
POVs and Experience Prototypes

for

Optimizing K-12 Learning Environments

Problem Domain

Our team's problem domain is the creation of better teaching and learning environments for elementary and secondary schools via mobile technology.

Some feedback we received after our initial needfinding was that the scope of our target audience was too large, and thus it might be beneficial to narrow that scope to one profession. We chose teachers as the profession, and in particular, we decided to look at elementary and secondary school teachers.

Initial POV

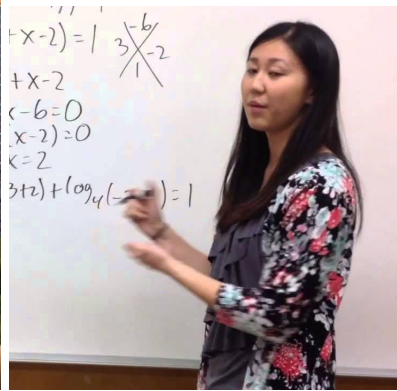
- ❖ We met **Aileen**, an elementary school teacher who has been teaching all subjects for 3 months.
- ❖ We were amazed to realize that her **biggest challenge** was in getting her students to **focus** on the lesson.
- ❖ It would be game changing to find the **optimal learning environment for each student**.

Additional Needfinding Results

Interviewees



Jonathan Agin
Social studies
Grades 7 - 12



Sharon Matsuoka
Mathematics
Grades 6 - 12



Aileen Chang
Elementary School
Grades K - 1

First we interviewed Jonathan Agin, a former high school teacher living in New York. We learned that one of the pain points Jonathan had was in planning his assignments, which he said can take upward of 1.5 to 2 hours to prepare every day. He said that many of his lesson plans at one of his jobs were passed on from his predecessor, and that was a big help to him. Additionally we learned that he really valued feedback on his teaching and stated that feedback is "an important part of being a teacher." However, much of the assessment information comes through ad hoc feedback mechanisms like preliminary, formal, and summative assessments given at various points in the course.

Next we interviewed Sharon who worked as a teacher for several years in California. We found that there is much variation in the way teachers plan lessons. Additionally, we found that a major pain point for Sharon was that, in many classes, she needed to "teach to the middle student". She explained that there is substantial variation in the knowledge of a given student in the same academic level in the classroom. When teaching material this means that half of the students are lost with the topic and the other half believes the course is moving too slowly. In order to gauge where the middle student was, Sharon and her colleagues would give preliminary assessments at the beginning of school year.

Lastly, we interviewed elementary school teacher Aileen again. She started her teaching career in the elementary school 3 months ago. She talked about how as a new teacher, she spent 3.5 hours a day preparing for lessons. She also shared concerns that the vastly different knowledge levels of kids pose challenges to her teaching. But her main concern is still on students' behavioral problems. She talked about how students were easily distracted by things going on in their personal lives during lessons.

Revised POVs and Sample HMWs

POV 1

- ❖ We met Jonathan Agin, a former social studies teacher from New York City.
- ❖ We were surprised to find that it took him 1.5-2 hours every day to plan his lessons from the following day.
- ❖ It would be game changing to make lesson planning easier and more collaborative.

How might we?

- **Let teachers search many lesson plans for key terms and ideas**
- Incentivize teachers to share their lesson plans
- Standardize the way lessons are planned
- Test marginal changes in lesson plans
- Test new activity ideas
- Divide work among different groups of teachers
- Create a common space to store lesson plans
- Incorporate information on the class' existing knowledge in lesson plans
- Remove the teaching completely by outsourcing
- Incorporate students' feedback on lesson plans

POV 2

- ❖ We met Sharon Matsuoka, a math teacher who has taught at four different schools across the performance spectrum over the past few years.
- ❖ We were surprised to find that she needed to teach to the middle student since there is a substantial amount of variation among student knowledge in a given class.
- ❖ It would be game changing to tailor content to each student's knowledge and interests.

How might we?

- **Get data on students' knowledge**
- Assess how well a teacher is performing
- Assess how well plans are working
- Give all students some amount of one-on-one tutoring
- Have students learn from each other
- Get students to catch up on free time
- Help every student apply new learning to things that excite them
- Get real time learning metrics data

- Detect the knowledge gaps of every student
- Separate students based on knowledge in a politically correct way

POV 3

- ❖ We (again) met Aileen, a new elementary school teacher.
- ❖ We were amazed to realize that she even tried meditation in order to help her students focus, but it does not work well.
- ❖ It would be game changing if we can organize students such that they behave.

How might we?

- **Make students understand why they should focus on their current materials**
- Use student's energy in learning
- Make class more engaging
- Help teachers learn classroom management skills
- Help students to focus better
- Get students to police their peers' behaviors
- Engage parents to help their kids behave
- Create a tracked behavioral reinforcement system
- Incorporate counseling and psychological services in schools
- Separate peers into different study groups
- Make learning cool
- Isolate problem students

Three Selected Solutions and Explanations

1. Modular, standardized lesson plan format (HMW 1)

A modular format for digital lesson plans would let teachers mix and match concepts and activities to fit changing classroom needs over time. Lessons and pieces of lessons could be shared, edited at will, or preserved as-is for the future.

2. Optical character recognition for physical lesson plans that teachers upload (HMW 1)

This would allow teachers to easily digitize physical materials passed down by predecessors. More importantly, it would let them search through a huge database of these materials, finding great ones from all around the world that were previously unavailable.

3. Create a gamified system to reward assessments - HMW 2

The broader system hinted at by this idea is one where teachers could see at-a-glance data on where exactly every student is excelling or struggling. Teachers could then tailor their lessons better and give more personal attention. The gamification aspect helps to distinguish this data-gathering from ordinary standardized testing, which according to many teachers can be an impediment.

Experience Prototypes: Design and Testing

Starting from these solutions and incorporating related ones that weren't chosen, we used a whiteboard to sketch out each prototype. While waiting for our prototype interviews to begin, we also took some time to sketch one on a digital interface to provide a clearer illustration. We tested our experience prototypes on three tech-friendly educators. The first was Dr. Karin Forssell of Stanford's Graduate School of Education, with whom we tested our prototypes in person by presenting her with pictures of various screens and walking her through what a teacher would experience when using them. The other two prototype testers were Amanda Klein, a high school history teacher, and Elle Dodd, an elementary school teacher.

Experience Prototype Testers



Dr. Karin Forssell
Stanford GSE Professor
teacher

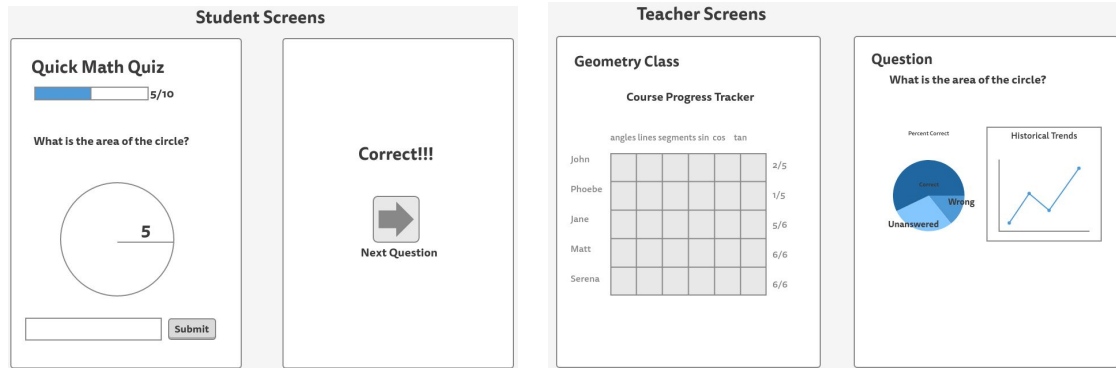


Amanda Klein
HS history teacher



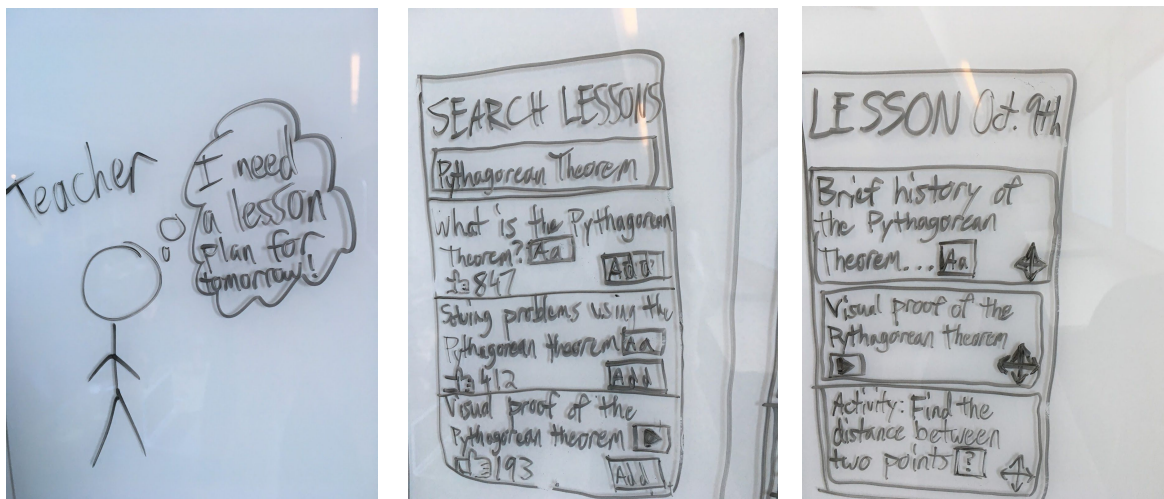
Elle Dodd
Elementary school

Experience Prototype 1



In this prototype, we thought of a way to collect up-to-date student data and present it in a useful way for teachers in their lesson planning. We assumed that this data is not already systematically collected by the summative assessments given at the end of the year. We tested the prototypes by showing them to the teachers that we interviewed. What worked was that the teacher screens give clear information on what the students know. What did not work, however, was that it's apparently quite difficult to break knowledge down into this level of granularity and have questions that are evaluative. By and large, our assumption was valid since our interviews showed that teachers typically do not have this information at the start of the year when plans are being made. A new assumption is that there are ways to make learning units more modular and testable.

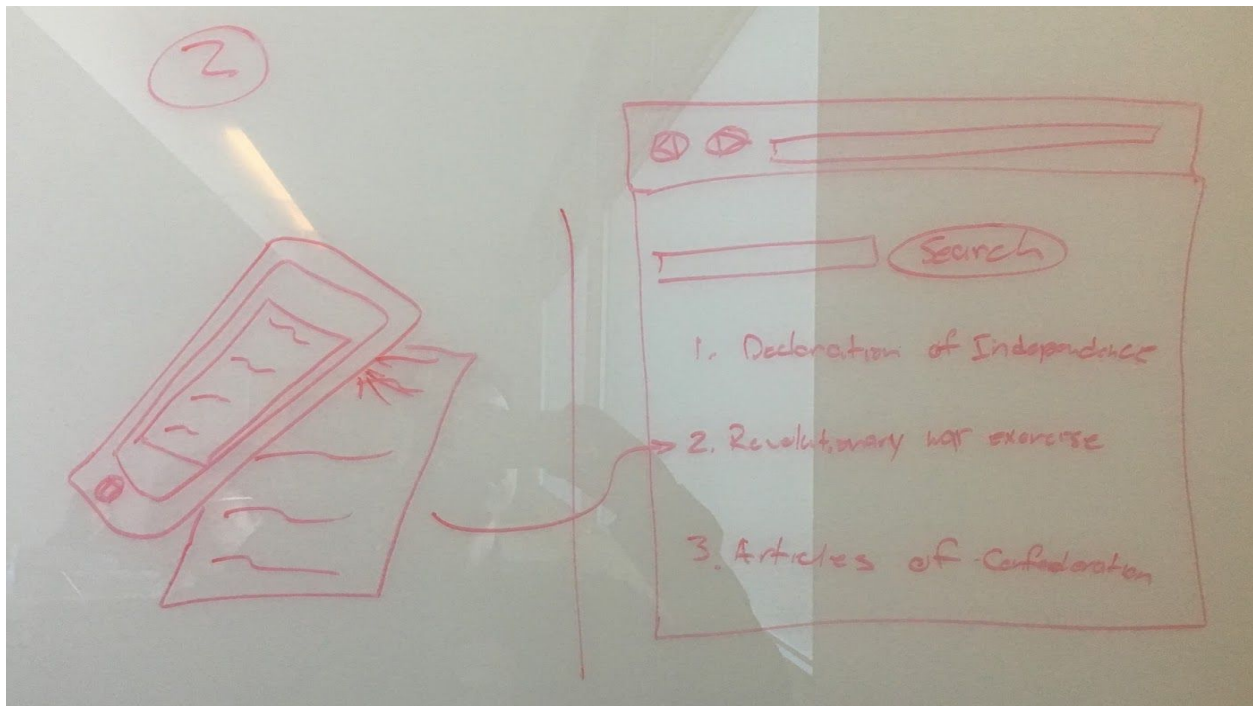
Experience Prototype 2



This prototype starts with a scenario where a teacher needs to produce a lesson plan. This is followed by two screens showing the process of creating one with a modular drag-and-drop interface. We assumed that adapting lessons to different classes was a clear need and that the time-saving benefits of this mix-and-match approach would be

apparent. One tester liked that you “can snag what you need” and thought this could be a handy way to adapt lessons. However, this tester also thought that other services like Google Docs already solve this issue, and another tester thought it seemed hard to understand and time-consuming. We learned that the keys to a great UI are ease-of-learning and a blatant advantage over existing ones. It was clear that while adapting to different classes and saving time were true needs like we assumed, the benefits and usages of this solution should have been clearer.

Experience Prototype 3

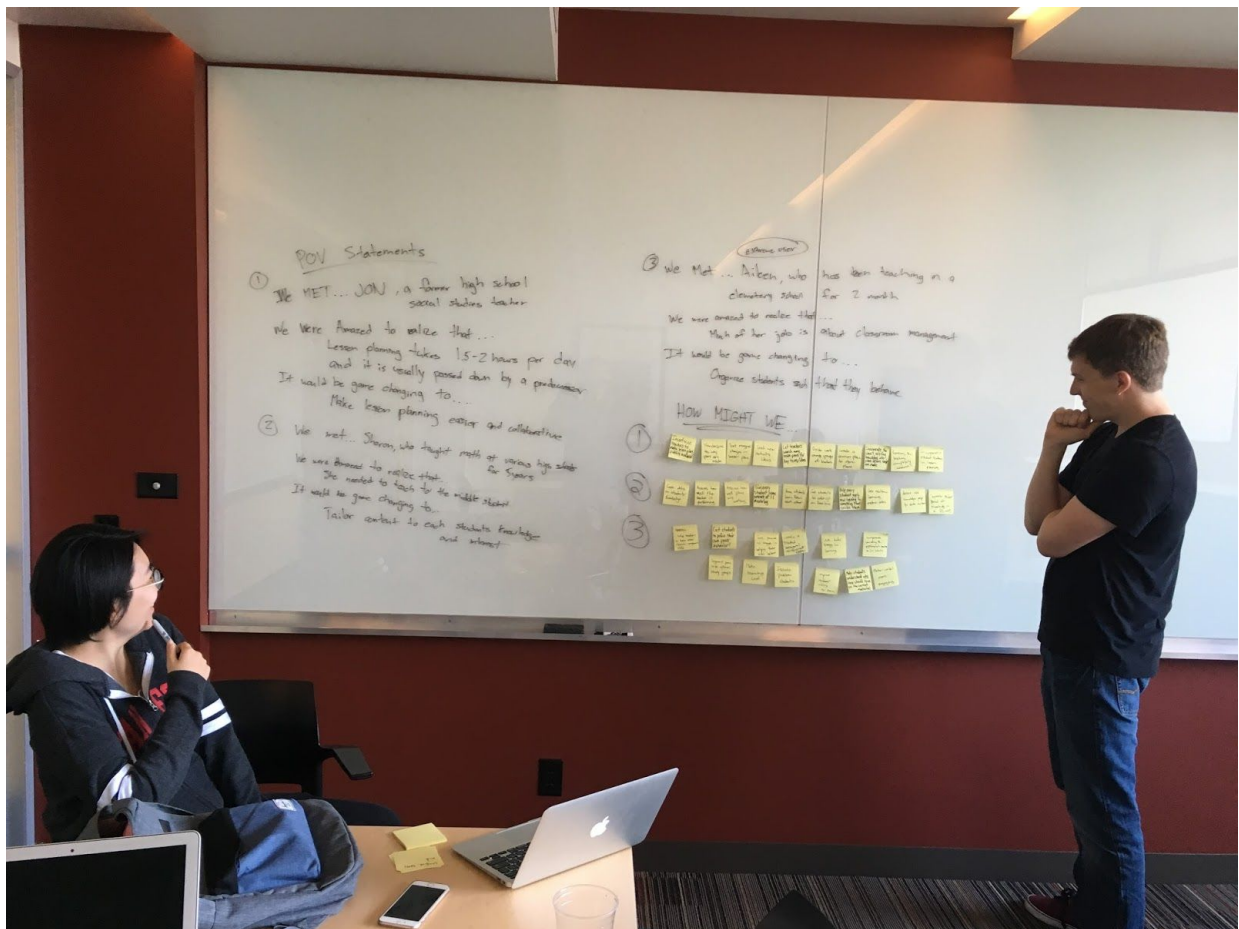


In the first frame of this prototype, a smartphone is shown photographing a lesson plan, which appears in the second frame as a document in a browser thanks to optical character recognition. Digitizing physical lesson plans would let teachers share them in a common space. One of our testers agreed that this touches on a real problem and another noted its similarity to a popular app called Teachers Pay Teachers. However, this second fact is a double-edged sword, and one tester also noted that this prototype doesn't address the core of her time problems, i.e. the many tasks that have to happen **after** a lesson. The fact that this, not the availability of lesson resources like we assumed, is a bigger resource problem facing teachers proved to be an important new learning.

Most Successful Prototype

Prototype 1 emerged as the winner. Out of the three, it elicited the most positive responses overall and seemed to address the most pressing need. Interestingly, each teacher said something to the effect of "I've tried something like this on my own by..." which gave credibility to our belief that teachers want to give each student unique guidance in spite of limited teaching time and resources. Going forward, our team will explore how this solution can be made even more effective and simple to learn.

Appendix



Brainstorming session from our interviews

