Project Perfect:

Low-fi Prototyping & Pilot Usability Testing

*Team **EduConnect***

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Introduction

Take-home projects provide excellent opportunities for students to internalize knowledge through hands-on activities. However, in their current state, these projects come with a unique set of challenges: teachers may struggle designing clear and thorough specifications, they may distribute paper handouts that never make it home, parents and students may have questions that never get answered, and submitting deliverables can be a nightmare of its own.

At EduConnect, we believe that all of this friction can be eliminated. Our mission is to ***bring painless class projects to classrooms everywhere*** by creating a virtual platform where teachers can easily create and assign projects, and students can easily complete and submit them. In this report, we outline the sketching and lo-fi prototyping stages of our work on **Project Perfect**.

Design Selection

After going through a process of intense design sketching of three different design realizations (see figures 1-3 below), we settled on two that seemed the most promising. One was a web-based interface that would be fast, informative, and easy to navigate. The other was a much simpler touch-tablet interface that would rely on simple taps and intuitive gestures.

These two realizations were very different from each other. For example, in the web interface, a teacher would build a project through a single page. A teacher would write information and drag and drop it to customize the project page displayed to children. In the iPad realization, a project would be created screen by screen, abstracting away the feature to design the project page children would see. The teacher would enter information into say a background page and then swipe to enter a supplies list and continue swiping until the project was finished. We would automatically format the information entered by the teacher into a standard project page layout for the children to view. See figures 4-6 on the following page for a visual comparison of the two.

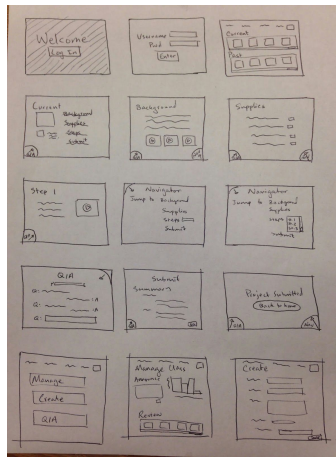## 15-20 Design Sketches

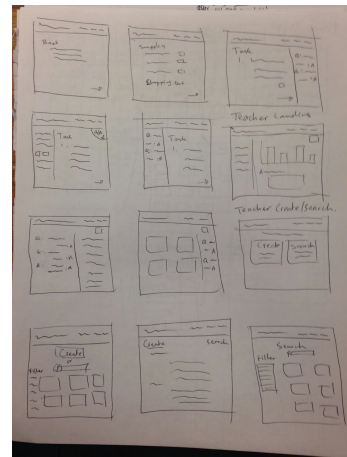figure 1: iphone interface

figure 2: tablet-touch interface

figure 3: web interface
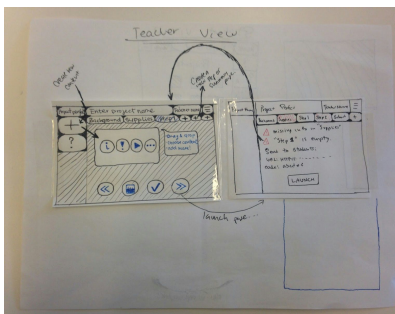
UI Storyboards

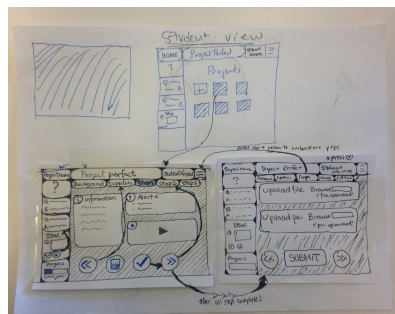
figure 4: teacher view for web app
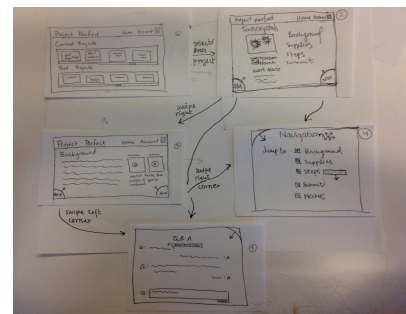

figure 5: student view for webvapp

figure 6: ipad-touch

While finally selecting a design to prototype, we asked ourselves the following questions:

- Which interface would be most compatible with both our student cohort (6-12 year olds) *and* our teacher cohort?
- What parts of project-based learning did students, teachers, and parents enjoy the most, and which of these interfaces best promotes those qualities?
- Which of the two design realizations best compliments the features we want to include?

Based on these questions, we considered which unique assets each interface could provide, as well as some potential limitations (summarized below). We felt that the iPad interface provided a cleaner, more simple, more applicable, and much more intuitive application than the web interface would. See figures 7-9 on the following page to view our task storyboard exploration of the iPad user interface. Notice how the reliance on gestures and buttons creates an equally comprehensive but much more visually simple interface than the web-based design of Figures 4 and 5.

| iPad	Traditional Computer Web Page
+ mobility (great for kids!)	+ most screen space
+ built-in camera for submission	+ word processing easiest
+ touch interface (intuitive)	+ power users (*some* teachers)
+ more screen space than a phone	+ printing info is easier
- not suitable for power users	- hard to interact w/ other apps
- not everyone has an iPad	- little to no mobility

Task Storyboards for Tablet UI
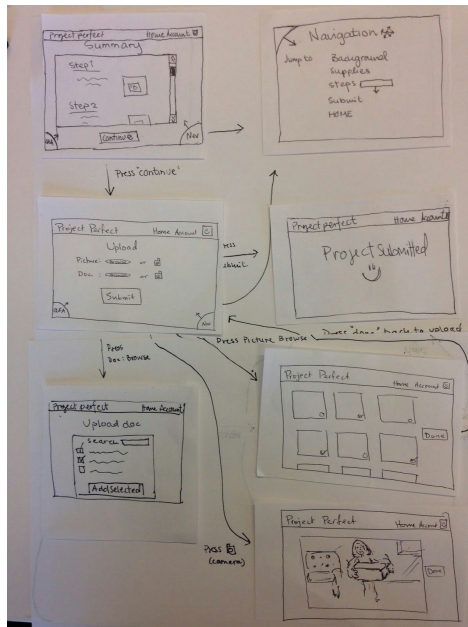
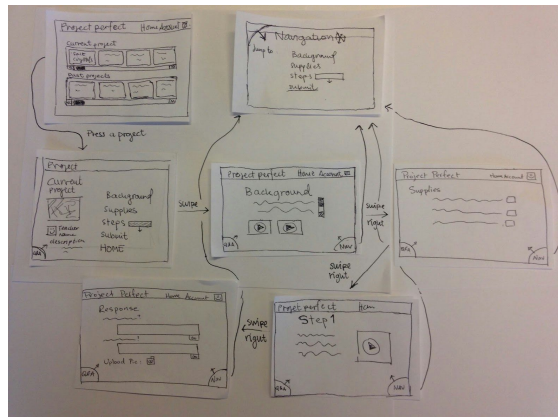figure 7: submitting a completed project

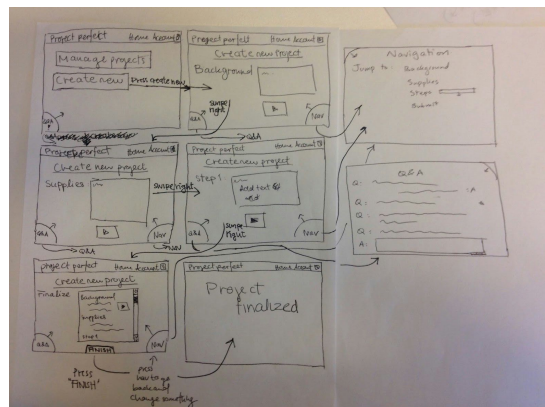figure 8: following steps to complete the project

figure 9: teacher creates a new project

Prototype

We built our low fidelity prototype around three important tasks: creating projects (teachers), viewing instructions and completing a project (students), and submitting pictures and reports (students). The nature of our application required us to create two completely different task flows for teachers and students. The prototype itself was drawn out pencil on paper.

For the teacher-relevant task (creating a project), the tester starts on the teacher homepage, where they can choose to either manage their classes or create a new project. After selecting "new project", testers are presented with a screen where they have the option to either "create a project from scratch" or "view a collection of project templates". The latter option leads to a collection of project templates.   Selecting the former option takes the user through the process of creating a project, allowing them to input media (video, text, images, etc.) to the various component pages of the project outline ("Background", "Step 1", etc.). As seen in figure 10 (next page), the teacher can navigate the different portions of their project by simply swiping left and right., or pulling on the "Nav" tab on the bottom right of the screen.at any point. The "Q/A" tab is also available on all screens so that teachers can respond to questions as and when they appear from students (a big ! appears when a student has just posted a question).

Our two other tasks were more relevant to students. student interface starts at the student home-page, where they can select from a list of past and current projects. Once they tap the project on which they want to work, they can navigate through the Background, Supplies, Steps, and summary pages before entering the submission page. As seen in figure 11 (next page), navigation is very similar to the teacher interface, relying on swipes and the "Nav" menu. The "Q/A" tab is also available throughout all the screens in this task flow, so that students can ask questions at any time to their teacher.

Finally, the project submission task was designed to be as simple as pressing one button, taking a picture of the final product, and hitting submit after reviewing the submission. The submit feature would primarily be useful for projects that need student responses or a picture/doc of the completed project.
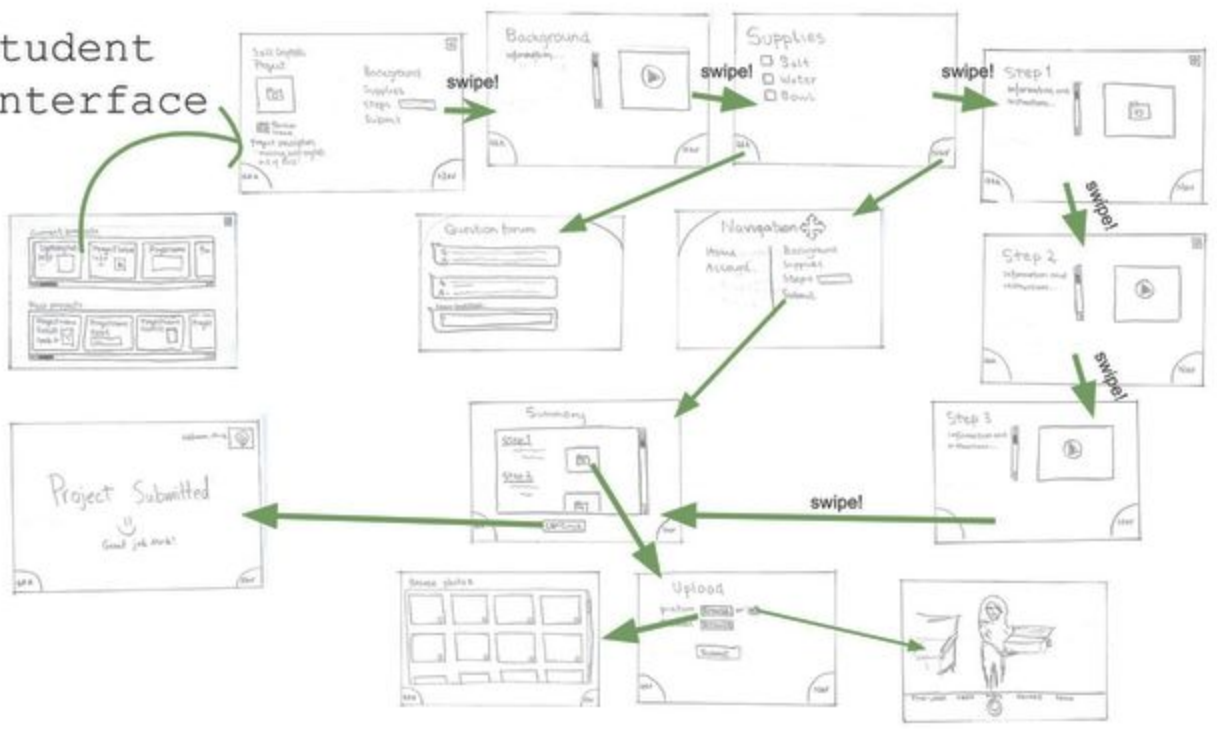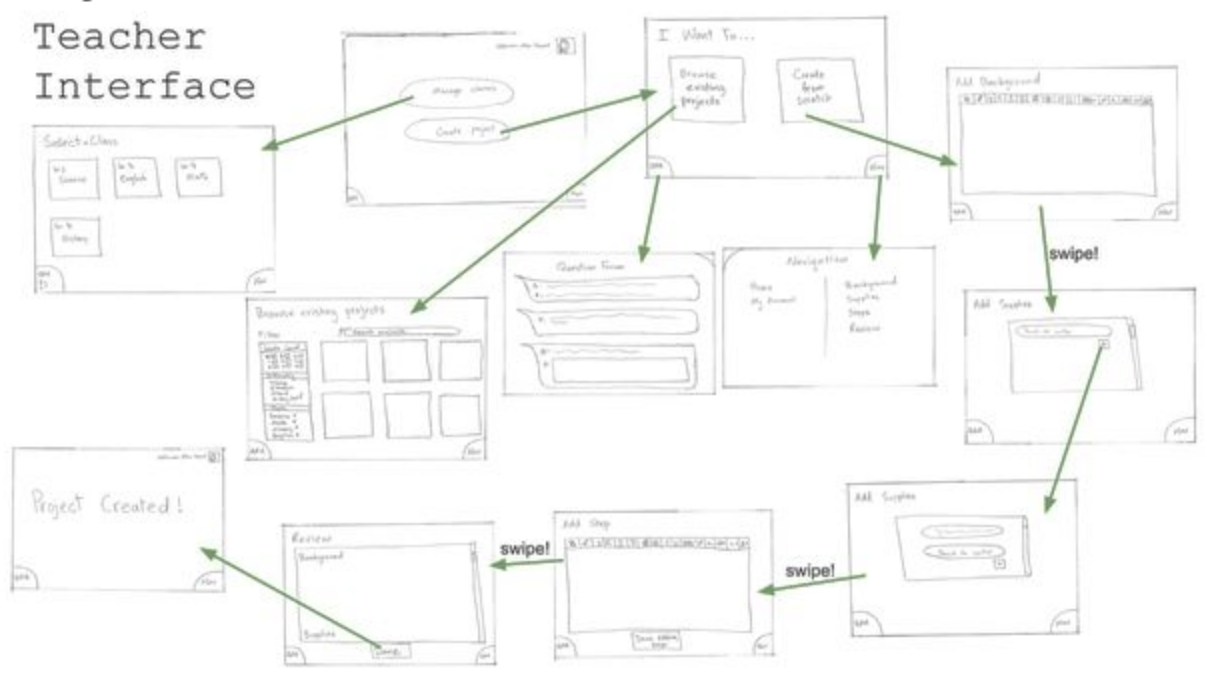
figure 10

Student Interface

figure 11:
Teacher Interface

Method

Participants

We took advantage of Priyanka's network of 4th and 5th graders in Cupertino to identify three test subjects actively involved in the elementary school learning space. One was a teacher at a public elementary school and the other two were students at the same elementary school.

Environment
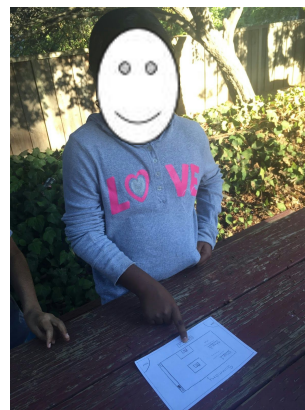

figure 12, teacher in testing environment

figure 13: student in testing environment

Testing on the teacher subject took place in the teacher's lounge after school for about 45 min. The student interviews took place at a community playground in Cupertino. Although ideally we would have conducted the tests at the students' homes, their parents were at work at the time and suggested the playground as the safest and most convenient meeting spot.

Tasks

The three tasks we asked our test subjects to attempt were: as a teacher, (1) walk through creating a project for a class; and as a student, (2) pretend to do the actual project and (3) go through the process of submitting the project. Since each of our tests targets a different user group, our test users did not all complete three.

Procedures

The team members who participated in testing were Priyanka and Ikechi. Due to scheduling issues, a third tester was unable to join. Priyanka played the role of facilitator and Ikechi played the role of computer. In preparation for testing, we tried to run our script within our group to make sure it sounded objective, welcoming, and clear.

Our test subjects were primed with an introduction, where we also asked some questions to understand their previous experience with iPad apps and class projects. We then proceeded to ask our test users (or their parents!) to sign consent forms. Finally, we set the stage for our test users by

giving a brief introduction about the purpose of our app and the general way to interact with it (swipe to change screens, for example).

Test Measures

Before beginning our experiment, we collected demographic information about each of our subjects. We asked whether they knew what an app was, whether they knew how to download an app on their own, and whether they had ever worked on a class project.

During the actual experiment, the metrics we kept track of included the amount of time each subject spent on each task of our prototype, and the number of errors a user made. We defined an error as an instance where a user tries to click/tap/swipe something not meant to be clicked/tapped/swiped or an instance where a user asks what a button/feature is. All comments, feedback, and reactions were taken note of as well and we have summarized them in the appendix.

Results

Teacher 1

Our teacher subject responded very positively to the product as a whole. She liked the iPad interface and the potential for differentiated learning. She mentioned that she had been developing a project that morning, and that the procedure that we presented on our prototype made her feel like we had "read her mind." She had some difficulty with our wording, at times. For example, she mentioned being confused by the "Nav" tab - shortening "Navigation" was not intuitive. With regards to the project creation interface, she liked being able to add different types of media, but mentioned that she would probably not add much text since it is hard to type on an iPad. The strongest response we got from this subject related to missing functionalities. She would have liked being able to export projects to save them locally. She also would have appreciated if students could work on teams and answer each other's questions. Finally, she mentioned that compatibility with California learning standards could be useful.

Students 1 and 2

The feedback we got from our students was a little less detailed, but provided important insights on how we can make our platform more accessible to young users. Since both responded to our prototype similarly, we're grouping them into one section here.

Both students responded very well to the swipe to navigate interface. They also found the layout of the student home page very intuitive. Similar to Teacher 1, our students struggled with the same terminology ("Nav", "Background"). Also similar to our teacher, Student 2 mentioned feeling that pulling out the Navigation and Q&A menus was confusing. Instead, she mentioned that her intuitive response to these buttons was to touch them. This might have been due to the static nature of a paper prototype - but it is an important insight nevertheless.

Discussion

Some of the key changes that we need to make relate to functionality. Our participants unanimously believed that students should be able to answer questions posted by their peers. Our teacher subject, in particular, shared that project exporting and student-to-student interaction through teams or the Q&A would be critical to the product's success.

Much of the other feedback we got related to UI Design. Our participants struggled to understand some of our terminology ("Background", "Nav"), or felt that more appropriate wording could have been used ("English"->"Language Arts", "History"->"Social Studies"). Moving forward, we need to improve the clarity and relevance of these titles and headers.

We need to review the design of our "Q&A" and "Nav" buttons, which produced mixed results during testing. Users liked being able to quickly access questions and navigation menus, but struggled to understand the terminology we chose as well as the dynamics of these two shortcuts (they often tried to tap instead of dragging). Some design alternatives to explore include: experimenting with new terminology or symbols that imply functionality, changing the design of the tabs to help users understand intended dynamics, and changing the dynamics themselves so that the menus expand with only a tap as opposed to a drag. We still feel that easy access to these two menus is critical for smooth use of our application, so removing the tabs altogether is not an option.

Finally, we need to re-think and potentially re-design the content creation interface, which should be more touch driven as opposed to word-processing driven. We might borrow from the content creation interface created for the web version of our product.

One potential limitation of our study might be that it was conducted with a paper prototype instead of an actual device. Some design approaches might be very effective on paper but later prove to be awkward on a handheld device. Another might be that parents were never present during student testing. Conventional wisdom suggests that the presence of parents might have a huge influence on the way students interact with their take-home projects. We believe that these gaps in our understanding will be filled, as we continue iterating on our design and building stronger and more detailed prototypes.

Appendix

Testing Script

Introduction

We've been working on an app for teachers and students that makes class projects easier and we want to get your insight on it! We have sketched the tentative design of the app and want to observe your interactions with this design. A few things we would like to know about you:

- Do you know what an app is? (important to know for students)
- Do you download apps on your own?
- Have you worked on a class project before?

Confidentiality

Whatever we discuss today is completely confidential. No information that can identify you will be available to anyone except our team and instructor. Please sign a short consent form if you are ok with participating.

Introduction of Project Perfect

What you will be interacting with is a very basic, rough sketch of how our app will look like. Our app is highly touch-based and would be implemented on an iPad. You can swipe like this to move back and forth between screens. Please let us know anytime if you have questions about how to interact or if something is intuitive/unintuitive for you. We appreciate any and all insights and suggestions for improving the app and have three tasks for you to walk through.

- First, you will put on a teacher's hat and walk through creating a project for a class.
- Then, you will put on a student's hat and pretend to do the project.
- As a student, you will also go through the process of submitting the project.

Raw Data

	Student #1	Student #2	Teacher
time spent on task 1: project creation	-n/a-	-n/a-	10 min
time spent on task 2: walking through project outline	4 min	2.5 min	-n/a-
time spent on task 3: submitting project	2 min	2 min	-n/a-
number of errors	3	4	2
have you ever done a class project?	yes	yes	yes
do you know how to download an app?	yes	yes	yes
do you know what an app is?	yes	yes	yes
school year	4th grade	5th grade	5th grade
time spent interviewing	10 min	15 min	45 minutes

Additional Interview Notes and Feedback

Teacher #1:

Design feedback

- For the student task flow, she said it is intuitive and a good way to follow the guidelines step by step
- Recommends changing English->Language Arts and History->Social Studies
- She would be very brief when typing background because it is difficult to type on iPad for long
    - if she also had a web interface, that would make life easier
- Likes that she can customize background page so that she can omit text and just have videos/pictures for some projects
- Navigation after successfully creating project wasn't intuitive

Functionality feedback

- She had just made a project in the morning and the task flow was exactly what she was thinking of. She was surprised we "read her mind"
- Fav feature is ability to browse existing projects since she often reuses them
    - Likes that she can tweak existing projects
    - One thing that would prevent her from using the app would be if she couldn't export data. She doesn't want to lose all her work, so she really really wants this feature
- Wishes we had a feature to add an Essential Question and Learning Goals (standard in CA)
- Wishes students could answer questions too
- Said our project is good for differentiated learning (different students can work at their own pace)
- Wishes we could let students work in groups of 2-3, since in elementary school, projects often are in groups
    - makes it easier to grade for the teacher
    - more fun for the students
- Currently uses google docs to do projects, but this doesn't allow interactivity with students especially when they have questions
- Said that usually elementary school teachers have one class, so the select a class page isn't necessary
    - But the number of classes a teacher teaches varies from school to school and district to district
- Coincidence: she thinks iPads are a great device to put our app on and would invest in it
    - School bought ipads for classroom use for all teachers and students
    - One concern is that to have an Ipad app used by students, need to send out permission slips and get them signed
- Note that projects are usually offered at the end of the topic lesson

Student #1:

Design feedback

- they liked the swiping interaction
- Feature of ticking off supplies on the supplies checklist was not obvious
- Found the first page for the student task flow very intuitve (current/past projects selection)
- Found video on background page intuitive

Functionality feedback

- they really liked the Q/A feature
  - Wishes students could answer too
- Didn't really understand what went on behind the scenes for the teacher task flow
  - since she doesn't know how teachers make projects
- Little confused why there was an upload picture/doc feature
  - not used in elementary school?
- Doesn't feel need to have questions private

Student #2:

Design feedback

- Found browsing photos obvious (knew that she could select multiple photos)
- Didn't know what "nav" stood for until she swiped it
- Seemed to enjoy using the app
- Thinks the q/a and nav buttons should be touch based also (not just swipe to pull)
- Found video on background page intuitive, clicked it and then swiped to continue to supplies page

Functionality feedback

- Found app very intuitive after seeing student #1 use it
- Really wanted to be able to answer questions too
- Didn't think private questions were necessary
- Wanted another section on the home page for projects (current/pas projects + recently created projects from teacher)
- Wanted another thing on the Q/A page - comments from teacher/student, different from answers from teachers
- Wanted to be able to group projects by folder
- Appreciated idea of having streamlined projects, said it was cool