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Ted L. (management, development)
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LowFi Testing: The Atom Map

Introduction

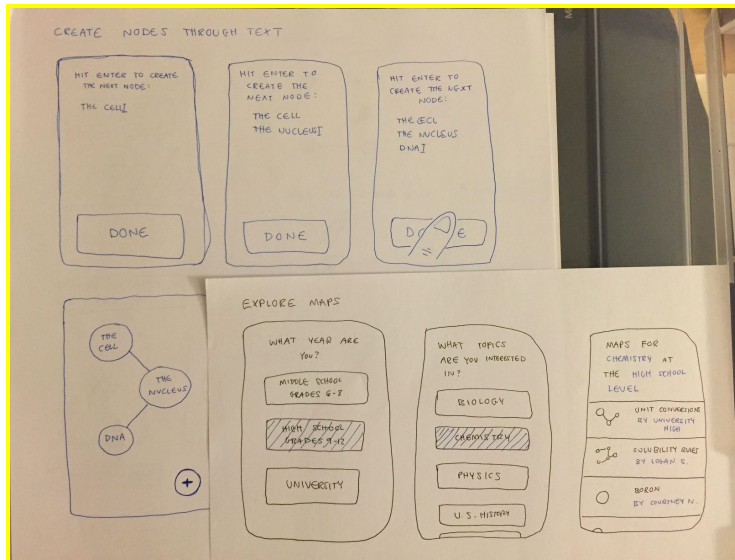
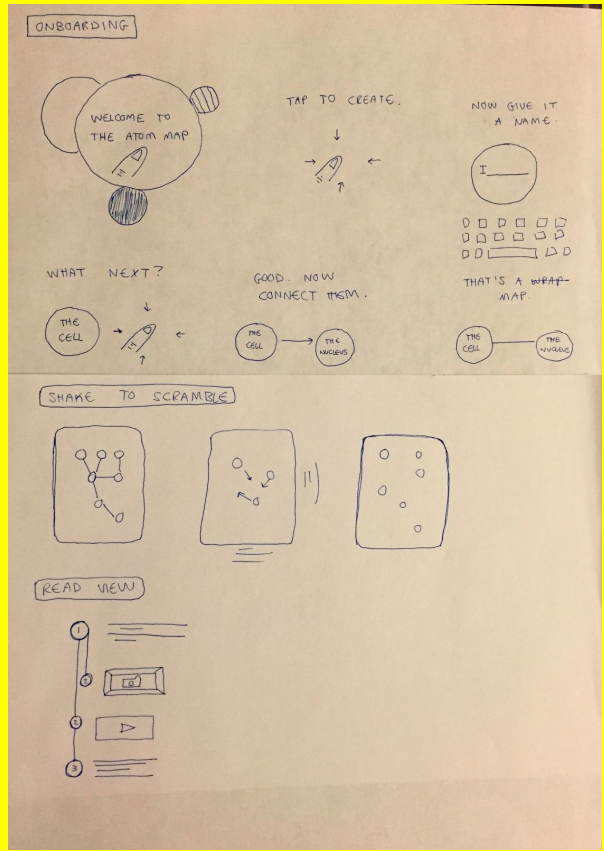
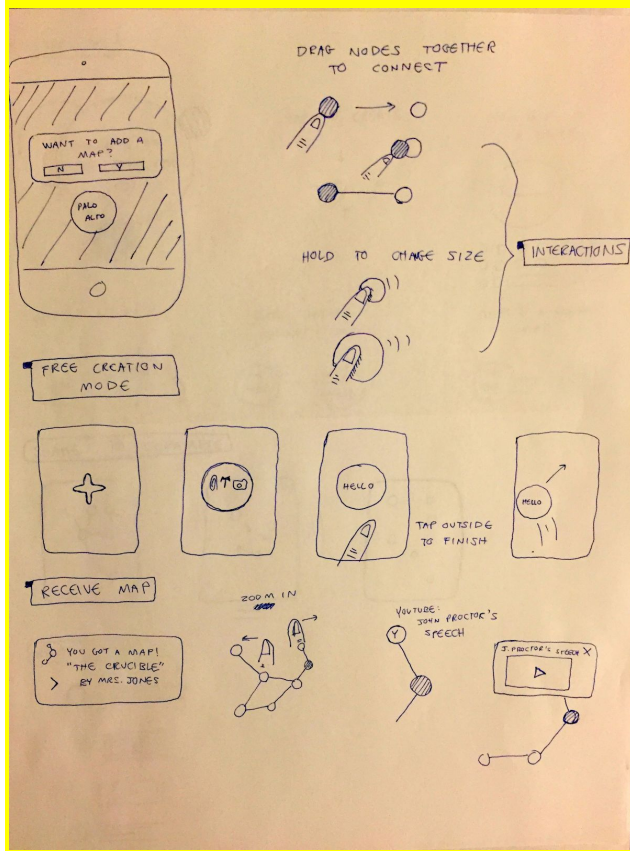
The Atom Map is a visual, mobile workspace that allows you to create connections between written concepts, images, and other resources like never before. Learning today is scattered across PDFs, course websites, handwritten notes, and Powerpoints -- the Atom Map differentiates itself from the other creative tools of today by being content agnostic. By focusing on the need for flexibility, the Atom Map allows users to pull together all the resources that are most important for learning and synthesis.

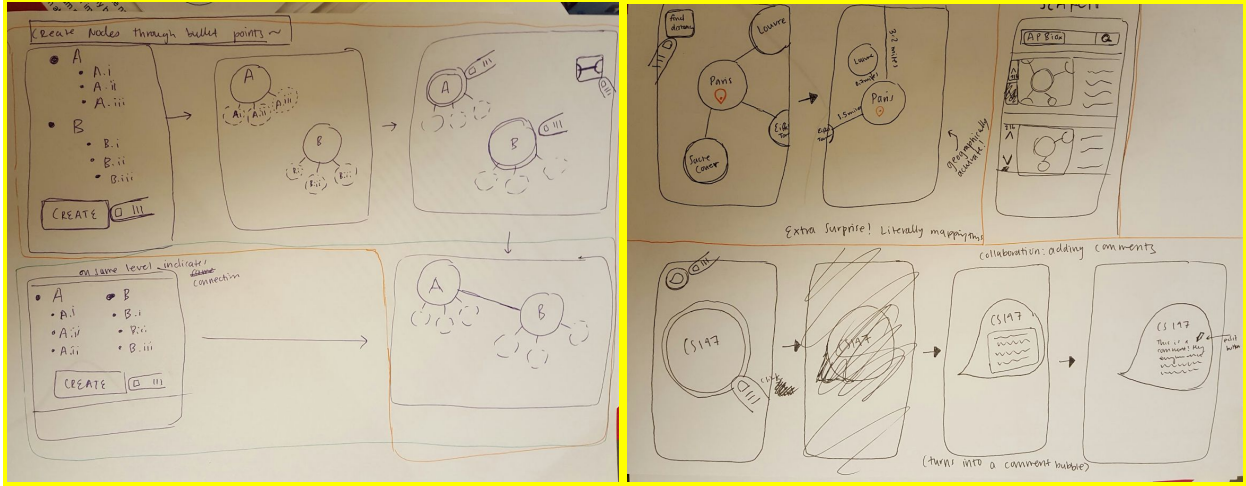
Sketches

Our biggest challenge in designing the interface for the Atom Map was thinking about how we can make this *better* than drawing a conceptual map on paper. Some driving concerns we had:

- We need to make it easy to integrate different content types (photos, videos, PDFs, plain text, etc.) -- teachers from Bellarmine noted this as a limitation of their current tools.
- We need to make it easy to collaborate -- the creation of these maps was very collaborative and conversational during our early concept testing with Bellarmine English students.
- We need to make it easy to review -- if this is really some kind of study or information storage tool, you need to be able to get a lot out of looking at it fairly quickly.

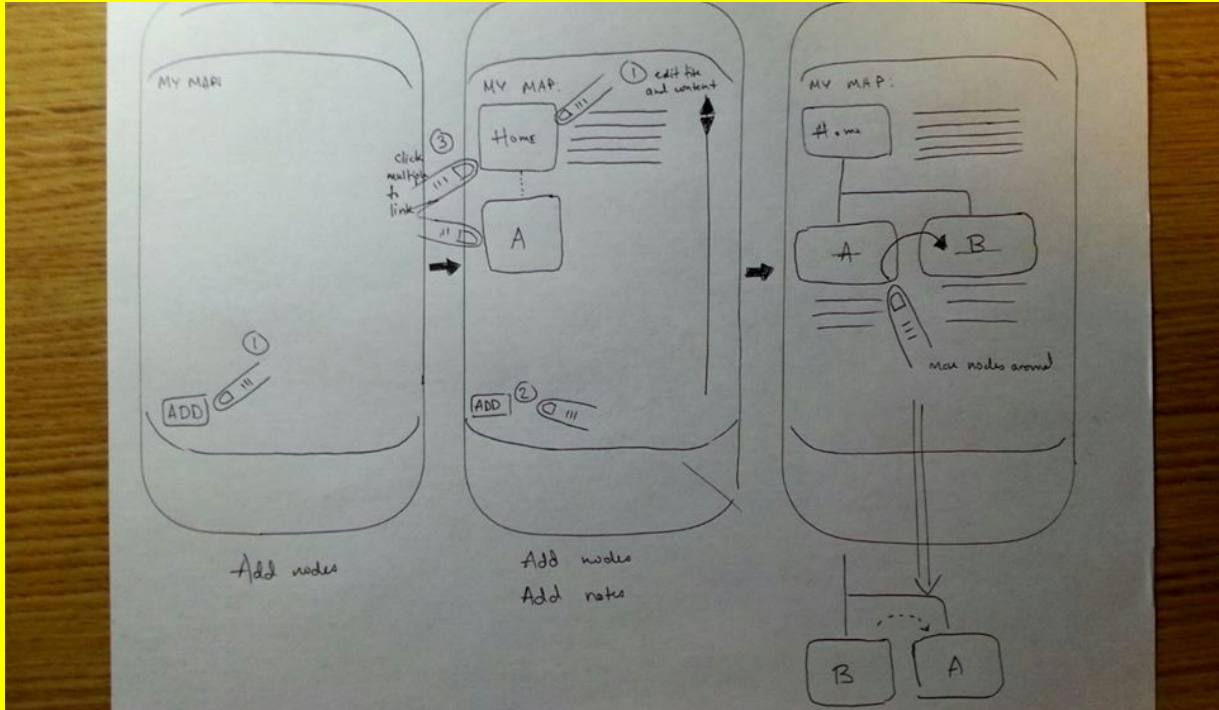
Figure 1: A sampling of our 15-20 sketches

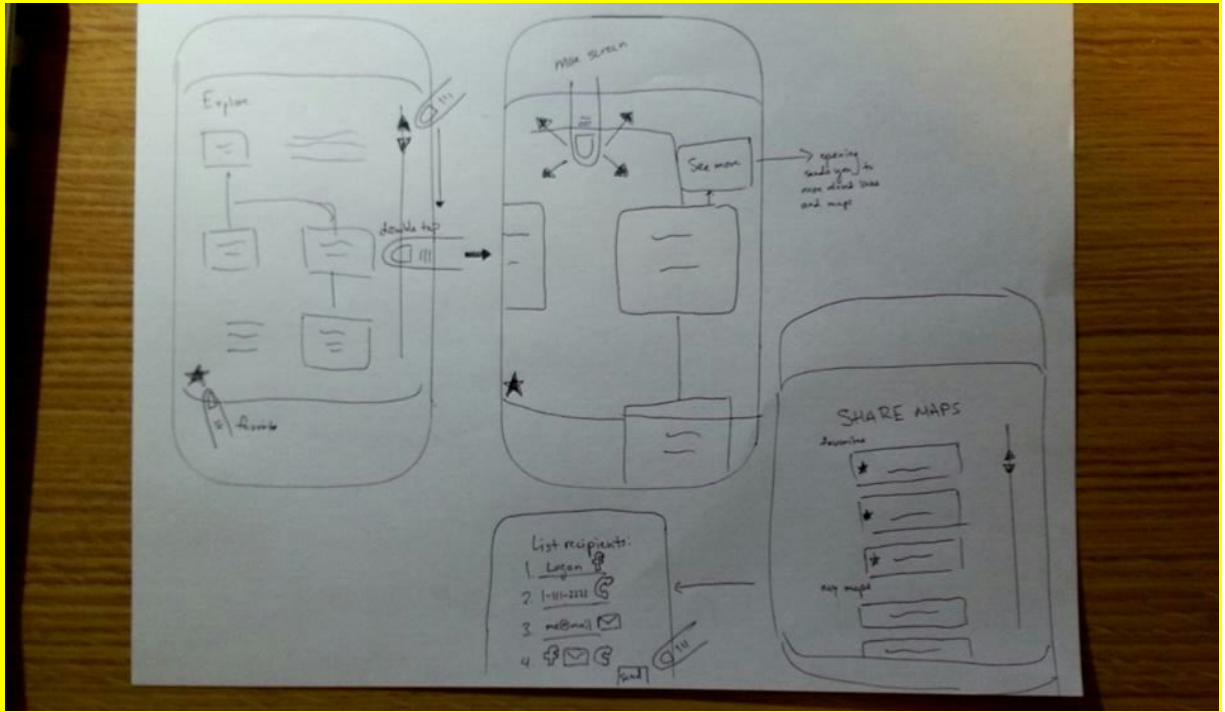




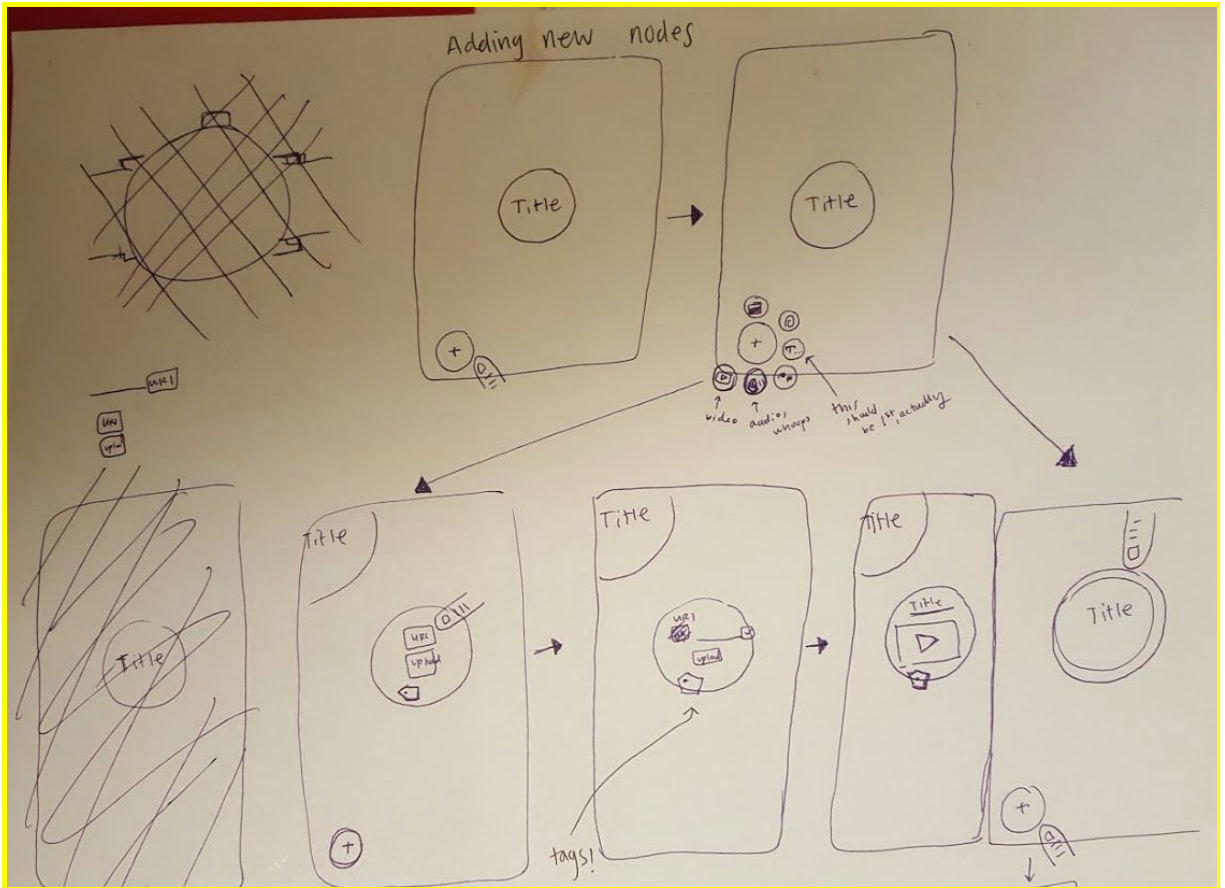
We chose two design directions that we thought were promising, tentatively calling them “node view” and “read view.”

Read View:





Node View:



'Node view' is all about the possible interactions -- dragging nodes together to show connections or shaking the device to rearrange them and reconsider. 'Read view' allows users to zoom in on certain parts of the map and review connections in more detail.

Selected Interface Design

We decided to move forward with the "Node View" for our interface design because it facilitated more intuitive creation than "Read View." It takes fewer taps to add and connect nodes, which is the fundamental interaction. In addition, "Node View" seemed more tailored toward collaborative creation of maps. "List View" felt very static - it would be difficult to rearrange and add new nodes and content (especially with multiple people) given the limitations of the structure of the map: it only has up/down scrolling and a lot of text. "Node View," on the other hand, has a dynamic interface that allows users to scan around wherever they are interested - making changes is cleaner and easier in the larger space, and people can work on their own sub-categories freely and combine them quickly. Ultimately, we prioritized the areas that our users valued the most: flexibility, speed, and collaboration.

A primary focus of our design is that using The Atom Map remains simple and intuitive enough to act as an alternative to creating a map by hand. The first task in our prototype was to test whether our design achieves this - the user arrives at the "Create" tab and is instructed to create a map about a topic of their choosing (*Fig. 2a*).

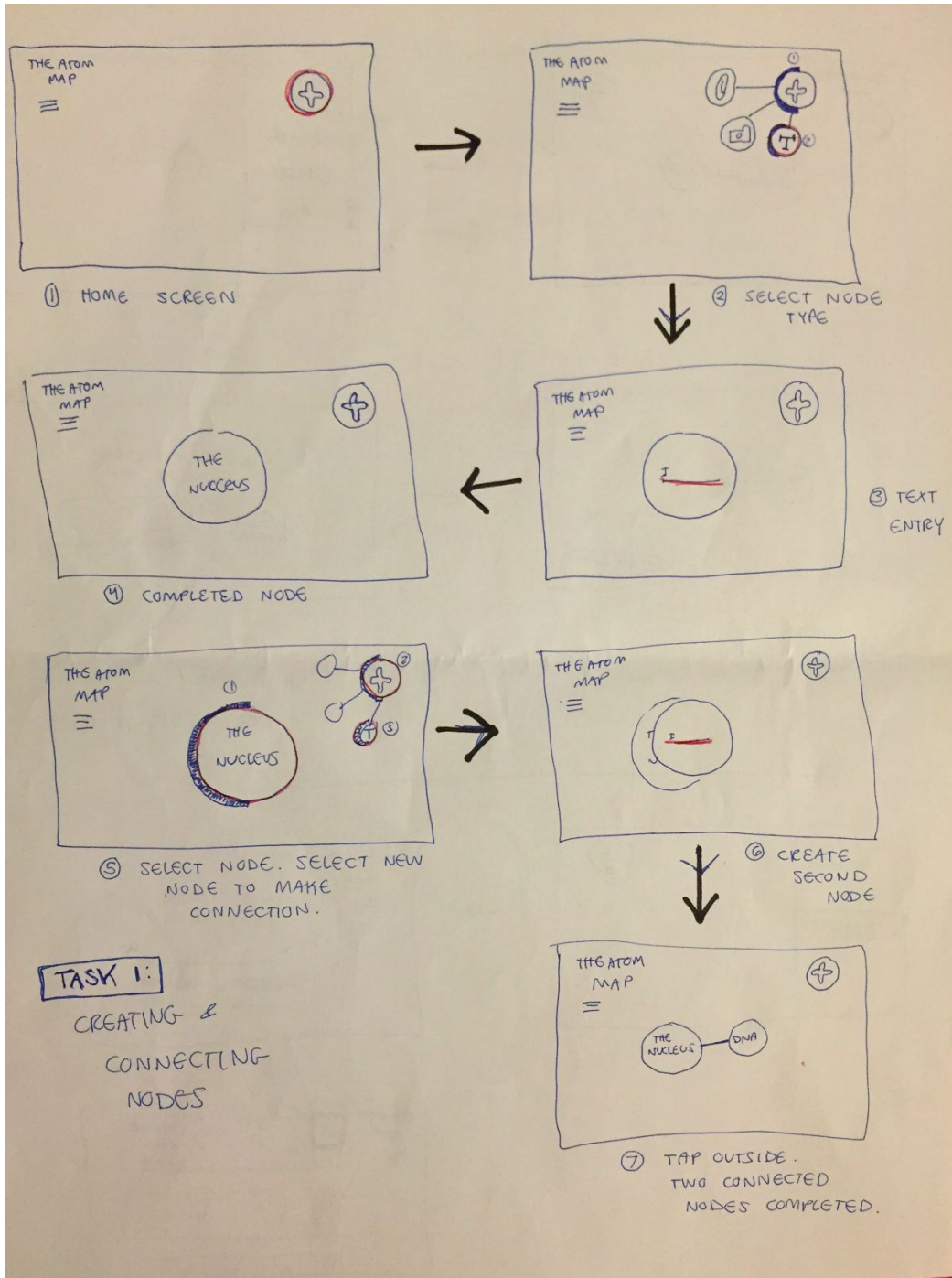


Figure 2a: Task flow for the creation of a concept map

The Atom Map also needs to allow for convenient and useful exploration of maps created by other users. The goal of our second prototype task is to test whether our design properly addresses this use case (Fig 2b).

TASK 2: EXPLORE OTHER MAPS

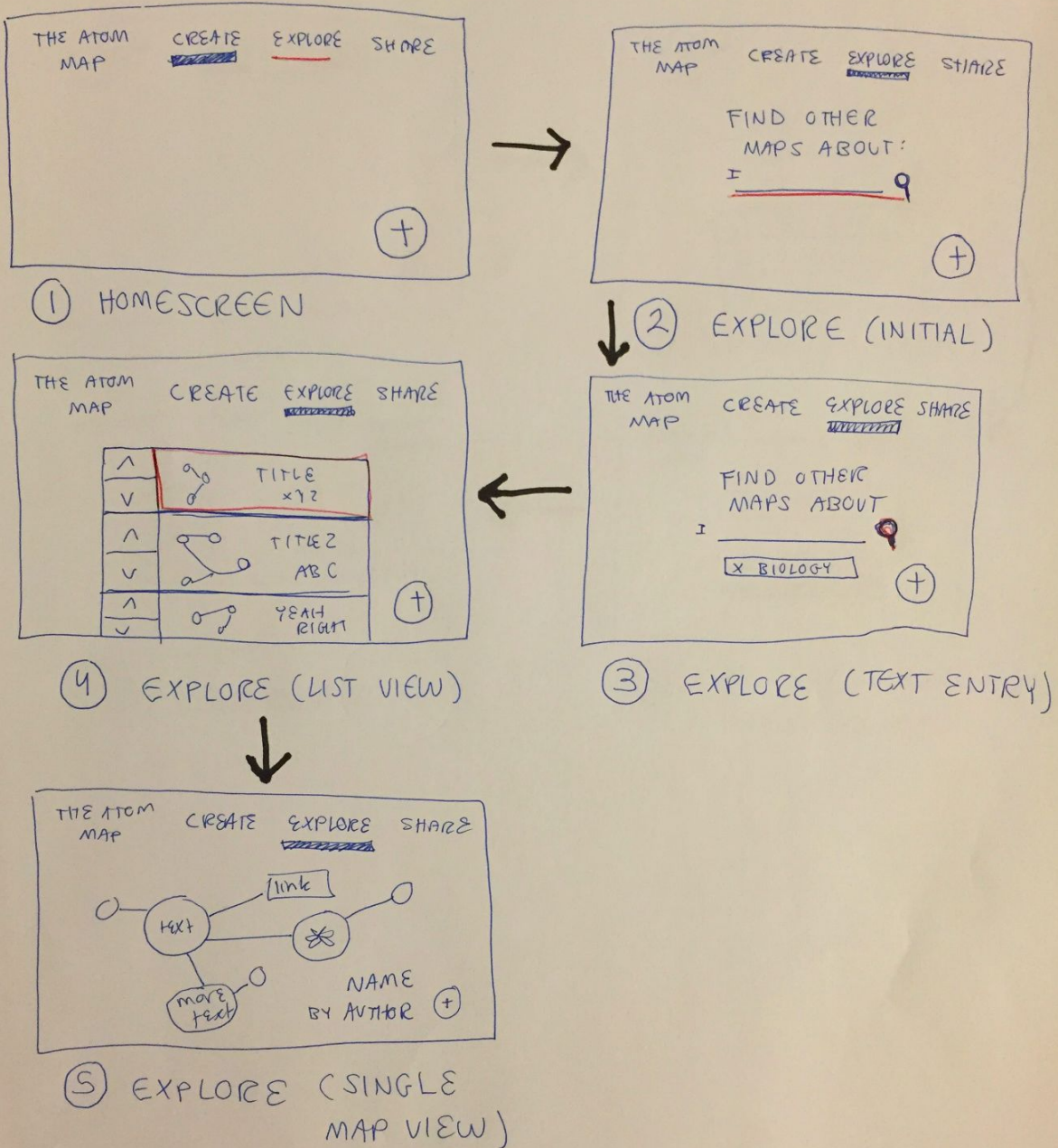


Figure 2b: Task flow for the exploration of maps created by other users

Our final prototype task tests the sharing interface to make sure that a user can easily share a map with other users. Since sharing maps is integral to the use of the app for collaboration, this feature needs to be intuitive and lightweight (Fig 2c).

TASK 3: SHARE RECENT MAPS

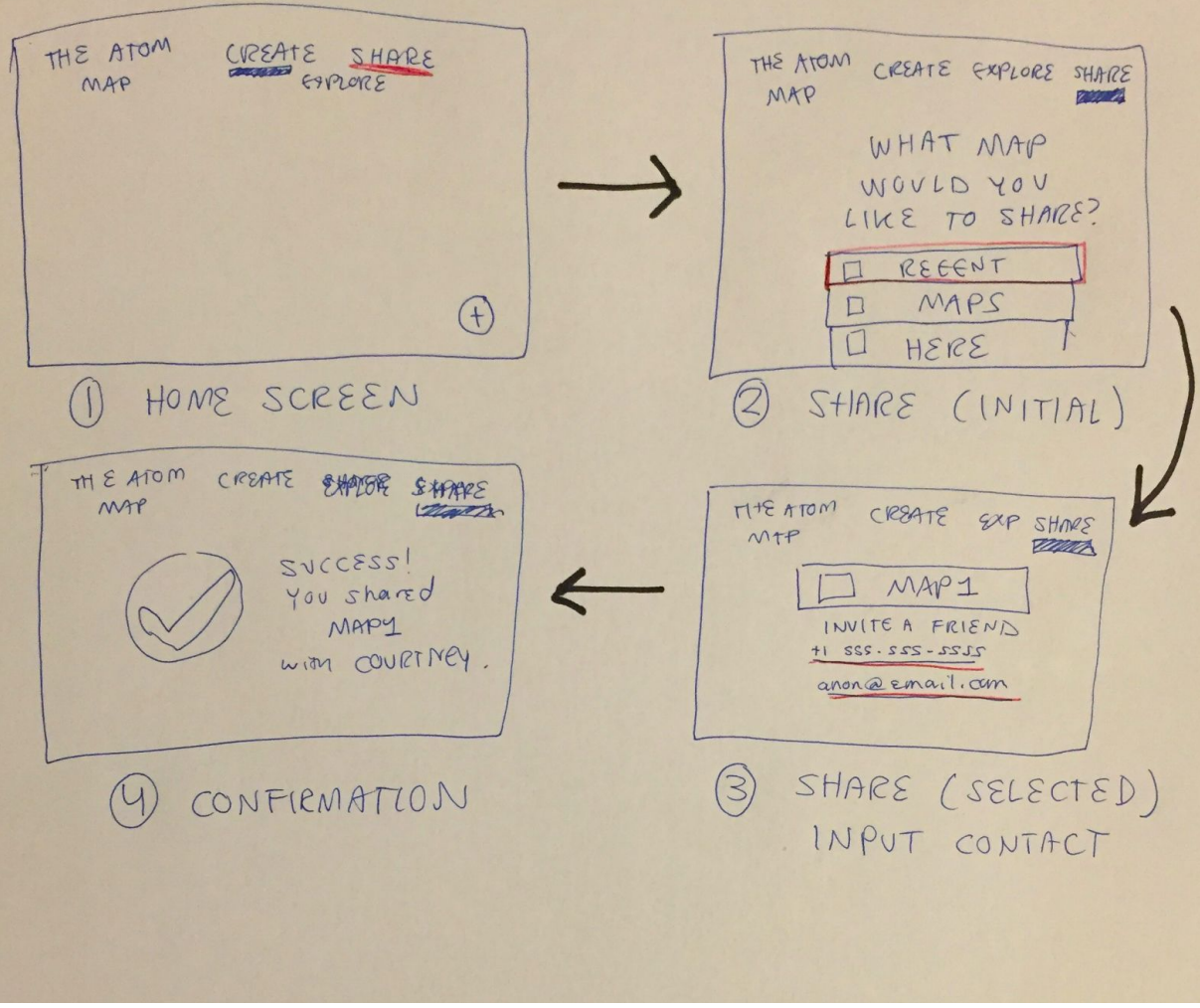
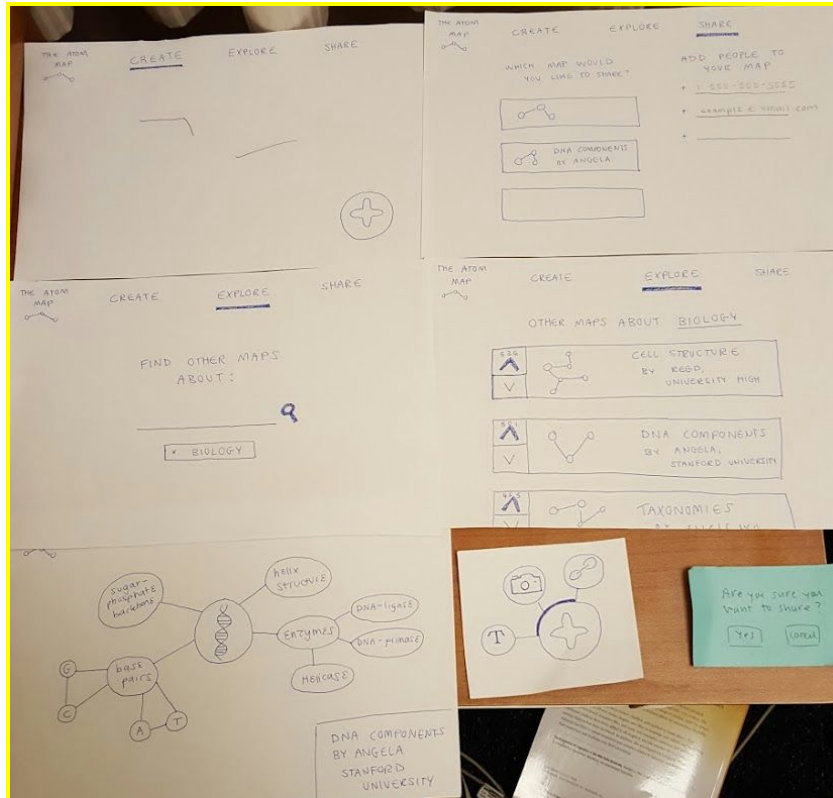


Figure 2c: Task flow for the sharing of a map with other users

Prototype



The first task of our low fidelity paper prototype revolves around the creation of a concept map using the “Create” tab. The default “Create” tab is almost blank save for a large plus figure in the lower right corner (*Fig. 3a*). Tapping this plus figure brings up another menu with tabs for creating text, image, or hyperlink based nodes (*Fig. 3b*). Tapping one of these buttons prompts a sticky note (representing a node) to be placed in the “Create” tab. The user can position this note however they choose and write information on the note. Dragging out a line between two nodes makes a connection between the notes (*Fig 3c*).

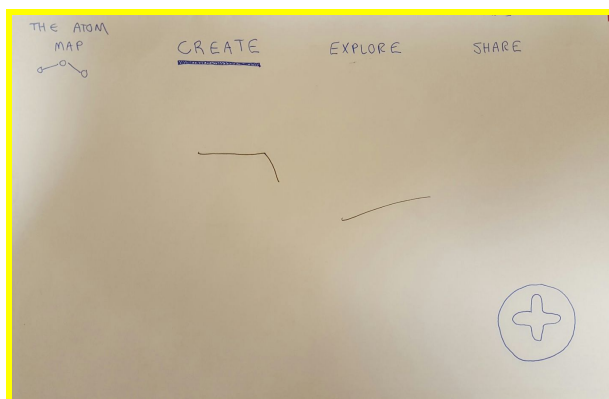


Figure 3a: Default “Create” tab screen

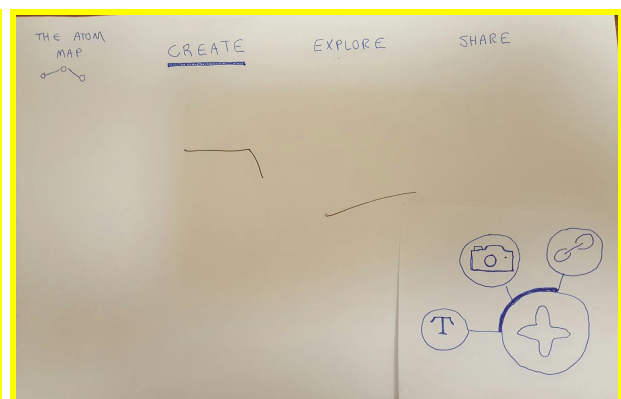


Figure 3b: “Create” tab screen with create menu open

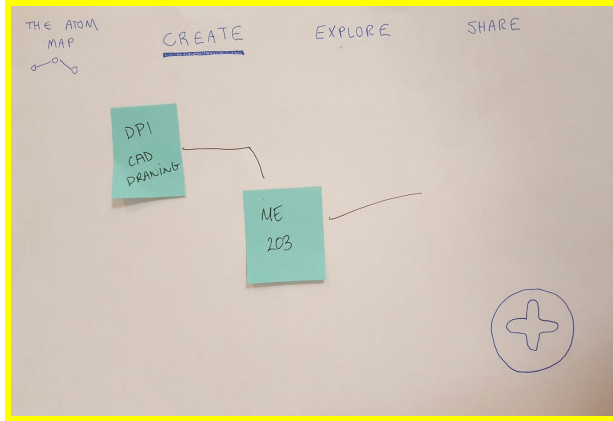


Figure 3c: "Create" tab with nodes and connections

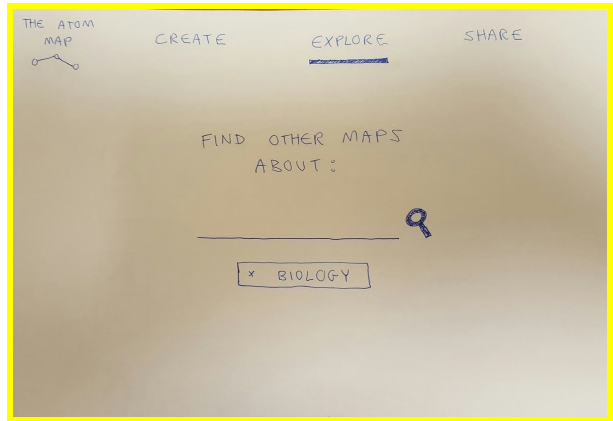


Figure 3d: Default "Explore" tab screen

In the second task, the "Explore" tab is used to simulate searching for and examining a map made by another user. Tapping the "Explore" tab in the bar at the top of the interface brings the user to the "Explore" screen which features a search bar and suggested topics (Fig. 3d). For the purposes of our prototype we assume that the user searches for the keyword "Biology". This brings up a screen displaying relevant maps and their community based ratings (Fig. 3e). Selecting one of these maps brings the user to an interface displaying the map (Fig. 3f). At this point subjects were asked what kind of interactions they expected to be able to perform with the displayed map.

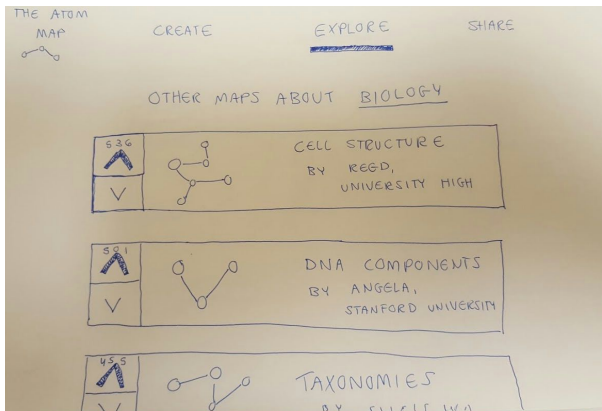


Figure 3e: "Explore" tab with "Biology" searched

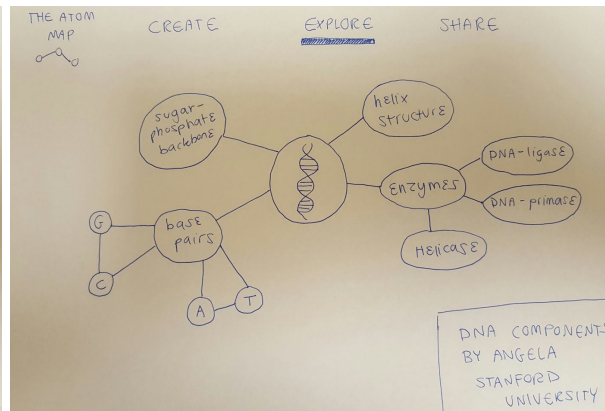


Figure 3f: "Explore" tab with another map open

The final task of our prototype was to utilize the "Share" tab to share a map with another user. Tapping the "Share" tab at the top of the interface generates a display containing a list of user created and recently viewed maps. This display also contains editable fields on the right that allow the user to specify whom to share a map with (Fig. 3g). Tapping a map in the list highlights it, indicating selection. Tapping the same map again brings up a menu allowing a user to confirm the sharing of the map (Fig 3h).

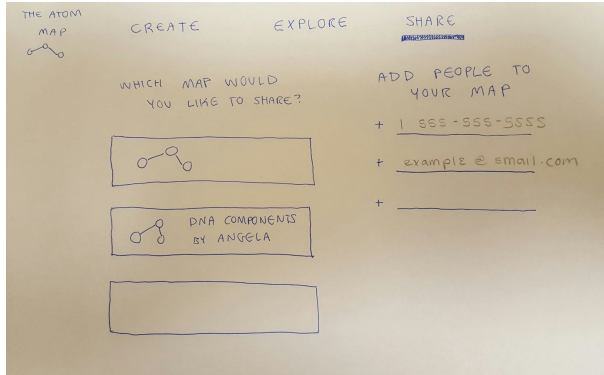


Figure 3g: "Share" tab after viewing another map

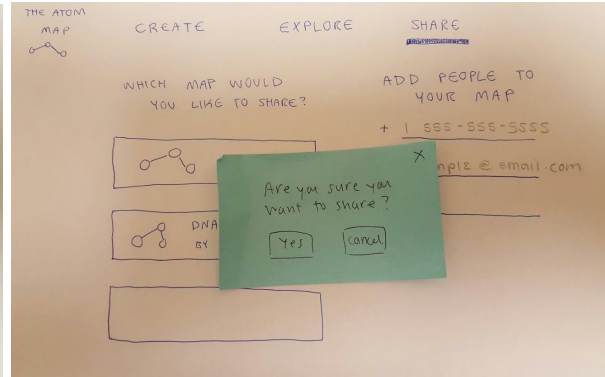


Figure 3h: "Share" tab after selecting a map to share

Methods

Participants and Environment

Focusing on the education use case, we recruited three Stanford students studying Product Design, Human Biology, and Chemistry. We found our subjects by searching for students studying in the various lounges in the Mirrielees housing complex, and enticing them with cherry turnovers. All subjects were tested sitting down in their study area as the environment, which aligns well with the education use case of our application.

Tasks

1. Create a concept map for (user's class). This was the most difficult of our tasks. It begins with a blank screen, on which the user adds nodes of different kinds (text, camera, hyperlink) and connects nodes to create a concept map.
2. Explore other maps for Biology. This was our moderate task. This task involved searching for other maps through our search system, as well as watching how users interacted with already-created maps.
3. Share a map you've either found or created. This was our easiest task, which involved selecting a map to share and inputting a phone number or email to share the map.

Procedure

For all experiments, our paper prototypes were used. Before the user test, the facilitator explained the purpose of our app, mentioned that it was an iPad app, attained all consents, and framed the testing within the subjects' own lives, asking what class the subject was currently studying for, and using that class in the testing (details in script, located in the Appendix). Before each task, the facilitator gave a description of the task and reminded the subject to think aloud. Ted/Courtney acted as facilitators, Logan acted as the computer, and Courtney/Emma took notes.

Test Measures

Our main goal is to have a product that is intuitive to use and has only the functionalities needed; we didn't want to get caught up in adding unnecessary features within our application.

To assess the level of completion, we used the following criteria:

1. **Number of major errors.** This allowed us to identify design flaws, which indicated that our product was not intuitive.
2. **Attempts at doing something new.** This allowed us to identify when users wanted a feature that we did not already have in our application, which shows us which features to add.
3. **Which features were used more/less than expected.** On the same vein as #2, this allowed us to identify when users did not care for certain features in our application, demonstrating that we should cut certain features.

Results

Participant 1

This subject clicked to add 5 nodes without putting in text. "These are subtopics of this main topic." He wanted to link the nodes (after having added these 5 nodes), and after linking these nodes, wanted to put in the text. However, the subject was confused by the linking process! He mentioned that he wanted to add a line before adding the connected node. While exploring maps, he did not use the upvotes/downvotes feature. The subject double tapped several of the bubbles and made a "zoom" motion. The subject wanted to edit the given map and wanted to interact with the map, but stated that he shouldn't be able to edit other people's maps. He had no particular difficulty sharing the map to a friend and used an email to do so. The subject also mentioned that he "likes writing to study" when we asked for overall feedback, comments, and questions.

Major Errors: 1 (Linking)

New Ideas: Making lines before nodes. Zooming in.

Used Less: Add Picture. Hyperlink. Voting



Participant 2

This subject seemed confused at our “Create” tab; it seemed that Material Design principles were not something familiar to him, particularly the “+” button. He asked how to even get started, and he took a while to make any actions. After some guidance, he added a node, filled it out, added another node, filled that out, and then attempted to connect the two notes. While connecting, he hesitated at the hyperlink button, and then attempted to use the button to connect the two nodes. While exploring and looking at new maps, this subject also did not seem to take notice of the upvote/downvote feature. He clicked on the map, zoomed in by spreading two fingers, and tried clicking on different nodes. He was especially looking for dates and different links, and he wanted to be able to trace through these. When sharing his map, the subject seemed hesitant to input a phone number; he said that it would be cool to share to Facebook instead.

Major Errors: 2 (Making Nodes, Linking)

New Ideas: Zooming in. Trace through nodes by clicking.

Used Less: Add Picture. Hyperlink. Voting.



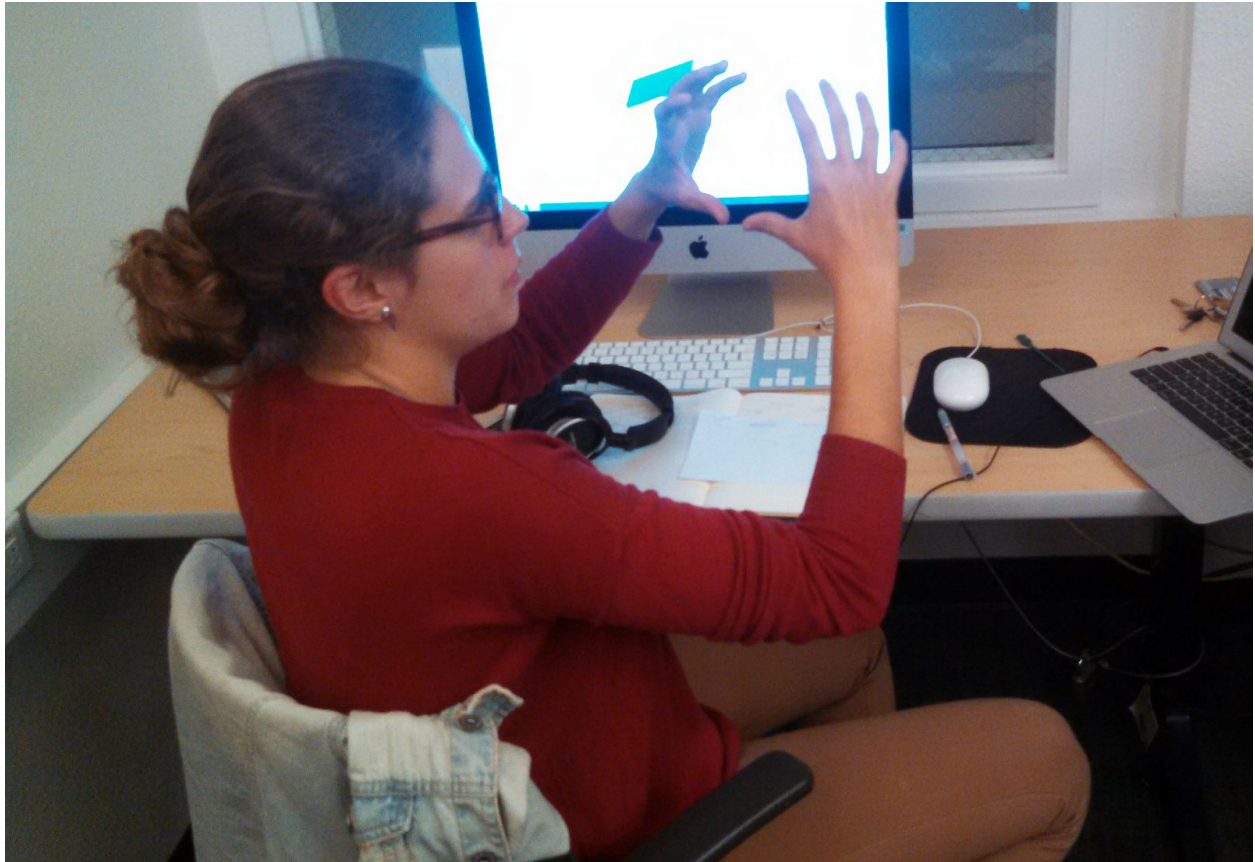
Participant 3:

This subject was also uncertain how to connect two nodes. She first put a main node, wrote something, looked for a way to add a line, and, not being able to find one, added another node. After having two nodes on the screen, she looked again for a way to connect the nodes and also used the hyperlink function. She stated that it would be cool to be able to have an outline with small dots on the nodes and drag a line from there, and that she'd like to change the shape of the line. While exploring maps, she mentioned that the up and down votes were like Yik Yak and that she "always goes with the one with the most votes, so I'll go with the first one." Like the other subjects, she zoomed in by spreading two fingers, and mentioned that "if this was by a person in my class, I'd want to add a comment, saying something like 'I think you should add this'." She also mentioned that she'd "like to copy this map and then I'd be able to edit that without invading in their space." Finally, while sharing her map, she also used an email instead of a phone number, although it took her a while. Afterwards, she mentioned that she "likes having [her] own handwriting on things -- the whole point of my making maps is seeing [her] handwriting."

Major Errors: 1 (Linking)

New Ideas: Handwriting. More line shapes. Add comments.

Used Less: Hyperlink.



Discussion

For everyone, linking nodes was ambiguous. Each attempted to use the hyperlink tool.

Two of the three participants wanted to be able to add a line before adding a second bubble, and wanted to draw the line by using the touch screen (one also wanted to change the shape of the line).

The difficulties for linking nodes is partially due to the static feel of paper prototyping, which makes testing draggable components difficult. However, it shows that we may need a tutorial or that we should add a more intuitive way to link, such as another button. Further testing should be done to determine the optimal way to link two nodes easily, given the different approaches on how people created maps.

The wish for participants to be able to write indicates that being able to use a stylus while making nodes would be valuable; the ability to take a picture of your notes or handwriting and upload that did not fulfill the needs of the users.

Participants mentioning the desire to interact and edit other people's maps without invading their space highlights the need to copy someone's map and interact with it as their own map.

One of the participants attempted to double tap on a bubble for more information. The map we presented was a high level representation of a map, and it did not have extra information "stored" with each bubble, but that interaction gives us potential for further functionality of notes - similar to flashcards. It also sparked a conversation about if hyperlink nodes should be tested - the flow for a link may be too interruptive to studying.

One participant mentioned that they "always go with the one with the most votes" indicating that having an upvote/downvote allows our users to pick popular/highly rated maps easily. While this is useful for users who want to get quick information, it may limit the diversity of maps that people visit and discourage exploration, so we may need to implement a way to encourage users to discover different maps.

Adding the ability to find maps by searching for classes or connecting users with other students in the university and their classes seemed useful to those who commented that they would be looking for maps made by their friends in the same class.

Although the participants had no trouble sharing maps, we noted that because "share" is on a different screen, instead of being in a pop up, there should be a way to "favorite" explored maps, so a user can access these maps to share, instead only sharing recently viewed maps or your own creations. We noted that no one used a phone number to share their creation; this may indicate a need to remove phone numbers and focus on sharing through email, social media, or to create a "friending" system.

Final Word Count: 2491

Appendices

(Summary) Raw Notes From User Testing:

Participant 1

Clicked add nodes (and put a bunch of them) without putting in text -- "These are subtopics of this main topic" -- and then wanted to link and then put in text (had the idea first?)

- was confused of how to link them!! it was very difficult for people to figure this out (dragging one to the other)

- add a line before the bubbles (!!! interesting)
- while exploring maps -- he wants to be able to edit them (double tap bubbles, drag and rearrange) -- nice to be able to interact with a given map himself
- so we should add something so that people can “copy” a map

while sharing maps -- everything looked good

“i like writing to study” -- ADD A WRITING FUNCTIONALITY?!?!?! YOU CAN WRITE IN THE NODES

Participant 2

A bit confused at the home screen -- what does “+” mean
 also confused about the hyperlink again!!!! → thought that it was for linking two nodes versus inserting that type of content
 selecting nodes and pinch/zoom seem intuitive

when exploring and looking at a new map:

- click on it, get dates and look at all the links

Participant 3:

- linking should be from each node (a line from each)
- would want to be able to make the shape of the line (drag it)

up and down votes are kinda like yik yak

“i always go with the one with the most votes, so i’ll go with the first one”

zoom in (pinches with two fingers)

“if this is a person in my class, i’d want to add a comment” “I think you should add this” “i’d like to copy this map and then i’d be able to edit that without invading in their space”

“I like having my own handwriting on things” -- “the whole point of my making maps is seeing my handwriting” -- making an option for text and notes

User Testing Heuristics:

Problem	Severity	Possible Fix	Task #
Could not link two nodes together	4	Add a linking button above the + button (and	1

		facilitate both actions); show a short tutorial	
Double clicking node did not bring up additional information	2	Add ability to double click and have more information appear	2
No upload button/ability to attach images from web	3	Add upload button/ability to attach images from web	1
Functionality of create hyperlink node button is not intuitive	2	Have small subtitles for each task or add a mini-tutorial. Can also have a (?) button	1
Can't keep track of best/favorite maps that they've made or found	2	Add a favorite button and an easy way to access all favorited maps	2
A lot of the actions are simple and easy to remember, but not too easy to guess on your own	3	Add a few pictures (similar to our storyboard possibly) or animations that show the simple actions that can be taken	1

Severity Rating:

0 = Not a usability problem

1 = Cosmetic problem only: need not be fixed unless extra time is available on project

2 = Minor usability problem: fixing this should be given low priority

3 = Major usability problem: important to fix, so should be given high priority

4 = Usability catastrophe: imperative to fix this before product can be released

Test Script:

Introduction

Hey, do you mind testing something for us? We're doing a project for CS 147, Introduction to Human Computer Interaction. In this class, we're making an app, and we're testing the overall design of the app through these paper prototypes right now, before we actually code everything up. We're testing the design of the app, not you! And let us know if at any point, you're uncomfortable or you want to stop.

Okay, great! Here's a waiver to sign! Courtney will be taking notes while the testing is happening, if you're okay with that. Do you mind if we take pictures during the process?

Setting the context: design testing

We're going to have you do three tasks. While doing these tasks, it would be really helpful for us if you think aloud while you're trying these things out. For example, if I have this stapler, I would say "Hey, here's what I think is a stapler...it looks larger than your normal stapler, so I don't think I'd be able to carry this around, and it doesn't look sturdy enough to staple more than 20 pages at a time, which might end up being problematic for my creative writing classes...Okay, so I'm putting the papers in altogether right now and testing it out...the edges are pretty pointy, but I like this squishy bit, because it's very ergonomic."

It's especially helpful for us if you point out when you're confused or unsure about something. Again, we're testing the design, and we just want to make it better! So if you're confused, it's probably faulty design on our end, and we'd like to know and fix that.

Have any questions?

Setting the context: our concept

Okay, great. The overall idea of the app is for it to help you create concept maps, especially when studying. So let's say you have a test coming up -- what's a class you're taking?

Okay, so for **(Class Name)**, you have a midterm coming up, and you want to study for this test.

(present with the appropriate screen) Pretend this screen is on an iPad. This is the main screen; you can click around here (it's touch screen) and drag components around; this is the add button.

Moving through the tasks

So the **first task** is to create a concept map. How would you create a map for **(Class Name)** given this interface?

The **second task** is to explore other maps. Say you want to find other maps related to **(Class Name)**. How would you do this? How would you want to interact with this map?

The **last task** is to share a map that you've either found or created.

Consent Forms:

Consent Form

The Covalence 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 Team Covalence. 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 Ted Li, Courtney Noh, Logan Short, Emma Townley-Smith 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

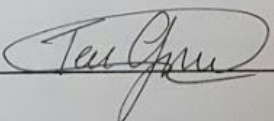
Participant anonymity will be provided by the separate storage of names from data. Data will only be identified by participant number. No identifying information about the participants will be available to anyone except the student researchers and their supervisors/teaching staff.

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 Team Covalence 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

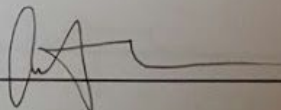
Name TERESA GRANDIA

Participant Number 3

Date 10/21/15

Signature 

Witness name Courtney Noh

Witness signature 

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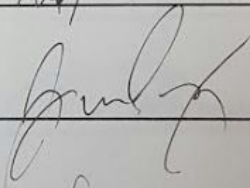
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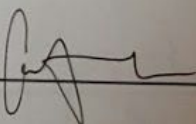
Name Jordan Richmond

Participant Number #2

Date 10/20/15

Signature 

Witness name Courtney Noh

Witness signature 

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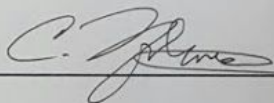
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Name Cameron A. Holmes

Participant Number 1

10/21/15

Signature 

Researcher name Courtney Noh

Researcher signature 