

Connect

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Introduction

Mission Statement: Making STEM Accessible

Problem: Barriers such as lack of academic resources, lack of exposure to mentors in STEM fields and lack of information on scholarship educational opportunities prevent low-income and minority students from having easy access to STEM fields. At the same time although there are minority industry professionals who want to give back to communities many lack the platform to reach students.

Solution: We propose a solution that introduces low income and minority student to STEM related career paths that they might find interesting, connects them with mentors from similar backgrounds, and provides them with information on relevant summer opportunities. The app also doubles as a platform to ask questions and receive answers from mentors.

Sketches (Design Ideas)

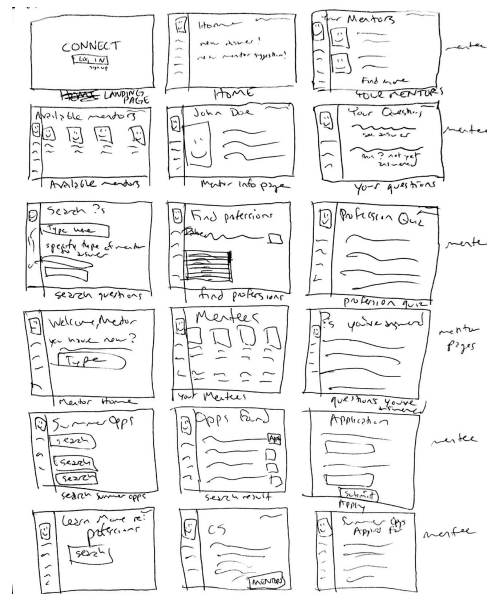
Mobile Web App

(Available online and also on tablet/phone)



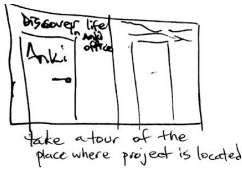
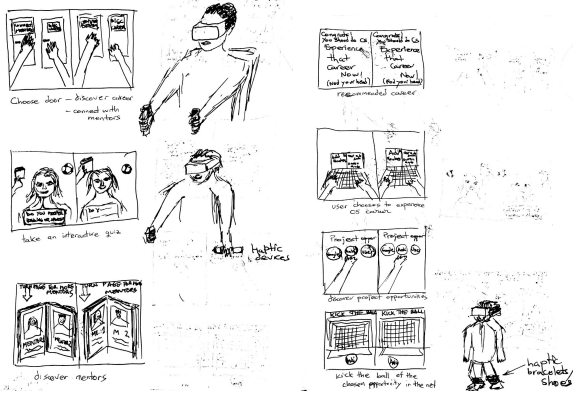
Website

(Standard website for computer)

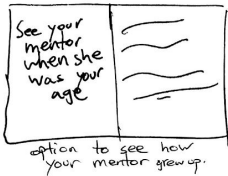


Virtual Reality

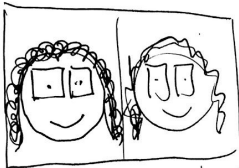
(Experience what mentor experiences)



take a tour of the place where project is located



option to see how your mentor grew up.



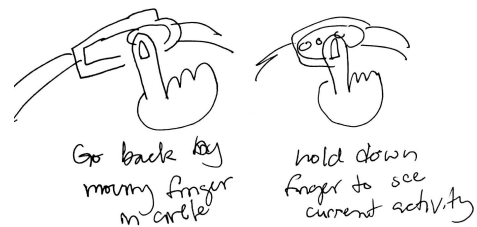
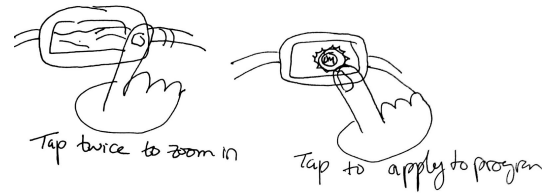
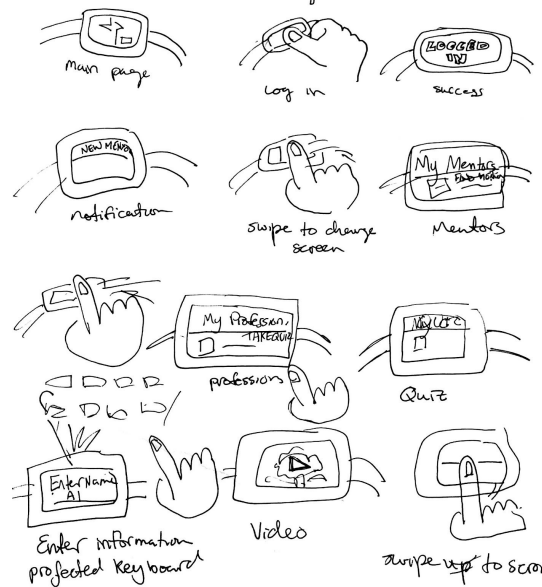
option to see mentor when young



Recommendation after career quiz

Apple Watch

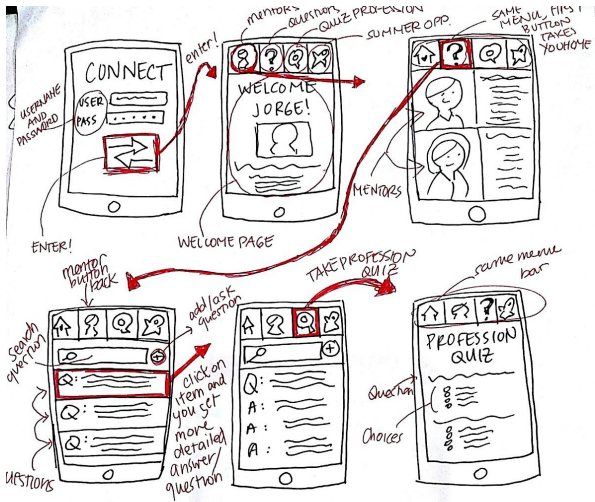
(Easily get notifications and updates)



Top Two Designs Storyboards

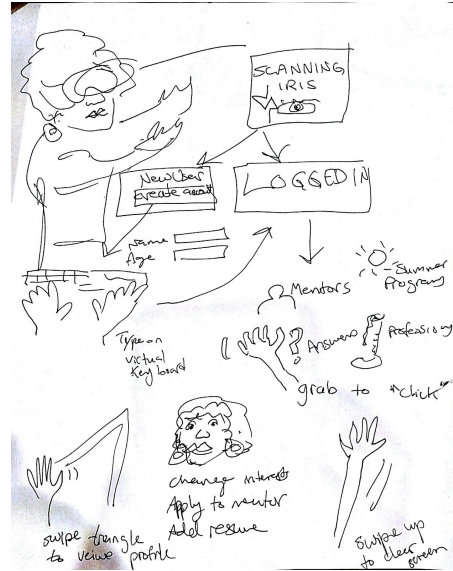
Mobile Web App

Tasks Shown: taking a professions quiz, look at mentors, and reading questions.

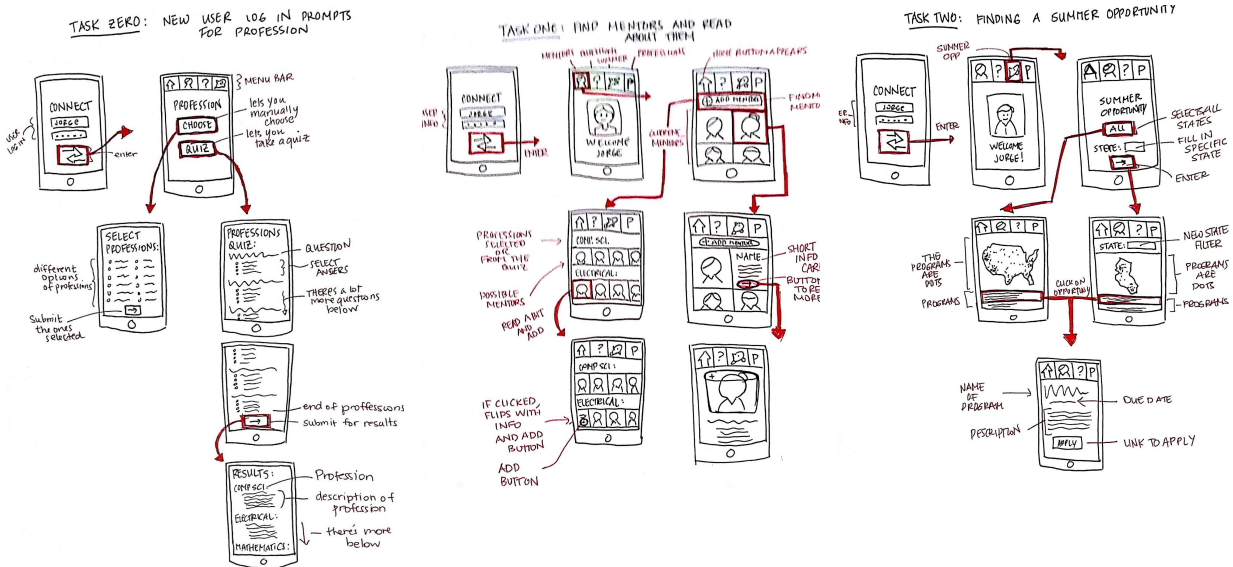


Virtual Reality

Tasks Shown: logging in, seeing a mentor, and clearing the screen.



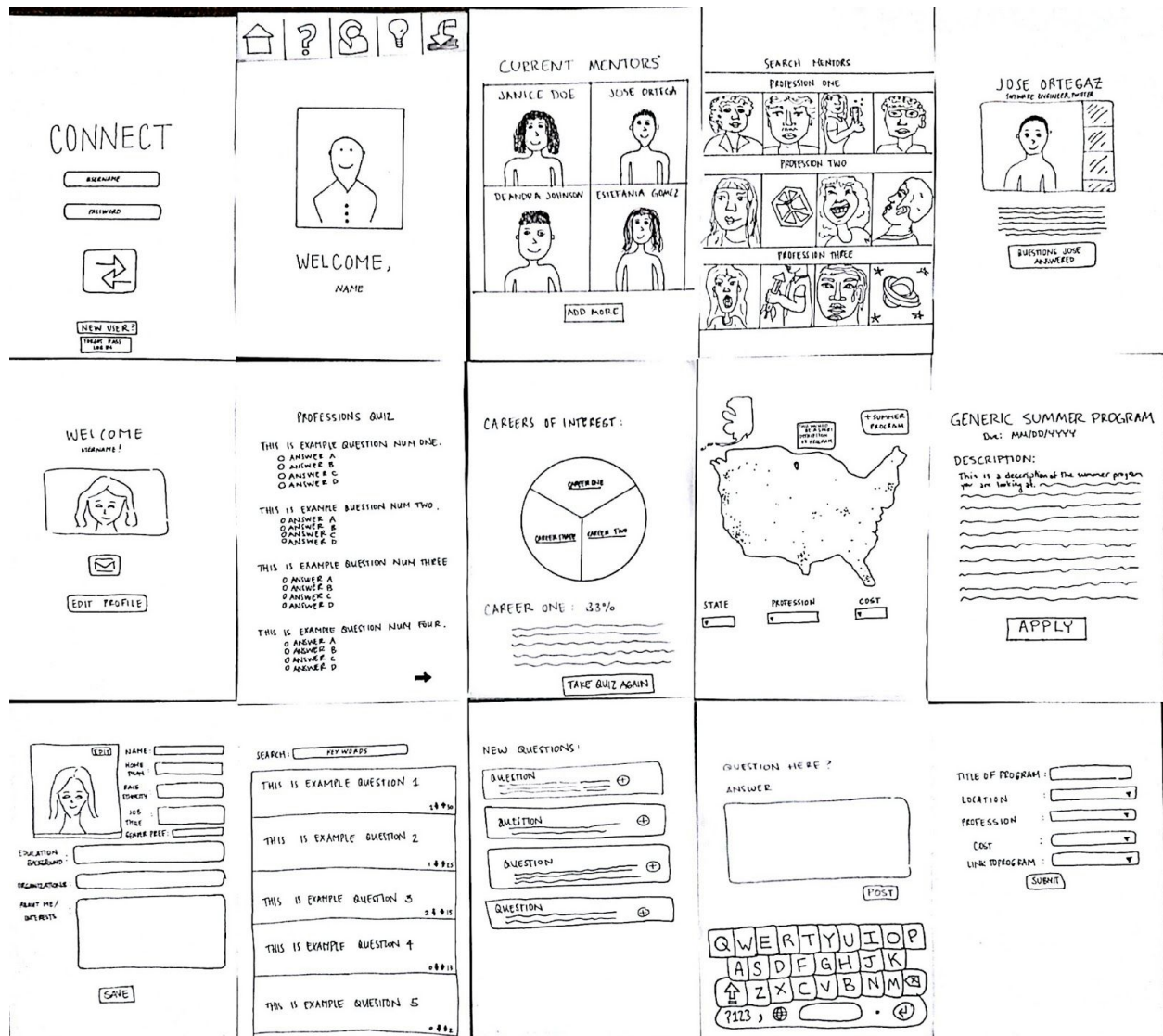
Selected Interface Storyboard (User Login, Find Mentors, Summer Programs)



Selected Interface Design

We picked the mobile web app because it is the most accessible to our target demographic. Mobile web apps can be used on smartphones, tablets, and also online. It is easier for low income and minority high school students to gain access to computers and smartphones than more expensive, rarer technologies like Apple Watches or virtual reality devices. Additionally, our target users have a level of familiarity with computers/tablets/smartphones that will make using the app feel more intuitive and comfortable. These two needs are especially necessary for mentors who may be supporting the app. Mentors should not need to buy new devices in order to answer questions for students.

Prototype



The main pieces of functionality for our low-fi prototype are 1) navigate to the home page, 2) review the questions that have been asked and view the answers, 3) browse current and additional mentors in fields of interest, 4) take a profession quiz and read about different professions in results page, and 5) learn about summer opportunities and apply. Since we have chosen to make a mobile web application, our key interaction ideas are to tap and swipe through visual screens. The user will not interact through speech, VR, or video. Every interaction the user will have with the product is through a click (tap), swipe, or typing. We will now further describe the interactions above.

- 1) Navigate to the home page:** There is a navigation bar at the top of every page (except the opening screen) with five buttons. The first button is a house, which will bring them back to the home page (Fig 1). The home page is the page with their profile picture and welcome sign.

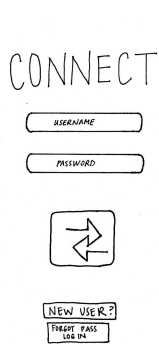


Fig 1



Fig 2



Fig 3

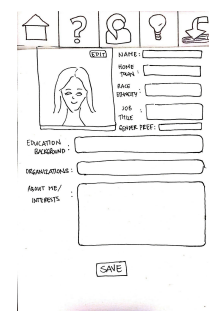


Fig 4

- 2) Review questions/answers:** The second button is a question mark. The user will click on the button in order to view all the questions that have been asked. There will be a list of questions that the user can swipe up and down through. If they click (tap) on a question, they enter a screen where they can view all the answers.

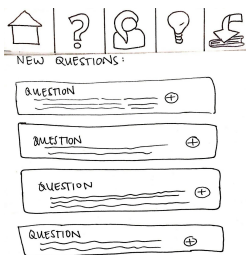


Fig 5

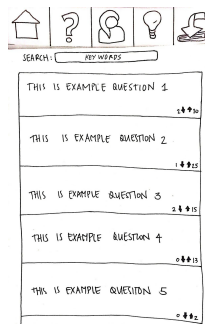


Fig 6

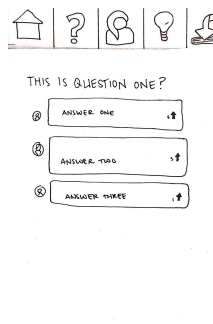


Fig 7



Fig 8

3) **Browse current mentors and find more:** The third button is a person. If clicked, the user will be able to view current mentors by swiping up and down. At the bottom there is an add button. When clicked, a screen with different professions and mentors for them will appear. Users can swipe left and right to view them all and click on one to find the add button.

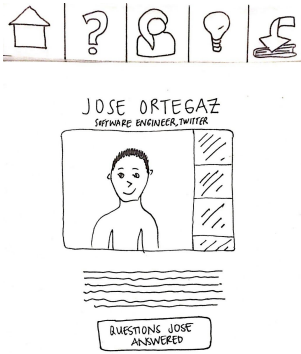


Fig 9

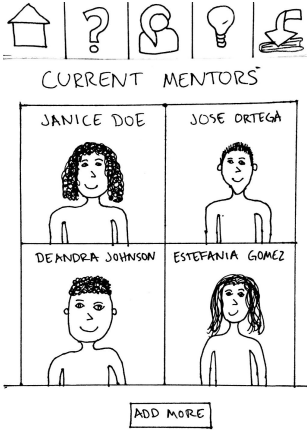


Fig 10

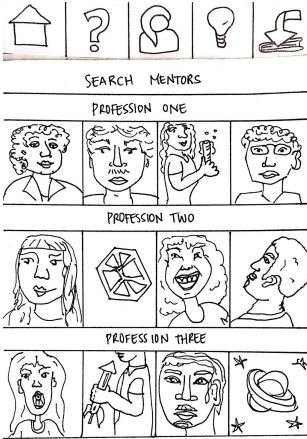


Fig 11

4) **Take profession quiz/view results:** The fourth button on the navigation bar is a light bulb. This will bring up a quiz that they can swipe up and down through and then click on answers. After submitting, a screen with a pie chart will appear with the results. The pie chart is interactive because if you click on a slice, then the description of that profession will appear.

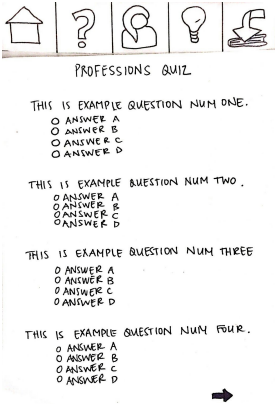


Fig 12

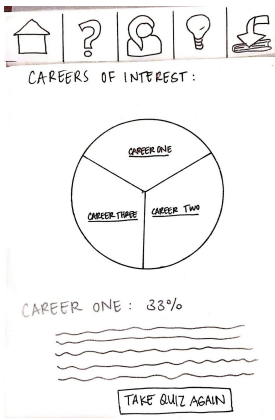


Fig 13

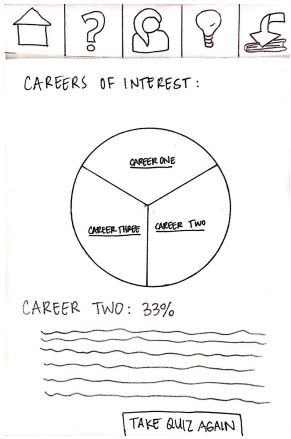


Fig 14

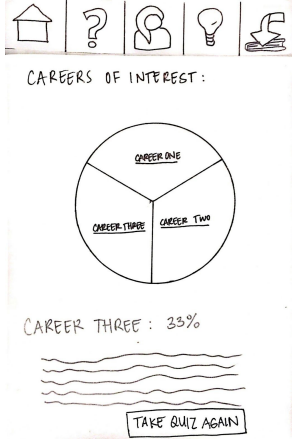


Fig 15

- 5) **Learn about summer programs/apply:** The last button on the navigation bar will be an arrow into books. If clicked, a map will appear with dots that represent summer programs. At the bottom the user can click on a dropdown menu that will let them filter through categories. If filtered, different dots will disappear/reappear. If the user clicks on a dot, then a short description will appear. If the user double clicks on a dot, then a new screen will appear with a longer description, due date, and an apply button. If the user clicks on the apply button, then it will take them to an external link where they can find more information about the summer program and apply.



Fig 16

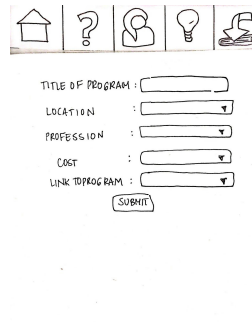


Fig 17

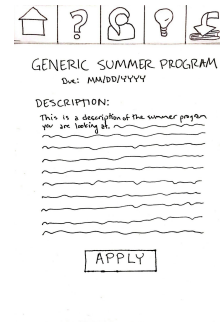


Fig 18

Method

Participant 1

Education: Ph.D Electrical Engineering
 Occupation: Assistant Dean for Diversity Programs, Data and Technology at Stanford
 Demographic: Black
 Recruited: Responded to Email
 Compensation: Aloha Pineapple Jamba Juice

Participant 3

Education: Undeclared College Freshman
 Occupation: Student
 Demographic: Latina
 Recruited: Responded through Leland Scholars Program
 Compensation: N/A

Participant 2

Education: High School Sophomore
 Occupation: Full-time Student
 Demographic: Half Black, half White
 Recruited: Responded to Email
 Compensation: Ice cream

Participant 4

Education: B.S. Chemical Engineering 2017
 Occupation: Student
 Demographic: Latino
 Recruited: Responded to Dorm Email
 Compensation: N/A

Environment:

We conducted all of our interviews in quiet, calm environments, ranging from an office to a study room in Old Union. We wanted participants to focus on the app without any outside distractions. We made sure that testing occurred indoors so that our low fidelity prototype would not blow away. Additionally, we made sure that everyone was seated and that there was a large table to put down the prototype securely.

Tasks:

We had separate task sets for the mentors and the mentees because they will interact with the app in differently.

Mentors

1. *edit their own profile (simple)*
2. *answer questions from mentees (medium)*
3. *add a summer program opportunity (complex)*

Students

1. *take a profession quiz (simple)*
2. *find a mentor (medium)*
3. *apply for a summer opportunity (complex)*

Procedures:

We had at least two group members present at all interviews: four attended the first, three went to the second, two went to the third, and four went to the fourth.

The procedure was roughly the same for each participant. We started off with the facilitator (Jasmine) reading the script and showing how to log into the app. Next, we requested that the participant conduct a running monologue about anything that confused, surprised, or interested them while they were exploring Connect. The facilitator then told the participant what task they were attempting to accomplish and let them try to work it out.

The computer (Betsy) would flip through pages of the prototype according to the buttons the user pressed. The note-taker (Sage) would listen to the user's thought process and take notes on surprising observations. The only interview that deviated from the norm was the one with Participant 2, which was conducted over Google Hangout. In this interview, we had the participant tell us what she wanted to click on rather than physically touch the prototype.

Script:

We're going to start off by showing you how to log in to the app so that you can get an idea of how to interact with this interface. After the demo, we will give you a broad task to accomplish and let you explore Connect while trying to accomplish the task.

Click on something by just pressing it like that (presses "button") and the computer will display the page to which that button leads. If you reach an undeveloped page this screen (shows participants the "undeveloped screen" page) will show.

Test Measures:

Number of Errors: *We kept track of the number of errors the participant made when trying to accomplish the given task. Each error was assigned a severity rating as the instructions indicated.*

Ease of Use: *This was a less quantitative metric than the number of errors, but we estimated a number out of five (with five being the most comfortable with the app and 1 being the least) to try to measure how easily the participant was able to navigate the app.*

Results**Participant 1:**

P1's feedback was particularly helpful because most of our ideating had been focused on mentees. Although P1 figured out how to do the first two tasks on her first try, she did, however, suggest new functionalities that we hadn't considered, like giving mentors the ability to edit their answers to questions after posting them. The third task posed a little more difficulty mainly due to some ambiguity about what the icons at the top of our screen meant. Once she figured out which one was the correct one, she was able to proceed easily from there.

Number of Errors: 1 **Ease of Use: 4:5**

Participant 2:

P2 found the app very intuitive. During the first task (take a profession quiz), she almost clicked the wrong icon to start with, but corrected herself through deductive reasoning. We were surprised when she switched tabs after receiving the results of her profession quiz rather than clicking on the career to learn more. The "Add a New Mentor" task went really well; she was able to do everything on her first try without visible hesitation. P2 was also the only one who

wasn't confused by the "Apply for Summer Programs" icon, saying, "It looks like I'm applying for something." She clicked on a program dot on the map immediately without filtering the options by location, cost, or profession, which was another surprise.

Number of Errors: 1 **Ease of Use: 5:5**

Participant 3:

P3 had no trouble finding and taking the profession quiz. Adding a new mentor was more difficult; she expressed some confusion over the "Current Mentors" page because she didn't realize that those were the mentors that she already had, not the mentors that were currently available. When she got to the "Add New Mentors" page, she picked the mentor who was holding a beaker because she thought that person would align most closely with her interests. She explored the questions answered by her new mentor and found it intuitive that the tiny pictures next to the various answers represented the mentors who had provided that particular answer. P3 had some difficulty applying for a summer program. She first clicked on the lightbulb icon, which takes users to the "Professions" section of the app. She clicked on the right icon on her next try, but was still a little confused about the summer program map page because she thought the "+ Summer Program" button was to apply to a program rather than to add a new program to the list of opportunities.

Number of Errors: 4 **Ease of Use: 2:5**

Participant 4:

P4 found it difficult to find the button that would lead to the profession's quiz. He thought that it would be the question mark because he would be answering questions. When he saw the results page from the profession's quiz, he found the pie chart very intuitive. When asked to find a mentor, he quickly knew it would be the icon with the person. He wished that he could add a mentor from the individual mentor page. It was easy to find the summer application button for P4 but only through process of elimination. Once there, he was confused if the cost selector was how much he was going to be paid or if he had to pay. He also wanted to zoom in on the states to get a closer look at the programs offered.

Number of Errors: 4 **Ease of Use: 2:5**

Discussion

Our testing revealed several features that need to be adjusted, but also several that worked quite well. The most common suggestion was to make the buttons in the top bar more clear. The mentor, home, and question mark icons seemed to be self-explanatory, but the lightbulb and summer program symbol were confusing. We will change those icons in the next iteration.

On the mentor side of things, we learned that flexibility is of the utmost importance. P1 wanted to be able to edit her answers after posting them, have freedom when entering information in for new summer opportunities, and select multiple options under the “race” category of her mentor profile. We intend to implement the latter two suggestions. We might adjust the editability of answers by creating a preview page so that mentors can view their answers before submitting them, but we’re hesitant to give them complete freedom to revise their answers, as their initial responses might have been helpful to some mentees.

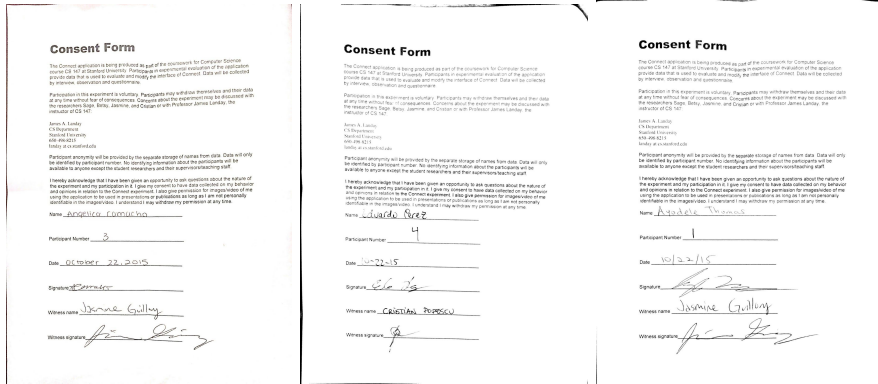
P1’s responses also broadened our vision of the potential of the mentor side of the app. We had originally envisioned that sector of the app as fairly limited - mentors could answer questions, adjust their profiles, and provide other sorts of information, but the rest of the app was geared toward the mentees. While we probably will not expand the functionality of the mentor side of the app much (our goal is to support the mentees, after all), we might decide to let the mentors access more of the same features that the mentees can interact with. That way the mentors can, if they so desire, get a better understanding of the mentees’ experience with the app.

The main information we got from the mentee interviews was which features were self-explanatory and which required further clarification. We also learned that participants wanted to be able to see reviews from students who had done the summer programs in the past. Lastly, we realized that the way we had set up the app sometimes required slightly different versions of the same base page. For example, college students who are both former mentees and current mentors might want to be able to view pages from both perspectives.

Testing the low-fi prototype could not reveal one of the most important aspects of the app: how much time mentors and mentees would be interested in investing. We tried to gather more information by asking our participants after testing. Participant 1 said that she thought it would be helpful to have a cap on the number of unanswered questions that each mentor could have at one time so that the app did not start getting overwhelming. Mentees seemed enthusiastic about using the app (particularly about finding summer programs), so there’s definitely a willingness to participate on that front.

Appendix

Consent Forms:



Error Log:

Participant	Error Log Rated (0-4)			
Participant 1	1 - wanted to ask another mentor a question, but it wasn't clear that the app didn't have that functionality			
Participant 2	1 - confused for a second about which icon was for the profession quiz, but did pick the right icon on her first try			
Participant 3	2 - confusion over what "current mentor" meant	2 - goes to light bulb instead of summer program icon when doing the apply for summer program task	3 - thought the results of the career quiz she was seeing were an evaluative metric	3 - didn't realize that the "+ summer program" button was for adding a new program to the app
Participant 4	3 - Went to wrong page to respond to mentee questions	3 - No way to add mentor from view mentor page	1 - momentary confusion over what the '?' icon represented	2 - confusion over what the mail icon on the mentor home page represented

Notes:

Interview 1:

Edit their own profile (simple)

Login button is confusing: "Is that logo or button?"

First and last name should be options

"Is it hometown or where I live right now?"

Should be able to choose multiple ethnicities

Should have lots of space for job title

"Does it matter where I works or not?"

"Is education background freeform or pre chosen?"

"Do we want to know degrees or where I went to school?"

"For the about me what kind of things to write? Letter? Otherwise I'd say something generic without having more information"

Answer questions from mentees (medium)

Wishes that it showed how long each question would take to answer and keywords

Wants to be able to go back and edit answers

Would like to be able to insert a hyperlink and for it to show up in a viewable way in the application

Would like to only see ten at a time

Would like to be able to see who else answered this question

Would like to be able to skip or delete questions

If it is too broad. Better to know a select group than a lot. How easy is it to use for a mentor? Will it ping you occasionally . How do you prevent it from getting overwhelming. 200 messages is just overwhelming.

How to attract mentors and mentees. Need to attract mentors first. So that they do not get overwhelmed. Can there be groups within the application?

Is everything asynchronous? Are there any chats?

Only go to places that are diverse spaces. They do not need applications at Stanford but they do need diversity. If it becomes viral in that community will be spread across the country.

Add a summer program opportunity (complex)

Location is drop down....will it be complete enough?

Will she has to enter it in multiple times if it is in multiple locations

Cost assuming it is a range

Why is link a drop down. Wants to be able to describe the program. There is a description without a place to put it.

Wants to be able to use it on a computer. Writing the date due would be nice.

A feedback mechanism to see if the link is broken

List of all the current mentors in the program. Wish had more information on the first page

Computer and device would make it easier.

Interview 2:

Task 1: Take a Profession Quiz:

first thought about clicking the question mark, then switched to light bulb

Why? Lightbulb turns on for what you wanna do

"Takes" profession quiz

Taken to results page

clicks question mark at the top (instead of engaging with the results from the profession quiz)

clicks on example question

notices that the picture to the left is the one who answered the question

goes back home

Task 2: Find a Mentor

clicks the right bar button on first try
add more
chooses planet person
clicks plus button
goes back to list of current mentors
clicks on the mentor she just added
goes to questions José answered
clicks on first question
back to mentor page

Task 3: Apply for Summer Program

clicks on the right thing on her first try (says "it looks like I'm applying for something")
goes to one of the programs without filtering anything
clicks APPLY

Suggestions

wants an edit profile page
wants to put name, picture, description of what she's looking for
wants to connect with people her own age using the app
summer programs would be most helpful
what would you wanna know about the summer program before clicking apply? Reviews from people who have done it in the past

How would you want to connect with the mentors? would be cool to have mixture of famous people who you can't talk to directly but can answer questions, then less famous people who you could talk to directly
wants in between people to talk to

app interface confusing?
nothing confusing

2 key features: mentors and summer programs

Interview 3:

Task 1: Take a Profession Quiz

goes to career one on first try
thinks the quiz is based on performance

Task 2: Connect with Mentor

clicks person tab (correct)
clicks janice
goes to questions he's answered to learn more about him
picks a question based on how many upvotes it has
picture on the left is intuitive for her

had difficulty adding a mentor
confusion over current mentors page

went to add more after we helped
chooses mentor based on perceived profession

Task 3: Apply for a Summer Program

tries lightbulb (which is the career tab she already worked on)
goes home
then to "whatever this is" for summer program tab
confusion over "adding summer program" as like creating it herself versus searching
clicks on west coast program and clicks apply

Overall Feedback

buttons on top were confusing
summer programs would be most useful - being able to filter stuff
what would be most useful to know about the program aside from description/name?
cost, reviews

w/ mentors - how connected would you want to be with them?
pretty connected - would be really helpful to get help planning out the future
instant chat would be nice bc it would be personal, but a forum would be good

Interview 4:

Task One: Take a professions quiz

radio buttons, transition automatically or am I supposed to touch the arrow?
questions I answered are supposed to tell me the career I am most apt for?
"i don't like this, i'll take the quiz again."

Task Two: Connect with a mentor

Trial and error - now I know I have to press this button (the ? button is confusing)
He chose California
I'll choose the state, profession and the cost - should automatically come up
I want to be an electrical engineer
automatically I would want a salary to come up
I assume it's the cost of the program that will get me into the program?
Zoom in - california - see stanford - click -
I like it - I'll apply

Task Three: Find a summer program

Add a new mentor and look at their page
I'll click on the mentors button
I'm assuming these are current mentors that I am assigned to or choose another mentors
I assume these are professions, etc.
I assume you judge by their picture
or click on mentors and search by the name of one?

Bio about him, where he studied, how long is industry, here - a fancy frame
From the view mentor page - no way to add the mentor
What people ask them
This is like an FAQ that he's gotten
Oh a question - what did he answer?
I'm confused that there was a question and 3 people had answered. They answered for him?

Task Four: Answer questions as a mentor

If you were a mentor this would be your home page
I'll click the question mark again - hoping it won't take me to the questions

I guess take a professions quiz

The buttons should be different for a user

I'm assuming that this app is giving me an email address - and i'm answering someone - just to catch up

- i assume some people are just writing me 'hey what's up?'

it would be nice if questions were under the ?

In piazza - after i answer a question - we see what is the relation with other questions

I don't know if you need an icon change - after the first use i'll get the hang of it