



Learning Media Design · 2017 Fall

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Exploring

Motivation & Public Feedback

In IDeATE

Final Design Process Package

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Overview

This section provides an overview of the IDeATe program, our semester goals for the Fall 2017 Learning Media Design course, and the problem and vision statements that guided our work.

The Integrative Design, Arts and Technology (IDeATe) program at Carnegie Mellon University connects diverse strengths across campus in order to advance education, research, and creative practice in domains that merge technology and arts expertise. Our semester challenge was focused on applying the Maker Ed open portfolio initiative - how learning artifacts are captured and documented, and how these digital portfolios can enhance an educational or professional experience - to the IDeATe program. Through careful and methodical research, concept ideation, and prototyping, we explored the documentation practices currently used in the IDeATe program, and we worked to develop a public feedback system that would improve student experience in their documentation and portfolio processes. Below, we present the problem and vision statements of our design solution.

Problem Statement

Although the IDeATe program houses creative thinkers and makers, all students who are constantly developing unique projects and learning artifacts, the documentation of such creative works often does not keep up the pace. The Maker Ed open portfolio challenge questions how we can better construct a documentation experience for students, and we identified two specific reasons why students in IDeATe courses are not currently more engaged in documentation and portfolio practices. The first overarching weakness in existing IDeATe documentation practices stems from the *overwhelming demands* of the documentation and critique process. In addition, *student vulnerability* also prevents students from showing incomplete or simple projects.

Vision Statement

We believe we can address students' vulnerability and the documentation learning curve by: (1) structuring the feedback process, and (2) displaying projects anonymously to public critique. We plan to do this by using a feedback process open to the general public, which implements familiar communication channels such as texting or social media. Our aim is to motivate students to build a culture around documentation, as well as to better value the feedback and iteration that is necessary for successful documentation and portfolio practices.

Success Indicators

We identified several different heuristics that we can use to evaluate our public feedback system's success.

First, we turned to quantitative statistics. A simple metric could be from the raw number of public responses received over a given period of time. Additionally, with a little more effort in observation, we could track overall public interest over a given period of time. Public interest could range from

merely glancing over at a project display, to reading the posted signs, or even spending a few moments learning about the project (perhaps without leaving feedback).

In addition to the quantitative metrics, there is further qualitative analysis that needs to be done in order to fully understand this system's success. One big question we want to answer is "How valuable was this feedback?". Getting 10 responses to a question means relatively little, if all of them are yes/no or one-word answers. Ideally, the public feedback would resemble traditional critiques, pointing out specific areas for further improvement. In addition, the public feedback should not be ill-mannered in any way, as it might make students uncomfortable about displaying their work. Finally, we need to understand how the artist (the creator of the displayed project) actually made use of the critique. This would be a harder heuristic to track, but could be done with pre- and post-surveys of the artists.

Overall, the success of this public feedback design requires both quantitative and qualitative analysis. Not only can we gauge our design's success on basic interest and participation, but the value of this system also depends on the value of feedback and how it affects the IDeATe students' creative process and documentation.



Design Research & Synthesis

This section would showcase how we conducted the research and how we synthesized all the findings to reach a conclusion.

Our semester began with a “discovery” phase, which familiarized us with the Maker Ed challenge and existing documentation practices within the IDeATe program. We developed our initial research findings through different methods of data collection and analysis. This research phase was critical in identifying the needs of our clients, both IDeATe and MakerEd, and using these to form design implications for our continued concept and prototype development.

Literature Review and Existing Platforms

The first portion of the semester featured several influential reading reflections, which provided us with a foundation of knowledge regarding the design processes and portfolio concepts that have continued throughout our initial project development stage. Some particularly interesting insights from the readings are described below.

One reading earlier in the semester provided a basic introduction into e-portfolios. This Cambridge reading allowed us to understand how e-portfolios have previously been utilized, as well as recognizing standard practices. Specifically, this reading clarified differences between standardized and personal portfolios, as well as how both types related to the creator’s personal development. The second quote presented is particularly interesting, since students within the IDeATe program come from very diverse backgrounds and experience levels.

“The purpose of a standardized portfolio is to support learning more indirectly by providing data about the achievement of learning outcomes that can be used to measure the effectiveness of an experience (a class or a seminar), a program (such as a major course of study or professional development fellowship program)...” [Cambridge, D. (2010) "The Potential of Portfolios for Individual and Social Transformation" Chap. 1 in *E-Portfolios for Lifelong Learning and Assessment*. San Francisco: Jossey-Bass]

“In addition to helping students discover their vocation and exercise their creativity, e-portfolios are seen as valuable because they help take into account and celebrate student’s individual differences.” [Cambridge, D. (2010) "The Potential of Portfolios for Individual and Social Transformation" Chap. 1 in *E-Portfolios for Lifelong Learning and Assessment*. San Francisco: Jossey-Bass]

Another important reading was focused on understanding the MakerEd Open Portfolio project. This reading was focused on the MakerEd Research Briefs, and it was a critical step to understanding the MakerEd motivations behind portfolio development processes. Importantly, the following quote emphasizes how important documentation can be in order to develop deeper learning outcomes.

“...the turns they took, decisions they made, challenges they faced, and mistakes they confronted along the way. These processes can be idiosyncratic and serendipitous as the learning outcomes.” [Maker Ed Open Portfolio Project: A Networked Vision for Sharing and Documenting (2015)]

A similar sentiment is expressed in the *Visible Learners* reading, which provides another insight into the practice of documentation.

“Documentation is not just a beautiful end product...sharing builds the connections and makes teaching and learning public.” [Krechevsky, M., Mardell, B., Rivard, M., & Wilson, D. (2013). *Visible learners: Promoting Reggio-inspired approaches in all schools*. Chap 9 - Unpacking the Practice of Documentation. John Wiley & Sons.]

Finally, a significant reading reflection that influenced our design research processes was focused on techniques to model users. Specifically, this *About Face* reading gave us the basic instructions for developing a user's personas and goals in order to better understand the design needs.

“All humans have motivations that drive their behaviors; some are obvious, but many are subtle. It is critical that personas capture these motivations in the form of goals.” [Cooper, A., Reimann, R., & Cronin, D. (2014) Modeling Users: Personas & Goals (Chap 3). In *AboutFace 4: The essentials of interaction design*. John Wiley & Sons.]

“Personas goals contain three aspects: visceral goals, behavioral goals, and reflective goals, which relates to experience goals, end goals, and life goals respectively.” [Cooper, A., Reimann, R., & Cronin, D. (2014) Modeling Users: Personas & Goals (Chap 3). In *AboutFace 4: The essentials of interaction design*. John Wiley & Sons.]

This introduction into persona development greatly influenced our second user study, in which we focused on consolidating different user needs into a clear set of design insights.

In addition to background readings, we explored existing online portfolio platforms to identify their strengths and weaknesses. We conducted a heuristic analysis of the various portfolio and documentation platforms currently used in education. This technique of performing a heuristic analysis is a common method in human-centered design to test a system's usability, and we derived our analysis criteria by combining the values of the Maker Ed “vision & values statement” with the important concepts covered in our course readings. The resulting set of learning criteria and heuristics thus consisted of the values and best practices which contribute to effective learning environments.

Each group member chose a unique platform to explore. In total, we were able to perform heuristic analyses of Seesaw, Portfolium, Pathbrite, and the IDeATe Gallery (shown in Figure 1 below). The initial goal was simply to become familiar with each website's functionality - how to create an account, what kind of learning community it supports, how different users (students, parents, administrators) might access the information, etc. After these individual explorations, we looked more in-depth at each platform's target audience, examples of how it fosters good learning habits, and how

it supports peer collaboration. Connecting our notes from these inquiries to the set of learning criteria and heuristics, we made several significant conclusions.

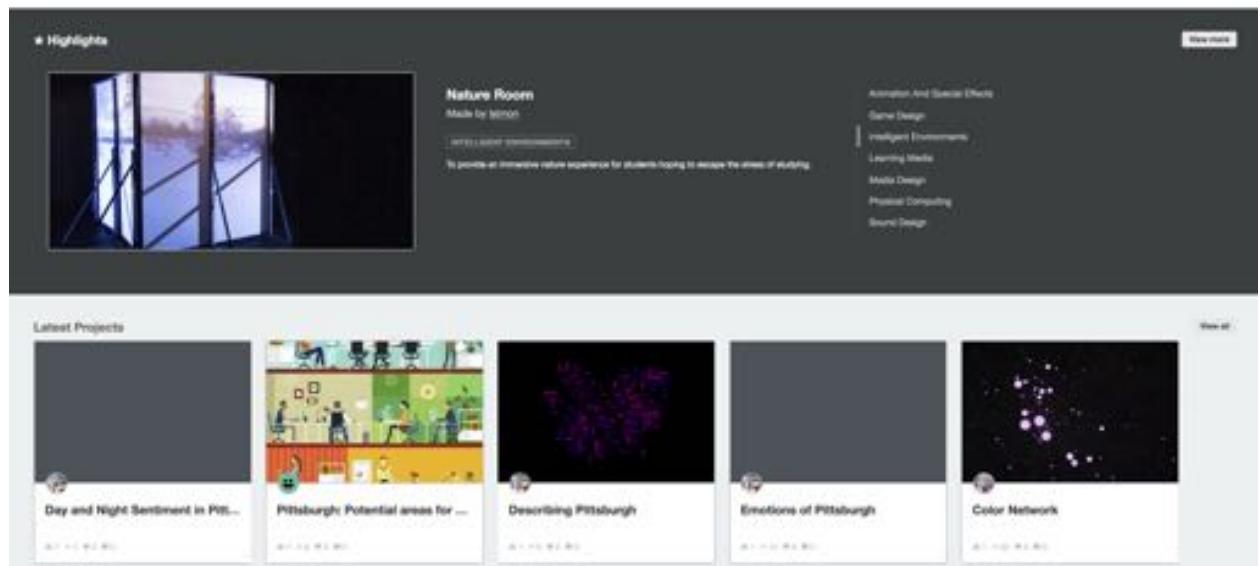


Figure 1. Screenshot of the IDeATe Gallery's home page.

The main concept that emerged from this exercise was how each platform's features depend on the target audience. For example, in more job-oriented platforms such as Portfolium and Pathbrite, there was very little evidence of "instructional methods to promote the development of expert practices." While concepts such as modeling, coaching, and scaffolding work well in a classroom of novices developing knowledge to become experts, these more job-oriented sites showcased much less of an explicit learning environment. However, there were some learning heuristics that appeared in all of our platforms. Most importantly, all of our websites showed evidence of "social characteristics of the learning environment." This primarily took the form of peer feedback, discovery pages or highlighted projects, and/or the opportunity for online discussion and collaboration.

As a result of performing these heuristic analysis, we gained a deeper understanding of existing approaches to online portfolios. By establishing our set of criteria as a combination of Maker Ed values and characteristics of effective learning environments, the resulting analysis provided us with a much stronger intuition about how to approach our semester-long design problem. The exercise also provided our group members with a common baseline level of knowledge. This shared vocabulary of learning media design processes only continues to strengthen our communication within the team, as well as to our project's external stakeholders.

User Study 1 - General Portfolio Practices

Our first primary user study exercise was based on a contextual inquiry technique. The purpose of this user study was to gain insights into the motivations and workflow processes of general portfolios and documentation. Specifically, we looked at an audience of pre-professionals who were still developing and refining their portfolios. This target audience would allow us to better understand the challenges that students face when first beginning and shaping their portfolios.

As mentioned above, one primary goal of this exercise was to gather evidence about how portfolios are developed and utilized among a pre-professional audience. However, we also wanted to understand how portfolios might be used differently between various contexts (for example, between architecture and Computer Science/HCI backgrounds). We hoped that, by grasping the different portfolio strategies within the different contexts, we could better design for our semester course project within the IDeATe program.

We interviewed portfolio owners from different academic backgrounds and professional experience. The questions we asked were focused on basic portfolio information, why each interviewee was motivated to develop his/her portfolio, how the interviewee built and maintained the collection, and what significant obstacles needed to be overcome in order to build the portfolio. Between our group members, we were able to gather information about portfolio and documentation practices within the fields of Computer Science, Architecture, and Human-Computer Interaction.

"As an aspiring interdisciplinary artist, I built a portfolio to benefit my learning and professional development." [Undergraduate, Bachelor's of Computer Science & Art]

"There's a steep learning curve each time you switch a platform...makes it challenging to learn the skills to build a website." [Architect, about 6 years of portfolio experience]

Once we each performed our interviewees, we reported out to each other and created an affinity diagram of interview notes. The clusters in our affinity diagram fell under two main umbrellas: *before* building a portfolio, versus *during* the process of building a portfolio. Within these categories, there were a number of main statements (in Figure 2 below, the pink and blue post-its) that emerged as common features throughout all of the interviews. These encompassed how users designed for a specific context, how the portfolio owners depended on tutorials, examples, and feedback in order to build their initial portfolio, and the challenges involved in learning and maintaining a portfolio.

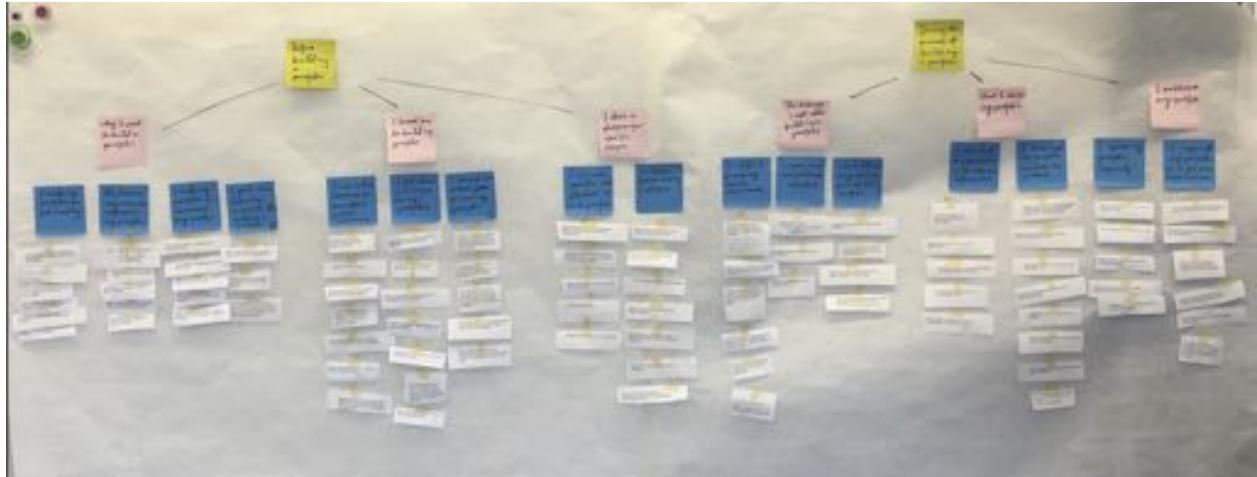


Figure 2. Affinity Diagram from User Study 1 (Contextual Inquiry)

We further developed a sequence-flow model to capture the emerging patterns about portfolio and documentation practices. This is presented and discussed in further detail in the "Research Insight Models" section. As a general overview of the model, we found that portfolios are typically generated by some trigger, which motivates one to begin the portfolio documentation process. What follows is a cycle of development, feedback, and iteration, and this cycle is constantly appended with more recent projects from the portfolio owner. This model, while seemingly very complex, allows us to strip down the complicated and uncontrolled process of portfolio development to the bare necessities - why does one need it, how can one learn to build it, how does one improve and maintain it, etc. Within this process, our model also splits up the main character (the portfolio owner) from the group of other acting parties in this design chain (most typically, domain professionals and friends).

Overall, this contextual inquiry user study gave us fundamental insight into documentation practices currently used by students or young pre-professionals. Despite gathering data from different sources, since our interviewees came from various academic and cultural backgrounds, we were able to comb through the interview notes and create a set of shared steps between all of the interviews. This set of shared steps may not be perfectly met by any one student, but it does represent the iteration/feedback cycle and the scale to which portfolio documentation matters. We created a sequence-flow model to summarize these steps, which is further explained in the "Research Insight Models" section.

User Study 2 - Understanding Documentation within IDeATe

While our initial user study was focused on understanding general documentation practices, our second round was focused specifically on the use of documentation within the IDeATe program. This allowed us to better understand the Maker Ed Open Portfolio design challenge in terms of the IDeATe program and the stakeholders at Carnegie Mellon. The primary objective from this user study was focused on taking the general documentation understanding that we had previously developed and defining more explicit needs that we can address. These needs can then form clear design insights that we will incorporate into our project design.

The primary method used for this study was traditional face-to-face interview, and we were much more explicit about choosing our interview candidates for this assignment. We wanted to understand the perspectives of both students and instructors within the IDeATe program, and how they perceived the program's goals and current uses of documentation.

In total, we interviewed 8 students, 2 instructors, and 2 administrators.

For instructor perspectives, we received very influential insights from Daragh Byrne and Robert Zacharias. Both of these instructors are very experienced in portfolio-building, as well as the processes to manage media in order to share projects and documentation. When selecting our student interviewees, we wanted to learn about students from all levels of portfolio and documentation experience. However, we also hoped to cover another dimension: academic background. In particular, we hoped to get students at various points of the Technology-Art spectrum. Figure 3 below shows the distribution of student interviews that we performed.

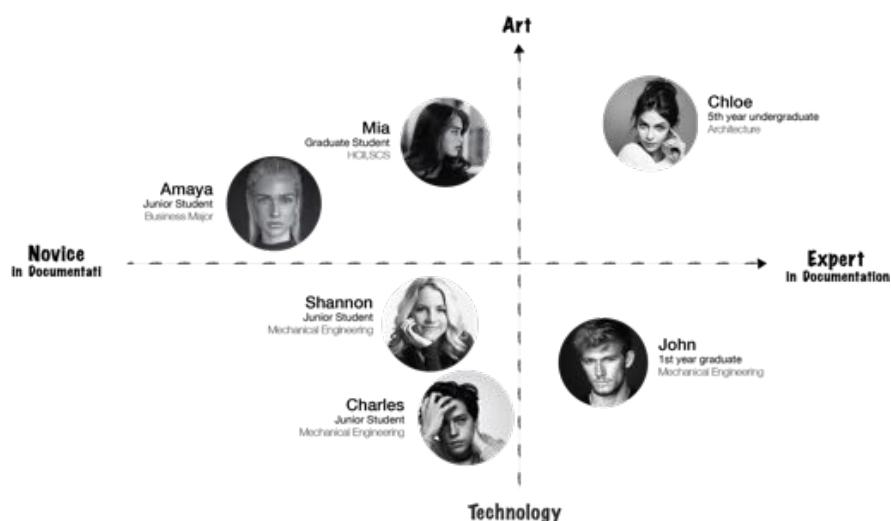


Figure 3. Student Interview Spectrum

These interviews provided us with a rich dataset of information regarding portfolio and documentation practices within the IDeATE program. Once we collected this dataset from our interviews, we met to synthesize the information into a conceptual model. We reported our interview findings out, taking notes as each team member discussed primary findings from their interviews, as well as collecting notes in our shared Google Drive documents. We further plotted our evidence onto a rough hierarchical concept map, the primary focus of which was "Motivation".

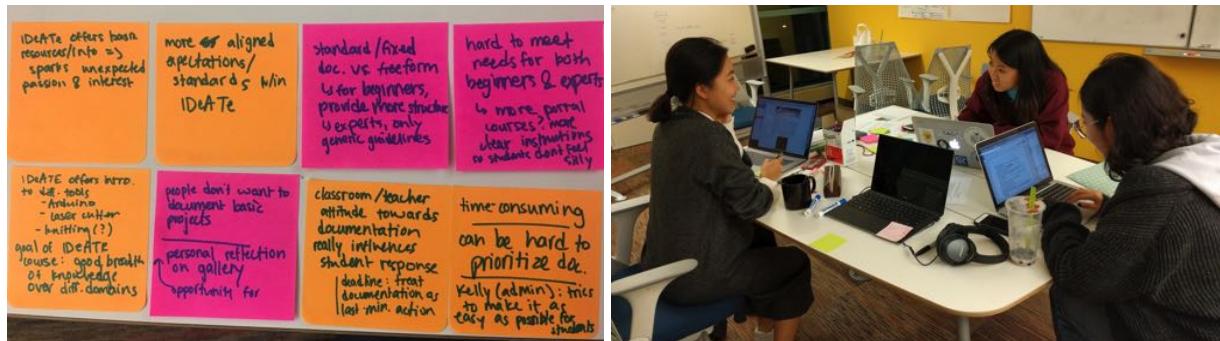


Figure 4. Discussing Interviews. Notes from Interview Insights (Left) and Group Discussion About Emerging Patterns (Right)

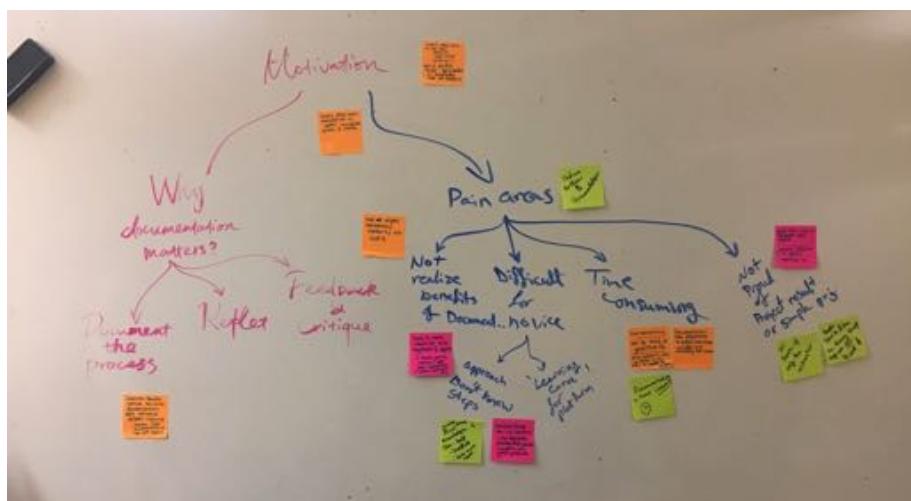


Figure 5. Initial Concept Map of Motivation.

This initial concept map allowed us to form a more refined concept map, as well as point out patterns between our interviews that would later influence our design. Both the refined concept map and the specific design insights from this exercise are discussed in further detail in the following sections.

User Profile Insight Boards & Research Insight Models

The following pictures present samples of our user profile insight boards, developed as a result of User Study 1:



Dima Almobarak

There are two things I care about presenting in my website: Technical part, showing my skills through projects; Personal Development, posting both sketches and updates in my journal."

Designer
Architectural

Started some documentation 6 years ago
Hold portfolio in 3 different platforms

MOTIVATIONS

- Recognized practice in the field of architecture
- The desire to present herself and the work she did
- Job seeking

BEHAVIORS

- Maintenance:
 - Update frequently
- Learning:
 - Learn through tutorials
 - Learn from more developed portfolios online

NEEDS

- Customizable
- Ability to have access control
- Include a blog/journal

DOCUMENTATION TOOLS



Dima Almobarak





Junyu Huang

I prefer to make it as storytelling instead of just the process. I want to make the people engage. It is important for the people as UX design.

UX-Designer
HCI

One-year study in UX/HCI domain.
Hold 2 portfolios for different usages.

MOTIVATIONS

- Apply for the master school.
- Looking for a job after graduation.
- Learn through the process of documentation by taking Interaction Design Studio (a course from MNICD).

BEHAVIORS

- Capture:
 - Capture the data and document the milestones along the process.
- Reflect:
 - Reflect and summarize after the whole project is done.
 - Get critique from others.

PAINPOINTS

- Cannot code his personal portfolio.
- Time consuming for the beginners.

DOCUMENTATION TOOLS



JUNYU HUANG



In addition, we present the sequence-flow model that we developed. This model (split into two figures below) represents the steps and actions necessary to create a digital portfolio. Portfolios are typically generated by some trigger, which motivates one to begin the portfolio documentation process. After this trigger, the individual enters a cycle of development and iteration, as well as updates when the individual completes more projects. This model may appear complex on first glance, but a more careful examination of the steps allows us to answer the following questions about portfolio development - why does one need it, how can one learn to build it, how does one improve and maintain it, etc. The portfolio owner and developer is presented as the main character, and the group of domain professionals, friends, etc. are presented as other acting parties in this chain. Figures 6 and 7 display the sequence-flow model in full. The first walks-us through the journey of creating a portfolio, including consultation of domain experts or friends with experience. The second elaborates on the maintenance of the portfolio and the different stages a user experience.

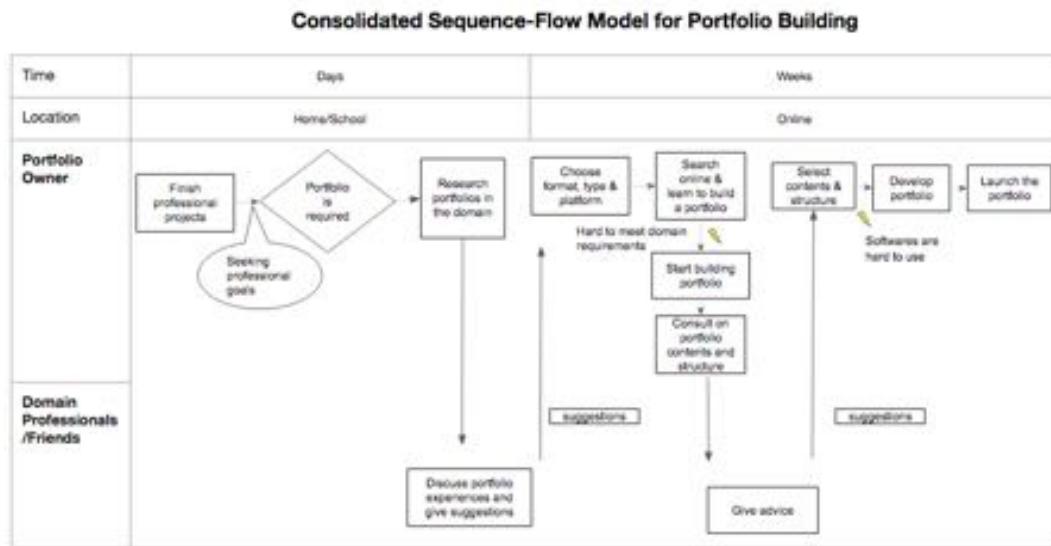


Figure 6. A Consolidated Sequence-Flow Model for Portfolio Building. Describes the Steps of Creating a Portfolio and Seeking Initial Instruction/Feedback.

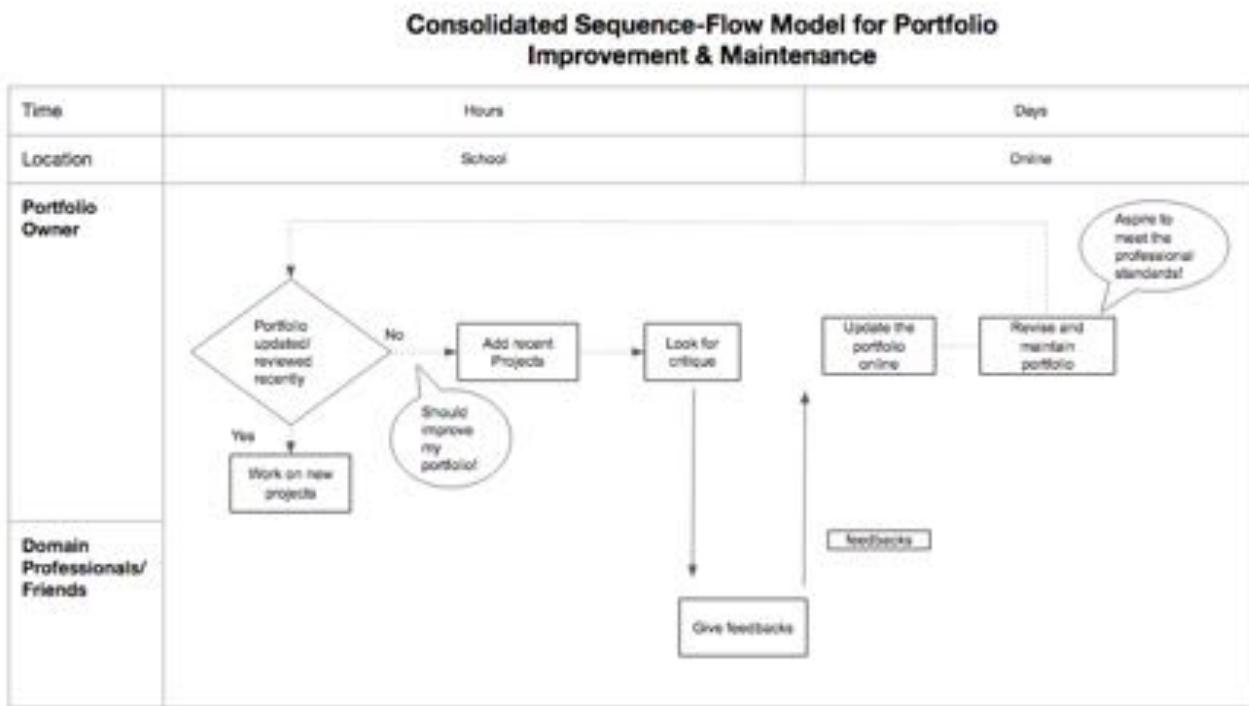


Figure 7. A Consolidated Sequence-Flow Model for Portfolio Building. Describes the Process to Maintain a Portfolio and User Experience

Building on our insights from User Study 1, we developed more site-specific insights from our second round of interviews through User Study 2. Rather than trying to understand general documentation practices, we wanted to specifically understand how documentation is implemented within the IDeATe program.

In the following figure (Figure 9), we represent the significant concepts that emerged from our second user study. The terms presented in this concept map are all derived from a central theme of “Motivation”, which was a major point brought up in all of our user interviews. This led to important conclusions from both sides of the tree. While low-hanging fruit lay in the ideas of documentation being “too time-consuming” or “too difficult to learn”, we also wanted to further expand on the motivation factors that were already working. If we can understand what motivates, say, 10% of the IDeATe students to motivate, then perhaps we could build on these successful factors and turn this into a higher percentage.

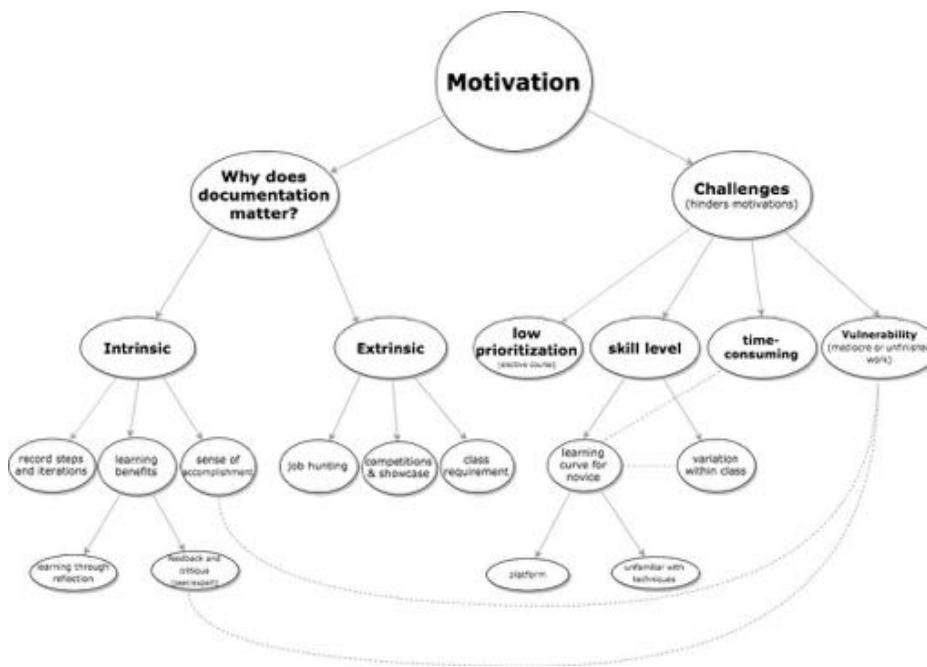
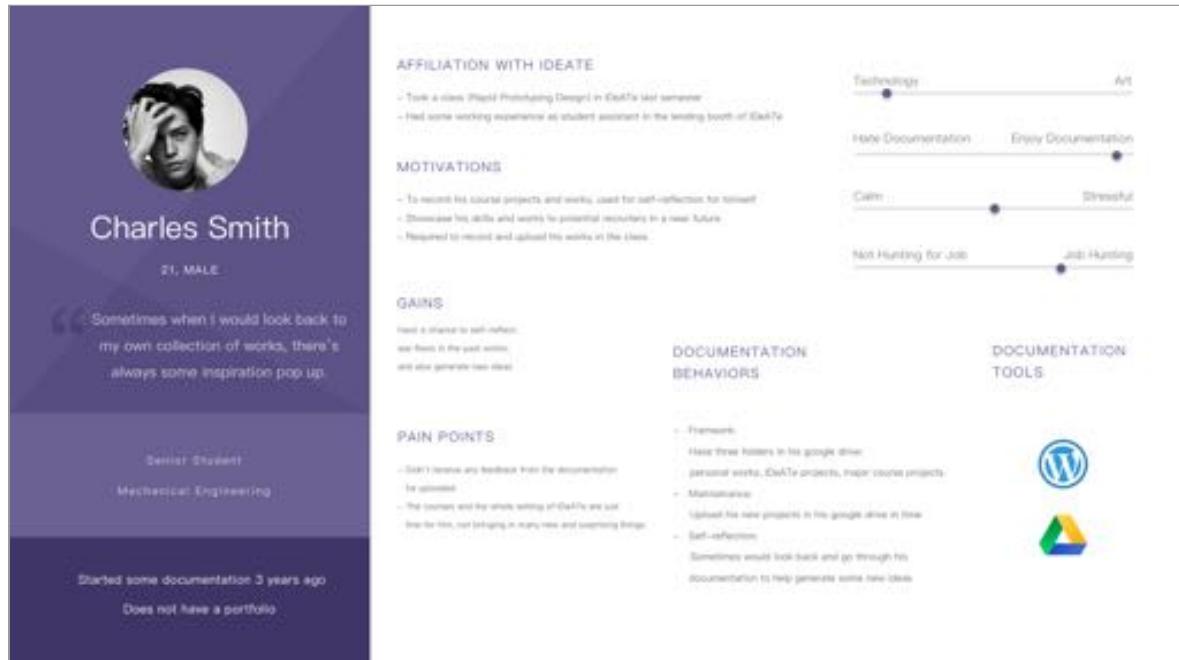


Figure 8. Hierarchical Concept Map on the Motivations Behind IDeATE Documentation.

In addition, we also developed user insight profile boards for the interviewees of User Study 2. These are presented in the following images:





Mia Scher

23, FEMALE

I don't want to share everything that I posted in the Gallery. I am willing to share big projects to my friends though.

Graduate Student
Educational Technology

Started some documentation before, has a medium-level portfolio

AFFILIATION WITH IDEATE

- Took one more class in Ideate this semester (not for several weeks)

MOTIVATIONS

- Want to learn some basic skills, like laser-cutting, 3D printing and fabrication
- The intro-level course is not available within the HCD department
- Not prepared for the future, like resume and job hunting

GAINS

Get critique and motivation from others

PAIN POINTS

- Ideate studio is not active enough
- Doesn't feel engaged enough in the activity
- Using the documentation is time-consuming and hard for the reader to grasp

DOCUMENTATION BEHAVIORS

- Frameworks:
Not really document in a specific step
- Management:
Put down the design idea in the notebook
- Usage:
Documentation is required by instructor for assessment

DOCUMENTATION TOOLS





Chloe Harper

20, FEMALE

I transitioned from a paper portfolio to a digital one after my Ideate course. Now my portfolio is split into three sections, each one targeting a specific professional audience.

Six Year Undergraduate
Architecture

Experienced in documentation practices although in CFA/Architecture

AFFILIATION WITH IDEATE

- Very experienced in Ideate 25 classes – Physical Computing, Responsive Mobile Environments, Digital, DIY Fabrication and Design, Rapid Prototyping Design

MOTIVATIONS

- Maintain an architecture-focused portfolio for job/professional search
- Different courses and domains require different documentation practices
- Architecture is more product-focused than process-focused like Ideate
- Switched from paper to digital portfolio because of vision from Ideate class

GAINS

Being comfortable with critique and feedback process.
One professor would say "I can't appreciate for your work".
In regards to critique: One architect even's reflective of the vision, especially for simple or important projects!

PAIN POINTS

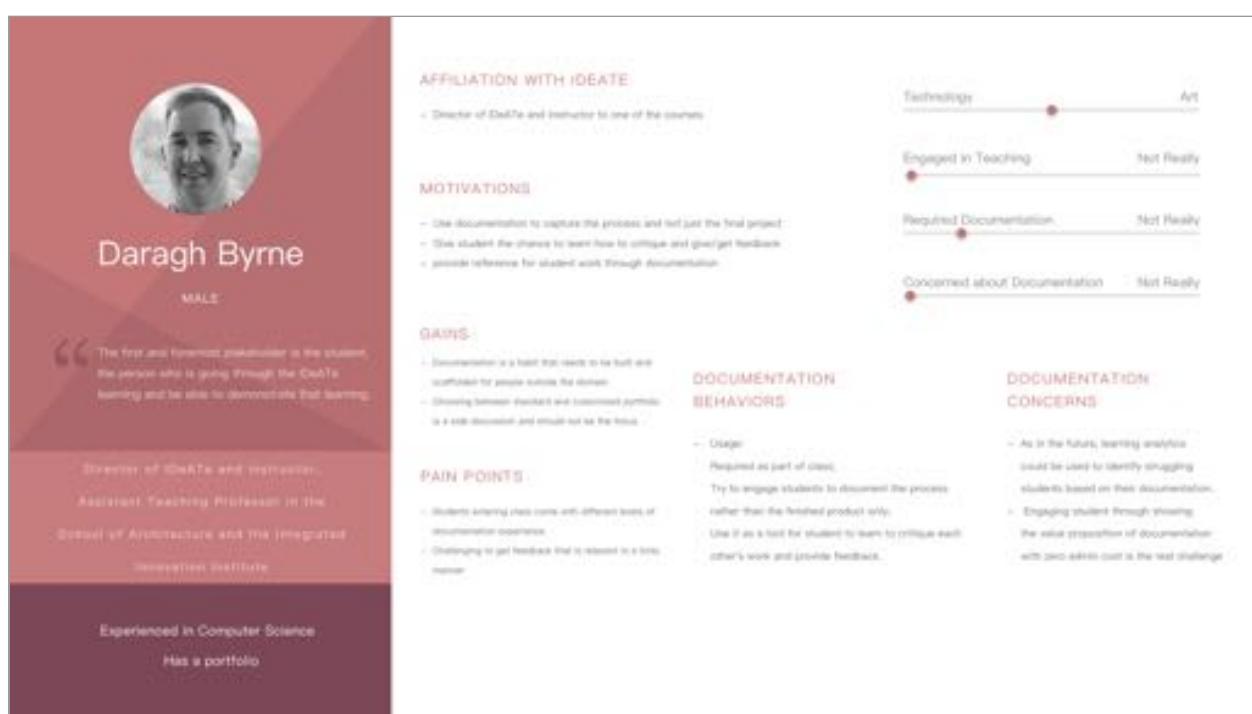
Comments/feedback doesn't seem implement once the project has been "transferred" – in CFA students are made to understand that "work is never completely finished", but that doesn't carry over to Ideate courses sometimes

DOCUMENTATION BEHAVIORS

- Frameworks:
Documents differently depending on the situation
- Management:
For some Ideate classes, the professor actually took photos for the students

DOCUMENTATION TOOLS



The user profile insight boards for User Study 2 helped us understand how each user was involved in the IDeATE program (students, instructors, administrators, etc.), and it helped us focus our research on the existing documentation practices within IDeATE.

Conclusions from Discovery Phase

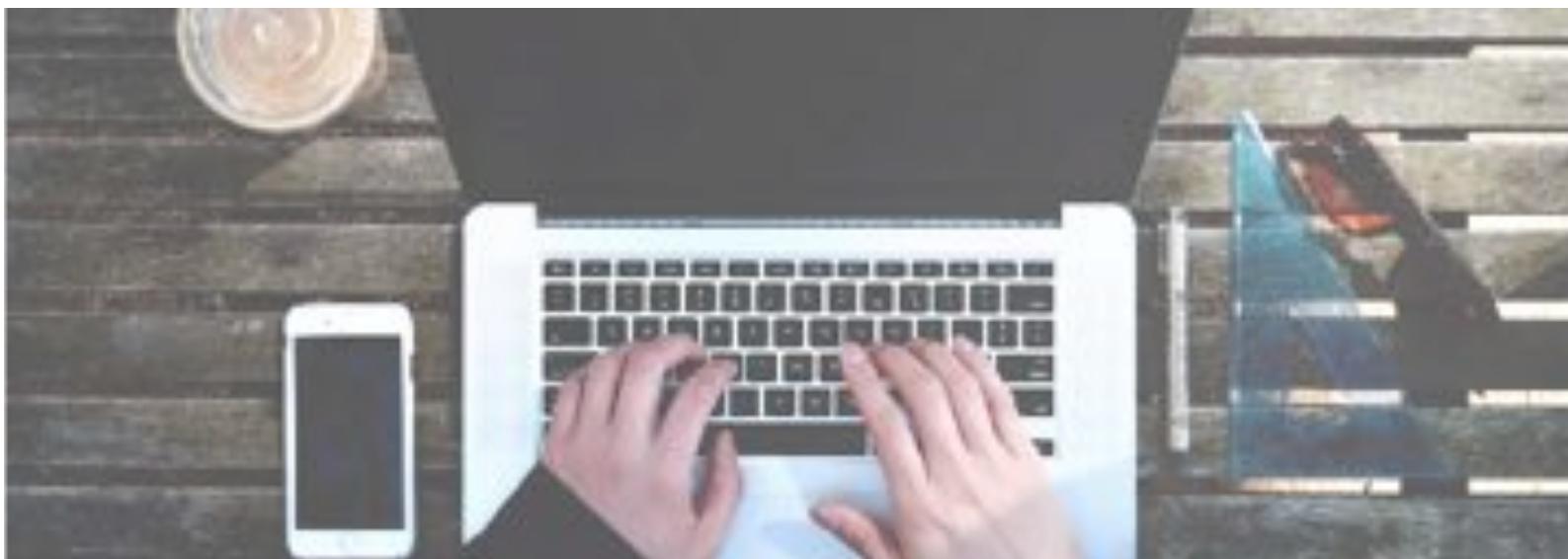
As a result of our initial research and discovery - background readings, user studies, and analysis models - we developed the following set of design needs. These needs would then form the basis for our problem statement, as well as the specific target areas for our design solution.

One of our primary discoveries from this phase was the idea of *vulnerability*. The idea that students are uncomfortable showing off simple or unfinished work, as well as being uncomfortable with the feedback and critique process, is a design problem that does not lead to a straightforward answer. In addition, general lack of student motivation to document their IDeATe work stemmed from several different causes. Students typically *prioritized core classes* over the elective and exploratory courses found in IDeATe, so more of their academic focus centered around courses for their individual majors. In addition, students find documentation *time-consuming*, and it can be difficult to learn new techniques and platforms. Finally, in order to fully understand the benefits of documentation, students need to get *feedback* from their peers (or field experts) in a timely manner. On the instructor side, we found that it was difficult for instructors to address all of the different documentation skill levels found in a single course, so any potential design solutions would need to appeal to both beginners and experts in documentation practices.

The following figure provides a tabular representation of these design conclusions, as well as the interview references from which we derived these statements.

Major Areas	Reference
Students feel vulnerable presenting mediocre projects.	MJ, CS, SH, DB, RZ
Students prioritize core classes over elective/exploratory courses.	CS, SH
Instructors can't address all different documentation skill levels .	CS, DB
Students find documentation time-consuming .	SH, RZ
Novice students have difficulty learning new techniques and platforms.	JS, RZ, DB
Student get feedback from peers and experts in a timely manner.	DB, RZ
Students capture their thinking by recording steps of the process .	DB, CS

Figure 9. Table of Design Implications and their Interview References.



Concept Prototyping and Refinements

This section provides our ideation and realization phases of the semester. First we present our concept generation process, which took place through storyboarding and mapping a user's experience through a documentation process in IDeATE. Next, we present our three iterations of prototyping. While some of these initial prototypes were relative disappointments compared to our intended goals, we constantly refined our ideas and methods in order to achieve our goal.

Concept Generation Process

Once we finished the initial discovery phase of background research and user studies, we needed to begin generating concepts about what our design solution should look like. We had a general guideline of design needs, formulated by analysis of our user study results, and we also had our vision statement (found in this paper's Overview section). The next step was storyboarding different design concepts that could address these design needs.

Our team members first went through a process of individual brainstorming and ideation, using "How Might We" brainstorming to generate 3-panel storyboards of potential portfolio features. These storyboards allowed us to explore specific steps of the documentation process - from initial capture of the work, to managing digital uploads across different platforms, adding reflections, curating the design and composition, and finally publishing the project or portfolio. Because our group members thought about these ideas individually, we were able to generate a wide array of concepts.

After we had our 20+ unique storyboard scenarios, we discussed them together as a group. Our goal was to analyze the scenario concepts, grouping them by their different stages in the documentation process (capture, management, reflection, etc.). In addition, we wanted to choose the top few ideas to continue moving forward with. The figure below represents the compilation of our ideas as we discussed which storyboards to continue exploring.



Figure 10. Compiling Group Storyboard Concepts.

One interesting idea that emerged from these storyboarding concepts was the idea of public display or sharing of student projects. This would then target our identified problem of student vulnerability of presenting simple or unfinished projects, as these displayed projects could be presented anonymously. The original storyboard for this idea is shown below:

Scenario Description: HMW encourage Student to share what work they have (less valuable maybe)

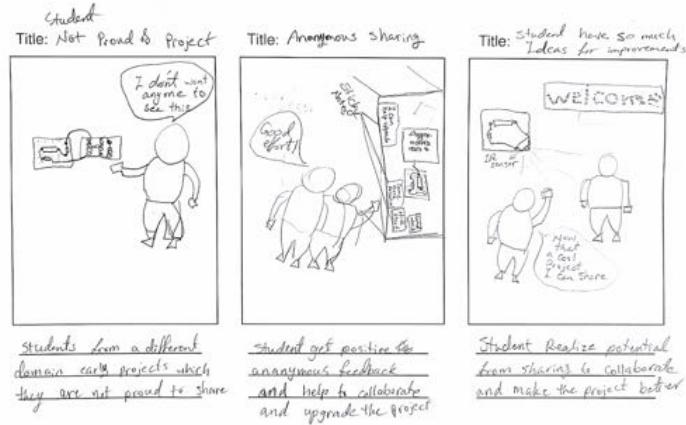


Figure 11. HMW...encourage students to share the work they have?

In addition, we outlined and presented a user journey map of the documentation process. This is presented in the figure below:

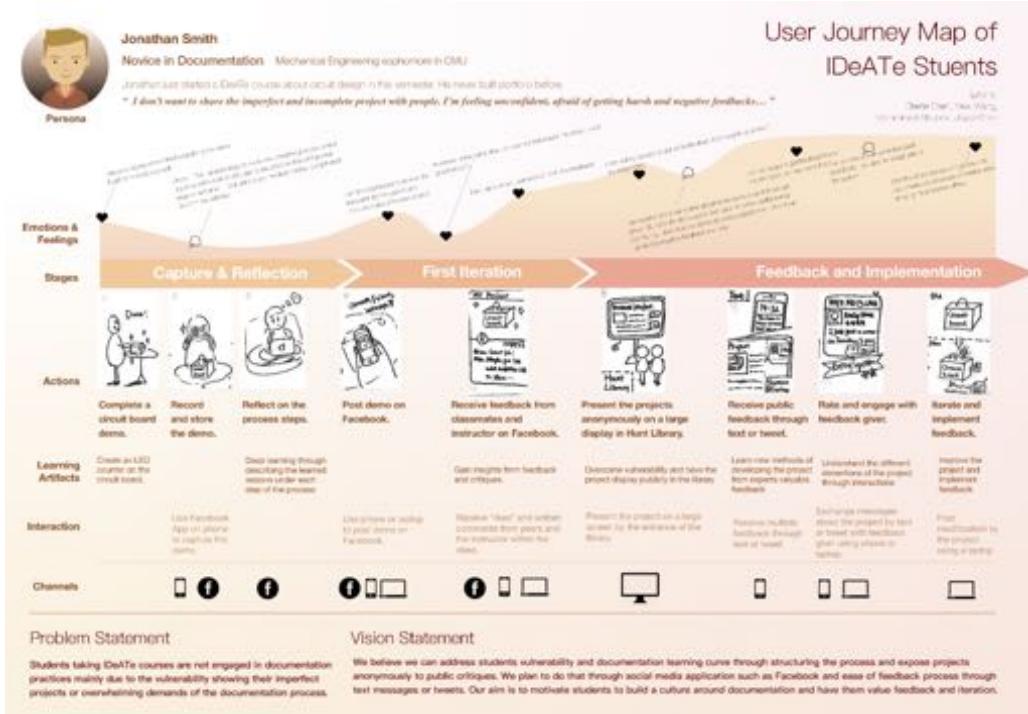


Figure 12. User Journey Map of IDeATe Students in the Documentation Process.

In the top-left of this poster, we present a model persona. For this persona, we chose a second-year mechanical engineering student at CMU. This student is taking his first IDeATe course but is a novice in documentation, and he feels uncomfortable sharing "incomplete" or "imperfect" projects because of the potential for negative class feedback. We chose this persona because it represents a sentiment shared by many of our user study results - students do not want to present their work if it does not seem perfect or complete.

Continuing further down the page, we present a mapping of the emotions and feelings of IDeATE students as they move through the stages of documentation. We divided documentation into three main stages: capture and reflection, developing a first iteration, and receiving feedback and implementing iterations. Below each stage, we present storyboard panels representing the actions of a user in each stage, as well as the learning artifacts and interaction channels used.

The most important development from this user journey map came from the addition of our design solution into the user journey process. This is presented in zoomed detail below:

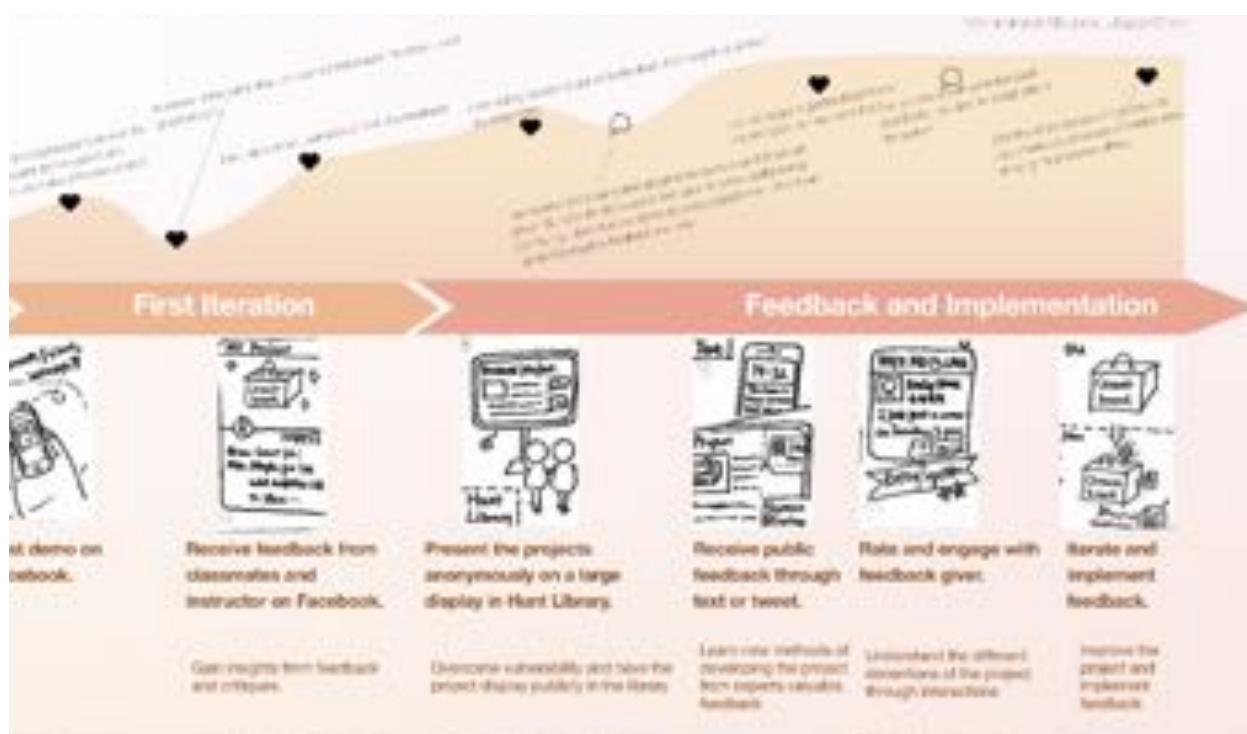


Figure 13. Zoomed View of Design Solution on User Journey Map

This was our first presentation of the proposed design solution. We wanted to enhance the “feedback” stage of documentation and portfolio development by including the idea of public feedback. Our proposed public feedback system, which we imagined to be a large display in Hunt Library, would show anonymous student projects to the general public. Students and passersby would be invited to provide feedback and engage with the artist through texting or tweeting, which are both familiar channels that require no additional learning curve to use. Finally, the project creators could iterate on their projects based on the public feedback provided.

After putting this idea into sketches and text descriptions on our user journey map, we moved into the Prototyping phase of our project.

Prototyping (Phase 1)

Goal

Based on the solid foundation of the discovery phase and the preliminary ideation, we targeted our 1st prototype of a public feedback system. Our first prototype expanded on the idea of "gathering public and community feedback". We aimed to discover how we could (or whether it was even possible to) encourage passing students to stop and provide feedback for other anonymously displayed projects in public places.

The essay *What Do Prototype Prototypes* actually helped us to be clear about what we should focus on in each different prototyping stage. At this stage, we realized that this prototype was somewhere between "implementation" (How does this design actually work? What components are used?) and "role" (How is the design useful in a user's life?). On the diagram of the implementation triangle presented below, we placed our prototype at the green circle, as we were trying to confirm the function of the prototype, and to figure out the components of the prototype.

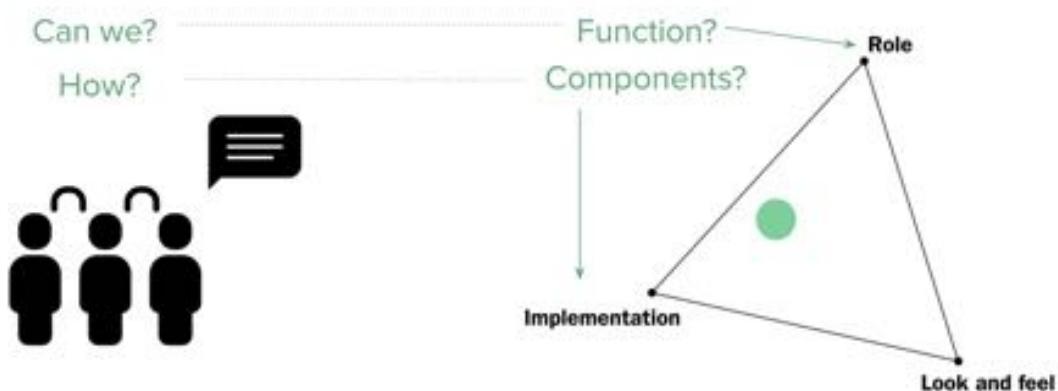


Figure 14. The Prototype Approach of our first Prototype.

Design Decisions

After the in-class brainstorming and group analysis, we finally scoped down our initial ideas about enhancing public feedbacks and comments into a specific one. We decided to set up monitors

displaying student projects throughout Hunt Library. These screens would prompt nearby students to tweet/text in a short comment as feedback to the project creator.

In order to attract students passing by, we decided to design and utilize some physical signs attached to the monitor to capture students' attention.

Although the monitors (project & feedback displays) are going to be run unsupervised, our team members will spend some time monitoring the areas where these are displayed. In this first iteration, we also planned to students after they send in a tweet/text, and ask for their opinions on our idea.

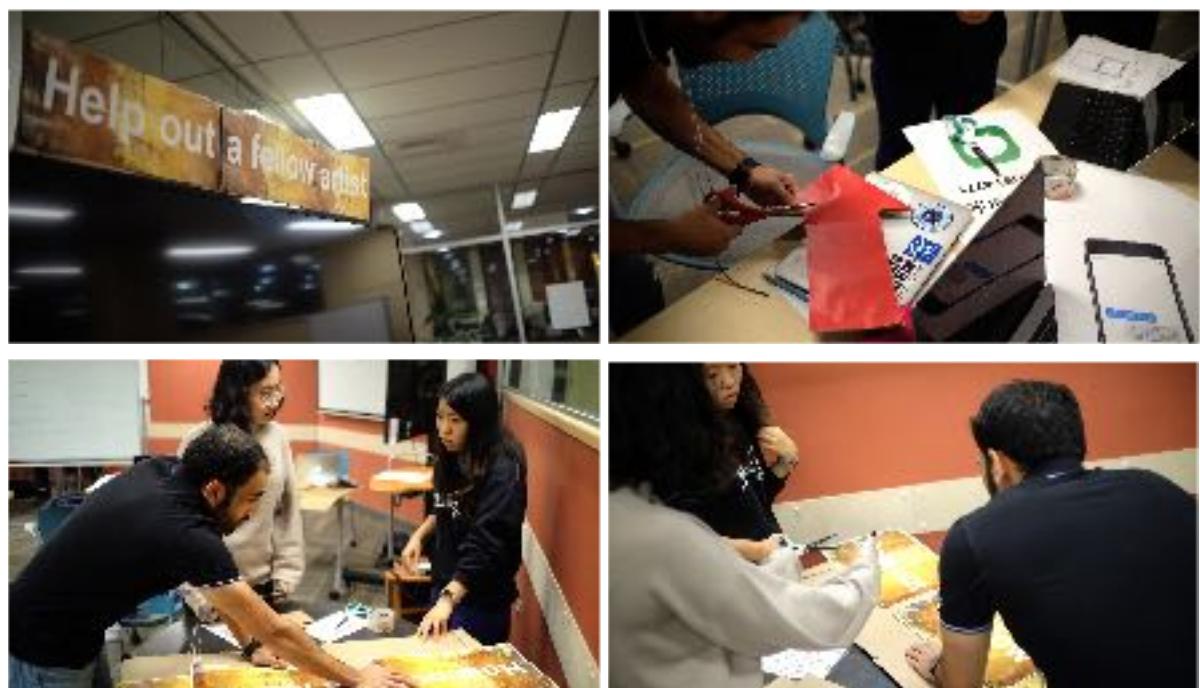


Figure 15 . Team Design and Development of First Prototype.

Design Elements

We set up a large TV monitor on the first floor of Hunt Library. The TV screen itself displayed a student project, and we attached signs to the exterior of the monitor in order to draw further attention and provide instruction of how to send feedback in the form of text messages.



Figure 16. View of First Prototype Monitor.

The sign above the screen is our “call to action”. We wanted to choose a phrase that would attract attention and inspire nearby students to send in feedback. We also wanted a phrase that would inspire a sense of community among students (especially those in the IDeATE program). We went through different ideas for this “call to action”. Some of our initial ideas were “Help out a CMU student” or “Give feedback on an IDeATE project”. We chose the phrase that displayed best across the top of the monitor and which seemed the most community-driven, which ended up being “Help out a fellow artist”.

Above the top-right corner of the monitor, we attached a large red arrow. This sign was fully meant to attract attention. Initially, we considered putting the prompt or call to action on this arrow sign, but we decided that it was too obscure to fully attract student attention.

The sign on the right of the monitor provided directions for a participant to send in their feedback. The sign asks participants to text a provided number, and then we present a picture of a text conversation on an iPhone. In addition to attracting attention and being a very visible icon for desired action, the messages provided actually provide an example of what a resulting conversation might look like. A zoomed-in view of the example conversation is provided in the figure to the right.

Figure 17. Zoomed-in View of Example Text

After creating the exterior signage for our monitor, we also chose a student project to digitally display on the monitor. The initial student project we chose was based on a design project about technologies to augment human relationships. We showed a 3-minute project video on the monitor, as well as alternating with a slide that provided the basic project description and creators.

Results and Analysis

Although we were excited to set up our first prototype, the results were largely unsuccessful, as no one actively showed interest in participating.

We got to interview several students who passed by, and asked them how they thought about our design concept. Here are some comments that we got from the interview:

"I don't want to text anything - I don't want to connect feedback back to myself."

"The purpose of the video wasn't very clear, so I lost interest pretty quickly."

"All I saw was the video. I didn't really notice the sign on the right."

Between our group analysis and class feedback, we identified a few reasons for the unsuccessfulness of this prototype. First, we determined that the display space we used was very "busy". We had chosen the lobby area of the Cafe in Hunt Library, since we expected a large number of students to pass the monitor in a given period of time. However, even though we had a large screen and unusual signs, most people still walked by very quickly, and the library houses a constant level of activity. In addition, the "call to action" sign ("Help out a fellow artist!") likely was not invoking the correct community passion. The term "artist" is vague, and is not strong enough to persuade someone to spend a few minutes of their time in order to fill out a survey. Therefore, we realized that we should appeal more to the IDeATe and "Maker" movement.

In addition to the display space and call to action, the video and presentation of the student project was not fully clear and appealing to a general audience. In addition, it was difficult to understand in a short period of time. We had chosen a 2.5-minute video, but we realized that students only spent a few moments glancing over at the screen before diverting their attention. Therefore, they were missing the point of the project, and they were uninterested in giving feedback. Finally, the method of giving feedback was not always the most convenient. We had chosen texting as an option, since nearly everyone carries a cell phone with them. However, passing students actually found it more work to pull out their phone and type in a unique number.

Takeaways from Initial Prototype

From what we have concluded in the analysis phase, we identified several factors that we could take into consideration in the next round of prototyping.

1. Location - For our next prototype, we should move somewhere closer to the IDeATe community (perhaps the IDeATe basement, which houses the fabrication labs and lending resources for the program).
2. Feedback method - For our next iteration, we should provide a more convenient method for feedback and response.
3. Call to Action language - The call to action should appeal more to the IDeATe and Maker movement, since these are established communities with common student passions.
4. Display format - The project display should be both concise and visually appealing.

Prototyping (Phase 2)

Design Elements

According to the observation and feedback from the first prototyping, we integrated the insights and implemented the second round of prototyping. The detailed design elements are listed below:

Location and audience



Figure 18. Different Prototype Locations between Phases 1 and 2

For the first phase of prototyping, we learned that the cafe space was not necessarily optimal. While there are a high number of students in the area of the Hunt Library cafe, students come and go very quickly, without paying attention to the screen for more than a few seconds. In addition, the project displayed was not very clear. Therefore, we switched the location from the Hunt cafe to the Hunt basement in the open area of IDeATe. We wanted to target more of the IDeATe community, so we set up near the fabrication labs and lending resources of the basement level. In addition, we chose a more relevant student project from IDeATe (with appropriate participation). This video was also only 1 minute, which was a drastic reduction from the 3-minute video we used previously.

Screen Size

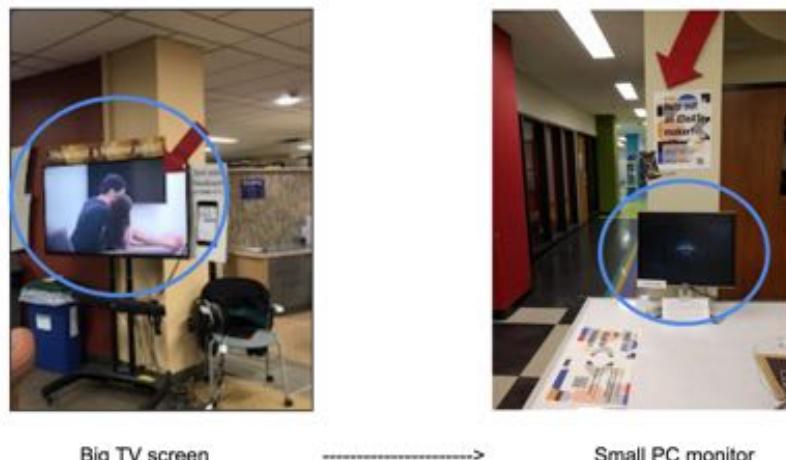


Figure 19. Different Prototype Screen Sizes between Phases 1 and 2

From the large TV screen used in the first prototype, we changed to a smaller computer monitor. One of our interviewees in the first stage had suggested that, because of the countless monitors around campus, a single monitor with a video was not enough to distract their attention. Specifically, this interviewee thought that a video near the library cafe might just be showing an advertisement or commercial for the cafe. Therefore, we changed to a smaller monitor. In addition, the monitor stood out more in the relatively empty and quiet basement. This made the format appear more special, and we hoped it would draw more people's attention.

Slogan Language

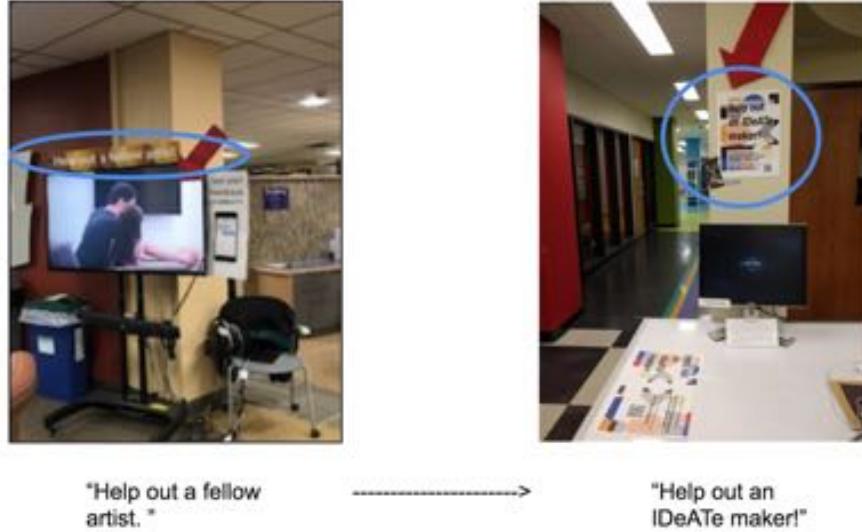


Figure 19. Different Prototype Screen Sizes between Phases 1 and 2

For the first prototype, we had used the term "fellow artist", which might not resonate with the students in the various IDeATE programs. Instead, a better term for IDeATE students might be more of a "Maker". Therefore, we changed the slogan from "a fellow artist" into the "a maker" to shorten the distance from the audience with the project author.

Feedback Method



Figure 20. Different Feedback Methods between Phases 1 and 2

From the first prototype, we learned that people considered texting or tweeting to be too much personal effort. In addition, there was further fear of personal information being

divulged because of these methods of communication. For this stage of prototyping, we switched to using an anonymous survey link and/or QR code, which provides an easier method to provide feedback without personal information being traced back.

Content Readability

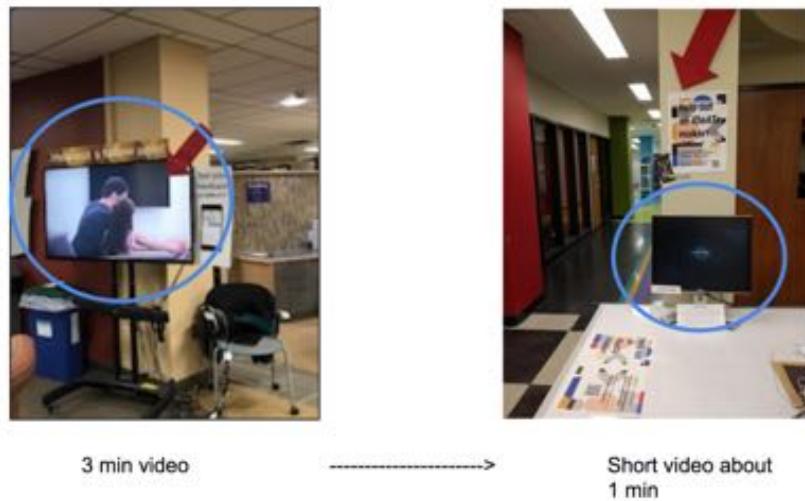


Figure 21. Different Content Readability between Phases 1 and 2

In addition to changing the project video, we also wanted to add more description and context of the student project. For this prototype, we placed a placard with project information (similar to a curatorial statement or the like) next to the monitor. This was done to increase readability and provide sufficient information for people to give feedback.

Time Duration

For the first prototype, we only performed 1 hour of supervised observation. For the second round, we left the monitor showing the project for 24 hours in the basement. We checked the monitor occasionally during the day, in order to check that the video was still running without issue. We expected that we would get more response in this unsupervised environment. Although there might not be as much traffic in the basement level as on the first floor, the project would be displayed for a much longer period of time.

Suggestions from the expert

Unfortunately, this second prototype also resulted in overall disappointment, as we received 0 public responses. After our struggling prototype session, we turned to the course instructors for suggestion about the improvement of the design. First, they suggested that we make the process of giving feedback easier - perhaps we could place an iPad or some other mobile device next to the monitor, providing a dedicated and convenient method to answer a survey form. In addition, we should pay even further attention to the words we used in the call to action. While the move from "artist" to "maker" was a step in the right direction, appealing for the public to help a single "maker" might indicate this is just an individual project. In order to have a larger impact and engage more people in the community, we wanted to consider changing from "a maker" to "makers" to target the whole IDeATE community on a broader scale.

Prototyping (Phase 3)

As we moved into the third round of prototyping, we wanted to incorporate all of our learning from previous iterations. We started by applying the expert feedback from our second iteration, such as the use of an iPad and the plural "makers" term. In addition, we also added the different elements described below:

1. In order to maximize potential for public responses, we setup the project display in both the basement and the first floor of Hunt Library.
2. To accommodate the two displays, we placed a laptop in one station and a tablet in the other. We predicted that it would be easier for a student to engage and provide feedback if they could enter their responses into a dedicated device, rather than needing their own devices.



Prototype 2: Link & barcode



Prototype 3: Tablet & Laptop

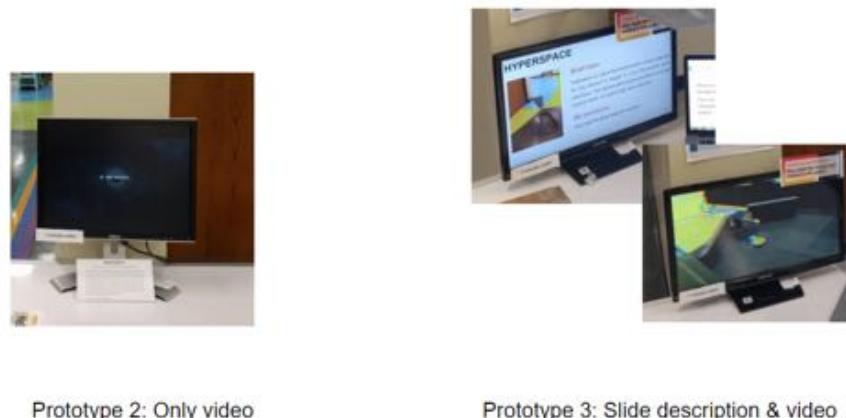
Figure 22. Expanding the Prototype Displays to Two Areas

3. We changed our call to action from "Help out an IDeATE maker" to "Help out our IDeATE makers". We hoped this modified phrase would appeal more to the voice of the community, rather than a single maker.



Figure 23. Adding Community Empathy through the Plural "Makers"

4. We altered the content showing on the monitor to switch between the 1-minute video and a project description slide.



Prototype 2: Only video

Prototype 3: Slide description & video

Figure 24. Different Presentations or Project Content and Background

5. We also added a layer of extrinsic motivation, offering free coffee or a bagel to anyone who completed our survey. At the end of the survey we provided a coupon that a feedback giver could redeem at Maggie Murph Cafe in Hunt library.



Figure 25. Extrinsic Motivation of Third Prototype.

- Finally, for the third iteration we did a 3 hour observation to capture students interaction with the design even if they didn't provide feedback.

Results

We finally managed to receive two organic pieces of. We also elicited feedback from 4 people who showed interest for a short period of time, but didn't engage.

	2 Feedback Forms	4 Interviews
Interest Trigger	<ul style="list-style-type: none"> - Being at the same location for a long time (2nd iteration) - Extrinsic motivation (coffee) 	<ul style="list-style-type: none"> - Interesting content presented
Maximum time willing to spend	3-5 minutes	
Recommended location	<ul style="list-style-type: none"> - Next to the elevator - Same location 	<ul style="list-style-type: none"> - Hallway or lounge area - Waiting areas (elevator)
Ways to improve	<ul style="list-style-type: none"> - Dynamic & interactive setup - Explain more how the project works 	<ul style="list-style-type: none"> - Have the actual artifact to play with - Shorter video

Figure 26. Summary of Prototype 3 Results.



Figure 27. Students Organically Participating in Public Feedback.

Final Design Recommendations

Synthesizing all our research and findings from all the three iterations, we concluded that a successful public feedback system should include the following:

1. The presented project should be simple enough for the audience to quickly understand the concept.
2. The optimal presented project should align with audience passion.
3. The public feedback system should be intuitive to use, with optional channels to communicate back and forth with a project creator.
4. The public feedback system should be set up in a common location, to develop the habit of feedback-giving in the community.



Moving Forwards

To combine all the factors and design elements, which have the impact of engaging people for feedback, we generate the concept of “Feedback Hub” as a system of feedback posting. We are willing to implement it if possible in the future.

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System Mechanism

From the initial point of our design, we can build a system with positive circulation. We can tap into people's intrinsic motivations and extrinsic motivations. For example, the intrinsic motivation might be the potential audience targeted. Since IDeATe is a community of makers and young designers, the enthusiasm, one of feature of "maker spirit", might be one of the intrinsic motivation. According to the presentation and in-class report from the other IDeATe group, experts or senior students in IDeATe are willing to provide feedback to the novice and young designers. The gap between might just be a channel to connect the project authors and feedback givers and provide more opportunities to giving feedback. So "Feedback Hub" is the system designed to show projects to the public and make the easy feedback channel possible. In the system, there will be several projects showing during the week. The feedback givers can select different projects as they like, which caters to their personal interest. And people show their interest to the interactive product or system during our interview and investigation. So we are thinking about building a interactive system that will display the feedback into the screen after the feedback giver submit their feedback.

What's more, the extrinsic motivation is very important, according to our previous prototyping. So the feedback giver will get a chance to have a coffee or bagel when they provide the feedback for the students. Ideally, the natural language processing technology can be embedded into the system to check whether the feedback given is a desirable one with the intention of helping the project author or just the one for free coffee without constructive suggestions. As the concern of the budget for coffee or bagel, we can contact the new open cafes around pittsburg and sign a contract with them for the coffee/food and advertisement. Since we embedded the cafes in our system, more people will know them and promote the consumption. On the other hand, students can grab a free coffee or snacks, which will motivate them to engage in the feedback.

Imaginary interface

Based on the design ideas above, we first came up with the hand-drawn design scripts to depict the different components in the system and process of system working. And then turned it into a high fidelity interface.

Devices in the system:

A huge monitor and an iPad or tablet attached to it. Both devices are hanging on the wall in the area of the IDeATe space.

Process of system:

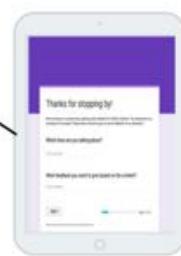
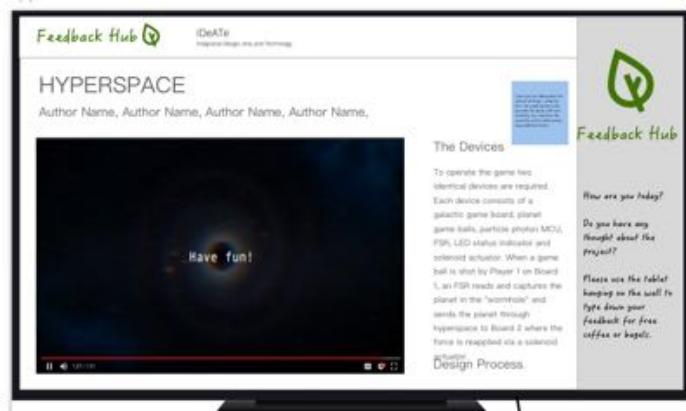
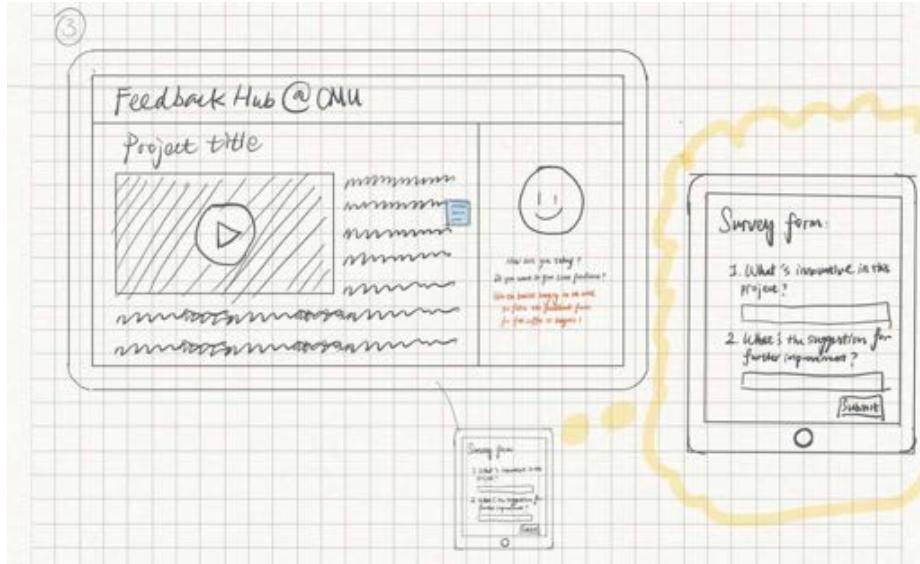
1. Someone is engaged by the project and typed down their feedback using the mobile devices next to the monitor. During the feedback giving process, if they have any confusions to the project, they can look at the screen and scroll and search for the useful information they need.

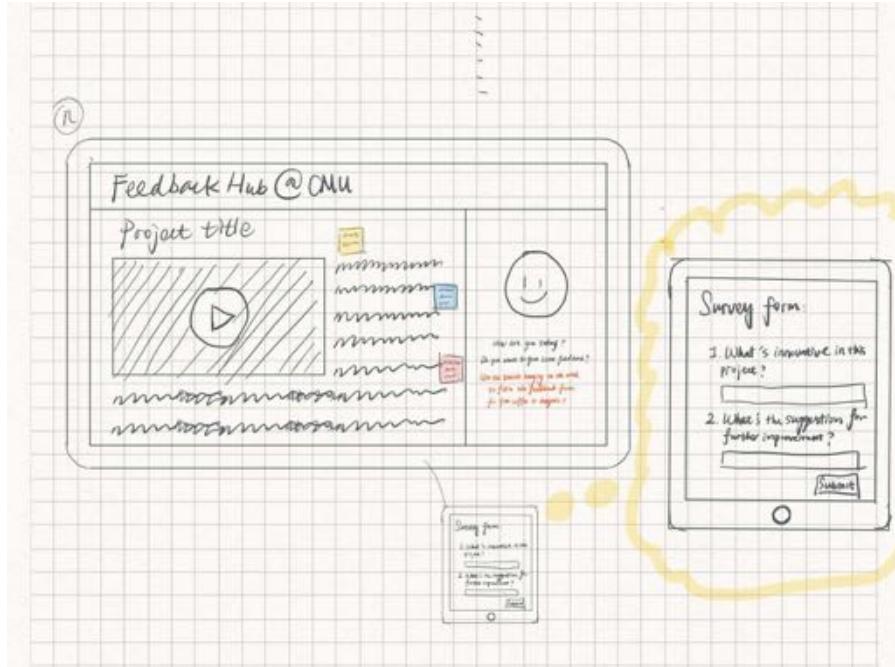


2. After the person submits the feedback, there will be a coupon showing on the screen for free coffee and bagel. In addition, the feedback will automatically show next to project description.



3. The feedback fill-in form will change back to the blank one after the several minutes. And other people coming can provide feedback to the project. Or build on the previous feedbacks.





Feedback Hub iDeATE
Innovative Design for All Technologies

HYPERSPACE

Author Name, Author Name, Author Name, Author Name,

Have fun!

To operate the game, two identical devices are required. Each device consists of a particle game board, pixel game ball, particle photon MCU, FSR, LED status info, and a solenoid actuator. When a particle ball is shot by Player 1 or Player 2, it hits the planet in the "wormhole" and sends the planet through. Hyperspace is based 2 where the planet is swapped via a solenoid actuator. When a planet is sent through the wormhole, it is sent to the "wormhole" and sent back through the wormhole.

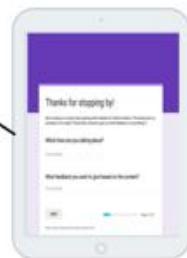
Design Process

Feedback Hub

How are you today?

Do you have any thoughts about the project?

Please use the tablet hanging on the wall to type down your feedback for free coffee or bagels.





Final Reflections

This section provides our final reflections on this project, including the overall high and low points of the semester's work - what went right, what went wrong, and how we could improve this project if we were given more time.

First we discuss the critique from our final review sessions, presented in class on Tuesday, December 12, 2017. We then discuss the overall high and low points of the semester's work - what went right, what went wrong, and how we could improve this project if we were given more time. Finally, we thank everyone who has provided guidance to our project throughout the semester.

Review Session Critiques

After our final review session, we read and analyzed the helpful feedback from our course guests. Overall, the feedback provided important suggestions that we would want to implement for future development on this public feedback system. One important note was that creating a "culture" of documentation (one of our main goals in our vision statement) was inherently a difficult challenge. However, one aspect that could be further played to our advantage is the idea of familiarity. If we can expand on the ideas, concepts, and technologies that are already present in IDeATe courses or curriculums, then we would not need to design a completely new system for users. In addition, another point of feedback mentioned that using the "artist" sign in a location where the community consists of more artists (or at least students who identify as artists) could also yield interesting results. Perhaps in a future iteration of this system, public feedback could be displayed in another building or department wing, where student backgrounds might be more coherent.

Another important insight we got from feedback came from its application in actual IDeATe courses. While the idea of anonymously displayed projects can sound great as an isolated system, how would this integrate with actual coursework? Would instructors react badly about students getting outside feedback that might oppose the course instruction? In addition, what would the interactions between the artist and the feedback-giver look like in real life? One point of critique from our final review suggested that knowing the context of the artist, or perhaps even speaking face-to-face with the creator of the project, might encourage more feedback.

What went right?

Upon final reflection, we felt that our group completed a strong analysis of current IDeATe documentation experiences. The IDeATe program is an incredibly large client to target for a semester-long design challenge. The entire cross-disciplinary program spans the entire campus at Carnegie Mellon University, with 8 different undergraduate programs for minors/concentrations and 40 courses. This proved to be a challenge right from the start, as the results from our user studies were incredibly varied depending on what IDeATe experience the interviewee had. It can be argued that the diversity in background experience is what makes IDeATe such an amazing learning space, but it also makes the program much harder to design for.

Overall, we thought we provided creative design solutions that could impact the IDeATe space as a whole. There are so many opportunities for new design solutions in the infinite scope of IDeATe - from individual courses, labs, resources, etc. - but we spent the latter half of the semester fully invested in developing and iterating on a public feedback system that has the potential to benefit the

entire IDeATe program. This also holds incredible potential to improve the space of Hunt Library, or even other buildings on campus.

What needs more work?

The challenges we faced were mostly in the development and testing of our prototyping. Some specific challenges resulted from lack of material or dedicated space. All of our prototypes were using the monitors or screens that were accessible to us, and we had to set up our own space throughout the library. Perhaps if we could have moved furniture around or set up a separate table, we could have attracted even further attention as a new display. This was also a particularly difficult time of the year to test such a system, as students were only using the library to study for exams. For our second prototype, students actually sat at the same table as our computer monitor, ignoring our project display in order to continue their own academics.

In addition, our project could certainly benefit from further iteration on the public feedback system. By the end of our third prototype, we were in the process of getting organic participation in our system. However, much more research could be done into how to best get further responses. As we mentioned in our Overview section, success is measured both by the pure number of responses and the value of these responses. When we were able to get feedback from our third prototype, the responses were still minimal. Given more time, we could further develop the best questions and locations to get more valuable feedback to public projects. In addition, if we could set up a consistent "feedback" schedule - perhaps a guaranteed project for display every Friday afternoon - then students could know to look for such a space. Word could also spread about the public feedback system, which would only serve to increase its popularity.

Final Remarks & Thanks

Finally, thank you to everyone who helped make this work possible. We could not have finished this project without the excellent guidance of course instructors Marti Louw and Francis Carter, our Maker Ed contact Stephanie Chang, our IDeATe points of contact Kelly Delaney and Daragh Byrne, and all of the course visitors throughout the semester. We also want to thank Carnegie Mellon University and the overall IDeATe program, as well as Hunt Library, for providing us an overall space to develop and iterate on our prototypes.

Appendix

Works Cited

[IDeATe gallery](#)
[Course Website](#)

Literature Review and Reading Citations

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