

# H<sub>2</sub>OW low

...can you go?

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VERONICA CRUZ · manager, documentation  
MATTHEW LEONG · user testing

NICO CSEREPY · development  
JANE E · design

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*collect, compete, conserve*



*"Moisture is the essence of wetness, and wetness is the essence of beauty." - Derek Zoolander*

## INTRODUCTION

We created a demo app that helps solve the problem of water usage. The app uses POP to make the experiment more realistic. With POP, the user is able to interact with an interactive version of our UI on a screen.

The experiment aims to verify our assumptions about how our target audience might interact with a water-conservation app. By studying the usage patterns of the interviewees, we hope to find parts of our UI that are not intuitive. We might even find faults in our basic assumptions, such as people's motivations for saving water in the first place. Even though such a fault might be considered as major or even catastrophic, the cost of fixing it now is much lower than the cost of fixing it in the future.

## MISSION STATEMENT

Currently, very few people have systems in place to track water usage. At this time, there is no easy or convenient way to collect this information. As a consequence of this, most people have no concept of how much water they use, or where it is used, and therefore have no motivation to track or reduce use. Even for those who are interested in saving water, there are no concrete implementations to feasibly and easily facilitate this, because people cannot even definitively determine their main source of water use.

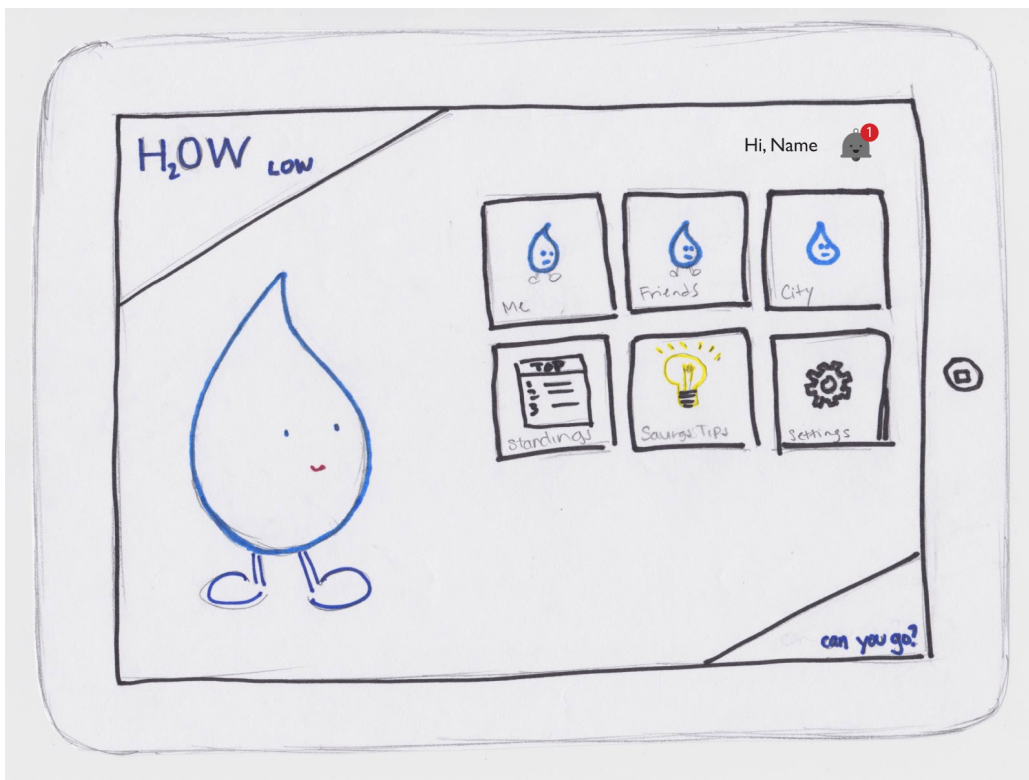
*Our mission is to provide a means of accurately tracking water usage on personal and aggregate levels, as well as a source of external motivation to conserve.*

## PROTOTYPE

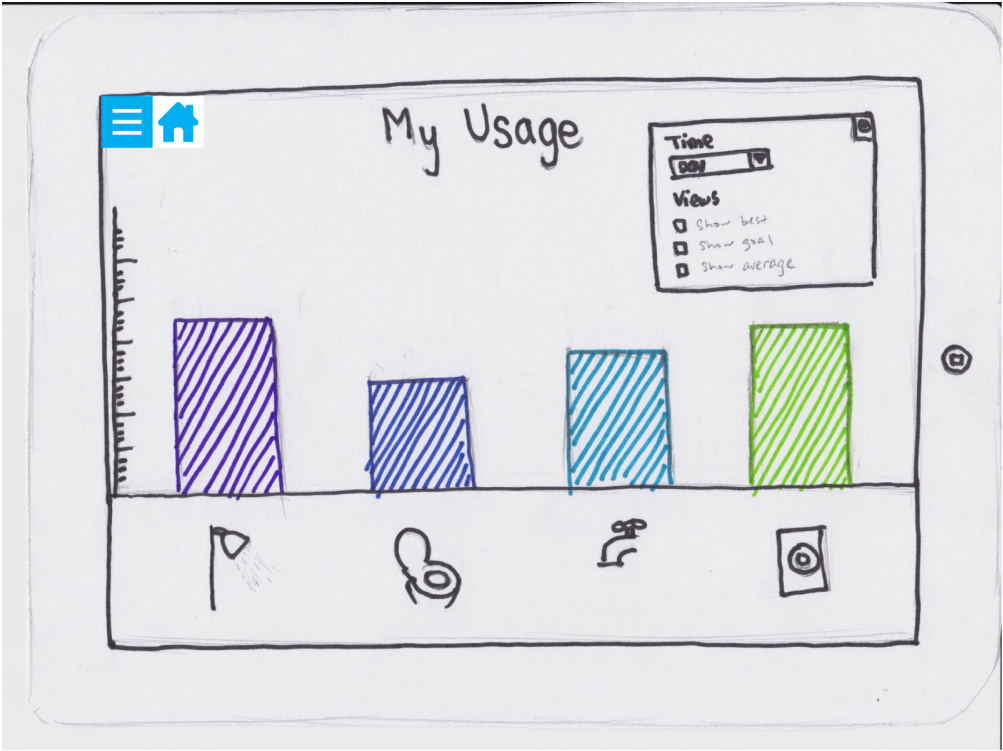
The main aim of the prototype is to allow the testers to interact with it as they would with the finished product. By fixing this parameter, we hope to find faults in our UI design rather than get sidetracked by the faults specific to our prototype.

Our prototype was implemented using POP, which allowed the users to feel like the prototype was truly interactive and responsive to their clicks on the iPad screen. The screen required a simple tap to bring the user to the linked screen.

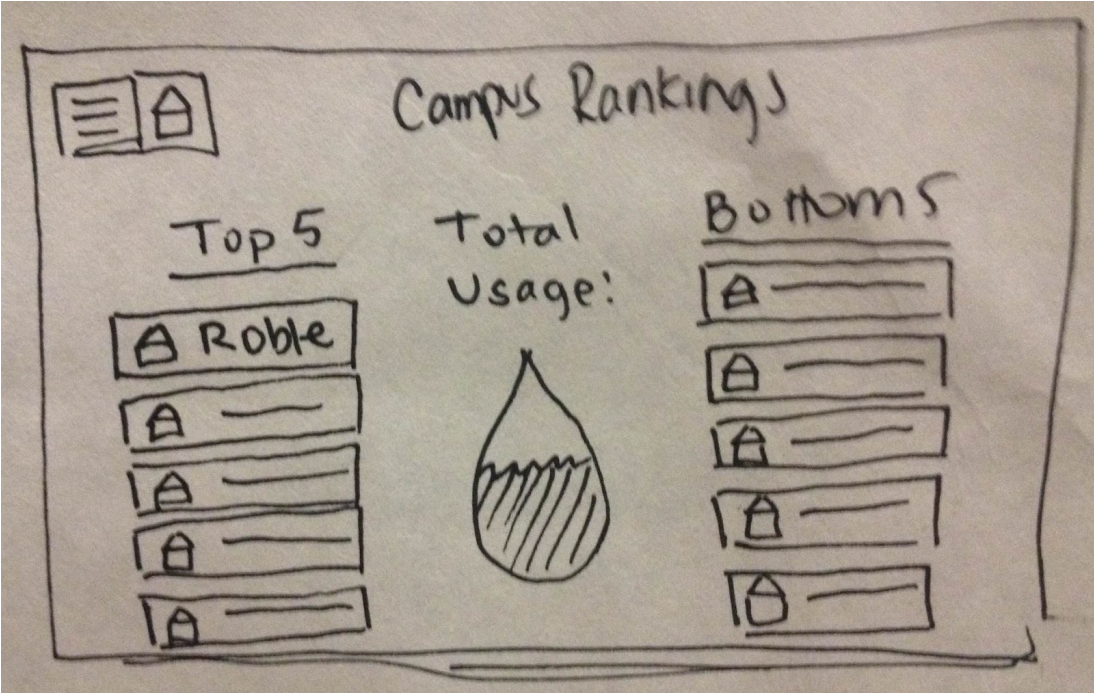
The application has a home screen from which you can access different water usage statistics.



Some statistics relate to the personal usage of the user. These include a breakdown of how the individual used water in the last day/week/month. The total usage can be split by appliance.

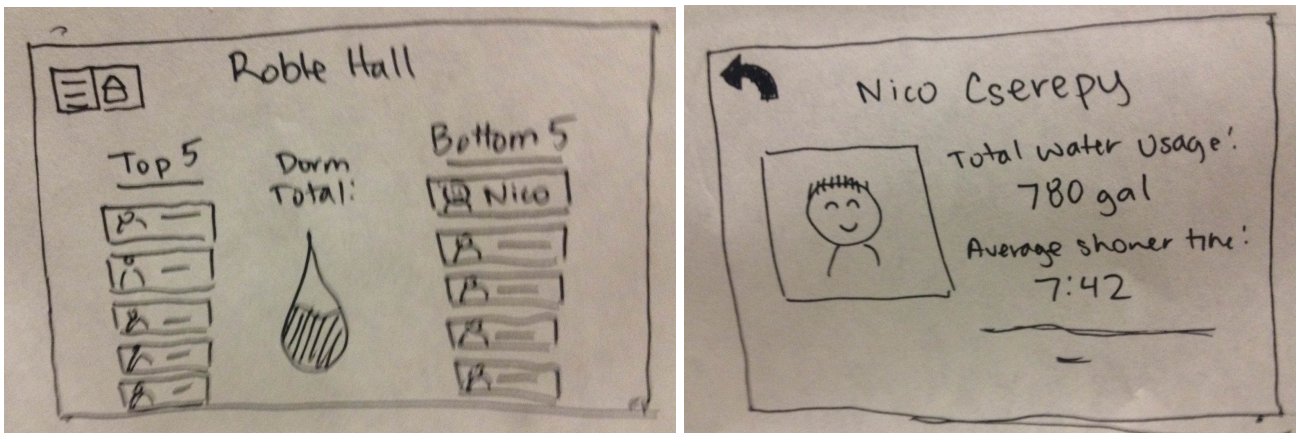


Others statistics show the state of the competition that the user might be part of. Here the user can look at current rankings and at the contributions of individual competitors.

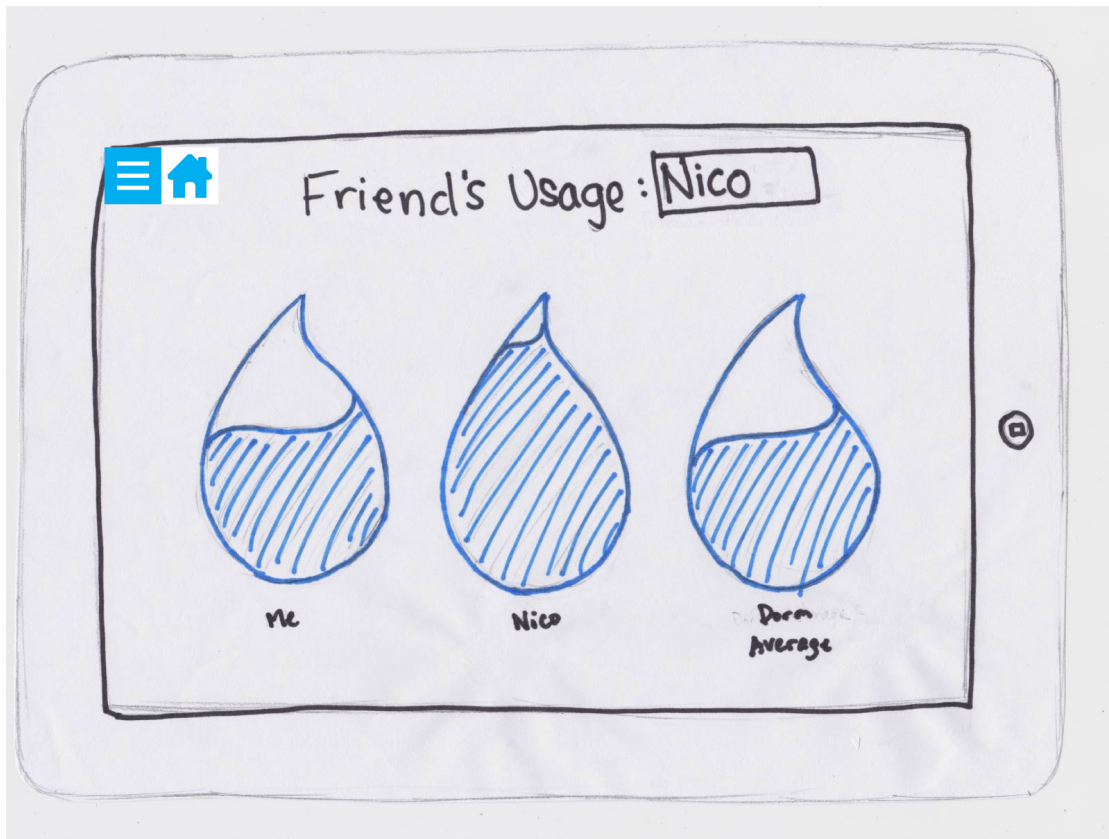




By clicking on a team, the user can look at details of individuals' performance within that team.



The user can add friends and then view individual friends' water usages in comparison to their own as well as their "team" average, if they are participating in a competition.

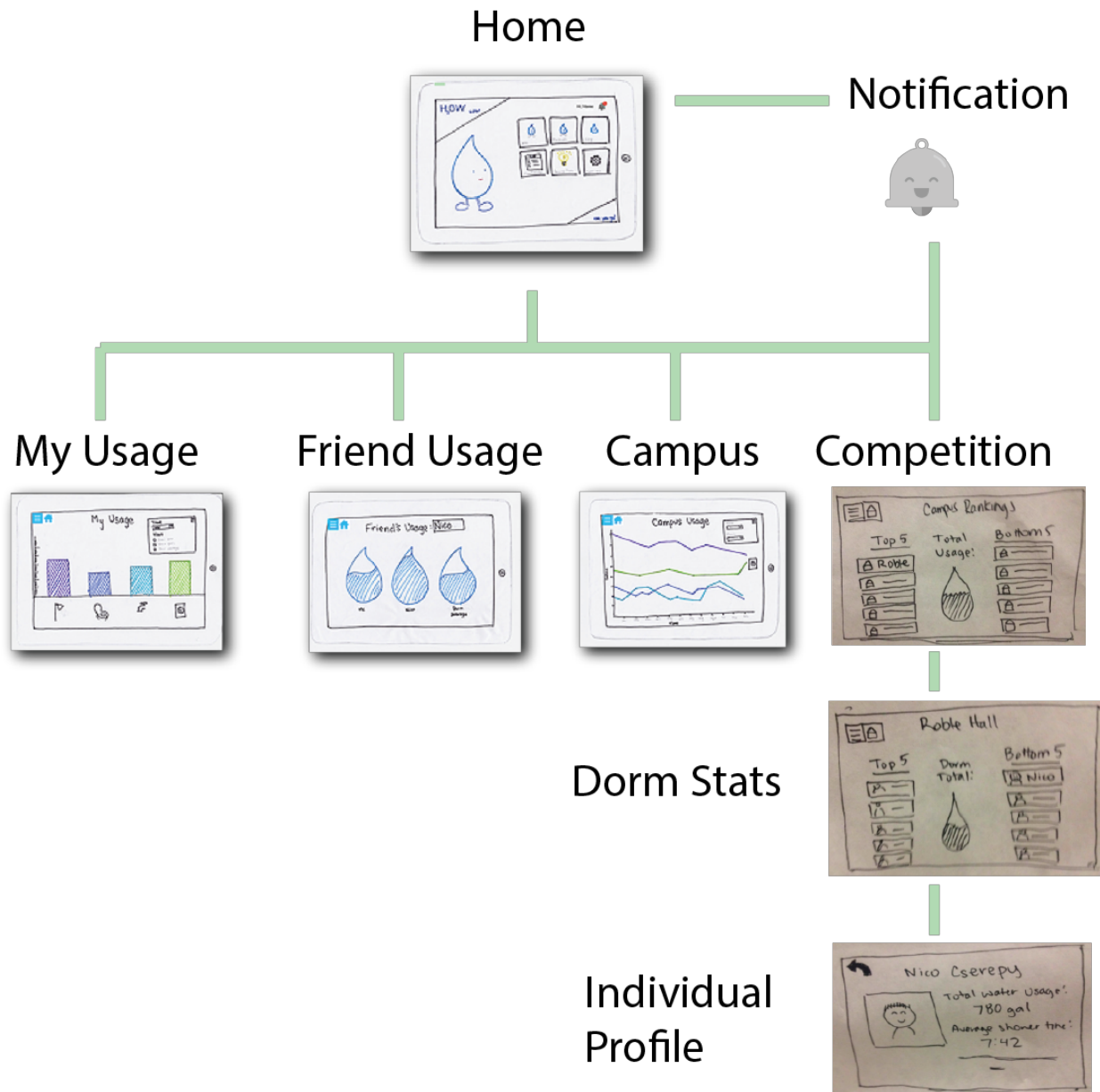


Finally, data for all users is aggregated to allow customizable visualizations for a city/campus/population of your choice.



From each (non-home) screen, there is a menu and a home screen button that will help you navigate to different pages. The usage graphs also have settings options on the top left corner where you can adjust the time span, view categorization, etc.

Here is a complete picture of our prototype screens, along with the link patterns between pages.



## METHOD

Our participants were diverse in gender (male and female), living location (off-campus and on-campus), and year in school (undergrad and grad). We recruited people from our classes, work environments, and beyond who had never been exposed to our project before. We did not incentivize our participants with any type of compensation, but assessed willingness to participate and provide useful feedback, as well as availability at the time.

We performed our testing at our common room tables with each participant seated at a table. We tried to limit distractions to the experiment by choosing a clean, quiet location. Our procedure involved a one-on-one interaction between the facilitator and the participant. The administrator began by demoing the POP app, without showing the participant how to perform any particular task. Afterwards, the administrator followed the script and observed the participant performing tasks. We measured the number of actions required to complete the task, as well as the estimated number of seconds.

We asked each of our experiment participants to complete three tasks:

1) check personal water usage

“Please check your personal water usage.”

2) identify a dorm’s highest user after entering the dorm competition

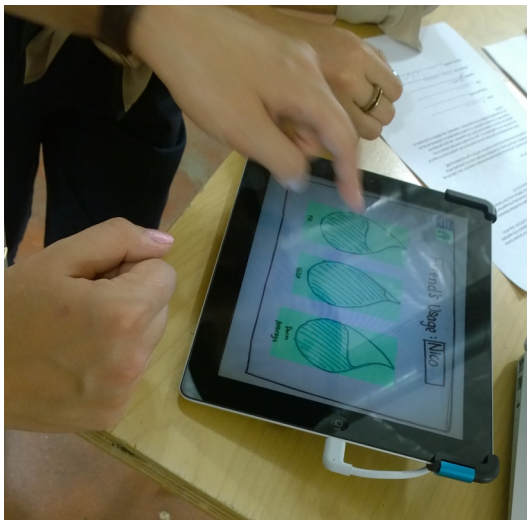
“You have received an invite to a school-wide water saving competition. Please join the competition, and identify the resident in the dorm that leads the bottom 5. What is his/her total usage?”

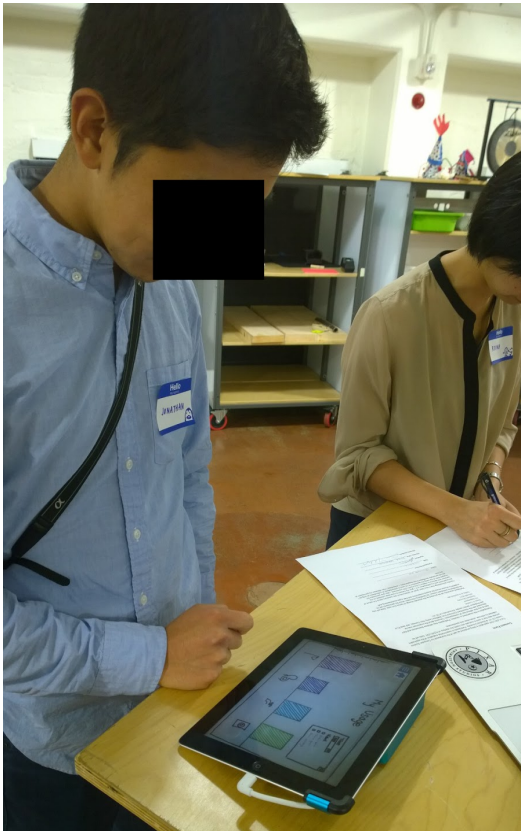
3) analyze total campus water usage and identify the appliance that has experienced an increase in use at the end of the year.

“Return to the home screen. Analyze campus water usage (modeling campus as a city), and identify which appliance’s use has seen increased usage since November”

Please see the Appendix for our complete script.

During the experiment, we recorded the number of “clicks” that the user needed to get to the target screen, as well as the time it took the participant to complete the task. Shown below are participants interacting with our POP prototype.





Each of our experiments is described individually in the next section.

POP links:

iPhone: <https://popapp.in/projects/544887c5afd636be3212be00/preview>

iPad: <https://popapp.in/w/projects/54498965d388e4b9328e94d7/preview>

## RESULTS

Participant #1 was a 21-year-old undergrad male.

Participants #2-4 was a group of three designers at gravitytank in their 20's, teaching a pop-up class at the d.school.

Participant #5 was a male Stanford junior.

We evaluated errors/time delays using the following assignment of severity ratings to the problems: 0=no problem, 1=cosmetic problem only, 2= minor usability problem, 3=major usability problem, 4=usability catastrophe.

Below is a summary table for each task, along with the severity rating for any problems participants had.



TASK 1 SUMMARY & RESULTS	Severity Rating
Action sequence required to complete the task: Home screen > Me > completed	
Participant 1: Participant did not make any errors, and it took <5 seconds for participant to find correct button and click it.	0
Participant 2: No trouble completing the task quickly.	0
Participant 3: Very straightforward (also commented that it helped that it was the first button)	0
Participant 4: Immediately found button, seemed to be waiting for me to finish speaking and already had finger hovered over.	0
Participant 5: Identified the "Me" button within two seconds, and completed the task within 1 click.	0

TASK 2 SUMMARY & RESULTS	Severity Rating
Action sequence required to complete the task: Home screen > alerts > accept > Roble > Nico > completed	
Participant 1: hesitated when deciding where/how to join competition, but clicked the alerts button correctly. Could easily navigate from Campus Rankings page to Nico's usage page. 0 errors, minor hesitation in execution. 34 seconds to completion.	1
Participant 2: Participant commented competition joining process was ambiguous and doesn't allow initiating.	1

Participant 3: Actually found “standing” first, which in the future should provide a way to make/join a competition if the user hasn’t already.	1-2
Participant 4: Found notification pretty quickly, but mentioned that she wasn’t sure if it would’ve lead her to the right place but thought it was worth trying.	1
Participant 5: Searched for message notification for < 2 seconds. Clicked the alert, and accepted the invite. Seemed a bit shocked that the screen went straight to the rankings page instead of a competition registration page.	1

TASK 3 SUMMARY & RESULTS	Severity Rating
Action sequence required to complete the task: Home screen > city > completed	
Participant 1: although the participant completed the task sequence correctly, the participant seemed confused on how to see <i>campus</i> water usage, since there was only a <i>city</i> option. Participant had a hard time identifying the drawn appliance icon as a washing machine. No errors, just hesitation and possible misinterpretation of graphics. 25 seconds to completion	1-2
Participant 2: Participant was confused because our script prompted analysis of campus water usage, but our home page only afforded a city option.	2
Participant 3: Understood “city” as campus, but admitted that it wasn’t particularly intuitive.	1
Participant 4: Also understood “city” as being campus, but again only because she was used to navigating to the home screen and based on the options, it seemed to fit the best.	1-2
Participant 5: The participant was confused by the “City” labeling, but found little trouble reaching the Roble Campus dorm rankings page. The participant had trouble realizing that clicking on an individual’s rankings button would bring up their profile.	1-2

## DISCUSSION

After looking over all our experiment results, we gathered quite a few helpful points to take away. The feedback came in two main areas: graphics/cosmetic suggestions and app flow/function suggestions.

One of the participants took a while to find the alert / notification. In the prototype, this feature does not stand out very much. Even though it is colored red, the color could be more vibrant. Maybe making it bigger or brighter would be beneficial, but our group mostly attributes the difficulty finding the notification button to the fact that some of the experiments were conducted on cell phones, which have a significantly smaller interface than an iPad or other tablet, which better simulates our target platform (which could include something even larger, like a wall display).

We received a lot of feedback regarding the layout/design of our homepage. Participants commented they would like to see differentiation among the Me, Friends, and City icons; right now, they are each represented by a single water drop. Other graphics users hoped to see was a more interactive home page (and especially water droplet mascot), which we definitely have plans to improve, once we have ironed out all the functionality of our app first.

The first suggestion we got regarding app flow/function involved the contest process. Once the invitation has been accepted, the user is redirected to the rankings page. While we consider this to be the logical next step, one of the participants found this surprising. The participant suggested redirecting to a "competition registration" page. This is definitely something to take note of. We are not sure whether a registration would be necessary, considering that the user is already logged in. A registration page makes sense if there is any additional information that is required before the user can compete. Another choice would be to close the pop-up notification regardless of whether the user accepted or declined. From there he / she could then navigate to the rankings page him / herself.

Another thing we will be considering is the labeling of our competition page and aggregate data visibility page. We realize that calling the button on the home page "city" could be ambiguous to a first-time user, because it might not be intuitive for "campus" standings to be reached through the "city" button.

Finally, one participant said he would have liked to see water tips and facts integrated into the rest of the app.

Please see our Appendix for additional feedback from participants.



## APPENDIX

Additional Participant Feedback (raw notes from experiment time):

Feedback from Participant 4, task 1:

me- devices should link to pages - suggestions for how to improve in each area  
me page seems like the option on treadmill to race your best, line graph to give more information

Feedback from Participant 3, task 1:

show top friend even in my usage page? - would want bars stacked  
maybe friends page should be home page - better view/information through image - dive deeper through home button

Feedback from Participant 4, task 2:

Wondered what the top people were doing to perform so well; wanted to see tips  
find similar people who are doing better in some way?

Feedback from Participant 2, overall:

click on droplet guy - animation  
competition joining - less clear, doesn't allow initiating - more receiving and not sending  
instead of saying "city" or "campus" maybe use something like "everyone"

Feedback from Participant 1, overall:

Friends and city: more water droplets for friend; some way to represent city, to differentiate.  
graphics: if water droplet guy danced or saying things (maybe be able to turn it off though),  
would be cool to have something moving on the home screen.  
top 5/bottom 5 layout was easy to understand. might be interesting to see names on  
campus-wide list; compete with dorms but also campus-wide. might be excited to see top5 names  
somewhere on campus publicly, or bottom 5 if you were trying to shame people.  
animations: water droplet do the limbo...call water droplet Lil Jon, after rapper who sings that  
song "Low." dress up your water droplet to keep them on the app

### Script

After recruiting participants (with a brief overview of what we were asking them to help with), the facilitator used the following script:

"Hi! My name is \_\_\_\_\_, and I'll be facilitating today's experiment. Thanks so much for agreeing to help my project group test our first round prototype! My project group from cs147 is creating a prototype for a water usage monitoring/motivation system. We need your help to evaluate how users will interact with our app's interface. Your participation is voluntary and can be withdrawn at any time. Here is a consent form that I need you to sign. Please read it over and let me know if you have any questions. Would you like a copy for your records?"

*[Gave consent form, waited for participant to sign.]*

*[Showed participant the ipad/mobile phone]*

"Now, here's our app prototype. The interface has clickable links that will take you to other pages [*demo a link to another page*]. During this experiment, I will describe three tasks for you to complete. I will be monitoring the ease with which you complete the tasks, as well as the time taken to complete each task. After you've completed the three tasks, I will ask for feedback about our interface, design, and concept."

*[give tasks, observe/take data]*

"Do you have any feedback about this experiment? Were any aspects of the interface confusing/unclear? Do you have any suggestions for further development?"

*[record answers]*

"Thanks so much for participating and helping us with our development! Please contact us if you have any additional questions."

## Consent Form

### Consent Form

The H<sub>2</sub>OW LOW application is being produced as part of the coursework for Computer Science course CS 147 at Stanford University. Participants in experimental evaluation of the application provide data that is used to evaluate and modify the interface of H<sub>2</sub>OW LOW. Data will be collected by interview, observation and questionnaire.

Participation in this experiment is voluntary. Participants may withdraw themselves and their data at any time without fear of consequences. Concerns about the experiment may be discussed with the researchers (Veronica Cruz, Matthew Leong, Nico Cserepy, and Jane E) or with Professor James Landay, the instructor of CS 147:

James A. Landay  
CS Department  
Stanford University  
650-498-8215  
landay at cs.stanford.edu

Participant anonymity will be provided by the separate storage of names from data. Data will only be identified by participant number. No identifying information about the participants will be available to anyone except the student researchers and their supervisors/teaching staff.

I hereby acknowledge that I have been given an opportunity to ask questions about the nature of the experiment and my participation in it. I give my consent to have data collected on my behavior and opinions in relation to the H<sub>2</sub>OW LOW experiment. I also give permission for images/video of me using the application to be used in presentations or publications as long as I am not personally identifiable in the images/video. I understand I may withdraw my permission at any time.

Signed consent forms were omitted to protect the confidentiality of our participants.

## Additional Photos From User Testing

