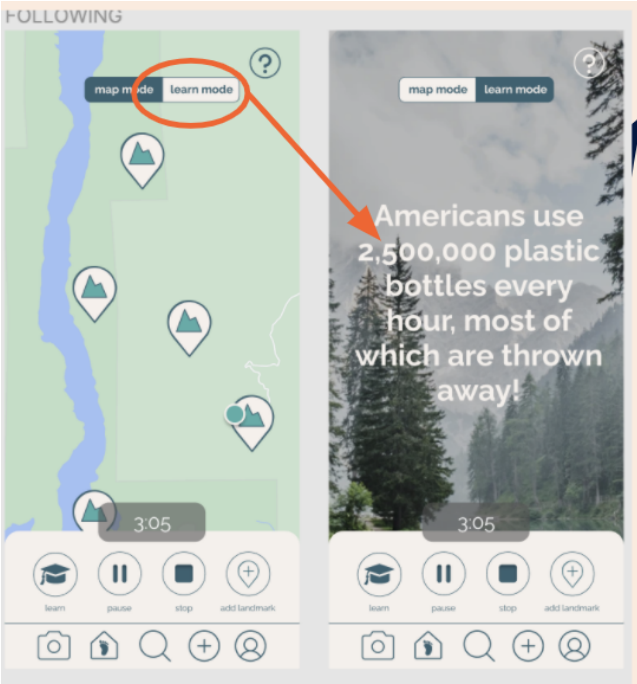
After ending hike, option to save or delete trail



13. Unclear what it means to share a hike vs. publish
14. What happens when you share?

Label buttons and rename share to send

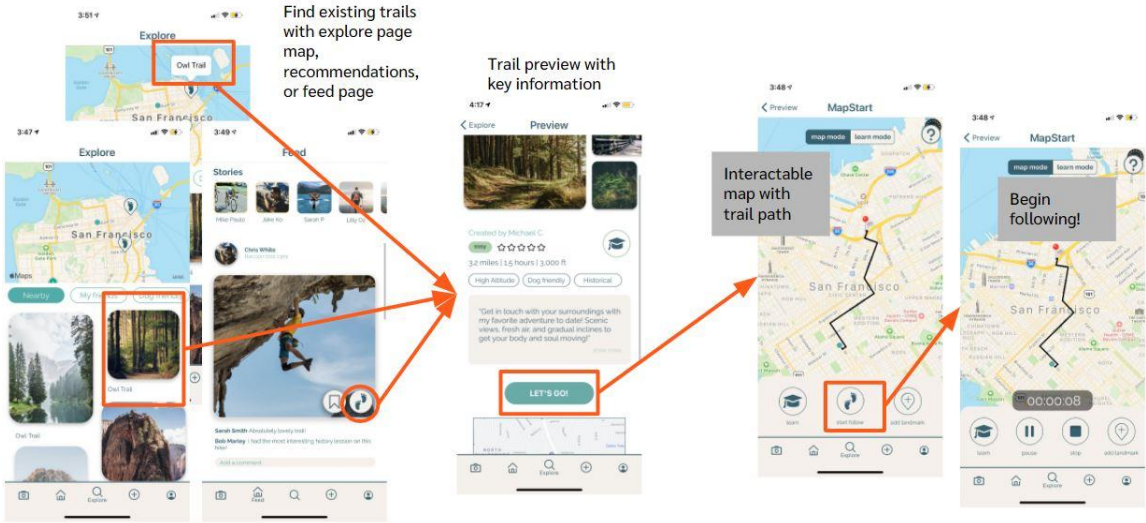


<p>15. User is only allowed to leave reviews after they finished hike</p>	<p>Add "add review" option in trail detail page</p>	
<p>16. Footprint icons on map did not signify which page you will be visiting</p>	<p>Add trail name on map (similar to google maps)</p>	
<p>17. Unclear function with audio only button</p> <p>18. Audio only button label implies there is audio in map view</p>	<p>Review audio only page and replace with learn mode</p>	

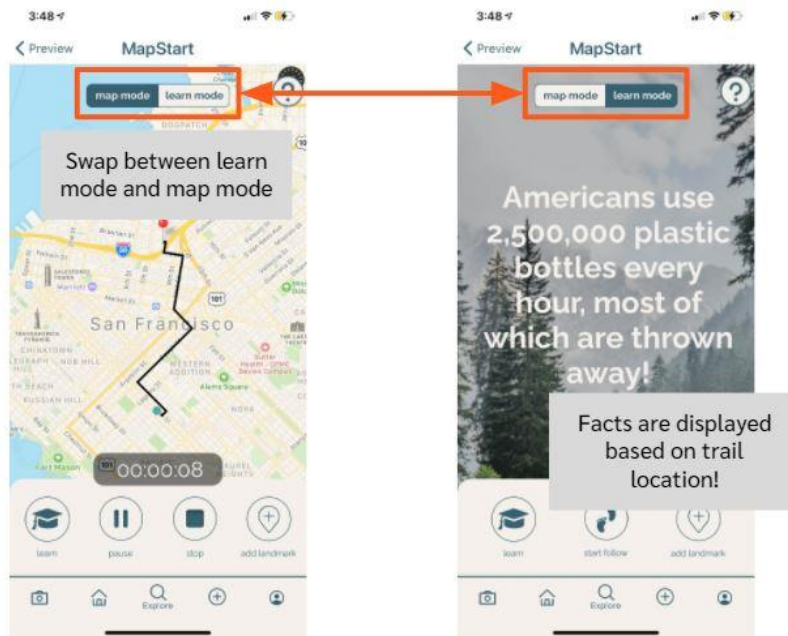
<p>19. How do you prevent accidentally posting trail?</p>	<p>No fix: Already have a sequence that prevents accidentally posting a trail</p>	
---	---	--

Hi-fi Storyboards

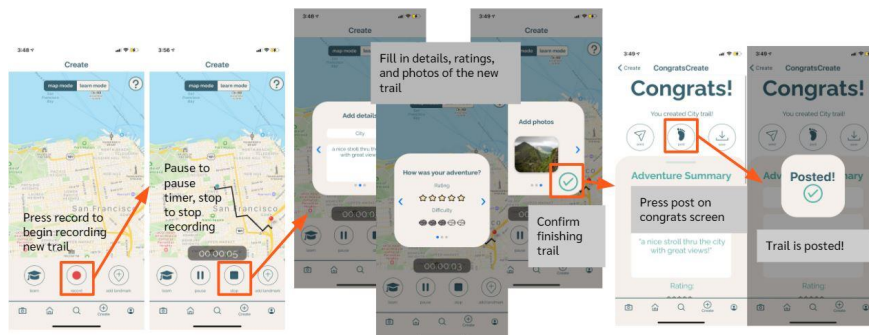
Task 1: Follow a trail



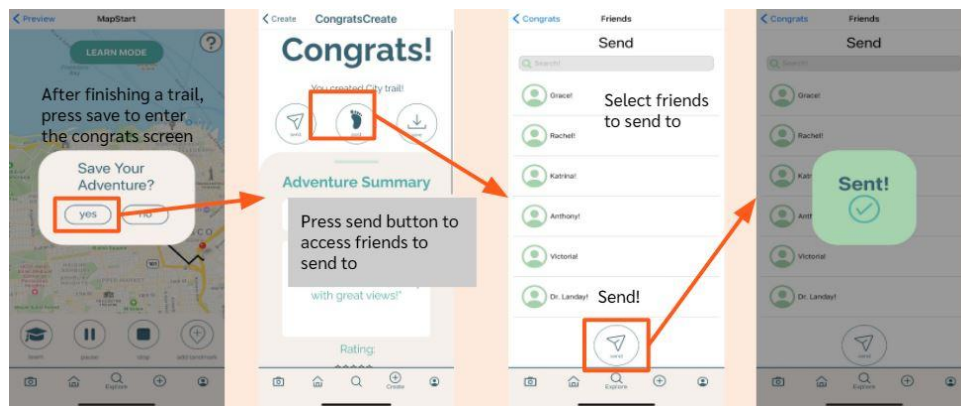
Task 2: Learn facts in-context



Task 3: Create a trail



Task 4: Send a trail to a friend



Final Prototype

Tools used: We built our mobile app using React Native and various React Native APIs and components to build out the features of our app. React Native's simplicity compared to other mobile app coding languages made it easier on us to code out the app itself, and the multitude of components and APIs that it offers such as React Native's maps, overlays, and slider tools all made it easier to implement many of our desired features without much difficulty. However, there were some limitations. Because we utilized many pre-built components and APIs, it was sometimes difficult to exactly match the visual design of our medium-fidelity prototype, and certain changes had to be made to accommodate this, such as in the help overlay and map.

For the prototype itself, we had a few wizard of oz techniques, primarily related to the implementation of following and creating the trail. The app does not actually track the user's location or movement, and the trail that is presented upon pressing start is a preset trail with the user's start location and end location fixed in San Francisco. Because of this, the act of "following" and "creating" a trail is limited to the process of pressing the start, stop, and save buttons.

Similarly, the feed and profile are hard-coded because we currently have no backend and database. The displayed trails on the explore page are hard-coded as well, but would theoretically be trails that other users have posted based on location.

Summary and Next Steps

Through this 10 week process we have learned a wide range of skills ranging from needfinding, to experience prototyping, to developing a high-fidelity functional prototype. All group members learned how to properly conduct interviews, usability tests and heuristic evaluations. Designers, Katrina and Rachel, drastically improved their styling and Figma skills when developing the medium-fi prototype. Developers, Anthony and Grace were able to test their mobile development abilities for the first time by building this application. Throughout the process of creating the high-fi prototype, they improved both React Native skills as well as collaborative coding skills with Github.

If we had more time, there are several features we would like to improve or implement. Building off our current model, we would implement a fully-functional trail-following and creating feature with location and metric tracking with the ability to add landmarks, as well as a working backend to handle the social media aspect of our platform such as updating profiles and feeds. We would also extend to implement a

feature that allows users to meet up with other people and coordinate adventures or learning content. That way, users can experience sustainability together. We would also like to display add features that allow you to set specific exploring goals and compete with others.

Overall, our experience developing Barefoot not only taught us how to create a mobile app, but it also made us more aware of nature and our surroundings, non-sustainable habits, and potential sustainability solutions.