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# Blueprint

## Peer to peer feedback

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# Abstract

*Blueprint is a peer to peer app that encourages kids to explore their interests and provide feedback to other students. Through careful scaffolding the app strives to move beyond "Good job!" feedback, and helps students engage at a more meaningful level. Feedback is an essential component to learning and developing a skill set, by harnessing crowd knowledge our team believes we can enable students to further develop their skill sets.*

*Through several months of research our team developed and iterated upon many ideas that eventually led to Blueprint. We conducted contextual inquiry with experts, maker professionals, and a Pennsylvania school district. Our methods ranged from developing personas to creating experience maps, helping us understand the maker space at a more granular level.*

# Problem Statement

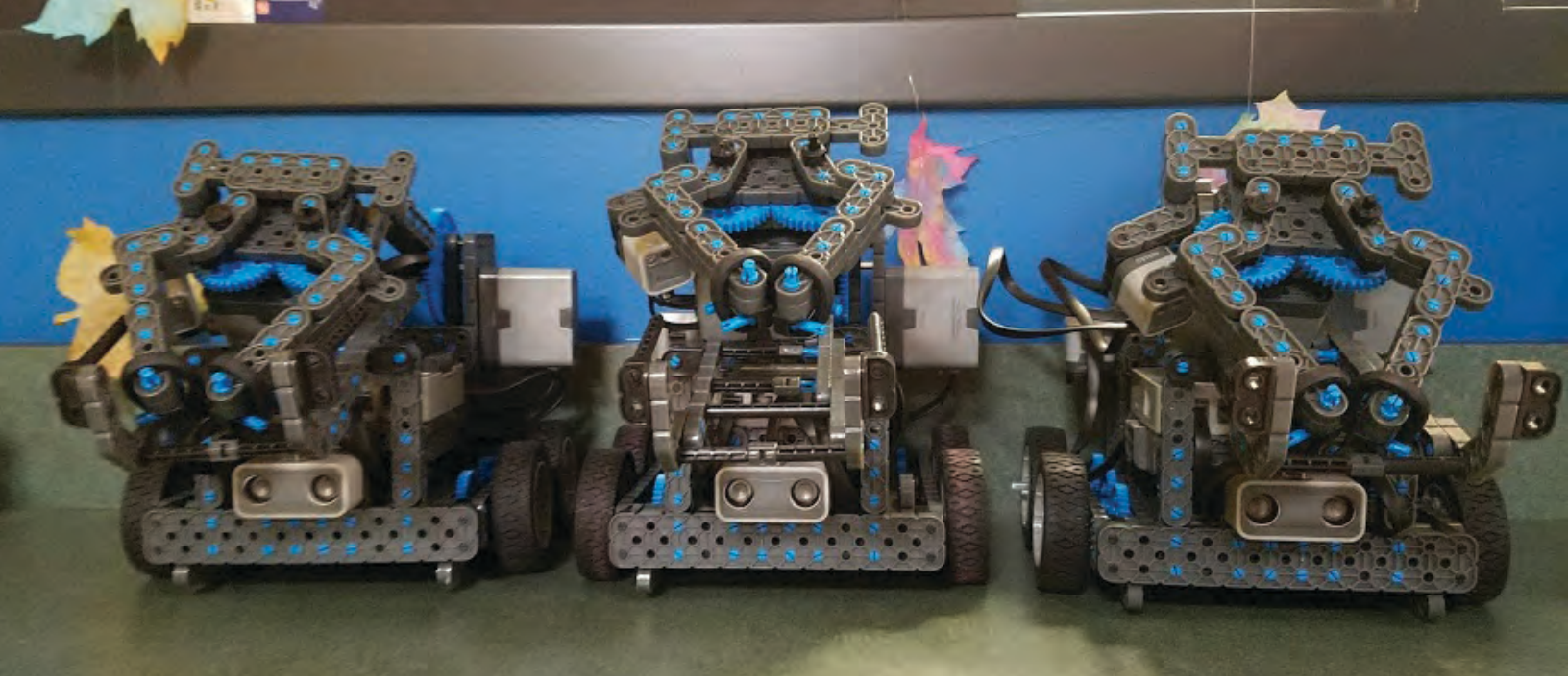
*Portfolio's are a student's tool through which to document, reflect, and add to their body of knowledge and skills.*

**COLLECTION OF WORK** A portfolio might be described as a collection of work. In educational contexts, portfolios are used in a myriad of ways. One way is as a student's own tool through which to document, reflect, and add to their body of knowledge and skills. Another method is as an assessment tool by teachers, institutions, colleges, and even potential employers once students become more expert.

In conjunction with this multifaceted approach, there is a decentralized nature to the portfolio in education ecosystem. Some challenges to which this translates include student's portfolio projects not following them through their education, teachers now knowing how to implement project based learning, teachers not knowing how to use portfolios or connect projects to portfolios in their classrooms, higher education institutions unsure how to evaluate portfolios as parts of criteria for admission, etc.

Maker Ed is a national nonprofit whose mission is "to create more opportunities for all young people to develop confidence, creativity, and interest in science, technology, engineering, math, art, and learning as a whole through making." This connects to project making in formal and informal educational contexts. Maker Ed also put together

*Unknown. (Unknown, Unknown). Open Portfolio Project Overview. Retrieved from http://makered.org/opp/overview/ .*

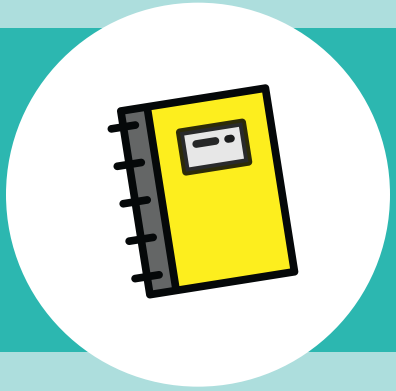


A few of the many resources students have available to them at South Fayette, teaching kids to build, explore, and play.

*Through Professor Marti Louw's Learning Media Design course at Carnegie Mellon University, our team was exposed and partook in this project by researching, visioning, and prototyping a learning technology design that addresses a key challenge related to open portfolio practice and proliferation.*

research briefs on making for learning throughout the United States to formalize a synthesis of practices and philosophies on the ground behind making in education. The organization is also host to the Open Portfolio Project (OPP), which "aims to develop a common framework for documenting, sharing, and assessing learning through portfolios. Open portfolios are openly networked, decentralized, and distributed systems of documentation, curation, and reflection, which can showcase a learner's abilities, interests, and voice in a way that test scores and grades cannot. Especially for students who may not excel in academics or high-stakes testing, portfolios allow for both themselves and others to recognize the skills and ideas they have to offer and contribute. Inherent to the creation of a portfolio is the process of reflecting on one's work, curating what's most appropriate for an intended audience, and designing an artifact to articulate that evolution of learning and making". Through Professor Marti Louw's Learning Media Design course at Carnegie Mellon University, our team was exposed and partook in this project by researching, visioning, and prototyping a learning technology design that addresses a key challenge related to open portfolio practice and proliferation.

Peer



Portfolio

Peer

# Vision

**OUR WORK** To address Maker Ed's open portfolio design challenge, we designed a platform that is portable, scalable, and shareable: Blueprint. Our application makes projects easily viewable and discoverable to motivated, interested learners and makers.

Our platform will be successful when students can learn about process documentation, iteration, and reflection from peer feedback regularly and with ease. This problem is important based on our research because both students and teachers at South Fayette Township School District, our primary research space, had difficulty finding exemplars of documented process work. Although South Fayette is a resource-rich, formal learning and making space that reaches out to experts in the community, students still had difficulty receiving quality feedback on their projects and portfolios, as well as finding exemplars to look to for inspiration. They also have trouble placing themselves in their own work.

We believe our solution will help high schools everywhere connect to the relevant experts and find meaningful exemplars with ease. This system should encourage iteration and improvement on projects, based on feedback from peers, so as to encourage self-reflection in learners.

# Design Research and Synthesis

# Introduction to Makerspace

**PROMOTING STEAM EDUCATION** Nina Barbuto and Megan Cicconi provided our class with a brief introduction to the makerspace, and pointed out several useful insights. At Assemble, Nina promotes making in a low-income community, helping kids engage with STEAM learning. She provides kids with a space where they can be an expert, from Laser Cutting to Minecraft. One of her main challenges is to increase community awareness and create meaningful impact. Megan's space is a formalized learning setting at Fox Chapel School District. She aims to provide an environment where kids can experiment, fail, and learn. Through maker education, she tries to boost college and employment applications meanwhile striving to prepare kids for the real world.

# NINA BARBUTO

*Director, Assemble*

*"Making is not about the end product, it's the process"*

## MOTIVATION

Create diverse maker-space and community

Giving people the opportunity to be an expert and showcase that skill

Showing kids that they can change the community around them

Educate your audience about your thought process and engagement with the material

## NEEDS

Access to experts their knowledge & experiences

Methods for documentation for reflection and feedback

Increased engagement and project showcases for/with the community

## GOALS

Creating environment where learners can be comfortable and have fun

Increase engagement with the community, create connections, take down barriers

Confidence in making abilities, self-reliance and empowerment

## TOOLS

**DropBox**

**GoogleDrive**

**Prototyping**

**Camera**

## INSIGHTS

Nina works with several families that use a mobile device as their primary computer, therefore the mobile interface is extremely important for kids to share work with their parents. Similarly, my team was captivated by the idea of a fridge as a portfolio. How can we replicate this tangible experience on a digital device for parents and children?

# MEGAN CICCONI

*Director of Instructional and Innovative Leadership, Fox Chapel Area School District*

*"There's a lot of really exciting technology out there; how can we fit it into our schools and standards?"*

## MOTIVATION

Give students the help and resources they need to demonstrate their expertise and skills

Boost students' college applications

Preparing students for the real world after high school

## NEEDS

A portfolio process that caters to individual needs

One single user-friendly platform for both students and teachers to use

Templates for storyboarding and iteration

## GOALS

Effectively capture student knowledge and skillset

Support risk-taking and iteration

Encourage work that shows thoughtful process in formal education settings (for grading)

## TOOLS

**Google Drive**

**Power School**

**Moodle**

**Tumblr**

**Blackboard**

## INSIGHTS

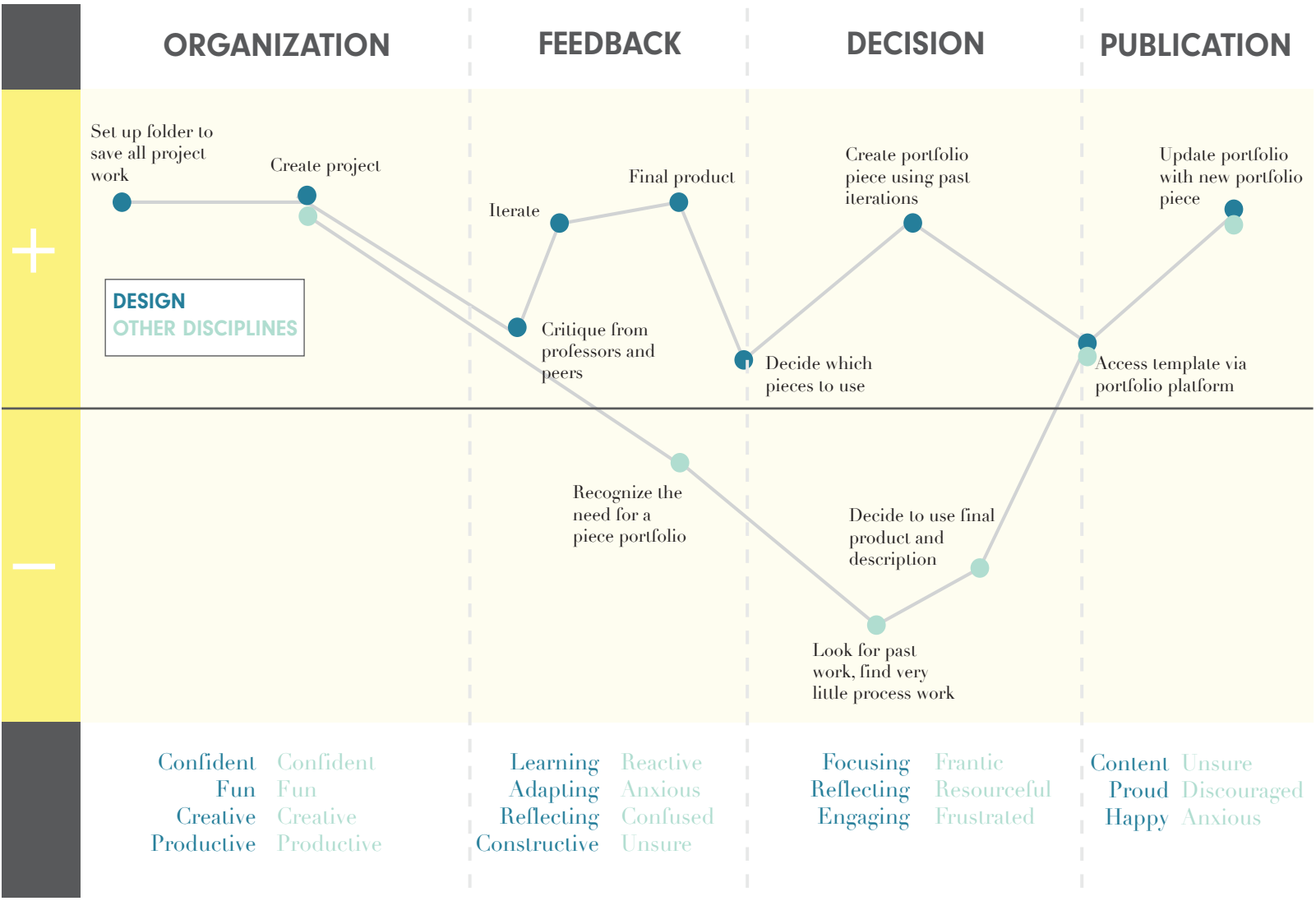
Megan guides curriculum coordinators and administrators to align curricula with the PA Core Standards. Technology plays a huge role in preparing students for life after high school, but curreent technology is neither user-friendly nor standardized. How can we develop a system (not necessarily software) that both students and teachers can easily use to review portfolio work?

# Contextual Inquiry with Experts

*Individuals from a design background rigorously documented their process work, whereas other professions often addressed it as an afterthought.*

**OVERVIEW** Our main insight during this phase of research was to begin documentation early. The most successful individuals created a cohesive portfolio process by arranging folders before their project started. Creating an easy and seamless environment that spurs documentation. Individuals from a design background rigorously documented their process work, whereas other professions often addressed it as an afterthought. Majority of our experts agreed process work and reflection were an essential part of the learning process. In the experience journey map below, it is apparent that individuals, who created an organization system early, had a more positive experience. Whereas, individuals who began portfolio process late had to play catch up.

## EXPERT JOURNEY MAP



## MARC ESTRUCH

*Marc is a Masters in Human Computer Interaction student at Carnegie Mellon University. Previously, he worked at lab testing and developing a facial recognition algorithm used in empathy studies, the cosmetic industry, and other applications.*

### MOTIVATION

"I keep a portfolio so anyone can contact me. You never know, who will got to your website."

"Portfolio gives you more space than a resume so you can take the time to show, who you are."

### TOOLS

Bootstrap

Camera

Links to Apps

Social Media

### CHALLENGES

Showing process work. I often don't think about a portfolio piece until I have the final product.

Aesthetic. If a portfolio piece is not displayed correctly it can challenge the quality of the work.

Choosing relevant and interesting work.

### NEEDS

Better documentation practices to show multiple iterations of work.

Ways to quickly add pieces that are visually pleasing.

Better ways to determine what information is relevant to a portfolio.

### GOALS

To make documentation part of the creative process.

Show pieces based on the position I want in the future.

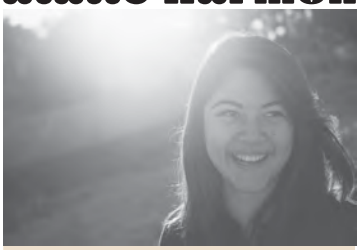
Using a portfolio to tell a story and engage the viewer.

"I need to train documentation into my creative process. A portfolio should be about 75% process work. It is the most important thing. But, I constantly get to my final product and have saved over drafts or lost iterations."

**MARC** agreed process work was important, but rarely took the time to document his work. This lead to great frustration when it took time to create his portfolio. His current goal is to include more process work with his portfolio.

**NATALIE'S** contextual inquiry session illuminated a methodological process that leads from project completion to project publishing on a formal online portfolio website meant for potential employers' eyes. Natalie said that she does not think she could adapt easily to other systems of organization since she has created one that works best for her. Also, the key motivator for Natalie's documentation and portfolio creation was for submitting portfolio materials to employers.

# Natalie Harmon



*Communications Design Undergrad, Year 4*
*Carnegie Mellon University, Pittsburgh, PA*

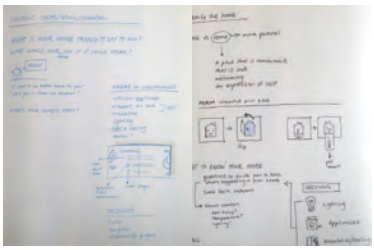
**GOALS** - Showcase design project work for potential employers (primary) and family/friend networks (distant secondary). Displayed projects should show interests, strengths, focus, willingness to take risks, and personality.

**MOTIVATION** - Show work to employers alongside resumes and job applications (primary). Help family members understand what she does as a designer (distant secondary). A place to articulate thought process behind designs.

**TOOLS** - Mostly online and computer tools: Squarespace and its templates (current content host), Behance (novice content host), Assets Folder (organization), process blog, phone (show work on the go), Photoshop (show work in context), Google Drive (share work), physical sketchbook (planning).

**METACOG. REFLECTION** - Organizing work, organizing portfolio, selecting which projects to include in portfolio, selecting which parts of project to highlight in portfolio, recognizing the importance of sharability, realizing when work is good enough and goals professional enough to start paying for platform and creating own layout.

**LEARNING MOMENTS** - Learns about how to design for web, coding languages, digital spaces. Portfolio supplements formal education. Learns about documenting her process in a clear way.



## Organization -------->

**Assets Folder** - Natalie utilizes a hardrive folder scheme in which each folder is a project clustered according to classes. Here, she stores all material she worked on in projects (colors, test colors, photos, etc.). From her Assets Folder, she selects what to upload to her Portfolio.

**Self-Catalyzed** - Professors never mandated how students should organize their work, so Natalie created her own Assets Folder system. She doesn't know how peers organize their work.

**Preference for Own Devised System** - Natalie would prefer to stick to her own system rather than learn another organizational method.

"I feel like I'm already biased towards one system."

## Publish <---------->

**Final Product First, Then Process** - Natalie puts visuals of her final product at the top of the page and as featured images. Then, she shows documentation of her process in chronological order.

**Work vs. Play** - Natalie publishes her best projects in "Work". It's this section that's displayed on her homepage. Other past projects that showcase personality or of which she is fond she puts into "Play" rather than discarding them altogether.

**Appropriate Explicit Explanation** - For some projects, explaning her systems thinking process is an asset, and she puts special effort to explaining her process. For other more graphic design projects, Natalie feels that explaining her process would be boring and mundane: "I moved this textbox here."

"Always have something handy to show. Whether it's a small sketchbook or screenshots...[at phone] this is magical!"

## Feedback

**Rooted in Experiences** - Preferred sentence structures for feedback include "I feel that you could change" or "I don't understand" or "What does this mean". "I don't like being told what to do but I can hear feedback from people's experiences whether negative or positive."

**In-Person Feedback Preferred** - Likes the in-person connection of having the person delivering feedback in front of her.

**How Electronic Feedback Is Valuable** - Lots of detail organized into sections such as "visuals, process, content". Commenting directly on points of focus in a PDF, which helps to see the context of feedback. Electronic feedback easily provides a record.

"Professors and internship people are usually like, 'yeah, it looks great," but that's not really feedback, so I'll leave it at that. That's not what I was looking for."

# Michelle Ma

**2D/3D ARTIST & PROGRAMMER**

**CARNEGIE MELLON UNIVERSITY**
**BACHELOR OF COMPUTER SCIENCE AND ART**
**CLASS OF 2017**

Michelle is an undergraduate student at CMU. She's a well-rounded artist in both traditional and digital media. She's also interested in creating experimental animations, games, and interactions with new media. She enjoys teaching others as a TA for an introductory computing class, as well as in the past as an instructore at the Pixel Academy (Brooklyn, NY) and a volunteer at Assemble (Pittsburgh, PA).

In her free time she enjoys playing video games and spending time with cats — in particular, her cat at home, Billy.

**"I DOCUMENT MY WORK IN HOPES THAT I CAN SHOW PEOPLE SOMETHING THAT I MADE AND AM PROUD OF...STILL, I FOCUS MORE ON THE FINISHED PRODUCT THAN MY PROCESS."**

## GOALS

Showcase exemplary work for peer evaluation and potential employers

Archive past work for future self-reflection and improvement

## CHALLENGES

Consistently updating, or keeping up-to-date, her public portfolio

Choosing which works are appropriate for what (friends, family, social media vs. formal professional website)

Portraying the intersection of computer science and art in her work to others

## TOOLS

Laptop

Cluster facilities

IDeATe labs

Tablet

Camera

Social media

Portfolio website

College of Art physical supplies

## NEEDS

Better peer critiques and evaluations for her work

Access to tools after graduation/ outside of formal education

Easier, more efficient (formal) method of uploading and sharing work

## OPPORTUNITIES

Sharing work within local community at school and around the city

Exploring a new interdisciplinary field

Working with well-known entities and organizations with professional facilities and resources

**MICHELLE** focuses her portfolio more on her finished works than on documentation of her processes. She knows that documentation is important to some disciplines, but doesn't find as much value in it for her purposes of peer evaluation and employment (applying to jobs). She currently struggles with getting quality feedback from her peers during critiques and evaluations, and thus has difficulty improving iterations.

**JUNYU** focuses on portfolios and documentation for jobs and applications. He understands the importance in documenting process but notes that it is difficult and requires strong motivation and metacognitive skills.

## Junyu Huang

*Junyu is a Masters student in Educational Technology and Applied Learning Science. He comes from a digital media background with most of his experineces coming from web, mobile, and hardware projects.*

***Motivation:*** *Excellence in UX design and striving to create usable, intuitive, and influential products.*

***Portfolio Skills:***
*-Web Development*
*-Website Design*
*-Typography*
*-Writing*

### CHALLENGES

Junyu feels that he has to worry about the presentation of his portfolio because of employment pressure. He doesn't think he can have a more open and free space until after he lands the job that he wants.

Junyu feels that you need to know that making a portoflio can help one develop and expand their skill set. He notes these are skills that are difficult to obtain and that he might need guidance in the first place through a course or small workshop.

For people who code, they can program a whole website, but for those who can't, they might need a template or some technical support. They might also need to learn basic coding. Additionally, portfolios need a lot of commitment and sometimes reflecting on a project is good enough. Maintenance is not always required.

"Self-direted learning requires a high level of metacognitive skills. Even though I know it is important I might not keep aiming that high"

### NEEDS

Junyu believes that just knowing you need a portfolio for something can get you to learn. While he is self motivated at times, he needs a place to let people know about hsi projects and recognize his skills and abilities.

Junyu needs a good portfolio to show case his work for schools and employers which is a different outside pressure compared to the inside pressure to create projects for the sake of doing them. Sometimes it is for personal self record and for his own learning and development.

"Letting students go through the actual process and make them reflect would be helpful"

### GOALS

Junyu developed his portfolio to apply to graduate school. He did not have one before applying and knew it was a requirement. This led pushed him to grab every opportunity for projects so they could be put into a portfolio.

Portfolios are a good way to rethink your process and think about what you have created. It is like a self refleciton that helps you reach your goals. When he thinks about his goals, he recalls the processes of how he made decisions and chooses those justifiable processes and thoughts.

Portfolios help Junyu see how much he has developed his skills compared to earlier projects. He finds it interesting to look back and see how much he has changed. He emjoys looking back to earlier iterations and reflecting on how he might make decisions in a similar situation.

"If I see something different now I know I have learned something new"

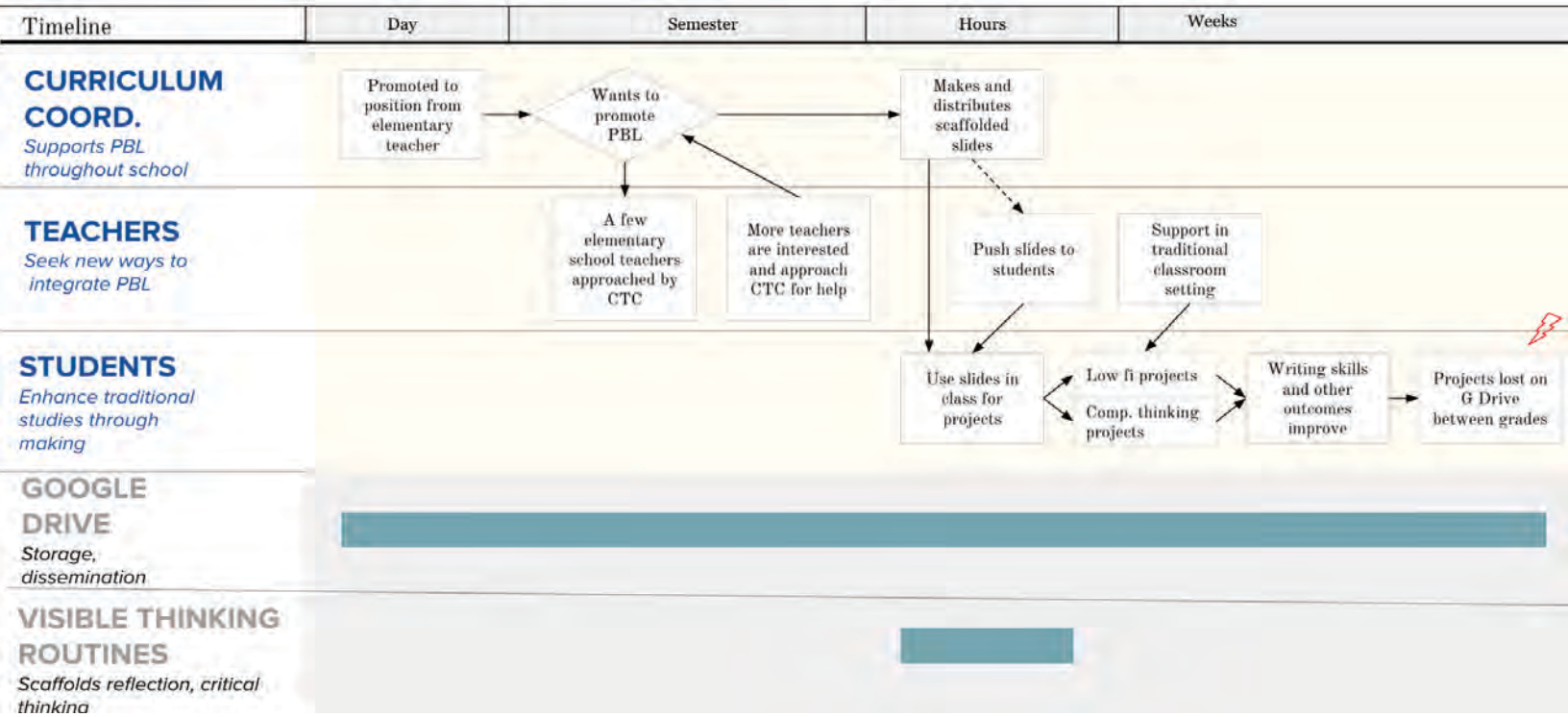
Our team synthesized our interview data through an affinity diagram, providing us valuable insight into student and administrator needs at South Fayette.

# Contextual Inquiry at South Fayette

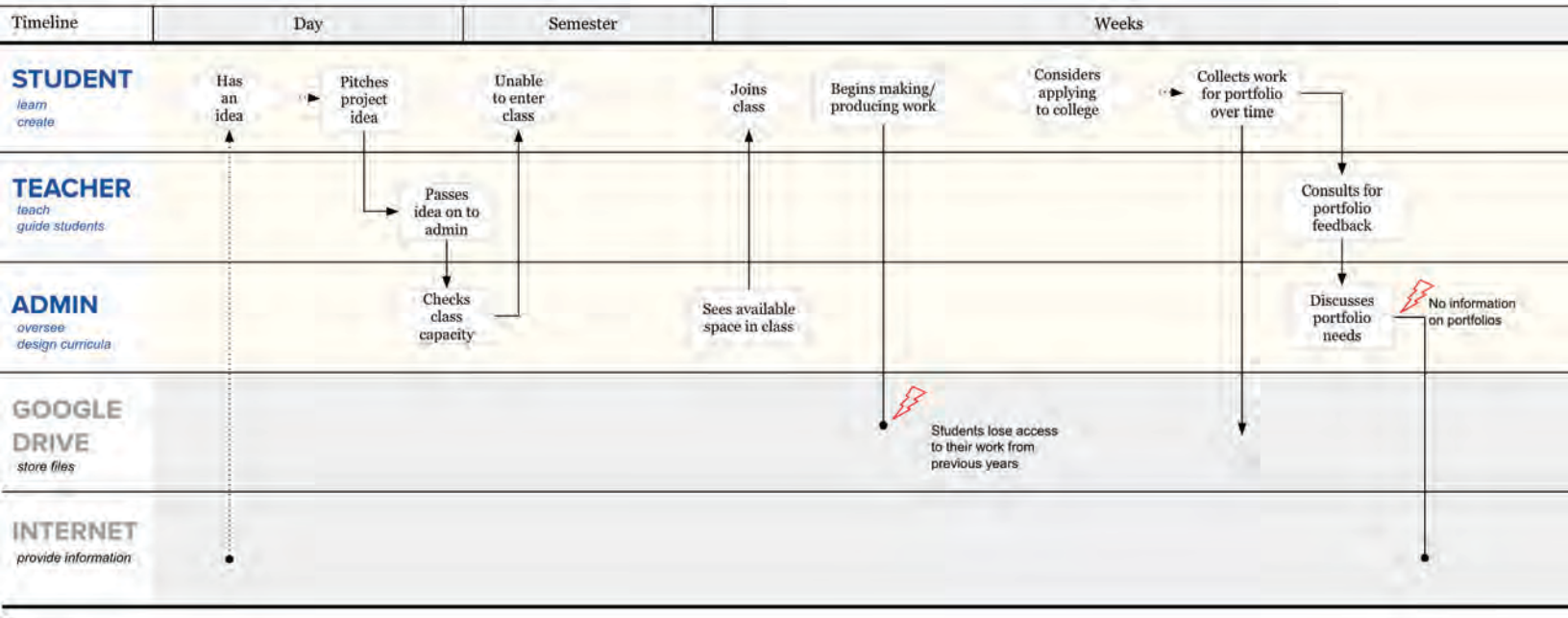
**OVERVIEW** South Fayette School District provided valuable insights into a formalized maker space. The administration had cultivated an extremely rigorous curriculum that introduced computational thinking as young as the second grade. Our team met with several advanced students, who were hungry for more opportunities, and guidance on creating a college portfolio. As the administrator informed us the curriculum simple didn't address portfolios, and the faculty were extremely short on time.

Initially, our team looked ad replicating South Fayette's makerspace success for other school districts by connecting faculty with experts in the field. South Fayette had incredible partnerships with Carnegie Mellon University, Maya Design, and All Clad that helped shape a robust maker program. Throughout the following models you will see how our team investigated this idea, and what barriers adapted our vision.

## ADMINISTRATOR SEQUENCE FLOW




## STUDENT



# Storyboards and Experience Maps

**SYNTHESIZING RESEARCH** As part of our design research and synthesis process, we created storyboards and experience maps to identify design opportunities and details in our problem space.

Our storyboards and experience mapping began based on our initial idea of connecting learners and makers with experts so they could see exemplars of work as well as receive high-quality, expert-based feedback on their projects for the purposes of iteration and self-reflection.

Based on feedback and critique from critical potential users and experts, we made the decision to pivot our approach toward peer-to-peer feedback as opposed to expert-to-peer feedback, considering there would be difficulty offering incentive to provide feedback. Based on research literature, we also focused on peer-to-peer feedback based on research suggesting that five pieces of peer feedback may be equal to or greater than in value to one expert's piece of feedback.

| **Instagram** | Persona | SB Scene 1 | SB Scene 2 | SB Scene 3 | SB Scene 4 |
|---|---|---|---|---|---|
| | Kimberly//Grade 11//interested in robotics//attends South Fayette High School | Kimberly googles MIT admissions and discovers the mysterious word "PORTFOLIO". She wants to learn more. | Kimberly and her teacher search for portfolios on Google. They come across a #specialhashtag on Instagram and Twitter. | This #specialhashtag leads to Kimberly discovering guiding statuses, videos, live chats, and examples from Maker Ed, real robotics professionals who engage portfolio practices, and other amazing resources. | As Kimberly scrolls through the #specialhashtag feed, she learns steps to help her get her portfolio started, ways to improv her documentation process, and begins wondering what projects she should make next. |
| PLACES | | Classroom | Classroom | Classroom | Classroom |
| | | | Online community | Online community | Online community |
| EXCHANGES | | | Kimberly-teacher: guidance | Kimberly-resources: feedback, guidance, mentoring, coaching, examples | |
| | | | Kimberly-teacher: articulation of goal | Maker Ed (resource) | |
| | | | | portfolio practitioners (resource) | |
| | | | | remote peerds (resource) | |
| INFORMATION CHANNELS | | internet (college website) | internet (search engines) | internet (search engines) | social media (Instagram) |
| | | | social media (Instagram) | social media (Instagram) | social media (Twitter) |
| | | | social media (Twitter) | social media (Twitter) | |
| SCAFFOLDING | | researching | social media savy | social media savy | reflection |
| | | | researching | coaching | iteration |
| | | | metacognitive knowledge | reading | feedback |
| | | | | peer critique | motivation |
| | | | | expert critique | |
| | | | | feedback | |
| | | | | mentoring | |
| | | | | examples | |

| **Experts in Rural Communities** | Persona | SB Scene 1 | SB Scene 2 | SB Scene 3 | SB Scene 4 |
|---|---|---|---|---|---|
| | Frits // 17 years old // HS senior // likes nature photography | Frits wants to improve his photography projects | He found an online community that might help. He follows guides that help him describe his process. | Experts view his process and make suggestions or changes that may help his work. | By articulating his process, Frits can easily reflect and make changes. His work improves! |
| PLACES | | Home | Home | Home | Home |
| | | Personal room | Personal room | Personal room | Personal room |
| | | Outdoors | | | Outdoors |
| EXCHANGES | | Picture taking | Website/platform | Website/platform | Picture taking |
| | | Frustration | Surprise! | Experts informal educators | Determination |
| | | Determination | Hopeful | Professors | |
| | | | | Informal mentors | |
| | | | | Coaches | |
| INFORMATION CHANNELS | | Journal | Personal computer/tablet/phone | Journal | Journal |
| | | Digital tools | digital tools for process work | Digital tools | Digital tools |
| | | Cameras | Cloud storage | Pictures | Cameras |
| | | Pictures | Social media | | Pictures |
| | | Art tools | | | Art tools |
| SCAFFOLDING | | Comparison | Projects | Projects | Comparison |
| | | | Writing | Comparison | Articulation |
| | | | Articulating | Mentoring | Reflection |
| | | | Reflection | Coaching | Critique |
| | | | | Articulating | |
| | | | | Reflection | |
| | | | | Feedback | |
| | | | | Critique | |
| | | | | Exemplars | |

| Multiple Hats | Persona | SB Scene 1 | SB Scene 2 | SB Scene 3 | SB Scene 4 |
|---|---|---|---|---|---|
| | Mrs. Potts // 5th grade teacher // goals: wants to teach children about robots | Mrs. Potts assigns a lego school project for her students | Samir, a bright young student, loves legos and starts doing all of the work in his group and his groupmates start to feel left out. | Mrs. Potts assigns "hats" to eat student, which denote what role they will play in their group. The students rotate hats every 10 minutes. | Everyone in Samir's group feels they have participated by the time they have finished building their lego project, and they are happy to have contributed different roles to an awesome-looking finished robot. Mrs. Potts is satisfied with her students' work. |
| PLACES | | Classroom | Classroom | Classroom | Classroom |
| | | Formal school setting | Formal school setting | Formal school setting | Formal school setting |
| EXCHANGES | | Teacher | Student | Teacher | Teacher |
| | | Students | Classmates | Students | Students |
| TOOLS & OBJECTS | | | Legos | Hats | Hats |
| | | | | | Legos |
| | | | | | Finished product |
| SCAFFOLDING | | Coaching | Feedback | Sharing roles | Reflection |
| | | | | Coaching | Feedback |
| | | | | | Articulation |
| | | | | | Showcasing |

| Twitch | Persona | SB Scene 1 | SB Scene 2 | SB Scene 3 |
|---|---|---|---|---|
| | Neeraj is a 17 year old boy, who loves to build robots. He is very knowledgable with Arduino and Rasberry Pi. He does most of his building as a hobby outside of school. He sometimes feels isolated because the kids in his school aren't interested in robotics. | Neeraj is building a dog robot and wants to show off his cool work, but none of his friends seem to be interested. | Neeraj decided to live stream himself while he is working. Throughout the video he also explains his steps he take while building. | Over a month Neeraj has grow to 100 followers, and has built an online community of friends. He also encourages new makers and gives them instruction and tips through his live feed. |
| PLACES | | Home | Home | Online Community of Aspiring Makers |
| EXCHANGES | | | Knowledge | Resources |
| | | | | Friendship |
| INFORMATION CHANNELS | | Open Source Materials | Internet | Internet |
| | | | Video Stream | Video Stream |
| | | | | Chat/Forum |
| SCAFFOLDING | | Problem Solving | Reflection | Feedback |
| | | | Meta Cognitive Analysis | Showcasing |
| | | | Articulation | |

| **Crowdsourcing** | Persona | SB Scene 1 | SB Scene 2 | SB Scene 3 | SB Scene 4 |
|---|---|---|---|---|---|
| | Frits // 17 years old // HS senior // likes nature photography | Frits wants to improve his photography projects | He found an online community that might help. He follows guides that help him describe his process. | Other students in the online community look at Frits's work and process and provide feedback. | By articulating his process, Frits can easily reflect and make changes. His work improves! |
| PLACES | | Home | Home | Home | Home |
| | | Personal room | Personal room | Personal room | Personal room |
| | | Outdoors | | | Outdoors |
| EXCHANGES | | Picture taking | Website/platform | Website/platform | Picture taking |
| | | Frustration | Surprise! | Experts informal educators | Determination |
| | | Determination | Hopeful | Peers | |
| | | | | Informal mentors | |
| INFORMATION CHANNELS | | Journal | Personal computer/tablet/phone | Journal | Journal |
| | | Digital tools | digital tools for process work | Digital tools | Digital tools |
| | | Cameras | Cloud storage | Pictures | Cameras |
| | | Pictures | Social media | Email | Pictures |
| | | Art tools | | Social media | Art tools |
| | | | | Web services | |
| SCAFFOLDING | | Comparison | Projects | Projects | Comparison |
| | | | Writing | Comparison | Articulation |
| | | | Articulating | Mentoring | Reflection |
| | | | Reflection | Coaching | Critique |
| | | | | Articulating | |
| | | | | Reflection | |
| | | | | Feedback | |
| | | | | Critique | |
| | | | | Exemplars | |

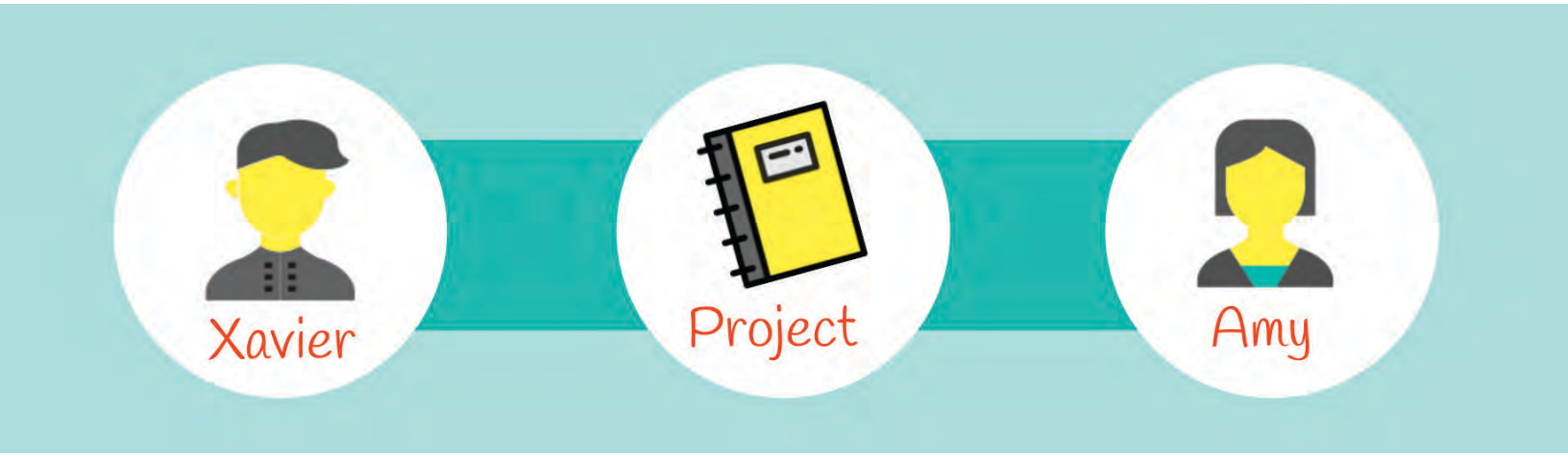
| **Instagram (Part 2)** | Persona | SB Scene 1 | SB Scene 2 | SB Scene 3 | SB Scene 4 |
|---|---|---|---|---|---|
| | Samy // biomed engineer robotics innovator// goals: want to mentor young high school students to give back | Samy has just taken a photo of her latest biomedical robot in a critical stage of its design process. | She posts it to her instagram and tags it with #special hashtag. In the image description, she describes the photo and why she documented this stage of the process. Hundreds of curious junior portfolio and project makers discover and are inspired by her work and learn from her. | Once a week, Samy also holds a Twitter #specialhashtagchat during which junior portfolio and project makers repond to a weekly portfolio challenge. This week, Samy's challenge is: "Share a theme you see in your projects. Why do you return to that theme? This=portfolio reflection" | Samy feels fulfilled and happy she is helping youth everywhere accomplish their goals by micro-mentoring with the help of #specialhashtag. |
| PLACES | | Maker space | Maker space | Online community of makers | |
| | | | Online community of makers | | |
| EXCHANGES | | support from Maker Ed on how to micro-mentor | Maker Ed | aspiring project makers | |
| | | | aspiring project makers | aspiring portfolio makers | |
| | | | aspiring portfolio makers | | |
| INFORMATION CHANNELS | | phone (photos) | social media (Instagram) | social media (Twitter) | |
| SCAFFOLDING | | capture | coaching | coaching | |
| | | coaching | writing | writing | |
| | | | sharing | sharing | |
| | | | | analyzing | |

# Personas

**LEARNERS AND THEIR PEERS** Based on our preliminary research and inquiries, we developed two personas in order to understand the scope of our application's target users, as well as users' needs and limitations.

Xavier is a highly motivated ninth grade student at South Fayette High School in McDonald, Pennsylvania. Outside of his regular curriculum, he enjoys building robots and working on programming projects to work with his robots. Although Xavier's immediate peers, parents and teachers appreciate his work and offer their praise, they lack the specialized knowledge for his interests to provide him good quality feedback. He craves more constructive criticism, as well as advice on how to proceed with his projects or improve upon them.

Xavier uses the Blueprint app on his smartphone to upload one of his most recent projects; he posts multiple pictures of his latest robot that can pick up objects and stack them neatly in a pile. Along with his photos and description of what it does, he posts a question regarding the program he wrote that controls the robot, seeing as it occasionally runs into glitches and knocks the newly made pile over.




Amy is also a ninth grade student interested in robotics but goes to Richfield High School in Minneapolis, Minnesota. Like Xavier, Amy craves better feedback for her work but also wants to look for exemplars given that she lacks sources of inspiration in her current environment. Although her school is not a resource-rich as South Fayette, she still had access to a smartphone with Internet access. She goes on Blueprint and finds Xavier's project, and given that she has experienced a similar glitch in one of her past projects before she post a comment on Xavier's post with beneficial advice and feedback on his project and its issues. Amy also finds many other students like herself and Xavier to see examples of other work, and gets feedback from makers and students all around the world on her work.

# VISION STATEMENT

### Problem and Solution

Students currently have difficulty finding exemplars for documenting their work and processes. They may also not have the resources to get good feedback on their work and portfolios. We'd like to help connect learners and teachers to experts to facilitate iteration, articulation of process, reflection, and feedback.

### Why Our Design

Our design makes easily discoverable and viewable examples and expert feedback. It provides and facilitates communities in the forms of classroom and interest groups that can be mentored by professionals at universities and in STEAM fields. Our platform also opens the door to integration with existing systems and for experts who are local to come and mentor classrooms in person.

# EXPERIENCE MAP

| | | |
|---|---|---|
| Students are encouraged to sign-up by teacher. Independent is also possible | Students make their profile and articulate interests by following groups. | Students discover expert profiles and select, who to reach out to based on past work and experience. |

| | | |
|---|---|---|
| Expert wants to give back and get involved with the community. | Expert signs-up for the platform. Uploads past projects of their own and fills out a brief bio about goals, expertise and professional past. | Experts connect with a student or a school group. |

| | | |
|---|---|---|
| Sign up for platform and create a class group. | Encourage students to sign-up and join the class group. | Request relevant experts to advise the class group. If possible, invite experts to classroom to work with students on projects |

| | | |
|---|---|---|
| The peer is encouraged to sign-up by teacher | Create profile and join class group. | Upload project work and articulate goal. Connect with other students, who have similar interests. |

CAP

## Meeting the Open Portfolio Challenge

Our vision meets the Open Portfolio design challenge in that it is portable, scalable, and shareable. Our platform will be successful when students can learn about process documentation, iteration, and reflection from peer and expert feedback and mentorship regularly and with ease. Teachers as secondary users will also receive guidance from experts when it comes to implementing challenging and relevant projects for learning in their classrooms.

## Rooted in Research

This problem is important based on our research because both students and teachers at South Fayette had difficulty finding exemplars of documented process work. Something that South Fayette did well was reach out to experts in the community. We believe our solution will help high schools everywhere connect to the relevant experts and find meaningful exemplars with ease.

# Experience Map Critique

**CHANGING OUR VISION** At this stage, our project still was envisioning a way to direct expert attention towards students' work within classrooms a well as students independent of classrooms. At this point, teachers were still included in our design as secondary users. Please reference our previous experience map.

A common point of feedback was the notion of directing attention towards student projects in the form of expert feedback was most promising. However, the other side of the comment typically was the question of what motivation experts had to engage and give feedback through our platform. One reviewer sad that in her past research, she read that peer-to-peer feedback can often be just as good at improving project iterations as expert feedback so long as the peer-to-peer feedback is sufficient in quality and quantity. Some critiquers gave the suggestion to keep the feedback exchange "informal" and to highlight that the projects posted on our platform were works in progress and that we wanted experts to engage with the work. One way that this point of feedback made its way into our final design is that we directed our focus away from expert feedback and towards peer feedback.

*A common point of feedback was the notion of directing attention towards student projects in the form of expert feedback was most promising. However, the other side of the comment typically was the question of what motivation experts had to engage and give feedback through our platform.*

Other reviewers said that they would advise being discipline-sensitive when it came to disciplines in which experts had knowledge and the discipline-specific aspects of students' project. This piece of critique was taken into account in our final design in that students who use Blueprint will be able to peruse projects in discipline-specific categories. Additionally, students will be pinged to answer questions in their disciplines of interests that the indicated upon signing up for Blueprint.

Another key piece of feedback we received in this session was the question of how do we lead students to keep using this platform besides making it mandatory in the classroom. This piece of feedback later manifested in our design in the way that our design drew inspiration from Tinder and Instagram's interactions and navigation. This is because these two mobile apps are highly addictive, so in our mobile app design, with the inclusion of swiping, perusing categories, accumulate points for viewing and giving feedback, and the ability to tap and leave thoughts quickly, our app would foster the desire to return to our app again and again, too.

# VISION STATEMENT

## Problem and Solution

Students currently have difficulty finding examples for documenting their work and processes. They may also not have the resources to get good feedback on their work and portfolios. We'll like to help connect learners and teachers to experts to facilitate iteration, articulation of process, reflection, and feedback.

## Why Our Design

Our design makes discoverable examples. It is a system that ... press , and encourages the stud... and skills. The challenge in our ... orchestrate successful peer to pe... the next few days with prototyp... explore successful scaffolding ... peer feedback and critique

# EXPERIENCE MAP

For, a South Pacific student, wants to make a portfolio for college. Unfortunately, he doesn't know what to do.

Course portfolio project in sof... plains process documents. Tide... inspiration

**PLACES**

Home
School

Home
Schoo

**EXCHANGES**

**INFORMATION CHANNELS**

Internet
Design Sofr
Social Me

**SCAFFOLING**

Motivation

Research
Reflectio

**FEELINGS**

Confused
Unsure

Uncertai
Motivate

and viewable portfolio
nects like minded
ents to share interests
design project is in
er interactions. Over
ing we will begin to
ethods that enhance

## Meeting the Open Portfolio Challenge

Our vision meets the Open Portfolio design challenge in that it is portable, scalable, and shareable. Our platform will be successful when students can learn about process documentation, iteration, and reflection from peer feedback and mentorship regularly and with ease. Teachers as secondary users will also receive guidance from experts when it comes to implementing challenging and relevant projects for learning in their classrooms.

## Rooted in Research

This problem is important based on our research because both students and teachers at South Fayette had difficulty finding examples of documented process work. Something that South Fayette did well was reach out to experts in the community. Part of the feedback we received regarding our project was why would experts buy in to this platform? We also received encouragement to focus on peer to peer systems.

...ments. Scaffolding ex-
..., pictures etc...Project

Creates own or scaffolded questions. Adds tags and ask specific people to help.

Free ready for college age

| | | |
|---|---|---|
| | Home<br>School | Home<br>School |
| | Peer | Peer |
| ...vare<br>...dia | Internet<br>Social Media | Internet<br>Slideshare<br>Behance |
| ...<br>...n | Feedback<br>Coaching<br>Critique | Accomplishment |
| ...n<br>...d | Productive<br>Learning<br>Inquisitive | Accomplished |

# Concept Prototyping and Refinements

# Static Prototype & Mockups

**CONCEPT IDEATION** Our user research presented our team with a complex, systemic view of project based learning in a formal high school context and the attempted curation and presentation of these projects for college admission purposes. Come time to ideate, our team realized that a good tactic would be to select one element of the project based learning system in high school that could improve and that, with improvement, would have large positive repercussions on students' learning, project creation and iteration, and eventual college and career outcomes. Through synthesizing our design research in user portfolio boards, sequence flows, experience journey maps, and affinity diagrams, we saw that one key problem is that, while in high schools such as South Fayette, students are making projects in their classrooms, they do not receive quality feedback easily that helps them take their projects to the next level. Teachers may catalyze project work in class, but they do not have the time nor domain-specific knowledge to advise each student in iterating upon their projects so that these projects are eventually of a quality that is presentable to college admissions boards and prospective employers. Therefore, we decided to pivot our vision away from meaningful reflection exclusively and towards facilitating quality feedback between peers.

*Through Professor Marti Louw's Learning Media Design course at Carnegie Mellon University, our team was exposed and partook in this project by researching, visioning, and prototyping a learning technology design that addresses a key challenge related to open portfolio practice and proliferation.*

With this in mind, we began ideation by brainstorming products and concepts that were existing that we thought could be applied to our design.

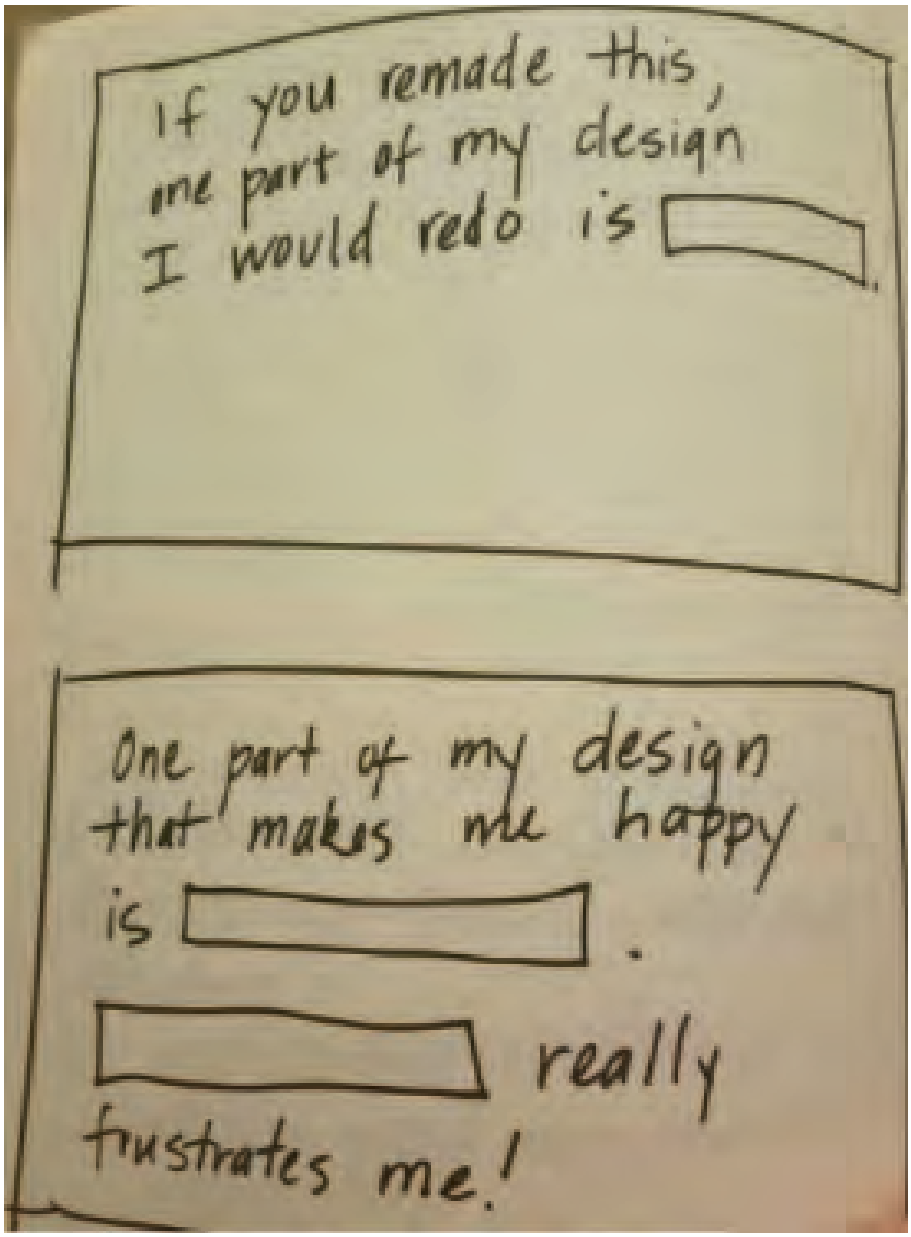
One format precedent we decided would be best for our vision was a mobile app. A mobile app is portable and scalable, so we thought this format meets Maker Ed's Open Portfolio Project criteria. Additionally,

Another key precedent we discussed as Mad Libs. We thought it would be a promising yet simple solution to let students send each other micro-feedback in the mold of small fill-in-the-blank-with-a-sentence forms with feedback on projects to each other.

With these precedents in mind, our team set to work rapidly storyboarding and sketching out functions, use cases, and a rough navigation of this map. It was these sketches that became our first paper prototype. Additionally, after this session, we felt our prototyping session at the Maker Ed workshop could help us gather feedback from teachers on specific content and Mad Libs style prompts to include in our app.

# Maker Ed Workshop

**INTRODUCTION** We had the opportunity to stop into Maker Ed's Open Portfolio Workshop in Pittsburgh, Pennsylvania at Carnegie Mellon University. This was a great opportunity to prototype and elicit feedback from teachers. While teachers are not the primary users of our solution, we planned a paper prototyping session accordingly. Using our first pass at a paper prototype, we set up a table during the workshops break session and engaged teachers as they walked passed. We also used this workshop as an opportunity with educators to co-design on the content.



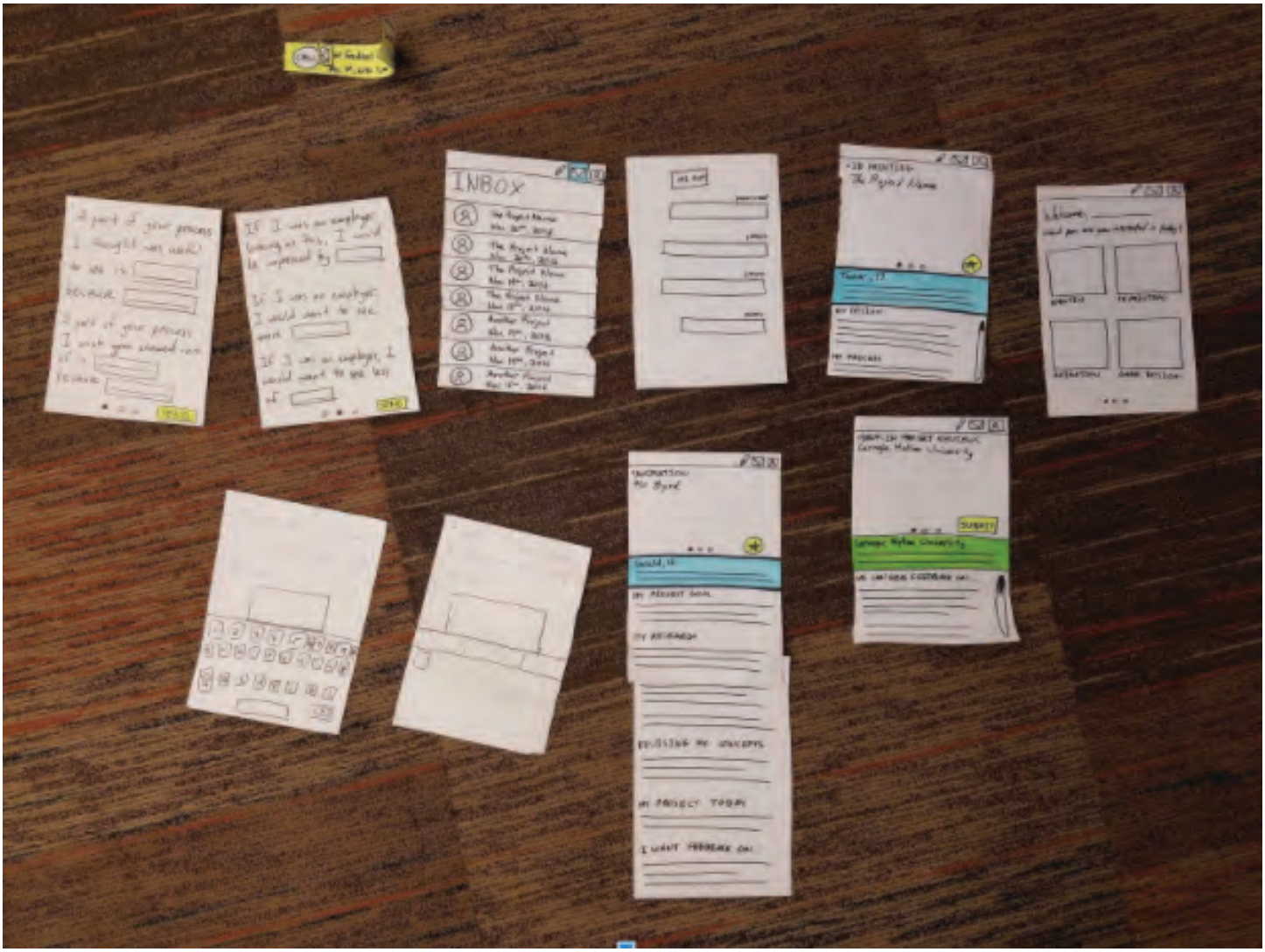
# Second Prototype

*As this occurred, other members of the team would make higher fidelity paper prototypes based off of the wireframe sketches. On the spot we would evaluate these prototype screens and adjust accordingly.*

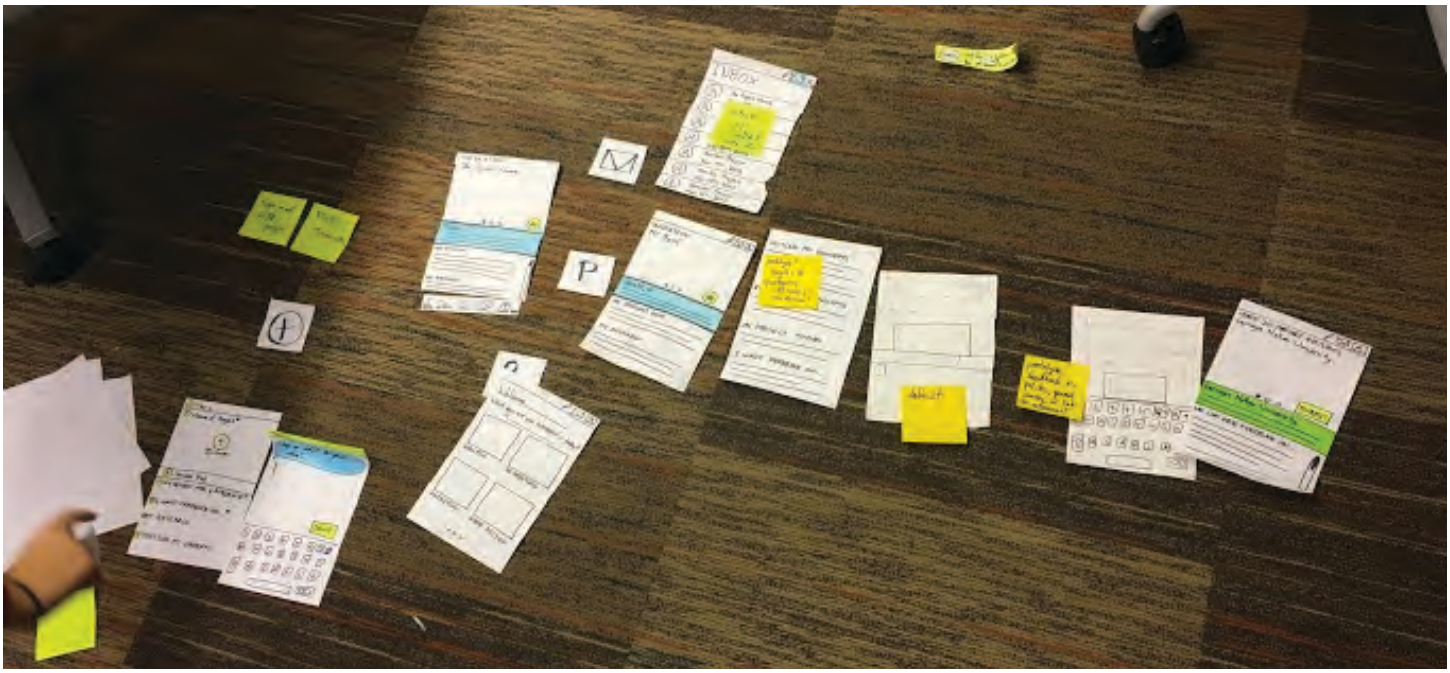
**PAPER PROTOTYPE SYNTHESIS** Our team met to synthesis feedback and findings from our Maker Ed prototyping session and to redesign our solution so that it was grounded in secondary research. As was discussed in the "Design Research and Synthesis" section of this case, literature most especially incorporated into our redesign at this time were, "Structuring, Aggregating, and Evaluating Crowdsourced Design Critique" and "CritViz: Web-based software supporting peer critique in large creative classrooms" .

As a team, we sketched out functionality branches. These branches included inbox and message receiving, sharing feedback in a format akin to mad libs, viewing project profiles and project descriptions on virtual cards, and selecting and searching categories for perusal.

Then, within each functionality branch, some of us would sketch wireframes on a whiteboard. As this occurred, other members of the team would make higher fidelity paper prototypes based off of the wireframe sketches. On the spot we would evaluate these prototype screens and adjust accordingly.




**INITIAL PROTOTYPE**




**WORKING COLLABORATIVELY**

# Toward a Final Prototype

*Users want specific targeted feedback from knowledgeable peers, but they don't necessarily want to provide excruciatingly detailed feedback.*

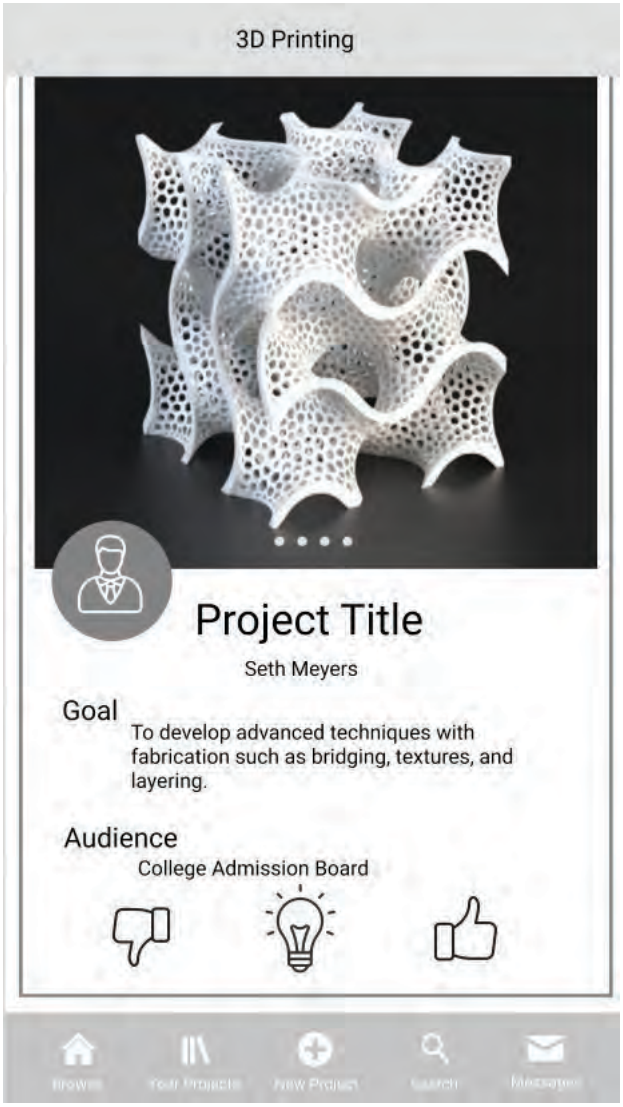
**DYNAMIC PROTOTYPE SYNTHESIS** Our final prototype designs centered around the search for an appropriate peer feedback system.

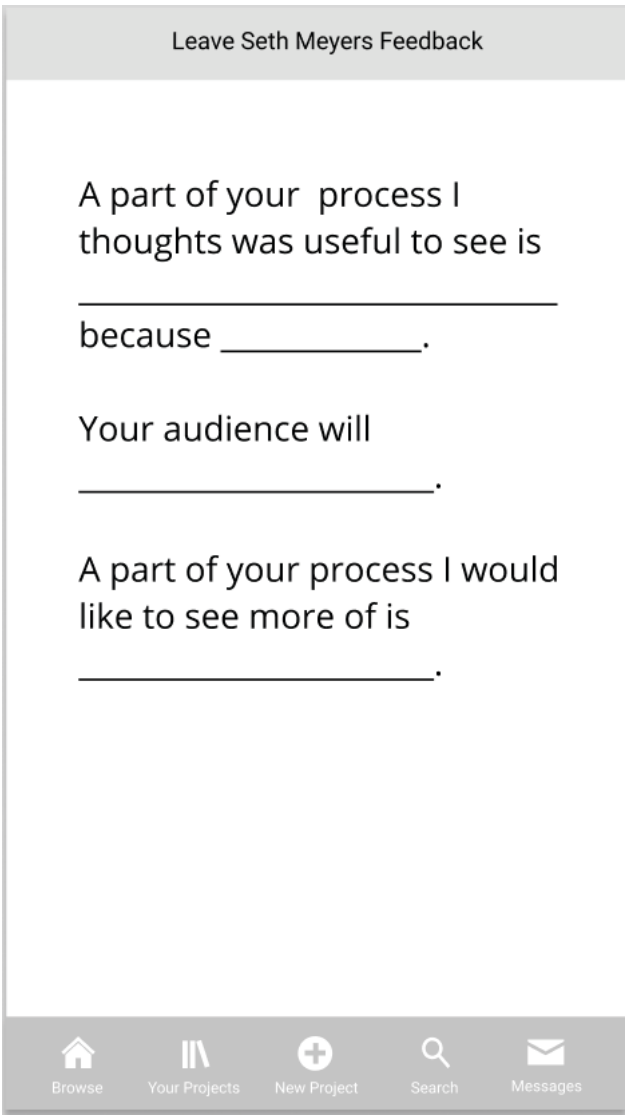
We tested various results with users, such as leaving general feedback about projects, star based ratings, and detailed prompts. Designs received various levels of criticism.

Key insights were that it is was (1) difficult for people to find projects randomly and (2) users did not feel equipped to provide useful general or specific feedback on projects

Another issue was that students did not necessarily want to put a lot of effort into giving feedback, especially for strangers. As noted in one interview "It's easy for you to write a question for me to answer, but then the burden is on me the receiver. I don't want to write an essay for you."

We put substantial effort into developing and testing ways to get targeted feedback and troubleshooting tips from students by working with users that had varying levels of motivation to write and provide detailed feedback.


3D Printing
Project Title
Seth Meyers
Goal
To develop advanced techniques with fabrication such as bridging, textures, and layering.
Audience
College Admission Board
Browse
Your Projects
New Project
Search
Messages


Leave Seth Meyers Feedback
A part of your process I thoughts was useful to see is _____
because _____.
Your audience will _____.
A part of your process I would like to see more of is _____.
Browse
Your Projects
New Project
Search
Messages

Search project
EAS
Advanced EDGE

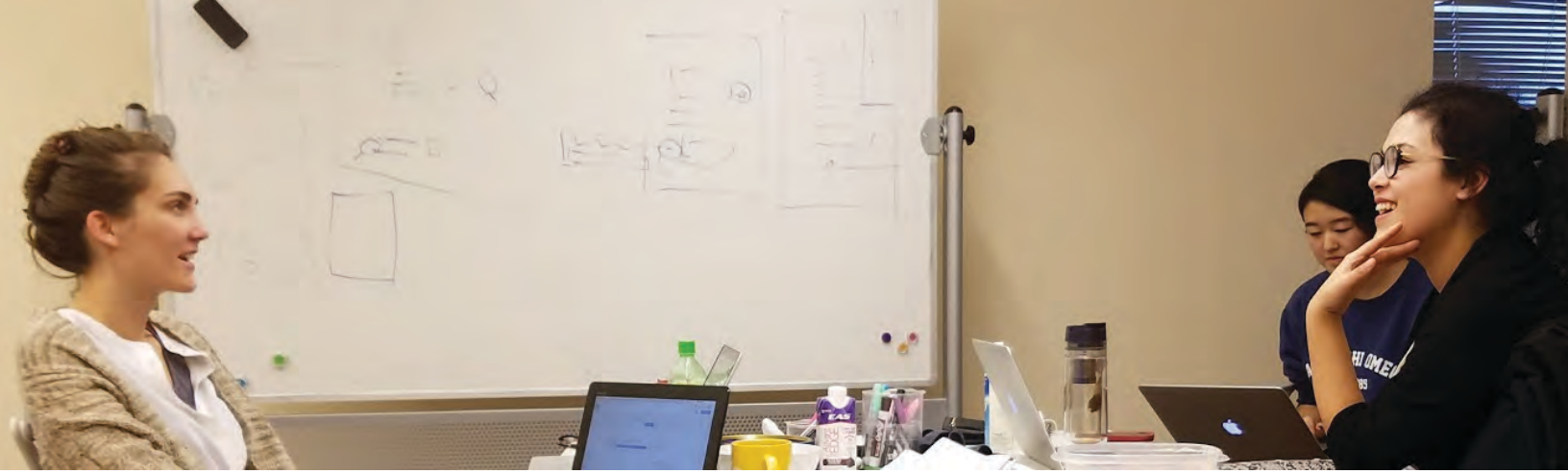
# A Final Design

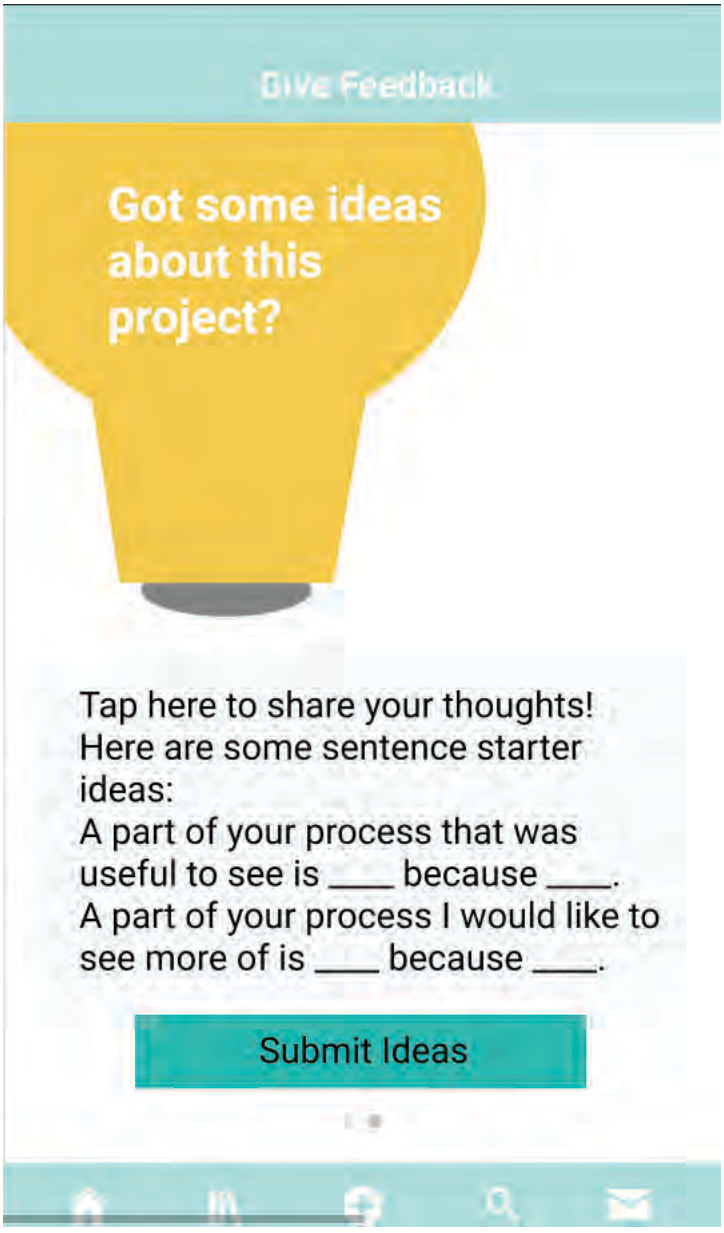
*The questions that you see in order to provide feedback are based on your interests and predictions of whether you might know the answer.*

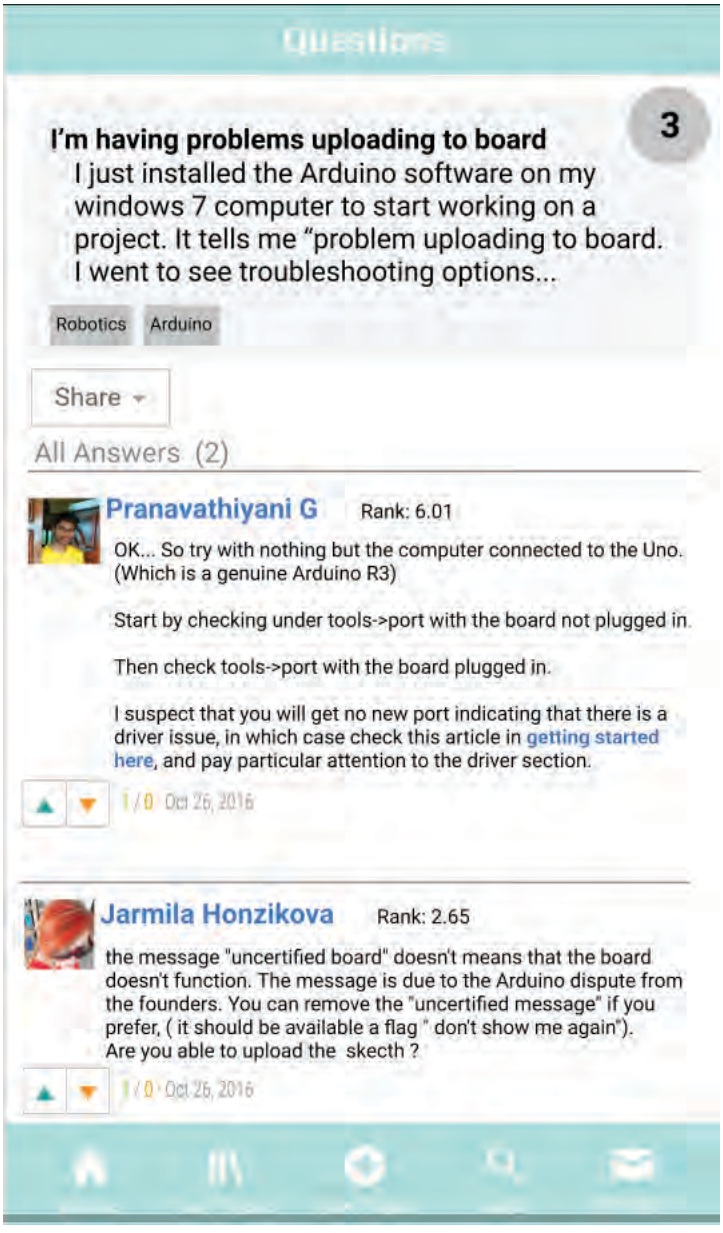
**COMING TO AN END** We listened to users during prototyping sessions and intergrated their feedback into the final design. Our peer-to-peer feedback system functions by allowing users to tag their interests and may also incorporate a sophisticated matching algorithm that connects users to projects in their area of interest, as well as questions about projects they may be able to answer. In turn, users will receive feedback on their own projects from others like them. This matching algorithm helps get questions answered quickly and effectively. Additionally, if a user doesn't know the answer to a question they are interested in, they can follow the question or share it with people in their network who may know.

We also addressed varying levels of motivation and feedback quality by implementing a ranking system for user answers to questions. This system helps organize feedback so that the best answers potentially rise to the top. This is also very useful for giving fast feedback when a user doesn't want to write much. Users can look at answers and rank them in order vote for an answer with which they agree.

Because students may not be inherently motivated to provide feedback we also implemented a point system in which points earned by giving feedback are necessary to receive feedback.




Give Feedback
Got some ideas about this project?
Tap here to share your thoughts!
Here are some sentence starter ideas:
A part of your process that was useful to see is ____ because ____.
A part of your process I would like to see more of is ____ because ____.
Submit Ideas


Questions
3
I'm having problems uploading to board
I just installed the Arduino software on my windows 7 computer to start working on a project. It tells me "problem uploading to board. I went to see troubleshooting options...
Robotics
Arduino
Share
All Answers (2)
Pranavathiyani G
Rank: 6.01
OK... So try with nothing but the computer connected to the Uno. (Which is a genuine Arduino R3)
Start by checking under tools->port with the board not plugged in.
Then check tools->port with the board plugged in.
I suspect that you will get no new port indicating that there is a driver issue, in which case check this article in getting started here, and pay particular attention to the driver section.
1 / 0 · Oct 26, 2016
Jarmila Honzikova
Rank: 2.65
the message "uncertified board" doesn't means that the board doesn't function. The message is due to the Arduino dispute from the founders. You can remove the "uncertified message" if you prefer, ( it should be available a flag " don't show me again").
Are you able to upload the skecth ?
1 / 0 · Oct 26, 2016

# Final Reflections

# Final Presentation

*One reviewer shared that major spaces for refinements are in the coordination system between peers and in how students would be invited to participate in the app.*

**CRITIQUE** Reviewers liked that our solution was mobile. One critiquer shared with us another paper that we can pursue and incorporate into our design. If we were to take this project forward, we would certainly read this paper thoroughly and implement relevant elements into our project.

Another point we received is that our project seems to edge on the uberification of feedback. The timely element of our solution is compelling. If we were to take this project further, we would certainly keep in mind this point and think about ways we could make timeliness of feedback receipt and dispatch a key feature of our app. A question on this point that we would try to answer through further prototyping is what constitutes timely. Is it the moment when a student feels they need feedback, or should feedback be sent to a student when the student needs it even if this is before the point of student's awareness? The answer to this question would influence the capabilities of our solution technology.

One reviewer shared that major spaces for refinements are in the coordination system between peers and in how students would be invited to participate in the app. We would have more ideation sessions around these refinements if we were to move forward.

Another reviewer said that a key area in which we could use more specificity was in sorting feedback from reviewers who

*Bernstein, M., Klemmer, Scott R., and Kulkarni, C.E. Peer Studio: Rapid Peer Feedback Emphasizes Revision and Improves Performances. In Proceedings of the Second (2015) ACM Conference on Learning @ Scale (L@S '15). ACM, New York, NY, USA 75-84. Retrieved from https://hci.stanford.edu/publications/2015/PeerStudio/Peerstudio.pdf.*

*Lastly, a critical note we received was the question of who does our solution privilege. The reviewer who shared this thought with us encouraged our team to try to incorporate a new kind of student–one without resources, one without rich project based learning at their fingertips in the classroom–into our system and into the maker movement at large.*

were from within a project's domain versus from beyond a project's domain. In our current design, we allow students to self-select which domain categories in which they are interested in perusing and receiving notifications. Students are able to specify domains in which they have experience and gain points for sharing feedback. However, we have not articulated a matching system specifically with regard to notifying feedback receivers whether or not feedback comes from a student with experience in a project's domain or not. Some challenges if we chose to go this route include: How would we verify if a student truly had experience in a domain? Additionally, how would we account for and communicate differing levels of experience within a domain?

Lastly, a critical note we received was the question of who our solution privileges. The reviewer who shared this thought with us encouraged our team to try to incorporate a new kind of student—one without resources, one without rich project based learning at their fingertips in the classroom—into our system and into the maker movement at large. Our research space for this class was a high school with rich resources and connections that is well into its use of project based learning. While for the scope of our Learning Media Design class we only focused on this research space, if we were to take this project forward, we would certainly do research in less resourced spaces and try to design for students in these spaces in our solution as well.

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Thank you, Marti and Irene for a great class!