

Sprout&About Usability Test Plan

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Maurita Hung, Shirley Long, & Colleen Tang Poy

Instructor Michael Corrin

MSC2006H

Purpose

Sprout&About is a mobile application that uses augmented reality (AR) and mobile technology to teach users about flora found in local nature park trails. Users walking within a Sprout&App-supported park can open their apps to scan 3D-printed “plant locators” that activate an augmented reality view of designated plants. The mobile app then relays information regarding that plant’s life cycle and ecological significance. Users can save plants they scan into a virtual collection and share this information with friends through social media. Although currently only a prototype within the Department of Biomedical Communications (BMC) at the University of Toronto Mississauga (UTM), Sprout&About’s short-term goals are to become a campus-wide mobile application that teaches students, faculty, and UTM visitors about the flora of the surrounding area. Eventually, Sprout&About hopes to adapt its technology for more widespread use at other institutions that want to spread ecological awareness of their local flora.

The goal of this usability test is to evaluate (i) the app navigation and app design, (ii) the augmented reality functionality, and (iii) whether the app is easy and enjoyable to use.

Problem Statements

- Can users successfully use and interact with the augmented reality viewer?
- Can users use the map to locate available Sprout&About Plant Locators (3D printed pots with a glyph)?
- Can users understand the main navigation without additional instructions?
 - Can users find more information about the plants they have scanned?
 - Can users interact with friends in the app?

User Profiles

STUDY BREAK SION (Primary Persona)

“I wish I could learn more about the plants I pass by on my study breaks”

Personality & Characteristics

- Nature lover
- Curious
- Enjoys going outside for study breaks
- Digital native (active mobile phone user)

User Goals

- Identify plants important to the UTM area
- Save the information about plants for future reference



Sion is an undergraduate Sociology student at UTM. She spends most of her time at school studying in the library by herself. When she needs a break, she likes to take walks along UTM campus trails. As a lover of nature, she often stops to admire the different flora she passes by—taking pictures of them so that she can look up more information about the plant when she gets back to campus. However, she finds that sometimes the plants are difficult to identify on her own, and the information provided by signage is not enough to satisfy her curiosity.

She wishes there was an easier way to identify, learn about, and save dynamic, up-to-date information about plants she comes across while casually walking around UTM.

ACTIVE ADVENTURER AARON (Secondary Persona)

“Gotta scan ‘em all!”

Personality & Characteristics

- Interested in “flashy” mobile technology (i.e. AR)
- Social
- Will actively search for opportunities to use the app
- Active social media user

User Goals

- Explore the UTM campus
- See AR models on his phone
- Connect with friends online and in real life



Aaron is an undergraduate Biology student at UTM who is always interested in trying out the trendiest new technologies like AR. He already uses mobile applications like Pokémon Go, but would love to use an AR app specific to UTM campus that he can use with his friends.

He hopes to use Sprout&About to see environmentally relevant AR models, save them to his phone, and share with his friends on his Instagram account. He would also like to be able to use the app to contact his friends to go exploring with him.

Methodology

A total of six participants will be recruited for the usability test; each of the two rounds of testing conducted will have three participants. Participants are considered eligible if they were a University of Toronto Mississauga student or staff member and own a personal mobile device.

All usability testing sessions will be held at the University of Toronto Mississauga at the Terrence Donnelly Health Sciences Complex on the third floor. Four people will be involved with each usability test: the participant, the moderator and two data loggers. The role of the moderator will involve reading the orientation script, reading the scripted tasks, beginning and stopping tasks, and answering questions from the participant. Data logger #1 will be responsible for transcribing what the participant says and recording qualitative information on the state of the participant (e.g. frustrated, annoyed, calm, amused, etc.). Data logger #2 will be responsible for recording the path to completion the user takes for each scripted task and timing each scripted task. Both data loggers will be recording their results within a logger form (see *Appendix B: Logger Form*) for each participant.

Prior to the usability testing session, the Android mobile phone (see *Test Environment and Equipment Requirements* for phone specifications) used will have Sprout&About V2.0 installed for the first round of testing and Sprout&About V2.1 for the second round of testing. Notifications (Whatsapp, Facebook messenger, etc.) will be turned off to remove visual elements unrelated to Sprout&About from appearing on the phone screen during testing; it will also be set on silent mode. The testing environment will be arranged and equipped as described in the *Test Environment and Equipment Requirements* section (see Figure 1).

Round 1 of Testing

For the first round of testing, the usability test will begin with the participant sitting in HSC 328. Participants will remain in the starting room until moderator has finished reading through the orientation script and has received oral consent to proceed with the test. During the usability test, participants will be asked to speak aloud their thought process, as well as have the freedom to explore the 3rd floor of the building however they wish to complete tasks. The moderator will read aloud the first scripted task and then hand the participant the phone to complete the task. The task will end if (a) the participant verbally confirms with the moderator that they think they have completed the task or (b) the moderator ends the task due to the participant spending the maximum allotted time for that specific time. The moderator will then instruct the participant to stop interacting with the phone and wait to listen to the next scripted task. This sequence repeats for all the tasks outlined in the *Task List* section. After all the scripted tasks have been completed, the participant will then be asked to provide general feedback on their experience using Sprout&About as well as any questions, comments, and suggestions they may have.

Round 2 of Testing

After four days, Sprout&About2.1 will be used for the second round of testing with the remaining three participants. The changes implemented to Sprout&About V2.0 to create Sprout&About V2.1 for this round of usability testing is detailed in *Appendix C: Changes to Sprout&About V2.0 for Sprout&About V2.1*. The usability test will begin with the participant sitting in HSC 316 and the rest of the methodology will follow as per the *Round 1 of Testing* above.

Data Analysis

Quantitative results—such as the number of completed vs. uncompleted tasks—will be graphed for analysis, whereas individual's time for completion of each task will be reported as raw data per participant but not used outside of helping the moderator determine a failure state during testing. Qualitative data (pathway to completion, user states) will be collected and deviation from ideal paths as well as key theme analysis will be employed.

Test Environment and Equipment Requirements

Usability testing will take place in the department of Biomedical Communications in the Terrence Donnelly Health Sciences Complex. The user will begin in HSC 328 for the first round of testing and in HSC 316 for the second round of testing. They will be required to remain in their respective rooms until the usability test begins. The moderator will remain to

the left of the user and follow them as they move towards the Plant Locators. Data loggers will always remain behind the user as they complete each task.

The plant pot locator will be positioned at the end of the hallway, in front of the entrance to the bridge to the Davis building. It will be placed on top of a chair.

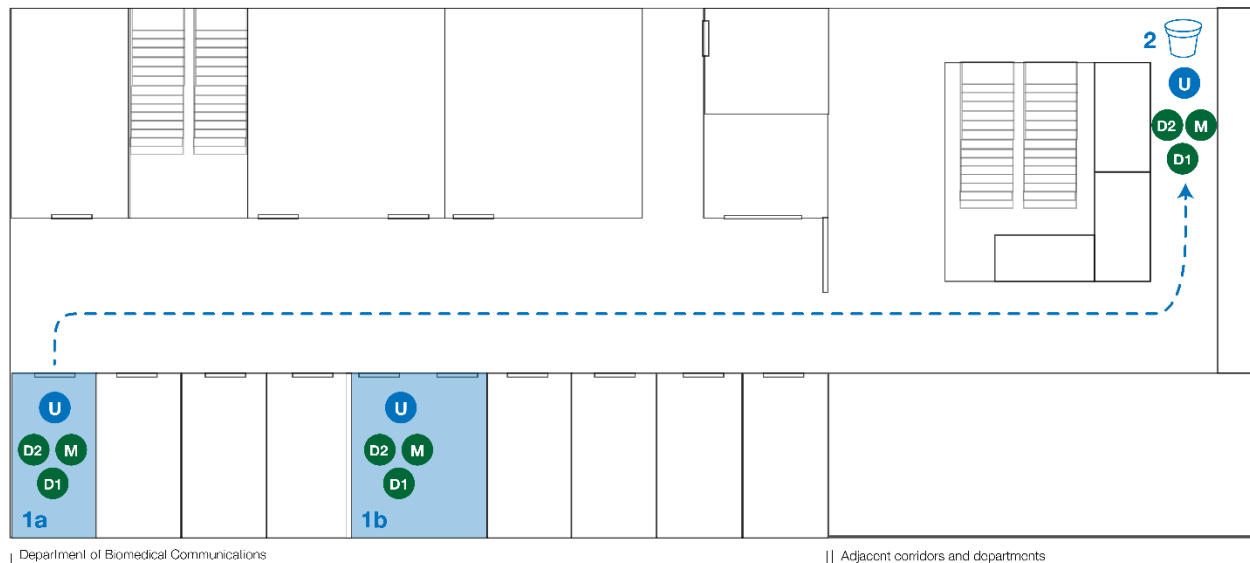


Figure 1: Testing setup. Users (U) in the first round of testing will begin in HSC328 (1a). Users in the second round of testing will begin in HSC316 (1b). Moderator (M) and data logger 2 (D2) stand near to the user during testing, while data logger 1 (D1) will stand slightly further back. Users will begin in the starting room (1a or 1b) and may move towards location 2 (entrance to bridge of Davis building) to complete task two (see *Task List*); in this case, the rest of the usability test will continue at location 2.

Equipment Requirements

- Mobile phone with Sprout&About V2.0 (testing round one) or V2.1 (testing round two) installed.
 - phone specifications: Android LG G5 Pro (4 Gb RAM, 16MP camera, display resolution of 1440 x 2560 pixels)
- Five chairs: one for each of the people involved in the usability test and one for the plant locator
- Two 10" iPadPros and Generation 1 Apple Pens for data loggers to record
- One 3D printed Sprout&About plant locators with a glyph corresponding to the White Trillium
- 1" x 2" version of White Trillium Glyph on printer paper
- Stopwatch timer

Testing Crew

1. Moderator: They will be responsible for leading the testing session; they will guide the user through the session by reading from a provided script throughout the test (Appendix A). The moderator may also stop the participant from performing tasks if they deem it necessary. The moderator should have a calm and friendly demeanour, and not provide more information prior to testing than what's indicated in the protocol. The moderator may answer questions once testing has been completed; during each scripted task, the moderator cannot provide any further instructions besides repeating the task.
2. Data logger #1: They will be responsible for transcribing what the participant say as he/she is completing the task (i.e. their thought process) and recording other qualitative measurements as mentioned in the methodology.
3. Data logger #2: They will be responsible for recording the pathway the user takes to completion for each task (number of taps/clicks that the user makes will be inferred from this data post usability testing). They will also be responsible for starting and stopping the timer and recording time measurements for each task throughout the testing process.

Evaluation Measures

For each task in this usability test, there will be two main criteria for success:

1. Reaching a certain endpoint within the application (e.g. getting to a specific page, clicking the required button, etc.):
 - a. Success: User has completed all objectives within a task.
 - b. Partial success: Completing a minimum of one subobjective or taking an unideal path to completion for specific tasks (*ideal paths outlined within results).
 - c. Failure: User has failed all objectives within a task.
2. Time for task completion, measured from the time the user begins the task to the time when the task ends (see the Methodology section for the definition of task ending):
 - a. Success: User has completed task within specific time limitation.

- b. Failure: User has exceeded allotted time, and task is considered a failure regardless of whether above objectives have been met.

Depending on the task in question, the specifics of each criterion vary. Please see *Task List* section for a detailed list of criteria for each task.

Constraints

- For certain tasks, users will operate within a time limit.
- Users will not be allowed to search the internet for any answers.
- Users will not be allowed to search the computer for any help documentation.
- Users will not be allowed to ask the moderator, data logger, or any member of the testing crew for assistance in understanding the application. Crew members may clarify questions regarding instructions and tasks, providing they do not reveal how to perform an action to the user.

Task List

Can users understand the main navigation without additional instructions?

Task 1

Completing the tutorial screens.

Start state

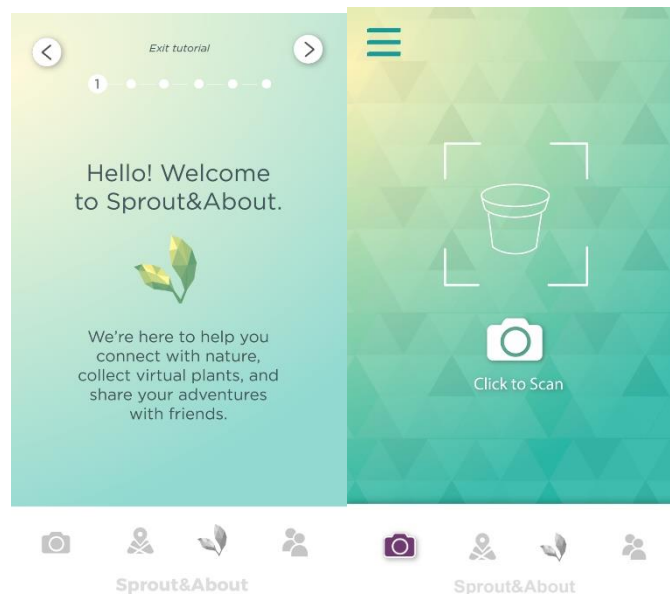
App: First screen of tutorial

User: Standing at the room entrance

Conditions for success

- User successfully completes the tutorial and lands on the home screen.
- User completes the tutorial in under two minutes.

Starting and ending screens



Script

You have just downloaded and logged into Sprout&About via social media. Begin by completing the tutorial, and verbally confirm when you are finished. Please let us know if you have any questions after completing the tutorial.

Post-task completion

Now that you have finished the tutorial, what do you think the goal of this app is and how can you achieve this?

Can users use the map to locate available Sprout&About Plant Locators (3D printed pots)? Can users successfully use and interact with the augmented reality viewer and 3D AR?

Task 2

Locating plant pots with the map function and triggering the 3D AR models to appear

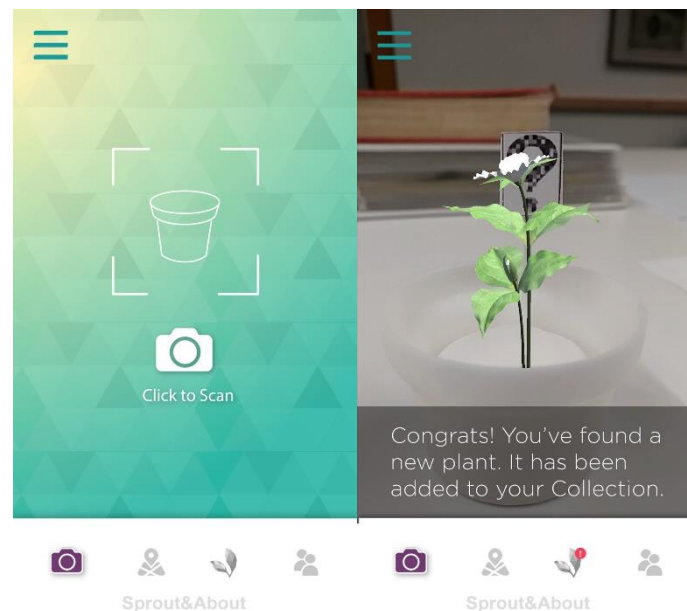
Start state

App: Home screen (Scan Mode)
User: Standing at room entrance

Conditions for success

- User successfully navigates to Map Mode and identifies where plant locators are in relation to themselves.
- Using map mode, user physically navigates to a plant locator.
- User positions device into the correct orientation and trigger the AR 3D model to appear¹.
- User completes task within five minutes.

Starting and ending screens



Script

Using the app, locate a plant that is near you right now and add it to your collection.

¹ *Due to the phone camera quality, a larger version of the glyph is provided to users if the participant cannot trigger the AR model within a minute of scanning the glyph.

Can users find further information about plants they've scanned?

Task 3

Finding plant information

Start state:

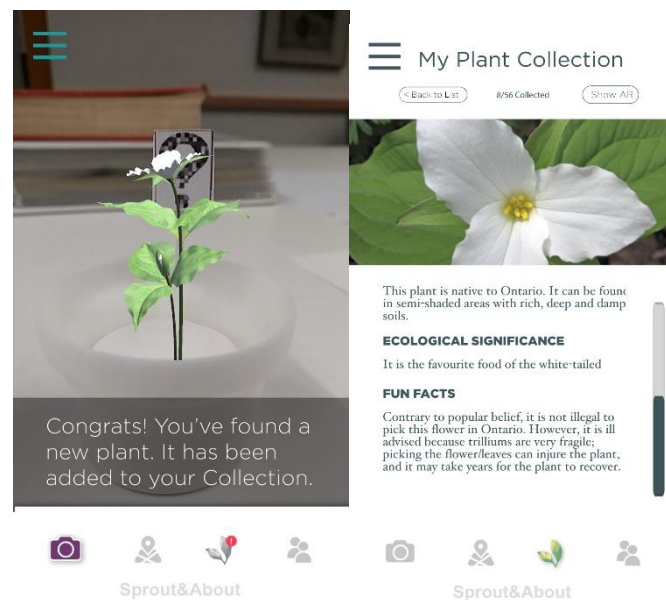
App: Camera mode (from previous task)

User: Standing in front of one of the plant pot locators

Conditions for success

- User navigates to the plant list information page and find additional information on white trilliums
- User completes the task within two minutes.

Starting and ending screens



Script

You have successfully scanned a plant model and you want to find out more information about its ecological significance. Please tell us the ecological significance of the plant you have just scanned.

Can users interact with friends in the app?

Task 4

Using the app to interact with friends

Start state:

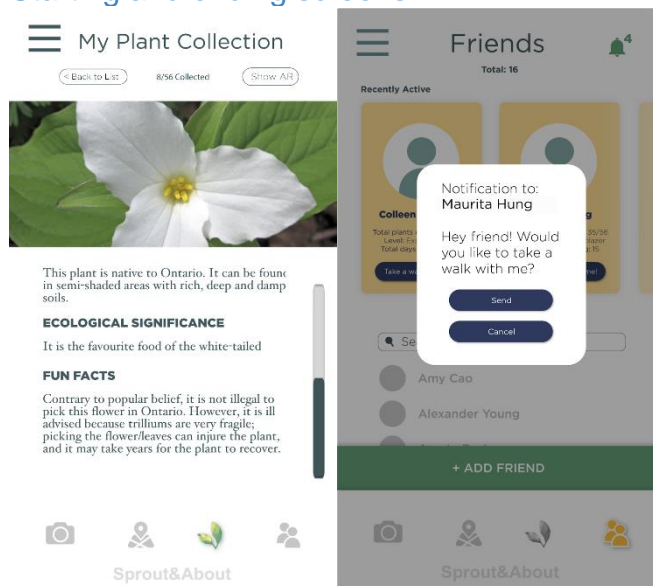
App: Plant information page for white trilliums (from previous task)

User: Standing in front of one of the plant pot locators

Conditions for success

- User navigates to Friend Mode and successfully sends a notification to Maurita Hung
- User completes task within two minutes.

Starting and ending screens



Script

You would like to take a break from working for 10 hours straight at BMC. Use the app to ask Maurita Hung to explore the UTM trails and learn about the surrounding flora with you.

Task 5

Share a plant on their social media

Start state

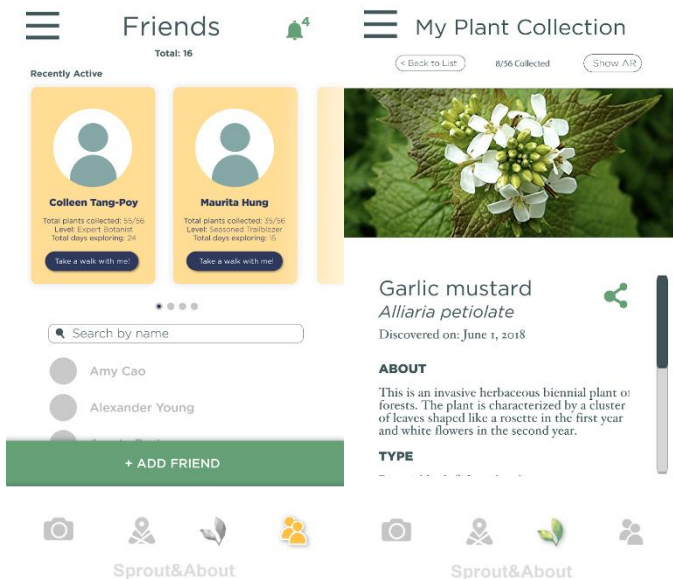
App: Friends screen (from previous task)

User: Standing in front of plant pot locator.

Conditions for success

- User attempts to click the social sharing button (the button is currently not functional so the user does not actually have to share it to social media).
- User completes task within one minute.

Starting and ending screens



Script

Now that you have collected some plants, you want to share them with your friends. Please attempt to share the garlic mustard onto your social media page.

Results

The first round of usability tests was conducted on Mar. 28, 2019 and the second round of usability tests was conducted on Apr. 1, 2019 at the Biomedical Communications Department at the University of Toronto Mississauga. Six participants were recruited to test Sprout&About.

Details of individual performance and the data log form can be found under *Appendix D: Raw Data*.

Task 1

Task Status	Round 1 (N=3)	Round 2 (N=3)	Average (N=6; round 1 + round 2)
Success	2/3 = 67%	2/3 = 67%	4/6 = 67%
Partial Success	1/3 = 33%	1/3 = 33%	1/3 = 33%
Failure	0/3 = 0%	0/3 = 0%	0/3 = 0%

Key User Themes

- Participants read most of the text on the tutorial screens
- Participants immediately try to swipe to navigate
- Participants tried to click icons in the tutorial

- Participants try to swipe to exit the tutorial before clicking the exit tutorial button, or do not exit tutorial at all
- One participant thought that the goal of the app was to scan real plants

Task 2

Task Status	Round 1 (N=3)	Round 2 (N =3)	Average (N=6; round 1 + round 2)
Success	0/3 = 0%	0/3 = 0%	0/6 = 0%
Partial Success	2/3 = 67%	1/3 = 33%	3/6 = 50%
Failure	1/3 = 33%	2/3 = 67%	3/6 = 50%

Participants (User) Path to Completion

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Ideal	To Map	To Camera					
User1	To Camera	Hamburger menu	To Map	To Camera			
User2	To Camera	To Plant List	To Camera				
User3	To Map	To Plant List	To Map	To Friends	To Camera	To Map	To Camera
User4	To Camera						
User5	To Camera	Hamburger menu	To Camera				
User6	To Camera	To Map	To Plant List	To Camera	**To Map	To Camera	
	*Deviation from ideal path	*According to ideal path					

***Toggled between camera and map as they navigated with the map

Key User Themes

- Participants start the camera first
- Participants often try to scan real life plants
- Participants have difficulty triggering the AR model using the small glyph; participants express some frustration of not having the model immediately appearing, or receiving more feedback about how they should trigger the model

Task 3

Task Status	Round 1 (N=3)	Round 2 (N =3)	Average (N=6; round 1 + round 2)
Success	2/3 = 67%	3/3 = 100%	5/6 = 83%
Partial Success	1/3 = 33%	0/3 = 0%	1/6 = 17%
Failure	0/3 = 0%	0/3 = 0%	0/6 = 0%

Participants (User) Path to Completion

	Step 1	Step 2	Step 3
Ideal	To Plant List	To White Trillium	Scroll
User1	To Plant List	To White Trillium	Scroll
User2	To Plant List	To White Clover	Scroll
User3	To Plant List	To White Trillium	Scroll
User4	To Plant List	To White Trillium	Scroll

User5	To Plant List	To White Trillium	Scroll
User6	To Plant List	To White Trillium	Scroll
	*Deviation from ideal path	*According to ideal path	

Key User Themes

- Participants notice the notification icon on the list icon
- Participants interpret the green highlight on the plant entry as an indication of the newest entry related to the recent scan
- Participants intuitively scroll through the plant information

Task 4

Task Status	Round 1 (N=3)	Round 2 (N =3)	Average (N=6; round 1 + round 2)
Success	3/3 = 100%	2/3 = 67%	5/6 = 83%
Partial Success	0/3 = 0%	1/3 = 33%	1/6 = 17%
Failure	0/3 = 0%	0/3 = 0%	0/6 = 0%

Participants (User) Path to Completion

	Step 1	Step 2	Step 3	Step 4	Step 5
Ideal	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card	Click send		
User1	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card	Send		
User2	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card	Send		
User3	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card	Send		
User4	To Map	To Plant List	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card	Send
User5	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card	Send		
User6	To Friends	Click <i>Take a Walk With Me</i> on Maurita Hung's card * (Clicked Maurita Hung's card first)	Click send		
	*Deviation from ideal path	*According to ideal path			

Key User Themes

- Participants mostly go straight to the Friend Mode of the app
- Participants express that the app design makes this a straightforward task
- Participants express that they expected this section of the app to also be a place to share things with others

Task 5

Task Status	Round 1 (N=3)	Round 2 (N=3)	Average (N=6; round 1 + round 2 / 2)
Success	3/3 = 100%	3/3 = 100%	6/6 = 100%
Partial Success	0/3 = 0%	0/3 = 0%	0/6 = 0%
Failure	0/3 = 0%	0/3 = 0%	0/6 = 0%

Key User Themes

- Participants express that the sharing button explicit and intuitive
- Participants complete this task relatively quickly

Participants (User) Path to Completion

	Step 1	Step 2	Step 3
Ideal	To Plant List	To Garlic Mustard	Share Button
User1	To Plant List	To Garlic Mustard	Share Button
User2	To Plant List	To Garlic Mustard	Share Button
User3	To Plant List	To Garlic Mustard	Share Button
User4	To Plant List	To Garlic Mustard	Share Button
User5	To Plant List	To Garlic Mustard	Share Button
User6	To Plant List	To Garlic Mustard	Share Button
	*Deviation from ideal path	*According to ideal path	

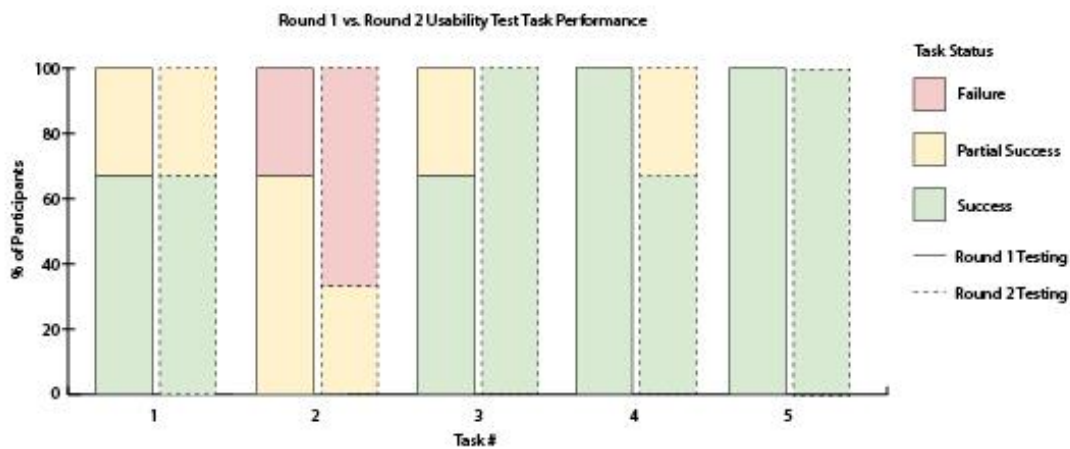


Figure 2 A bar graph comparing task performance between round one usability test participants to round two usability test participants. N = 3 each for round one and round two of tests..

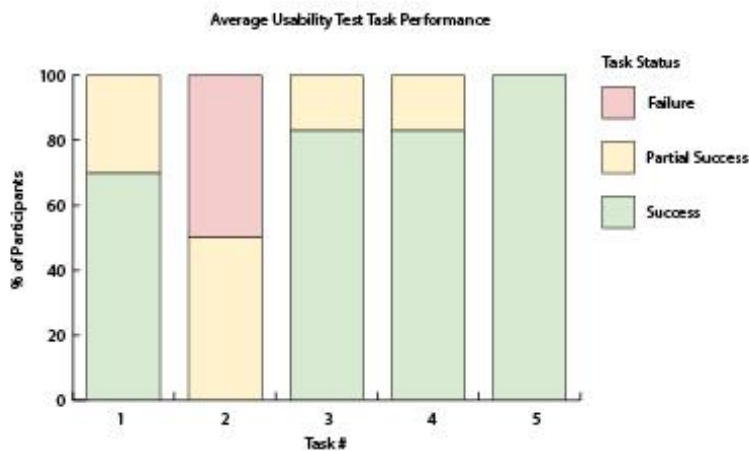


Figure 3 A bar graph displaying the proportion of the total participants (i.e. both round one and round two participants) who failed, partially succeeded, and succeeded at completing each task in the usability test; N = 6.

Discussion

Due to the small sample size for each round of usability testing, the empirical changes in performance alone between round one and round two of testing may not necessarily reflect the effect of the changes to the UI implemented between testing and must be interpreted in combination with the qualitative information collected. As such, average usability test task performance is more indicative empirically of the usability of this version of Sprout&About.

The first subtask of task 1 seeks to determine whether the UI of the on-boarding tutorial is intuitive to navigate. During round one of testing, participants alternated between using the forward and back buttons as well as the swipe functionality to navigate the tutorial screens. Though, when participants reached the last screen, most tried using the forward button to exit the tutorial or did not exit the tutorial at all. Subsequently, the buttons were removed for round two of testing to encourage participants to use the *Exit Tutorial* button instead. During round two of testing, participants still understood they could swipe through the tutorial without additional instruction, suggesting that the swipe navigation is intuitive to use. However, participants tried swiping forward to exit the tutorial before they used the *Exit Tutorial* button, or verbally confirmed with the moderator without exiting the tutorial. Thus, we believe the data shows that exiting the tutorial is not intuitive to users.

Furthermore, all participants tried clicking on the main menu buttons expecting that they would be clickable even though they are not in the tutorial; this suggests that the tutorial design indicates pliancy where there is none. While this did not impact user performance,

designing the tutorial to match user expectations more closely may enhance user experience.

The second subtask of task 1 seeks to determine if the on-boarding tutorial is effective at teaching the participant the goals of Sprout&About and how to use the app to achieve that. We believe the data shows that most users understood the goals of the app and were able to generally reiterate the functions of the app to achieve this; however, one user reported that they believed the app's functionality involved scanning real plants for identification. This indicates that the tutorial is not clear about the scanning or map functionality.

These findings corroborate with the high failure and partial success rate of task 2, which seeks to determine if the process of using Sprout&About to find a plant locator, scanning it, and adding that plant to the PlantCollection—a major app functionality—is intuitive. All users deviated from the ideal path to completion by choosing to interact with the Camera Mode first as opposed to the Map Mode to locate a plant locator. A significant number of users failed the task because they did not try navigating to other parts of the app besides Camera Mode, and many tried scanning real plants. Although, some participants discussed during debrief that they were unaware that they could leave the starting room during the usability test to complete tasks, which may have influenced them to try scanning real plants. This indicates that the scripted task/usability test plan may need further clarification for participants on the test's parameters. Despite this, we believe these observations indicate that Sprout&About's onboarding tutorial, Camera Mode, and Map Mode design do not effectively communicate their function or the context of when to use them to users.

Furthermore, participants in round one of testing who accessed Map Mode commented on the confusion of which icons represented their location and which was a plant locator. Subsequently, these icons were redesigned for round two of testing and participants who accessed Map Mode indicated that they readily understood which icon indicated their location but still showed reluctance to move towards the plant locator icon. We believe these observations show that the redesigned icons were more successful at communicating user location, but still failed to convey plant locator location.

Once participants reached the plant locator 3D model, most appeared frustrated and/or confused about how to interact with the model in order to trigger the AR model since the model did not appear within 30 seconds of scanning the glyph. Some participants noted confusion over whether they should be scanning the plant locator entirely or just the glyph. Though, when handed a larger version of the glyph, participants triggered the AR model more quickly and with greater ease. We believe this observation suggests that the plant

locator glyphs should be larger and designed such that they appear more intuitively scannable.

Task 3 targets whether accessing specific information about plants recently collected is straightforward. All participants immediately navigated to the PlantCollection section of the app, noting that they were cued by the notification symbol present. Five out of six participants continued to follow the ideal path to completion; they chose the White Trillium entry because it was the only entry highlighted and scrolled down the page to read out the target information. One participant partially succeeded the task since they read out the relevant information but for the incorrect plant entry. They indicated while speaking aloud during the task that they chose the White Clover entry to complete this task because the item was at the top of the list when sorted by most to least recent entries. Thus, the White Trillium entry was moved to the top of the list for the second round of testing. All participants in the second round of testing successfully completed the task, suggesting that the design of the PlantCollection—using both a coloured highlight and placing the recent entries at the top of the list—is successful at allowing users to search for specific information about the plants they have just collected.

Five out of six participants successfully completed task 4, which seeks to test the usability of the Friend Mode of the app. Only one participant partially succeeded at completing the task since they deviated from the idea path to completion by navigating to the Map Mode and PlantCollection before navigating to Friend Mode. However, this participant debriefed in retrospect of the task that they were unsure as to why they clicked through the other modes of the app prior to going to Friend Mode; although, this participant also admitted that specifically the wording on the tutorial screen suggested to them that the Friend Mode was for *sharing* plants with friends as opposed to interacting with them. This suggests that while the Friend Mode functionality is relatively straightforward, the tutorial could be revamped such that it more clearly indicates the Friend Mode functionality.

Additionally, one participants attempted to send a walk request by clicking the entire card for Maurita Hung instead of the button. This observation suggests that while interacting with the User Card is intuitive to send a walk request, the specific button for it on the card may be needless.

All participants successfully completed task 5, which investigates whether participants can share PlantCollection information to social media without further instruction. We believe that the data suggests that the social media sharing button is appropriate for communicating the app's sharing functionality.

Recommendations for Change

Tutorial screens	<ul style="list-style-type: none">- Design exiting the tutorial to be a more intuitive task- Make it more apparent that the menu buttons are not clickable during the tutorial- Improve the tutorial to better explain app function (especially <i>Camera</i> and <i>Map Mode</i>)
Scan Mode	<ul style="list-style-type: none">- Be more explicit on this screen what users need to scan and when they should use this mode- Encourage usage of Map Mode if the user is not in sight of a plant locator- Provide more feedback about scanning and locating plants within this mode
Map Mode	<ul style="list-style-type: none">- Design the plant locator icon to more intuitively represent the plant locator
Friend Mode	<ul style="list-style-type: none">- Increase the interactable real estate for friend cards
3D Printed Model	<ul style="list-style-type: none">- Improve glyph functionality

Appendices

Appendix A:

Orientation Script

Hello and thank you for coming in today to this usability test for the Sprout & About app! My name is [Moderator's Name], this is [Data Logger #1's Name], and [Data Logger #2's Name] and we are the development team conducting a usability test on this app.

Sprout&About is a mobile application that uses augmented reality (AR) and mobile technology to teach users about flora found in local nature park trails. Users can collect information about plants they discover using the app and share this information with friends through social media. Although currently only a prototype within the Department of Biomedical Communications (BMC) at the University of Toronto Mississauga (UTM), Sprout&About's short-term goals are to become a campus-wide mobile application that teaches students, faculty, and UTM visitors about the flora of the surrounding area. Eventually, Sprout&About hopes to adapt its technology for more widespread use at other institutions that want to spread ecological awareness of their local flora.

The purpose of this test today is to assess (i) app navigation and app design, (ii) the augmented reality functionality, and (iii) whether the app is easy and enjoyable to use. We are hoping to solicit feedback from end users to inform changes to improve user experience for Sprout & About.

At this stage, we as a team have a developed prototype android phone app that we will be conducting our testing with today. We will be using Sprout & About on the Android phone provided.

Today's test will be between 15-20 minutes. The testing will involve me asking you to complete a series of small tasks using Sprout & About. I will tell you when you can begin each task. When you believe you've completed the task, please verbally confirm with me; for example, you can say "I have completed the task." Whenever you are in the process of doing a task, please say aloud what you are thinking as you do the task. This is very helpful for our iteration process.

I may ask you to stop attempting to complete a task; if this happens, it is not a reflection of your abilities or your effort. Please stop performing that task and prepare for the next one.

If any question I ask is confusing or you have trouble remembering it, feel free to ask me to repeat the question; however, I cannot give you instructions on how to complete a task once the testing has begun.

Since there are three of us watching you use Sprout&About during today's testing, we may crowd around you to get a better vantage point of the phone. It is important to note that we are not evaluating you but Sprout & About as an app, and that if any point you feel uncomfortable to continue the test, you may leave. Do you have any questions about Sprout&About or the usability test itself?

...

Now that you have learned about Sprout&About and our usability test today, do you consent to participate in our test? ...Great! If there are no further questions, we can begin when you're ready.

Appendix B: Logger Form

User #				
Test Task	Success (Y/N/Partial)	Time (min)	Path to completion	Other observations
1. Completing the tutorial		X:XX	Action > action > ...action	[Point form notes]
2. Locating plant pots with the map function and triggering the 3D AR models to appear				
3. Finding plant information				
4. Using the app to interact with friends				
5. Sharing a plant onto their social media				
Debrief and further user comments - [Point form notes]				

Appendix C: Changes to Sprout&About V2.0 to Create Sprout&About V2.1

Four days later, Sprout&About2.1 was used for a second round of testing with three new participants. The following changes were implemented:

Tutorial screens

- Text describing the function of each button was altered.
- Photo of the 3D printed plant pot with a glyph was added to tutorial.
- Forward and back buttons were removed, "swipe to continue" was added.

Map Mode

- A person icon is now used to indicate the location of user instead of a red pin
- The Sprout&About logo is now used to indicate the location of the nearest plant instead of a question mark

- Plant screens
- White trillium was moved to the top of the plant list (in order to indicate that it was the most recently scanned plant).
 - The height of the text box on the ecological significance of white trillium was adjusted such that the text was fully legible

Appendix D: Raw Data

Testing Round 1: March 28, 2019

User 1				
Test Task	Success (Y/N/Partial)	Time (min)	Path to completion	Other observations
1. Completing the tutorial	Y	1:28	Swipe > Swipe > Swipe > Swipe > Swipe > Swipe > Exit tutorial *swiped with the button	<ul style="list-style-type: none"> - User suggests adding reminder on tutorial screen 6 to not pick plants. - Iterates app goal well.
2. Locating plant pots with the map function and triggering the 3D AR models to appear	Partial	3:56	Camera (Scan mode) > Hamburger menu > About > Map > Camera (Scan mode) > "Scanning" > "Scanning" > "Scanning"	<p>User looks around room and does not try the map functionality. Attempts to scan actual physical plants placed in room. "Is there supposed to be a pattern on these pots?" User indicates that they would like a button/something to go to when they have questions. User tries map button → opens map, sees pin and "?" icons but is confused and feels lost. User unsure what the pin and "?" mean. User finds icons on map were really small. User begins walking and understands map function now. User struggles to activate AR scanning; doesn't want to touch plant pot because of tutorial reminder/warning. Suggestion to replace "?" map icon with the same icon as the plant collection icon.</p>
3. Finding plant information	Y	0:49	Plant list > White trillium > Scrollbar	<p>User notices notification on plants, clicks into it, and selects highlighted row. User finds the scroll bar confusing/glitchy.</p>
4. Using the app to interact with friends	Y	0:21	Friends > User icon > Take a walk > Send	No further comments.
5. Sharing a plant onto their social media	Y	0:21	Plant list > Garlic Mustard > Share	User indicates that they are familiar with the social sharing icon and clicks it.
<p>Debrief and further user comments</p> <ul style="list-style-type: none"> - User thought that "plant pot" meant any generic plant pot. 				

- Found the scroll bar functionality throughout app strange.

User 2				
Test Task	Success (Y/N/partial)	Time (min)	Path to completion	Other observations
1. Completing the tutorial	Y	1:38	Swipe button > Camera > Camera > Camera > Swipe > Map > Swipe > Swipe > Swipe > Swipe > Exit tutorial *swiped with the button	User attempts to click menu buttons during tutorial; feels confused that they can't. Finally understood that it was a tutorial after clicking through several screens. Iteration of app goal: indicates that they thought they would be scanning real life plants.
2. Locating plant pots with the map function and triggering the 3D AR models to appear	N	1:30	Camera (Scan mode) > "Scanning" > Plant list > Camera (Scan mode)	User attempts to scan plants in Michael's office. User doesn't seem to read the scanning page instructions (to look for plant pot pattern).
3. Finding plant information	Partial	0:41	Plant list > White Clover > Scrollbar	User read "most recent" and clicked the plant at the top of the list, not highlighted plant. Clicked the white clover (not the trillium) and read information successfully.
4. Using the app to interact with friends	Y	0:17	Friends > User icon > Take a walk > Send	Attempts to scroll friends list.
5. Sharing a plant onto their social media	Y	0:20	Hamburger menu > Plant list > Garlic mustard > Share	No further comments.
Debrief and further user comments - No further comments.				

User 3				
Test Task	Success (Y/N/Partial)	Time (min)	Path to completion	Other observations
1. Completing the tutorial	Partial	1:47	Swipe > Camera > Swipe > Swipe > Swipe > Swipe *Swiped with finger, not the button	User wonders if they can swipe...yes they can. Clicked the camera button expecting something to happen. Stopped trying to interact with the tutorial after a few screens, once they realised that it was a tutorial. Did not exit tutorial to home screen before indicated that they were complete.
2. Locating plant pots with the map function and	Partial	4:29	Map > Tried to zoom in with fingers > ? icon >	Click map button right away → thought the red dot pin was the plant pot locator. Confused by the icons.

triggering the 3D AR models to appear			Plant list > Map > Friend > Map > Camera > Map > Camera (Scan mode) > "Scanning"	User spent a lot of time confused and asking for re-iteration of prompt.* After experimenting with orientation of phone and looking around room for a bit, user decided to walk and noticed that the red pin moved. Found plant pot locator → Read aloud "flower pot pattern"? Confusion. Had trouble triggering AR functionality. Picked up pot and tried to find another pattern.
3. Finding plant information	Y	0:35	Plant list> White trillium > Scrollbar	No further comment
4. Using the app to interact with friends	Y	0:17	Friend > User icon > Take a walk > Send	No further comment
5. Sharing a plant onto their social media	Y	0:20	Plant list > Garlic mustard > Share	No further comment
<p>Debrief and further user comments</p> <ul style="list-style-type: none"> - Likes graphical style of app. - Suggests making the "?" icon the myplant logo. - Wanted to interact with the tutorial <p>*Presence of testers that were there to reiterate prompt may have contributed to the success of this task, as user was struggling quite a bit to figure out the map functionality.</p>				

Testing Round 2: April 1, 2019

User 4				
Test Task	Success (Y/N/Partial)	Time (min)	Path to completion	Other observations
1. Completing the tutorial	Partial	0:59	Swipe (wrong direction) > Swipe > Camera > Swipe > Map > Swipe > Swipe	Did not exit tutorial before indicating that they were complete. When describing goal, indicated that they thought the goal was to identify real plants around campus.
2. Locating plant pots with the map function and triggering the 3D AR models to appear	N	1:19	Camera (Scan mode)	Attempted to scan real plants around room; did not know to look for plant pot locator.
3. Finding plant information	Y	0:59	Plant list > White trillium > Scrollbar	No further comments
4. Using the app to interact with friends	Partial	0:56	Map > Plant icon > Friends > Take a walk > Send	User thought that they could select which trails to invite friend to share first, which is why they initially clicked "map" screen first before "friends" button.
5. Sharing a plant onto	Y	0:19	Plant list > Garlic mustard	No further comments

their social media			> Share	
Debrief and further user comments <ul style="list-style-type: none"> - User thought design was intuitive and clear. - User thought they could scan any plant and did not know to look for indicator. 				

User 5

Test Task	Success (Y/N/Partial)	Time (min)	Path to completion	Other observations
1. Completing the tutorial	Y	1:00	Swipe > Swipe > Swipe > Swipe > Swipe > Exit	User indicated that "they were aware that there would be a sign they need to scan".
2. Locating plant pots with the map function and triggering the 3D AR models to appear	N	1:21	Camera (Scan mode) > Hamburger menu > Camera (Scan mode)	Tried to scan real plants around the room; did not use map/look for plant pot locators. User indicated that they thought they should be looking for a code/sign, but since they could not find one in the room, were confused and began scanning real plants in room. User tried to go back to the tutorial by accessing the hamburger menu
3. Finding plant information	Y	0:22	Plant list > White trillium > Scrollbar	No further comment
4. Using the app to interact with friends	Y	0:19	Friends > Take a walk > Send	No further comment
5. Sharing a plant onto their social media	Y	0:16	Plant list > Garlic mustard > Share	User indicated that their initial intuition was to go to the friends list to share plants, since this is associated with social sharing.

Debrief and further user comments <ul style="list-style-type: none"> - User initially thought that they should be looking for some sort of visible sign/code, but were then confused when they did not see any around them. <ul style="list-style-type: none"> - They thought the symbol (?) was not a code to scan; they believed it was just a "?" indicator and did not have significance beyond that. - They thought that the "map" functionality was more for random exploration and not for finding specific plants, hence why they did not click it when asked to find plants in task two. <ul style="list-style-type: none"> - They indicated that in the real world, they would probably never use the map function because of this; ie., they are more of the type of user that just opens the app if they see a sign/code, and would not seek to explore using the map. - User indicated that task two difficulties may have been to do with the testing itself → the way the question was phrased led them to believe that they were looking for real plants, even though they initially thought they were looking for a QR-code-like sign. 				
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User 6

Test Task	Success (Y/N/Partial)	Time (min)	Path to completion	Other observations
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	Partial)			
1. Completing the tutorial	Y	1:04	Swipe > Camera > Swipe > Swipe > Swipe > Swipe > Exit tutorial	User attempted to interact with buttons in tutorial before realising that they couldn't in tutorial mode.
2. Locating plant pots with the map function and triggering the 3D AR models to appear	Partial	3:17	Camera (Scan mode) > Map > Plant list > Camera (Scan mode) > Map > camera > Map > Camera > Map > Camera (Scan mode)	Used the scanning mode screen to look around area → user expected to see a “flower pot pattern” or other visual indicator within the scanning mode screen. After looking around area with camera to no avail, user clicked the map and realised that there was a plant pot locator at another location. User was a bit confused by map orientation. When scanning the plant pot locator, she tried to position the entire pot within the camera frame because the instructions had an image of a whole pot.
3. Finding plant information	Y	0:35	Plant list > white trillium > Scrollbar	No further comment.
4. Using the app to interact with friends	Y	0:26	Friends > Yellow card > Take a walk > Send	Tried tapping yellow box first.
5. Sharing a plant onto their social media	Y	0:20	Plant list > Garlic mustard > Scrollbar > Share	No further comment.
Debrief and further user comments <ul style="list-style-type: none"> - Enjoyed design/thought it was elegant. - When trying to find plants near her, she did not know what she was looking for/what to expect. There was an image of a plant pot on the tutorial screen, so she expected an AR location marker to appear in camera. <ul style="list-style-type: none"> - When probed further, user indicated that they did not think/would not have thought to begin scanning real live plants. - When scanning plants/trying to find a plant to scan, user was expecting visual cues to appear on camera/“live” as she moved and used the camera to explore her surroundings. This is because of Pokemon GO, as there is physical feedback in map/camera mode that prompts users to move towards pokemon, and she was expecting something similar for this app. 				