**kindergarten**

Introduction and Mission Statement

kindergarten is on a quest to make the distribution of office hours and the quick review of concepts in college **as easy as kindergarten**. We are creating a mobile app to equalize the distribution of office hour attendance over the course of a quarter and and to ease the collection of in and out-of-class student feedback and short "clicker"-style quizzes directly on a phone. In order to verify the usability of our prototype, we are implementing a think-aloud protocol with subjects similar in demographics to prospective users.

Prototype

The prototype is a Pop prototype, with printed-out mobile outlines and screens simulated with pencil drawings. In order to navigate the interface, we will simulate the interface in Pop, which allows simple directed connections via virtual buttons between discrete screens in the interface.

The first screen is a splash / initialization screen, which poses a list of classes.
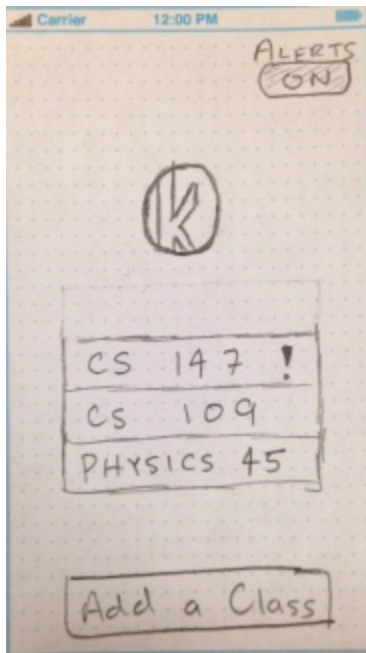
Once a class is tapped, a menu screen slides up partway up the screen with a button for Office Hours, for Polls/Quizzes, and for Alerts.
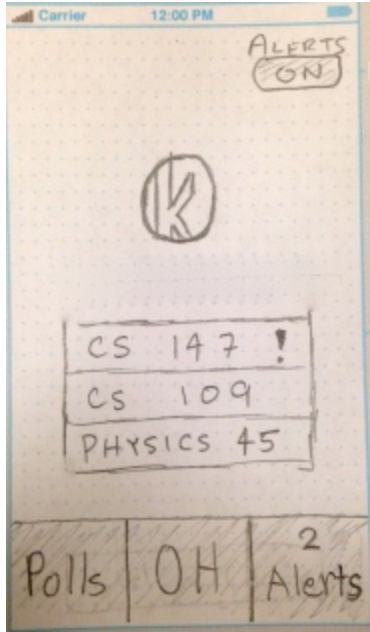
The *Office Hours* screen allows the student to inspect the office hours for the class and how many people are in any current office hours which are happening.
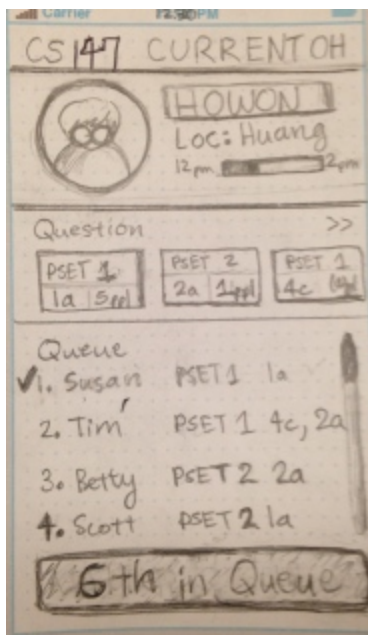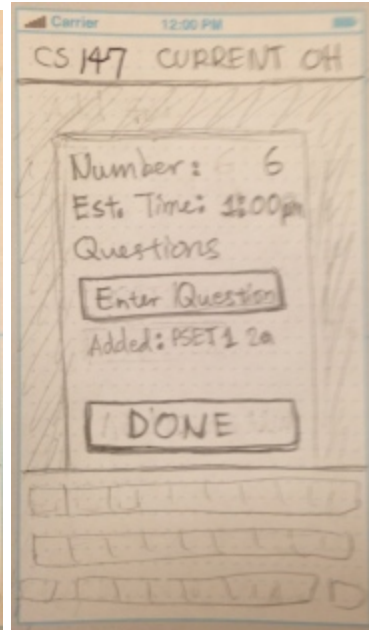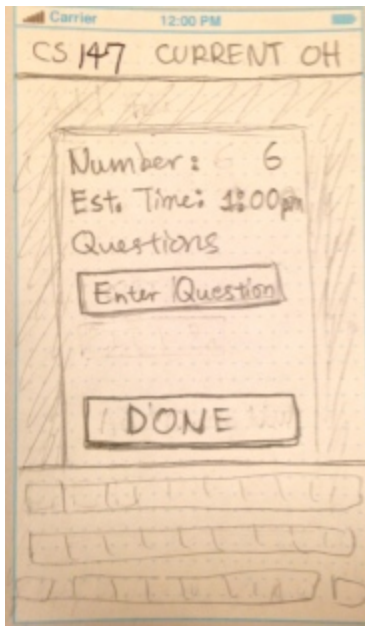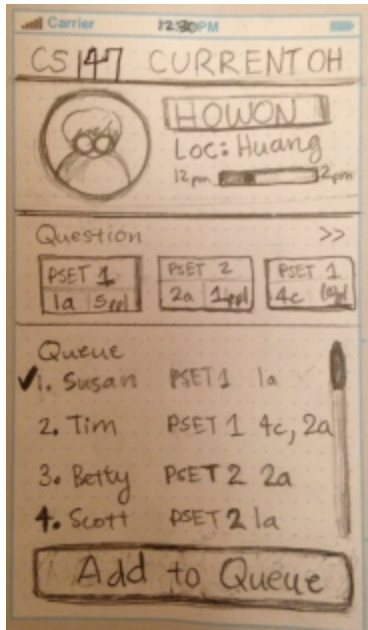
The *Polls/Quizzes* screen is a listing of polls and quizzes (active ones first) which the user can tap to take a poll or a quiz, multiple-choice and true-false quizzes by swiping.
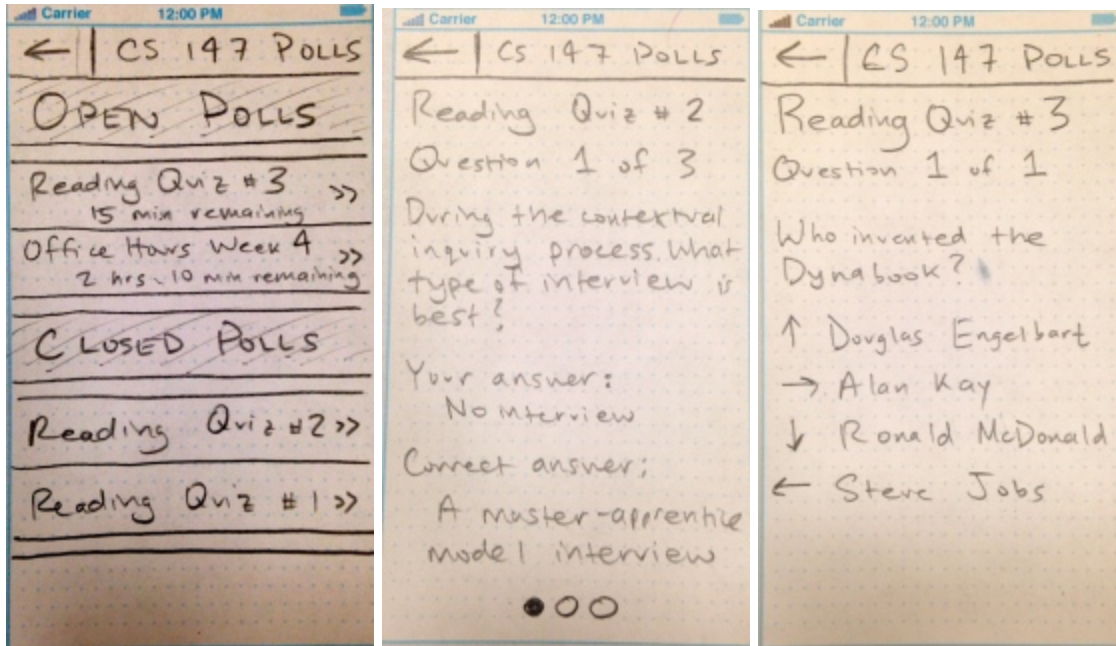
Alerts is a listing of push notifications for that class. There are push notifications for in-class quizzes and for office hour alerts.

Method

Participants

Demographics - We used Stanford undergraduate engineering and engineering-related students. They were not compensated, and they were recruited by approach on the street. One was an undeclared sophomore taking an introductory engineering class (subject 1), one was an undeclared freshman taking an introductory engineering class (subject 2), and one was a statistics master's student (subject 3).

Environment

The app is supposed to be mobile, so we found and tested participants where we found them.

Tasks

Taking a quiz and submitting the answer
Signing up for OH (adding themselves to a queue)
Fill out poll to give instructor feedback

Procedure

- An introduction was read to the student:
  "This is a usability study for an app which we're making in order to answer quizzes and to sign up for office hours for a fictional class. That means that we're going to ask you to complete a few tasks on this mockup of our app: when you pretend to tap the screen, we will change the screen for you as if you were on a real phone. I'm going to ask you to complete three tasks on this app. While you are completing these three tasks, we also want you to say whatever you are looking at, thinking, doing and feeling when you are completing these three tasks.
- Get them to sign waiver form
- The app was demoed, meaning that the way in which to navigate the Pop interface was shown (by clicking on a button, then on a non-button to make the interface flash, and then resetting the interface):
- "To use the app, click on the paper buttons on the app. If any other parts of the app are clicked, then the clickable parts will flash green."
- Tasks
  The first task is to take a quiz on this app and submit the answer.
  <they do the first task, record problems>
  The second task is to search for office hours for the class and sign up for office hours on the app.
  <they do the second task, record problems>
  The third task is to fill out a poll to give instructor feedback.
  <they do the third task, record problems>

Measures:

Code every response per utterance, error or problem on the suggested 0(no problem)-4(catastrophe) scale. Note that each response is highly correlated, so the low *n* will not allow regression analysis or anything fancy.

Categorize each response within looking-at (a statement of what subject is looking at), thinking(statement about what subject is thinking), doing(statement of what subject is doing) and feeling(statement of what subject is feeling).

Results

The first task (taking a quiz and submitting the answer): We noticed that both participants 1 and 2 clicked on the arrows on the quiz screen first, and then swiped(a level 2 mishap, to be indicated by (2)). The third participant noted that "I guess 'Polls' means 'Quiz'", in noting that our interface does not immediately show the user a place to go to examine a quiz(a level 1 mishap). There were no additional comments on the push-notification quiz.

The second task(signing up for OH (adding themselves to a queue)): Both participants 1 and 2 noted that they were not sure if they had to indicate that they had a question in order to come to office hours(1): participant 3 stated that they were certain that a question wasn't needed, but it is certain that the fact that subject 3 stated it was evidence that it was not so certain. Subject 2 noted that they were confused about what OH stood for. Participant 1 noted that there was no "Home" button from the office hours so that they could not get to the default state so easily(1).

The third task (Fill out poll to give instructor feedback): Participant 1 was not sure what direction to swipe in, because the idiom in Android was to "pull" the next page in(a level 2 mishap), and participant 1 also thought that they were to click on the arrows, instead of swiping for the quiz(2). Participant 2 noted that they "really enjoyed" the swiping interface when answering the feedback poll. Participant 2 noted also, however, that they would use the push alerts if ever available: that they felt like this was lacking more push notifications (2). Participant 3 moved to explore the interface, ignoring the directions. Navigating towards the alerts screen, he noted that "there was a lack of buttons" and "you should be able to get home" (1). Participant 3 then moved to quit the user interface test, "because I don't have enough time"(4).

Although there were differences (not statistically significant, because of the small sample size: it would have taken >15 subjects to get a sample, which was infeasible) in the thinking versus doing versus feeling measure (there were no problems which involved the direction of looking) between subjects, there seems to be less difference within subjects, which is notable. However, the subjects expressed many of the same statements about the user interface in those different ways.

Discussion

We can see the homogeneity of the comments the testers made on our user interface as proof of the fact that, of course, the low-fi prototype has a long way to go, but we can also be grateful for the clarity of the points of improvement suggested to us.
To wit, we must make the sliding modal screen which comes up after clicking a class clearer; we must make the direction of swiping clear or rethink the idiom of swiping to answer a question; we must clarify the modal for signing up for office hours so that it conforms with the way that students like these students go to office hours, and we must make the navigation clearer, meaning specifically that there should always be a path towards "home".
An important point was learned in a problem in the sliding modal screen which comes up after clicking a class, because it was thought out in the immersion state of the problem we were solving. Because of this, we realized that we committed the cardinal sin of expecting the user to read our minds.

Inherent in our thinking about the low-fi user interface was a "happy path" through the tasks. The format of the experiment, in asking the user to *do a task* instead of *exploring the interface*, encourages this. Therefore, if there were interface problems with any rarely-encountered parts of the interface (say, the settings screen, which hasn't been fleshed out), then we would have no idea.

Appendix

(the method is described in its entirety in the paper. there were no printed instructions: all instructions were read aloud from the methods.

Participant 1

Task 1

    (2 Doing) Clicked on the arrows first and then swiped.

Task 2

    (1 Doing) Because we did not implement the ability to click Done without inputting questions, she had to click Add a question first and then click Done on the following page.

    (1 Doing) Once she was back on the OH page could not get back without help because we do not have a home button

    Note (Feeling): Not sure of the questions or how helpful, but liked the information about TA OH. Queue straight forward.

Task 3

    (2 Doing) Not sure what direction to swipe in because she was an android user to get to the questions. Swiped to the left instead of to the right because she thought she was going to pull the next page in.
    (2 Thinking) Also, thought she was supposed to click on the arrows.

Participant 2

Task 1

    (1 Feeling) He was confused about what OH stood for. (Need to write out Office Hours instead of OH)
    (2 Doing) Swiped in the wrong location to enter the correct quiz.
    (2 Doing) Tried to tap the correct quiz but could not ascertain from that action that he had to swipe it instead.

Task 2

    (1 Doing) It took him a little while to digest what was going on when he went to the Office Hours screen. He was diligently reading each part of the screen
    (1 Thinking) Wasn't sure whether or not he had to indicate a question after saying he was attending Office Hours

Task 3

(0 Feeling) He really enjoyed the swiping interface while he was answering the feedback poll.

(2 Feeling) His first instinct to do every task was to just use a push alert if those were available to him.

(2 Thinking) For the Medium-Fi Prototype, suggested we get the push alerts to actually work so that he can use those in the future

Participant 3

Task 1
- **(1 Feeling)** Confused about how to access the quizzes, which was through the "Polls" button

Task 2
- **(2 Thinking)** Questioned the necessity of signing up for office hours
- **(0 Thinking)** Noted that they didn't have any questions before clicking on "Done" button, in office hours.

Task 3
- **(2 Thinking)** Wondered if the polls were asking a question, or simply choosing among different choices (viz., asked about difference of polls and questions)
- **(2 Thinking)** Wanted to go "home" from the *Alerts* screen
- **(4 Feeling)** "I will give up and leave the site, because I don't have enough time."

Consent Forms

Consent Form

The **kindergarten** 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 **kindergarten**. 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 (Christopher Michael Ponce de Leon, Howon Lee, Thuy Ny Le) 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 **kindergarten** 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 _William Price_

Participant Number _#2_

Date _10/23/14_

Signature _____

Witness name _Christopher Ponce de Leon_

Witness signature _____

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Name _Asia Aguilar_

Participant Number _1_

Date _10/23/2016_

Signature _____

Witness name _Howon her_

Witness signature _____

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Name _Albert Chu_

Participant Number _3_

Date _10/22/19_

Signature _Albert_

Witness name _Howon Lee_

Witness signature _____