

# Finding real problems:

Using participatory design research to help students propose and design new applications

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## **Abstract**

Great apps allow people to express themselves, improve their productivity, or connect them to loved ones. They solve problems that are at the core of human life. As we educate students about designing new digital experiences, we also have to instill in them the ability to investigate and identify tools that will truly impact people's lives. Electives in web design can be a great way to introduce a design methodology to a wide variety of students.

The use of simple participatory design methods can introduce methodological thinking to students to help them understand potential users' real problems. In this paper, a case study will be shared about the use of participatory research methods within the context of digital design elective coursework. Examples of objectives and deliverables will be shared about the integration of these methods into course projects. From this paper, design educators can take away the ability to integrate participatory design learning outcomes into traditional web and application design projects. In addition, by using the documented approach, educators can provide their students with the ability to conceptualize realistic, useful, and potentially patentable new products in the context of their course.

## **Keywords**

design elective, design methodology, participatory design research, interaction design, web design, user interface design

**Background: broadening the idea of design**

Designers are steadily distancing the artifacts we make from the thought process we use to design. In response, the standards for visual communication design (VCD) education are evolving to emphasize the understanding of a broader design methodology. Collectively, design academia has had a nebulous understanding of how the designer's role is evolving (AIGA; Davis 2008; Lupton 2005). In response, faculty are updating curriculum to focus more on the process and impact of our profession rather than the output. Acceptance is growing and is evidenced by the proposed changes—as of July 2013—to the National Association of Schools of Art and Design's (NASAD) curricular standards. The production of disciplinary artifacts is still important, but curricular focus is evolving to address the designer's civic responsibilities by emphasizing methodological thinking. Two important competencies that have been amplified in the the proposed draft of changes from NASAD help solidify our evolving understanding of a designer's role. From *Draft 1: Proposed Handbook Changes* (NASAD), “Common curricular elements incorporated in all specific professional undergraduate degrees in design [include]”:

***Designing for and with people.** Contemporary design practice addresses varying levels of responsibility between designers and users. For example, control for design decisions can shift proportionally from project to project. Knowledge and skills to understand and begin to work in this environment are essential...Aspects include: appropriate use of methods, understanding human factors, use of participatory design...*

***Research.** Research is an integral component in designing for and with people in a context that encompasses complexity and technology. Research sensibilities and comprehensive capabilities are gained through study and practice over a lifetime. At the undergraduate professional degree level, basic understanding of research methods, and the ability to read and use findings in studio projects are essential. This competence includes basic knowledge and skills to develop research-supported design decisions for specific circumstances that address: What people want and need. What is needed that does not exist. How people learn and know... The effects of design action on people, communities, the environment, and the future... (NASAD 2013)*

As primary curricula for design majors are being updated to enhance the student's understanding of the profession, design electives tend to lack some of the new competencies noted above. If we as a profession are going to present a united front in advancing the understanding of our role in business and society, it is important that we also extend these philosophies to elective courses. For the purposes of this article, I am going to define a “design elective” as a course that has one or both of the following objectives:

1. To provide a place for visual communication design majors to explore a specialized facet of design which is not covered to a greater extent in the main curriculum (e.g., interaction design, exhibit design, motion design, etc.)
2. To introduce the design process and methodology to non-designers so that it might enhance their own disciplinary goals or thinking.

Of course, there could be many other definitions of a design elective depending on the specific goals of the instructor or students. However, the working definition above is helpful while thinking about why design electives are an important venue to utilize a methodological pedagogy. If a VCD student takes an elective where the NASAD methodological competencies listed above are not assessed—as they are in their main curriculum—it sends a mixed message to the student. Second, electives have the ability to expose a design methodology to a wider audience. Students from various disciplinary backgrounds—artistic or otherwise—will have the opportunity to take the course which may be their only interaction with design during their tenure. For these reasons, electives should be seen as an area of opportunity to advocate for a broader design ability.

In the following paper, I will outline one example of how methodological objectives can be added to course assignments in order to allow students to get a more holistic view of a professional designer's approach to problems. In the next sections, I will describe the design elective that was chosen as a test case for this work, discuss the complexities of combining disciplinary and methodological learning objectives, outline the assignment I used to introduce design methodology, and finally, share outcomes and insights from the experience.

### **Course structure**

The course that serves as the case study for this article is titled *Visual Design for the Web*. The course is relatively new at Herron School of Art and Design, being offered for the first time in the spring semester of 2013. Following my definition of an *elective* above, the course was created to offer visual communication design students a venue to amplify their digital UI design skills and professional understanding, as it is not covered deeply in the primary curriculum. Additionally, the course gave general fine arts students an elective opportunity which affords them an introduction to a design approach through the spectrum of web design. The course had an enrollment of 15 students: 8 visual communication design students and 7 fine art students from a variety of disciplinary backgrounds including photography, illustration, and art education. The class met for 5 hours per week—two 2.5 hour sessions—during a 16 week semester. There were no prerequisites for the course.

### **Complexities of teaching “web design” as an elective**

Courses in digital UI design evolve on an almost-constant basis. Because the industry changes so rapidly, education must constantly be working to understand the latest media, processes, and

output for the screen and translate that knowledge into coursework. The term “web design” is used here as a catch-all term to mean on-screen user interface design. Web design and its affiliates (e.g. user experience design, interaction design, user interface design, etc.) are complex fields with many schools of thought regarding practical and pedagogical approaches. Notably, there is constant debate about what medium designers should use to create their work. Preferences of designing with code (HTML and CSS) or traditional design tools (Adobe Creative Suite) are varied and deeply personal (Kolko 2012; Cooper 2013; Seiden 2013). A student’s learning style, and aptitude tend to dictate how they will approach a web design project in class. In an elective context, there will be a variety of approaches; some will be more prone to design in code while others are comfortable working statically. Accommodating the various approaches and skill sets in the classroom can be a daunting task.

Additionally, instructors must consider that there is quite a bit of up-front knowledge that a student needs in order to get started in professional web design. Consideration must be paid to all of the variables involved in good web design practice and determine how to draft the learning outcomes for the course: *Will you focus on design, coding, content, planning or some combination thereof? Will you introduce the concept of responsiveness—designing for multiple viewports—on the web? Will you have the students draft a site map and wireframes or is that overkill for an introductory level?* With so many decisions about teaching a novice *how* to design a web site, it is easy for a student to forget *why* we might design a web site.

It is much more important to focus on the *why* questions in an introductory elective rather than the *how*. This stance is supported by the observation that it is very difficult to teach one specific way to “make” a website; each student will approach the medium of web design differently. In the most recent NASAD curricular standards discussed above, we know that being a designer involves much more than the artifact you create. Therefore, introducing the concept of a design methodology into an introductory web design course is important. However, building in another spectrum of topics that need to be covered adds yet another level of complexity.

Wanting to manage this complexity, the course in question was defined by several learning outcomes (Figure 1), varying in scope, which were divided into practical (professional) and methodological categories. Documenting this dichotomy allows the students to better understand the relationship between traditional “making” aspects of the web design profession and the higher-level methodological approach. In the next section, I will discuss how to integrate these various outcomes into a course.

Practical/Professional	Methodological
<i>On successful completion of this course, students will have the ability to...</i>	
...utilize the principles of Design specifically in the context of web and digital media	...utilize a divergent design process to produce meaningful deliverables
...both verbally and visually communicate relevant, meaningful, and appropriate design solutions in response to communication problems	...develop a research plan and analyze data to better understand the users of digital media
...provide useful and relevant critique of own work and that of colleagues in the context of web design	...develop empathy with the users of proposed design solutions by integrating the concepts of usability, usefulness, and context
...recognize and utilize—at an introductory level—appropriate development methods (HTML & CSS) for proposed digital solutions	

Figure 1. *Visual Design for the Web learning outcomes*

### Project Breakdown

In order to satisfy all the outcomes established for the course, the activities were broken down into two primary assignments. The first assignment, completed the first several weeks of the semester, focused on the traditional hand skills and processes of a professional web designer. Working on technical and disciplinary-specific skills first is an attempt to get all students—regardless of background—on somewhat equal footing in terms of understanding basic design terminology, skills, and production processes. Focusing on a lot of the *how* aspects of design early in course allowed for more time to explore the *why* questions in a longer project during the second half of the semester.

The second project, which will be detailed in the following sections, was an adaptation of a common assignment where the students are asked to propose and design a new application or website. This activity is enticing to the students—it affords the possibility of getting rich if an idea is viable—but is usually problematic for a variety of reasons. Primarily, when the students are tasked with envisioning a new application, they are generally inclined to think very narrowly about issues that impact their own lives. While these ideas are valid on some level, they cannot be easily extrapolated to a wider audience and usually hold little intrinsic value. Because these ideas lack substance, the primary focus of the assignment will likely narrow to the visual layer of the design—making it look cool—rather than working towards solving a real problem through the design process. There is an opportunity space at the beginning of this project to introduce a design methodology and subsequently walk the students through a basic design research process. By introducing methodological thinking, the weakness of this very useful assignment—poor problem identification—can be turned into a strength: finding real problems.

To help frame the intent of the project, it was titled *Innovation for the web* rather than a more product oriented title such as *Interaction Design* or *Application Design*. The overall process that the students undertook is listed below. The important addition to this process is the first three steps:

1. **Set context - Identify audience**
2. **Seek a problem - Generative tool/participatory design**
3. **Identify problem space - Analysis of findings**
4. Propose a solution - Synthesize insights into proposal for a web service
5. Refine - Evaluate and iterate on solutions
6. Communicate - Tell an engaging story about the problem and solution

In a traditional design elective, the focus might be on steps 4-6. However, with the addition of steps 1-3, the students are able to see how a methodological design approach can be applied to the disciplinary process of web design.

### **Introducing methodology**

The basis for this process comes from Design Thinking literature, notably Kumar and Whitney's writings about the importance of *Activity-focused* research (Kumar and Whitney 2007). As they point out "... [focusing research on the] activity that [people] are trying to accomplish with [a] product can lead to surprising innovations that are grounded in their daily lives. For example, a food manufacture could look at 'eating and drinking at home,' a maker of laundry products could look at 'taking care of clothes'..." (Kumar and Whitney 2007, 49). Integrating this type of perspective at the beginning of the design activity can allow the students to define a *real* problems held by *real* people. After doing this, they can propose their solution and design an interface in a traditional "making" processes.

To help the students remain activity-focused—rather than product-focused—at the beginning, a participatory research method was developed to allow them to elicit valuable insight from people. This method is based on the work of Elizabeth B.-N. Sanders who upholds the idea that designers should "invite the people we serve through design to participate with us in the actual designing" (Sanders 2005). Using this type of participatory method can allow the students—acting as design researchers—to better understand an identified audience's unfulfilled needs which might be addressed through user interface design.

### **Developing a participatory design method**

To craft the method that the student's used, I looked to a framework provided by Sanders and her colleagues in a 2010 article (Sanders, Brandt, and Binder 2010). According to the framework, conducting participatory research has to have three dimensions:

1. **Form:** the type of action that a participant takes during an activity (either making, telling, or acting)
2. **Purpose:** why a specific tool is being used (to *probe* participants for self discovery, to *prime* them for further participatory activities, to *understand* their current experience, or to allow them to *generate* a future concept.)
3. **Context:** consideration for location of activity, type of interaction, or size of group.

Sanders writes, “It is very important to understand the purpose and context of the tools and techniques and to customize them accordingly. The content of the [method’s] toolkit and the instructions for its use will vary depending upon the purpose for which it is aimed as well as the context in which it will be applied.” (2010). With that in mind, I defined the purpose and the context first. Regarding purpose, I asked the students to focus on understanding frustrations that people have in daily life. This prompt was fairly broad which allowed for a variety of problem spaces and topics within the same class. Additionally, I wanted the students to have a broad understanding of the participatory processes; one that could include probing, priming, understanding, and generation. This prompt allowed for an exploration of each facet of purpose.

The context of the project was constrained by time and student ability. With limited knowledge of how to conduct a participatory session, each student separately interviewed three different participants in a one-on-one setting that was most comfortable for the participant. The students were asked to find three participants that could be categorized together in some way (e.g. college freshmen, middle-aged parents, etc). This restriction allowed them to more easily analyze their findings later.

Having the purpose and context in mind, I was able to use Sanders’ framework to determine the form of the method: 2-D collage. In addition to the collage, the students had to conduct a pre- and post-interview with the participants. An overview of the the research process and necessary tools are listed below. In the next section, I will go into greater depth on each phase.

<i>Phase</i>	<i>Activity/Tool</i>
Probe	Oral interview
Prime	“Describe your day” mapping activity, interview
Understand	2-D collage of emotional state, interview
Generate	2-D collage of solution, post-interview

**Method Phase 1: Probe**

In the first step, students lead conversational discussions with each participant. The intent of this phase is to allow the participant to feel comfortable talking about the subject matter at hand. In this case, questions like “Tell me about your day.” or “How was your trip to work this morning?” are asked to try to elicit “pain points” or frustrations from their participants. This information helped the student guide the participant through the next phase: priming.

**Method Phase 2: Prime**

Moving forward, the student introduced the next activity: “describe your day”. This activity primed the participant to do the next, more creative phases. The participant was presented with a canvas that has several blank rows on the left side and a likert scale on the right (Figure 2).



Figure 2. “Describe your day” canvas

The student then prompted the participant to walk them through a typical day in their life. It helps to do this activity sequentially (e.g. starting when you wake up, ending when you go to bed) but can be done in any order. As the participant documented their day, the student asked them to rate the level of frustration they had at each noted point. When the participant is finished, the two talked through what was documented, clarified any outstanding questions and noted the exceptional “pain points” throughout the day. These times of high frustration will be the subject of the next phase.

**Method Phase 3: Understand**

With the identified frustration points in mind, the student instructed the participant on how to complete the first step of a co-creative activity. This phase allows the student to better understand the specific emotion and origin behind the frustration. The participant was presented with a second, generative canvas and variety of stimuli, or tools, that they could use to illustrate their responses rather than verbalize them. The materials that were given to the participant were purposefully abstract as to allow them to project their own emotions or story onto them. A list of stimuli/tools that were used in this project are listed below. All materials used for this project, including project handouts, canvases, stimuli, and assessment criteria can be found online at <http://www.ganci.me/FindingRealProblems>



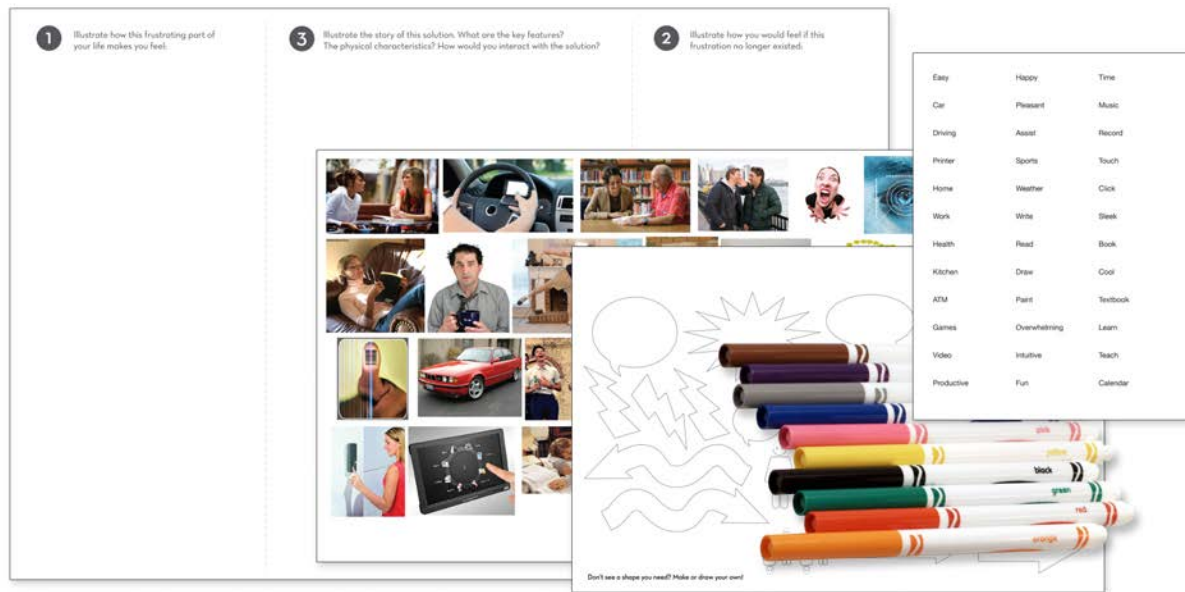


Figure 3. Generative canvas used for both Understand and Generate phases

- **Images:** (three tabloid sheets) concrete or abstract images that elicit an emotional response
- **List of words:** (two letter sheets) a range of emotional or descriptive words that help formulate thoughts
- **Abstract shapes** (one tabloid sheet): outlines of people, objects and shapes
- **Scissors**
- **Glue sticks**
- **Markers**
- **Colored Pencils**

The canvas (Figure 3) is divided into three sections. Starting with the far left section, the participant was asked to visualize their identified frustrations from Phase 2. The student asked them to think about what caused the frustration and to describe their feelings about the situation.

After the participant was finished, the student asked them to move on to Step 2 in the far right section. In this section, the student instructed the participant to complete a similar visualization; only this time they were asked to visualize how they would feel if the frustration was no longer present in their lives. Prompting questions included “*What would you now be able to do?*” “*How would your life be better?*”.

After the participant completed both Steps 1 and 2, the student then interviewed them about what they made, clarifying anything they did not understand. The goal of this phase is to better understand the root of the frustration and to better empathize with their participant. It helped get both the student and the participant in the head space of experiencing the frustration.

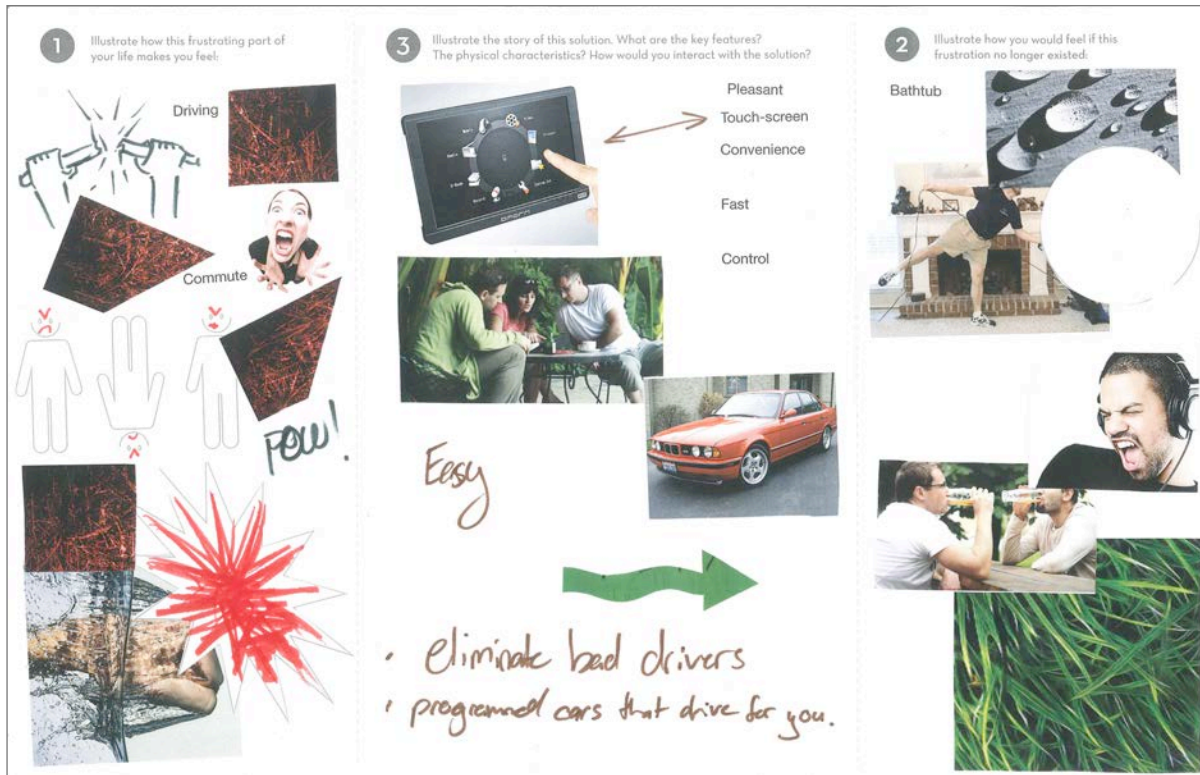


Figure 4. An example of a completed canvas

#### Method Phase 4: Generate

The final phase affords the participant with the tools to generate their own solution to the identified problem space. The solution is the “tool” they could potentially use to connect the emotionally frustrating state (left section of canvas) to the emotionally freeing state (right section of canvas). The student instructed them to use the same materials (stimuli) that they had access to Phase 3. Because the student knew they have to create a digital user interface at the end of this process, they guided the participant to think about that realm of solutions. However, if the participants’ solution is product- or service-based, it is still possible to derive useful insights that can be translated to a digital environment.

The important aspect of this phase is to allow the participant to be creative in the way that they solve the problem. Judgement should be deferred until later analysis. In Phase 4, the participant

should be enabled to create an ideal solution regardless of their technical knowledge. Following both Kumar and Sanders' philosophies, enabling the user to define and solve their own problems in a certain context is the key to true innovation. After the participant was finished, it was critical that the student complete a post-activity interview to fully understand the proposed solution. Figure 4 shows an example of a completed canvas showing frustration state, solution, and relieved state.

### **Post Method: Analysis and Iterative Design**

After the research session was complete, the students each had three sets of canvases, notes, and interview transcripts. The next step in the overall assignment process was analysis. Analysis of the data can be completed using many different approaches which will not be covered in this paper. Within the time constraints of the semester, analysis has to happen quickly, asking the student to use abductive thinking—another tenant of Design Thinking—to identify the root problem that is causing frustration in their users' lives.

With that problem identified, the student can move on to the traditional iterative design process of “making” a design solution. However, because the student identified the problem through a very quick and easy people-centered research processes they should be able to create a more appropriate solution. Visual elements, scale, mode of interaction, and format can all be derived from this exercise.

An important final step to the assignment process is to have the student visualize a story that frames both the problem and the solution together. In this course, the students were able to tell their story in any medium. There were a variety of responses that included an illustrated storyboard, videos, photographic interpretations and traditional visual communication infographics. See Figures 5-10 for two examples of the deliverables that were part of this project. Assessment of this project was based on administration of the method, documentation of the findings, craft and effectiveness of visual design, and storytelling.

### **Project example 1**

**Project name:** *Accolade*

**Student name:** Katelyn Perry, Senior photography major

**Audience:** Busy college students in late teens-early twenties

**Problem space:** People are confronted with tasks they are required to do but don't want to do. (e.g. menial work tasks, school work, exercise)

**Solution concept:** A rewards application for the iPhone. The app, Accolade, would reward the user with points once they finish an undesirable task such as studying, cleaning, working out or just going to work.

**Storytelling medium:** Photographic narrative

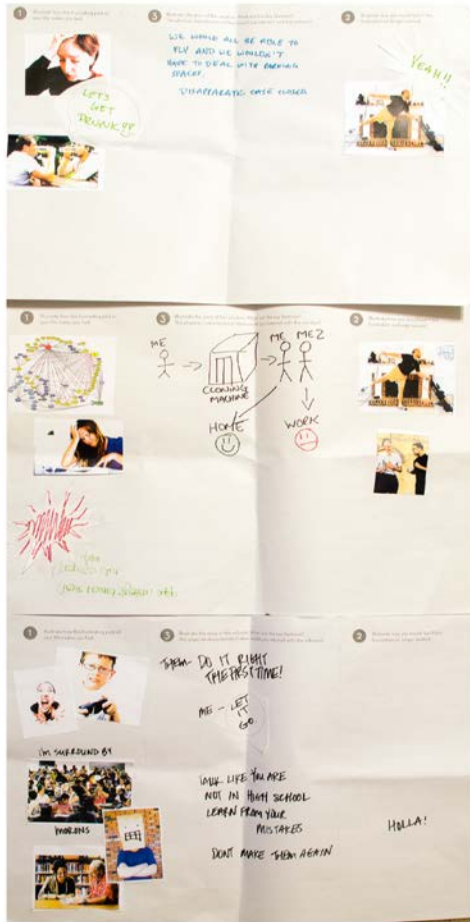
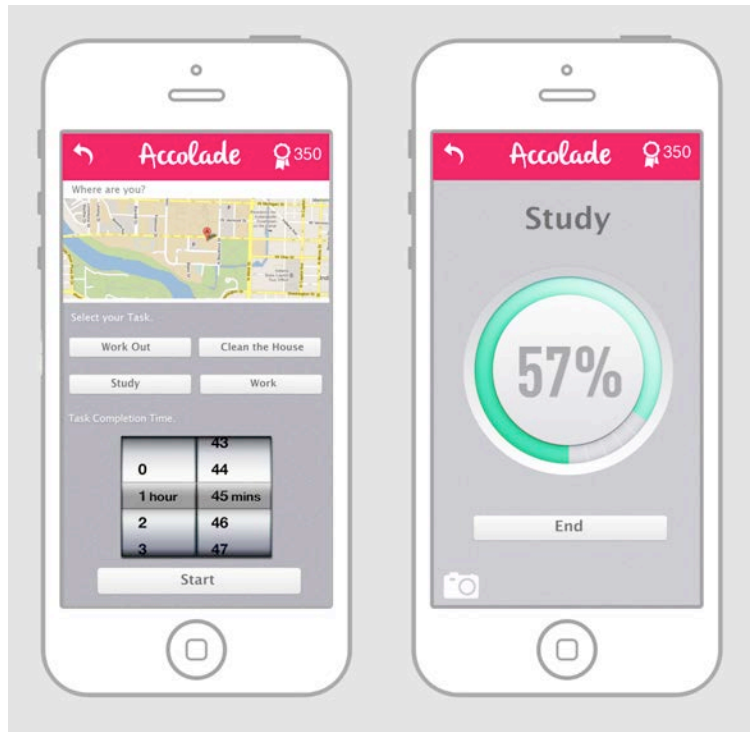


Figure 5. (left) Analysis of completed generative canvases  
 Figure 6. (right) Final static UI design of Accolade  
 Figure 7. (below) Narrative about the problem space and solution, told through a photography.



**Project example 2**

**Project name:** Project

**Student name:** Sarah Herbert, Junior visual communication design major

**Audience:** Mid-sized factory floor workers and managers

**Problem space:** Better communication between management and workers is needed to foster a more positive mindset, an alignment of priorities, and a feeling of accomplishment

**Solution concept:** Project, a large-format, touch-based interactive management tool allows machine shops to effectively organize employee information including jobs, materials, time, facilities, and archives. The software also keeps shop morale in mind by promoting team-oriented goals.

**Storytelling medium:** Process infographic



Figure 8. Finished visual design for Project



Figure 9. (left) Storytelling through processes-centric infographic [detail].

Figure 10. (right) Consideration for scale in format based on user input.

### Student insights and conclusion

After the completion of this project, I surveyed the students to better understand their interpretation and reaction to this assignment. I elicited their feedback in the form of an individual written reflection. For most of the students, this was their first exposure to a design process or methodology. The feedback I received was mixed; some students found the activity enjoyable and easy while others found it difficult to get useful insights from their participants.

One important pattern that emerged from their reflection was about their struggle to act as an effective facilitator. The most difficult part appeared to be getting the participants to think creatively in the *generative* phase of the method. The quotes below highlight some of their struggles with this phase.

*“Moving on to the third [section], the product, proved to be the most difficult, especially for one participant. This participant was taking the assignment very literally and did not want to acknowledge that anything would ever change.”* –Sarah, Junior VCD major

*“The issues that arose here were those of participants not feeling adequate enough in being creative. I hear a lot of, ‘Ugh, I should’ve picked a different frustration. This solution isn’t good at all.’”* –Katie, Junior VCD major

*“Moving on to the illustrative part got tricky. One of my participants, 49-male, thought to literal. Once illustrating his frustration and dream state he didn’t know how to solve this problem.”* –Stephanie, Junior VCD major

*“While participating in the interview process of this project, I found that the most difficult part to explain to the participant was the solution stage.”* –Sean, Junior Illustration major

In future iterations of this project, it will be important to make sure they have proper training around tactics they can use to elicit better feedback in that phase. It is also good feedback for me as the method toolkit creator. Adjustments should be made in future iterations to allow for better or more guided creation in the final phase.

As design educators, we have a duty to uphold the standards of our profession. Design electives can be a weak point in presenting a holistic design methodology throughout a curriculum. By making basic adjustments to the way we plan projects within electives—as in the example described above—we can promote a broader design methodology regardless of content. As the profession increasingly asks *why* instead of *how*, it is especially important that we ensure our students are well versed in a design methodology. By making a focused effort to stress both skill-based and methodological learning objectives, we can help our students be better, more well-rounded designers and design *thinkers*.

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