Hi, my name is...

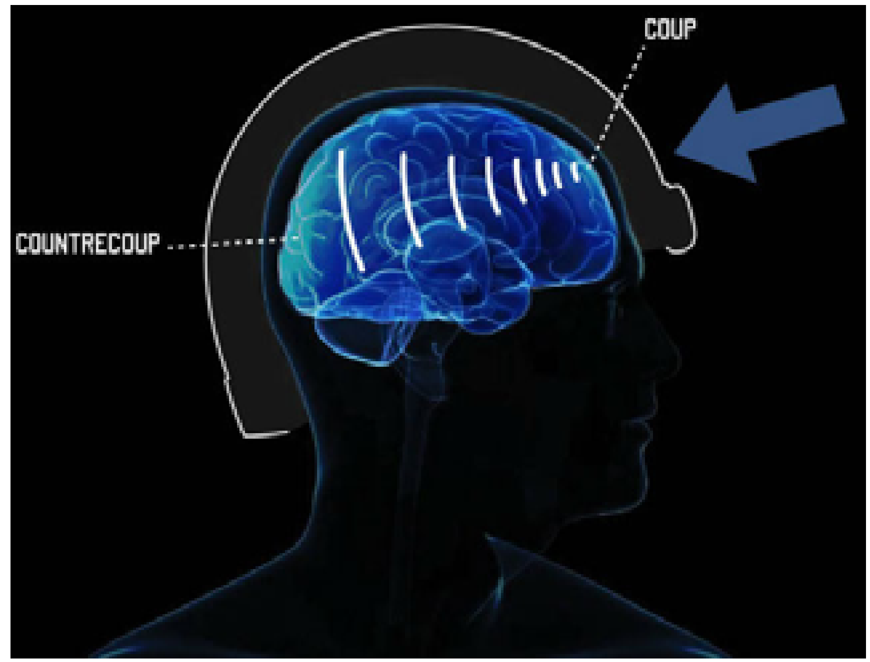
REBECCA RAHA RADPARVAR

and here is a taste of my work...

the AEGIS helmet

The Aegis Helmet was designed to prevent concussions and their long-lasting after-effects, most specifically in professional football. Instead of merely shopping players' skulls from shattering, the Aegis was created with one simple intention: to lessen the shock player's receive during impact by absorbing some of the force incurred.

understanding football and concussions



Before any ideation began, initial research was conducted to better understand the mechanical (or medical) and social causes of concussions. Concussion mechanics were explored to best understand how people physically get concussions, why the occur, and what their long term damage is. Once concussions were understood mechanically, we heavily researched why concussions are as rampant of a problem as they are in the NFL, and what the real causes are. Both areas of research were highly enlightening and informed the project's trajectory.

First and foremost, we learned that concussions are due to the coup and countercoup effect, the injury that occurs at the site of the initial impact and the impact that occurs on the opposite area of the initial impact, respectfully. These coup/countercoup injuries in turn lead to players suffering from Chronic Traumatic Encephalopathy (CTE) and ultimately cause players' mental states to degenerate - even long after they have left football.

After understanding the mechanical causes of concussions, the empire surrounding the NFL was examined as well. When we explored football's rules and regulations, protective gear evolution, and overall history, a number of issues became apparent. First and foremost, football player's injuries aren't properly reported. As football players lose game time when they admit to injuries such as concussions, players and coaches tend to sweep these issues under the rug and never report them. This lack of reporting leads to no medical attention and ultimately, long lasting effects. Additionally, as football equipment has increased in safety, the sport itself has decreased as players begin to play more aggressively. The biggest discovery however was due to the timing of our research. As American football has only existed for a few decades and the long term consequences were starting to appear more prominently than ever. Both Ray Easterling and Junior Seau had committed suicide - due to depression caused by decreased mental function - during the span of our project, indicating this was an issue that needed immediate attention.

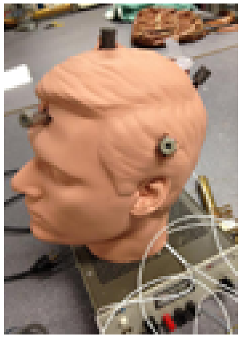
We came to one conclusion, while current helmets do a great job at protecting player's heads from physical injuries such as punctures, they do not properly protect players from the physical impacts that lead to concussions.

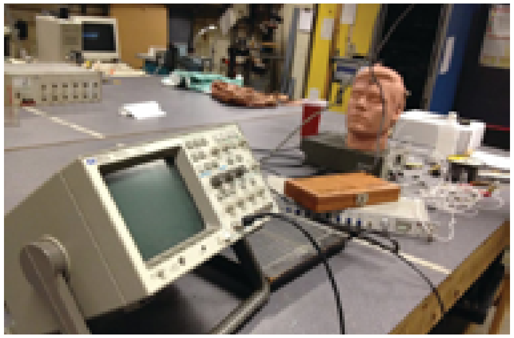
materials testing & design

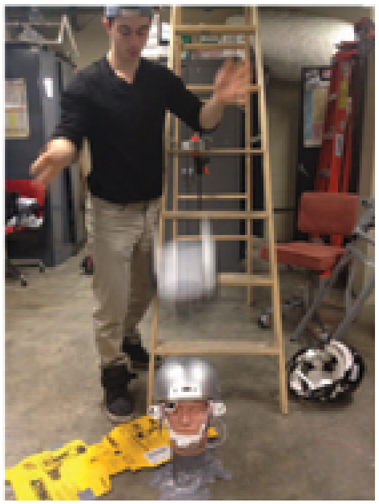
For this reason, we decided to focus on the actual padding instead of a helmet, as opposed to the shell casing. This original research and testing began with a number of different materials to best understand which materials could best protect against these physical impacts. One of the first materials tested, were non-newtonian fluids. While we found these materials interesting for the unique material qualities, their stiffness under impact was not desirable for our application so we moved on.

From there, we began exploring other materials impact absorbing qualities. One of the main materials tested, and used for the first iteration of the Aegis helmet, was Sorbothane Shock Absorbing materials. A sample of one of these sheets can be seen above. Different configurations of Sorbothane were testing to allow us to gauge what configuration would work best for our first iteration. The design to the far right, cut pieces of Sorbothane mixed with a semi-viscous fluid in a plastic casing, was utilized for the first iteration of our design.

Multiple balls of these configurations were created and then put into o-shaped rings for added support and shock absorption. These were then connected to an existing bonnet from a deconstructed helmet.







impact testing & results

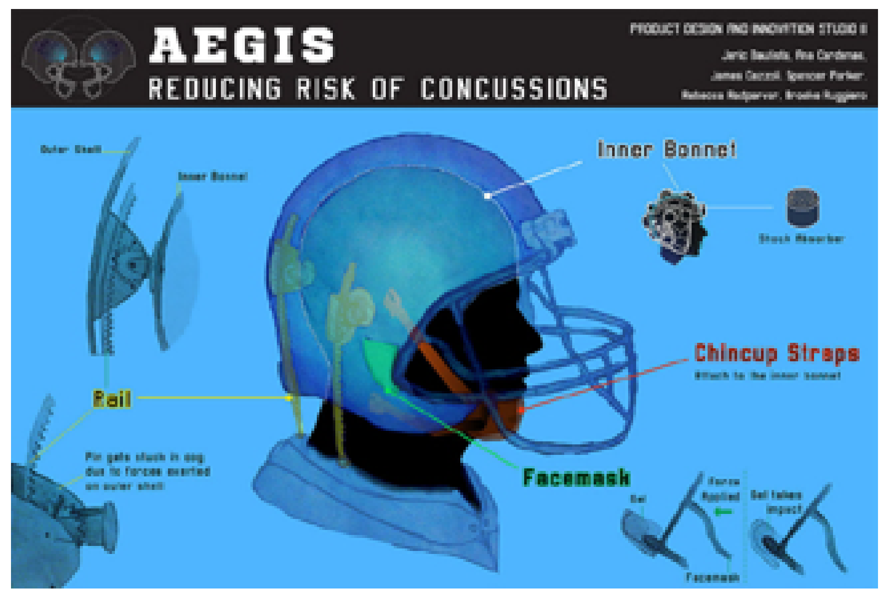
Once a prototype was completed for the first iteration, impact testing was conducted to determine the success of the first iteration design. Three accelerometers were placed in the dummy head to measure impact, one at the front of the head and two on either side above each of the ears. These three points were chosen as they are noted to be the most critically impacted during football related injuries.

With the use of accelerometers and a digital oscilloscope, testing on both the Aegis helmet and a Riddell Classic helmet was conducted to compare data. Both helmets were dropped from the same height multiple times at a number of the same orientations to collect data. The data from the two was compared.

While the Aegis helmet did not absorb any more impact than the Riddell helmet - it showed promising results. Most importantly, the Aegis was on pair with the Riddell helmet when it came to impact results, indicating it was just as effective as dispersing impact. Additionally, the Aegis helmet was found to delay the impact when compared to the Riddell helmet. While players would have received the same amount of impact by wearing the Aegis, the results will very promising for a first iteration prototype and test.

key insights & takeaways

Unfortunately, due to time constraints a second iteration of the Aegis was not able to be made - however the project was a wide success. Throughout the design and development of the Aegis helmet, I was responsible for material testing and impact testing. These two specializations within the project team provided me with the invaluable experience of formal scientific testing.



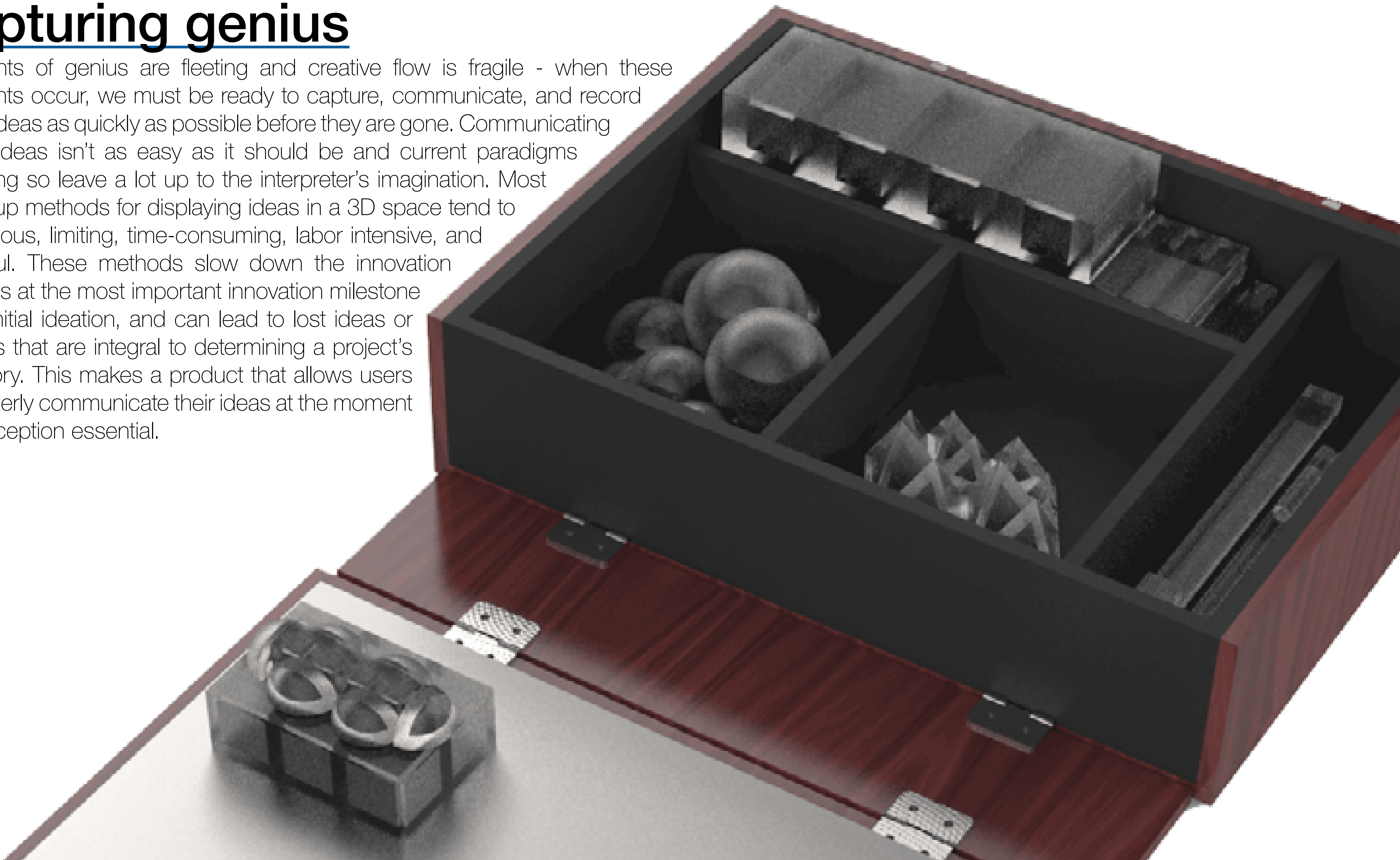
Rebecca Raha Radparvar
rebeccaraha.com

designer's block

Designer's Block is the ultimate prototyping tool. This tool enables designers to rapidly mock-up and communicate ideas as they progress through the early stages of their design process. Users are able to rapidly create, iterate, and scrap ideas with no waste and minimal clean up, creating a satisfying rapid prototyping experience and sustaining the momentum of users' design processes.

capturing genius

Moments of genius are fleeting and creative flow is fragile - when these moments occur, we must be ready to capture, communicate, and record these ideas as quickly as possible before they are gone. Communicating these ideas isn't as easy as it should be and current paradigms for doing so leave a lot up to the interpreter's imagination. Most mock-up methods for displaying ideas in a 3D space tend to be tedious, limiting, time-consuming, labor intensive, and wasteful. These methods slow down the innovation process at the most important innovation milestone - the initial ideation, and can lead to lost ideas or insights that are integral to determining a project's trajectory. This makes a product that allows users to properly communicate their ideas at the moment of conception essential.



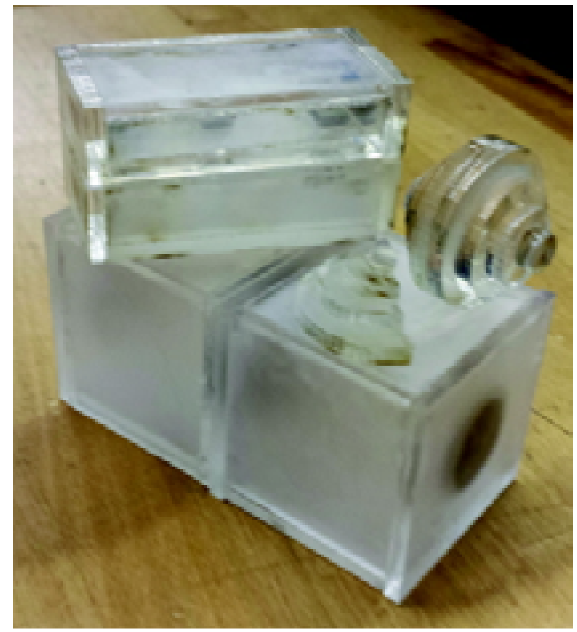
prototyping

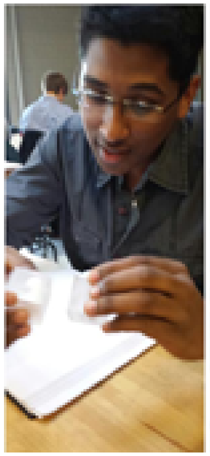
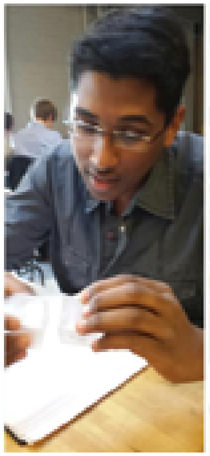
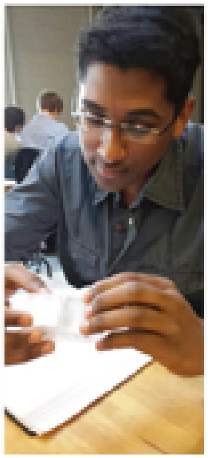
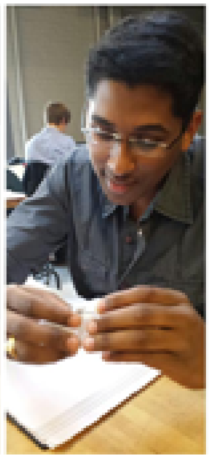
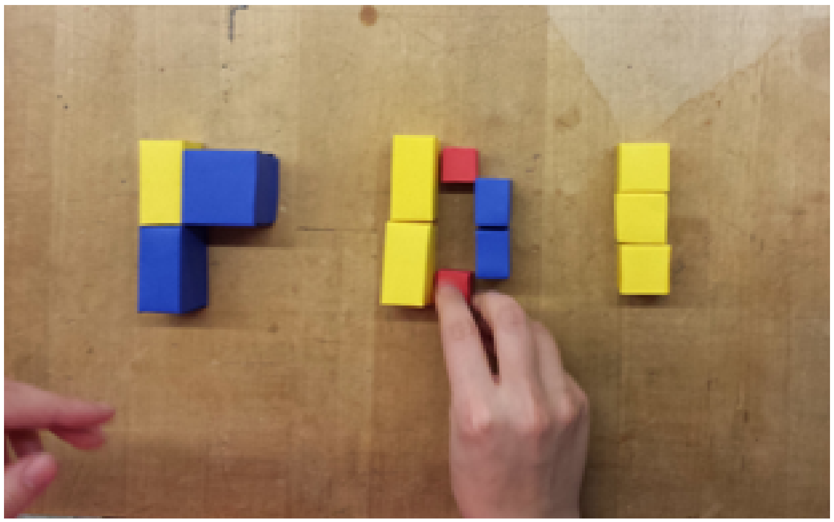
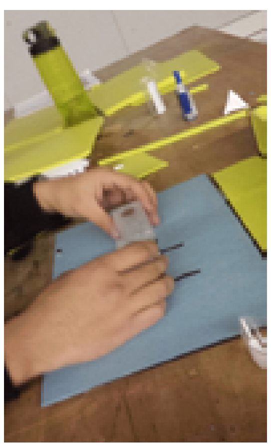
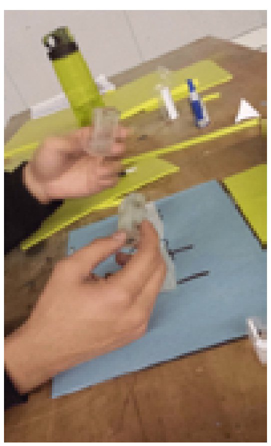
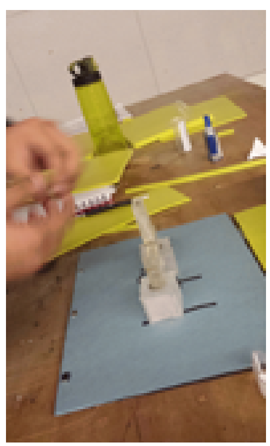
Visual and functional prototypes were utilized to understand how users would interface with Designers Block, how pieces would physically react, and how the final prototype would be organized. Velcro, a peg and hole system, a friction based system, and magnets (both craft and neodymium) were all explored for the initial Designer's Block Prototype. All of these were assessed by their pros and cons and magnets were determined to be the best possible choice. Craft magnets and neodymium magnets were both tested.

Once magnets were determined to be the best fastener method, rapid prototypes and mock-ups were made to determine size and shape considerations and magnet usage. The initial rapid prototypes were created from cardstock – one set with craft magnets and another with neodymium. The craft magnets proved they were way too weak early on, while neodymium magnets were too strong for the cardstock. As the cardstock was only to determine characteristics such as sizing and shape – as opposed to final materials – their abundance of strength was seen not to be an issue.

Once a fastener method had been finalized, four major materials were considered for the block material, these materials included: metal, glossy plastic, frosted plastic, and wood. All of these materials would have performed well under stress conditions, so the final material was determined based on what would give users the best user experience. Metal was forgone because of its cold exterior and sterile feel. Wood didn't exude the personality we wanted Designer's block to exude and didn't have the tactile properties we were looking for. Plastic allowed for more freedom than the two previous materials, but had to be further examined. After intense examination and deliberation, frosted plastic at 50% opacity was chosen. The material had a nice finish whereas glossy plastic felt slippery and cheap. Half opacity was also chosen to create more visual interest and give the kit more of a 'tool' and less of a 'toy' feel.

The second iteration of block prototypes were made from laser cut frosted acrylic and embedded with the neodymium magnets. This material combination proved to be the perfect fit and have the right amount of 'pull' when connecting pieces. The second iteration prototype was then utilized for user testing and the ultimate design.



user needs & testing

Through user testing, four main characteristics were desired to be tested. First and foremost, the quality. An important aspect of the user experience of Designer's Block is that the user perceives Designer's Block as a high-quality product, not a toy. It was desired that designers of all types would be interested in the product and not see it as a replacement for Legos or another building toy. Tactility was also an important factor. Once again, we wanted to ensure that Designer's Block was seen as sophisticated tool, but even more importantly, it was important to ensure that people enjoyed touching, using, and creating with our products. It was necessary to create a product that people felt compelled to touch and use.

Additionally, we wanted to ensure that the block's magnet pull was satisfying, Something that people would want to continually assemble and disassemble. Lastly, the most important characteristic was simplicity. Designer's Block was created to allow designers to explain their ideas to others effortlessly, however we wanted to ensure the product did not inform designer's ideation process by leading users to use certain pieces due to their interest in the eccentric or unique shapes. Simplicity was also important in ease of creation and iteration. We wanted to ensure designers could easily create, deconstruct, and rebuild in order to allow the design process to be fluid and continuous.

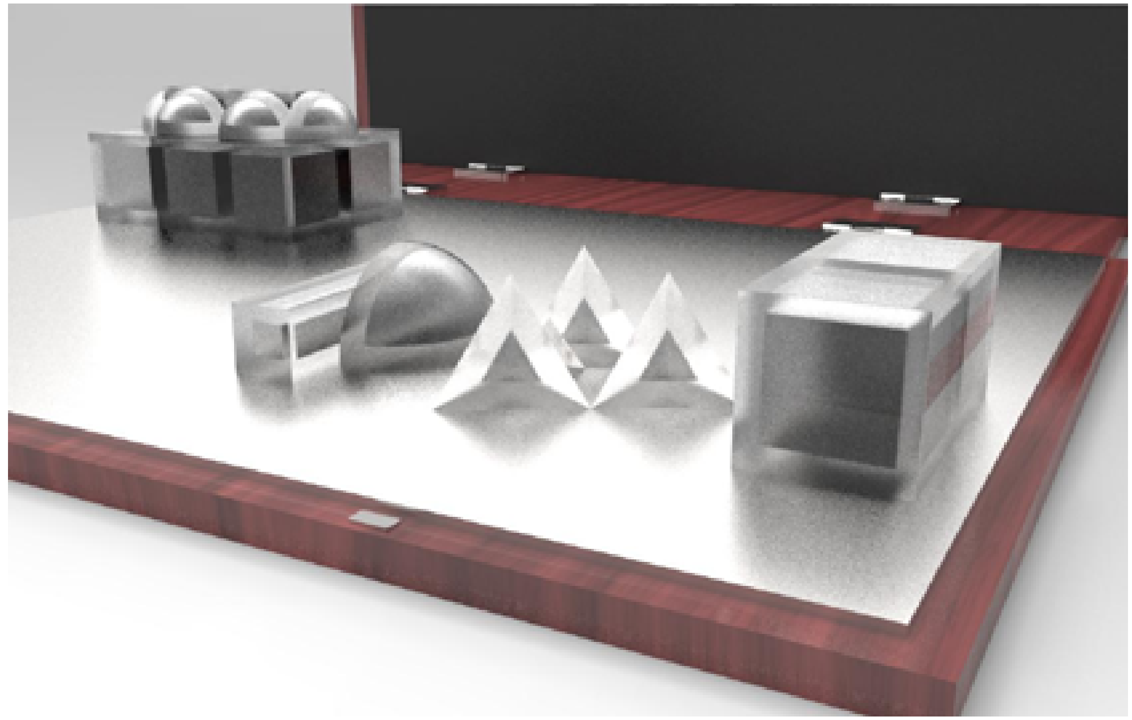
While user feedback didn't directly address all of these concerns, two major conclusions were reached. First, the initial Designer's Block sets users were given didn't supply designers with the adequate number of rectangular prisms and cubes. Despite this, many users noted that the use of magnets was 'entrancing' and really peaked their interest in the product. By watching many users interact, it was apparent that the choice of magnets was a well-received one. These comments and additional user feedback informed the final design of Designer's Block.

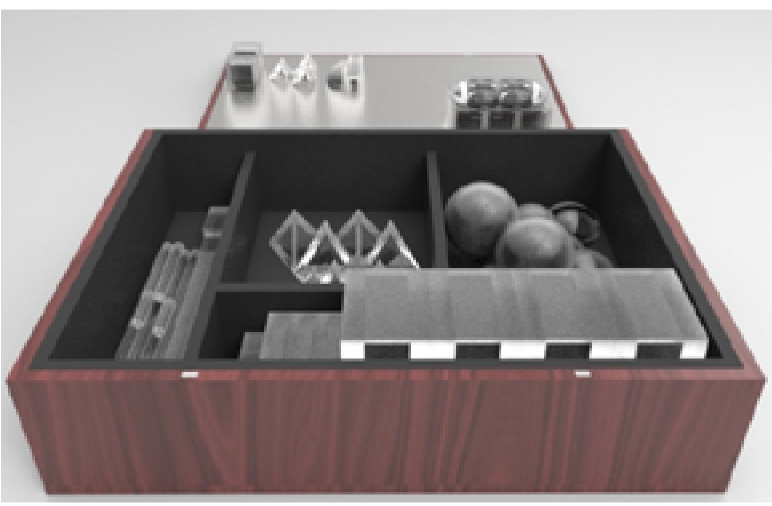
designer’s block

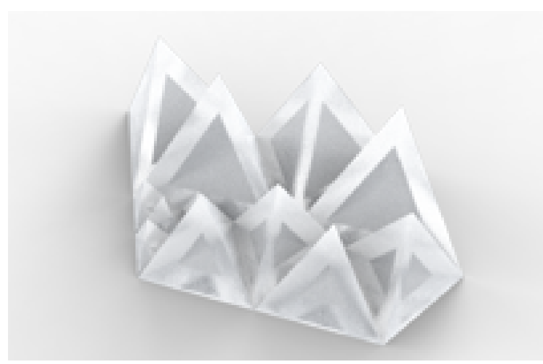
The final Designer’s Block Kit Design comes with an 82 piece set of building blocks, built from frosted copolyester, in different shapes and sizes varying from .5 inches to 1.5 inches.

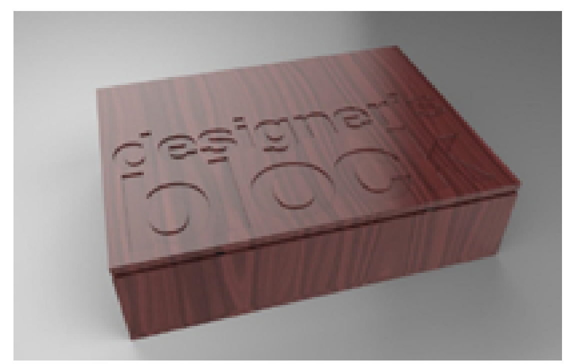
All 82 pieces have been specifically chosen to give users the maximum potential for creation of their ideas without leading them to a final result. Additionally, the frosted copolyester material provides the user with a great tactile experience, providing a smooth but non-slippery surface. The 82 pieces come in a specially designed case made from a dark stained maple wood cushioned with foam padding. The case also has a metal plate attached to the opposite side of the lid to allow easy, yet secure, building on the go. The case has been designed with aesthetics and portability in mind, so it can be proudly displayed on one’s desk but easily transported as well.

Designer’s Block also grants their users the ability to buy expansion packs that specialize in different features, from various sizes to different shapes, to grow and personalize their Designer’s Block to their needs.







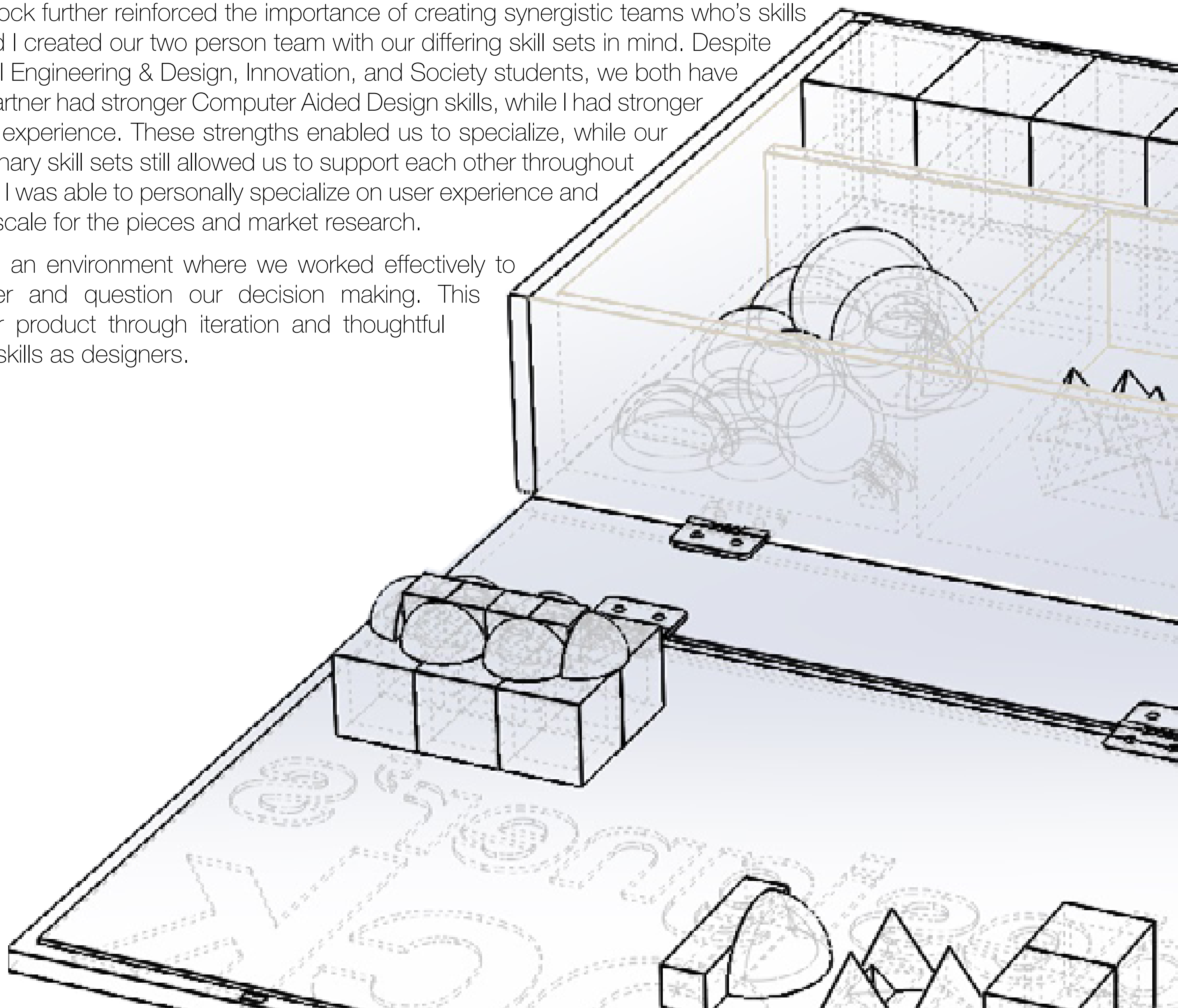


key insights & takeaways

Designer's Block reinforced the need to prototype early and often. Prototyping was integral to the design and development of Designer's Block as it informed the material and fastener choices, use cases, and the number of types and pieces necessary for a basic edition of the kit. The decision to prototype early allowed us to pivot our material choices and fastener choices - most notably allowing us to make the change to neodymium magnets, as well as make adjustments to the pieces we thought would be necessary in a first edition kit.

The process of creating Designer's Block further reinforced the importance of creating synergistic teams who's skills compliment one another's. A peer and I created our two person team with our differing skill sets in mind. Despite the fact that we were both Mechanical Engineering & Design, Innovation, and Society students, we both have strengths in different specialties. My partner had stronger Computer Aided Design skills, while I had stronger graphic design skills and user testing experience. These strengths enabled us to specialize, while our breadth of knowledge and interdisciplinary skill sets still allowed us to support each other throughout the design and development process. I was able to personally specialize on user experience and material testing, while he focused on scale for the pieces and market research.

Furthermore, we were able to create an environment where we worked effectively to constructively challenge one another and question our decision making. This environment allowed us to grow our product through iteration and thoughtful decision making, while improving our skills as designers.



Rebecca Raha Radparvar

rebeccaraha.com

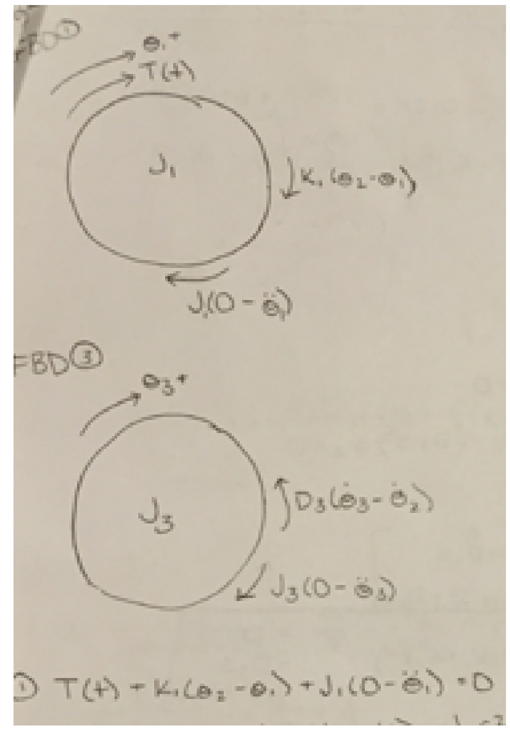
Re:IED Redesigning Introduction to Engineering Design

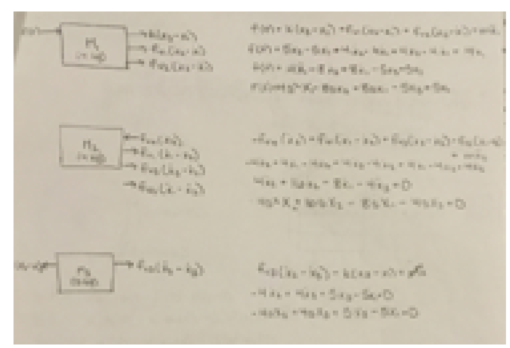
The Re:IED project critically examined Rensselaer's Engineering Education in order to design and develop a physical argument, a syllabus, against current Engineering Education methods. The Syllabus explored methods to create a more collaborative, engaging, and interdisciplinary experience while embracing Design Thinking and Engineering Education methodology.

defining the problem

There is an apparent trend towards reform in engineering education in the United States. Many engineering departments are developing innovative classes to address the problems facing the United States engineering industry. These problems and solutions are addressed at length in recent academic literature. Some of the research regarding engineering educational reform stems from an examination of the engineering education and industry of other countries that are more competitive than the US. In fact, this is one perceived problem – the United States' lack of engineering talent compared to other nations. This is an important ranking because of the enormous correlation between economic health and engineering industry strength. Engineering industry in the United States places the blame of its failures partly on engineering educational institutions and their inability to adequately prepare students for professional careers. While many institutions aim to mitigate these problems with teamwork based engineering courses, much of the time their efforts fail. At Rensselaer, Introduction to Engineering Design (IED) falls into this category.

With the project well defined through insight garnered from our literature reviews and own personal research, we created a plan to tackle the problems currently plaguing Rensselaer's engineering education through the redesign of Rensselaer's Introduction to Engineering Design.





research

Once introductory literature research was done conducted, as a team we dissected Rensselaer's approach to engineering in Introduction to Engineering Design. The course is Rensselaer's way of tackling some of the current issues existing in engineering education, yet aims to incorporate many of the suggested strategies from academic research and literature. The course fails to affect positive change on the Institute, where some of the shortcomings arise from improper implementation of these strategies, while others are simply due to an absence of an attempted solution.

After extensive research and interviews with students and faculty, we were able to distill four core reasons IED fails:

1 | IED grades students on their measure of mechanical success.

2 | IED does not encourage innovative behavior for students.

3 | IED does not equip students with the proper tools to be innovators and does not push students out of their comfort zone.

4 | IED does not excite students about engineering

These four core problems, as well as many other facets of IED (including the class size, professors, and physical space) are not only negative to students' engineering experience at Rensselaer, but are detrimental to their professional growth.

With this in mind, we took a look at the current IED syllabus, explored break-frame engineering and design thinking education models, and sought out to develop a new course with a new syllabus that meets all of the learning outcomes through more engaging and impactful activities and educational experiences.

course description

Rethinking Introduction to Engineering Design (Re:IED) is a piece exemplifying what the Introduction to Engineering Design (IED) course at Rensselaer could be, and how all of the same educational benchmarks can not only be met – but exceeded – through more engaging and collaborative curricula that provides students with the proper environment to thrive as engineers. Where IED dissuades risk taking, punishes hard work when it fails, and leaves students with a disappointing view of what collaborative engineering work is, Re:IED does the opposite. Re:IED incentivizes calculated risk taking, teaches students that failure is a step on the way to success, and that engineering can be engaging, collaborative, and exciting.

course objectives

This course will teach students about the importance of teamwork and communications in the context of the engineering design process. Interactive engineering design and professional development exercises will provide students with the knowledge and skills necessary to innovative effectively as a team. Coursework is designed to challenge students to improve and expand upon your oral, written and visual communication skills, as well as their creative, critical thinking, and engineering abilities.

learning outcomes

1 | Students will have the capacity to solve engineering design problems, while instilling the importance of creativity in developing innovative solutions.

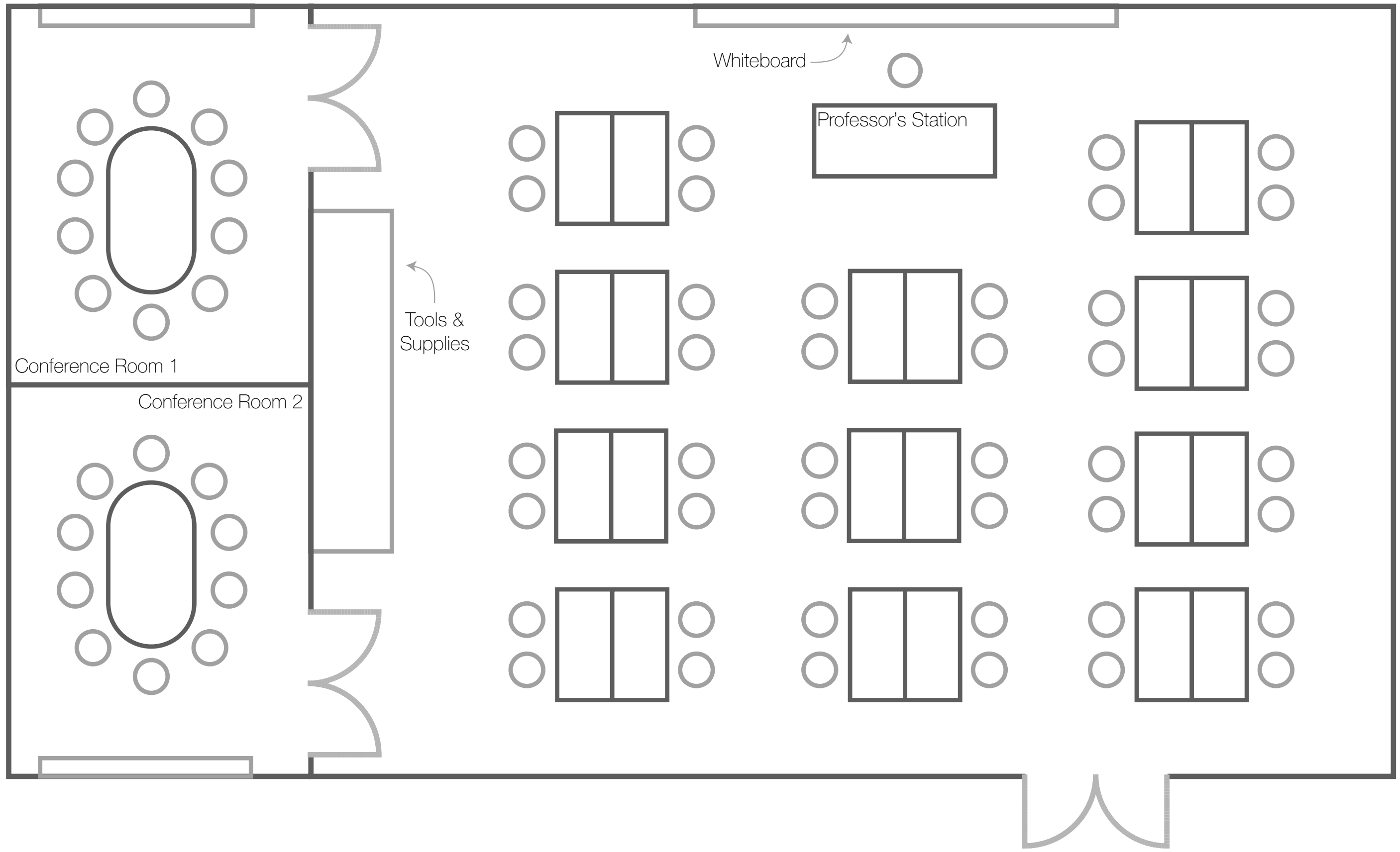
2 | Students will know how to identify customer needs, establish design objectives, and translate these into engineering design specifications.

3 | Students will exercise and improve important design skills of visualization, calculation, experimentation, and modeling.

4 | Students will have skills in organizing people and ideas for successful design. Skills include teamwork, project management, verbal and written communication, and documentation.

5 | Students will be able to function on multi-disciplinary teams and communicate effectively.

6 | Students will understand professional and ethical responsibility.



syllabus and classroom design

By altering the course description, class structure, syllabus, and classroom design, we were able to meet and exceed all of IED's original course objectives - which we left unchanged.

The course was redesigned to focus on first year, first semester engineering students in excite them about the vast diverse opportunities available to engineers. Additionally, while all students may not go into engineering design, many students have an expectation that they will be building things when they get to engineering school and we want to fulfill that expectation. This desire to build worked perfectly with our desire to further engage students.

Weekly themes were decided to ensure students properly learned the engineering design process and had an opportunity to explore the breadth of responsibilities engineers possess in the professional world. A teamwork model was created to ensure that students would work with peers within and outside of their own disciplines to ensure cross-function work, and a project structure was created to allow students to work on quick design and engineering activities as well as a long term project. A new classroom space was designed to enable a rapid prototyping. Movable desks were put in place to facilitate teamwork and a fluid environment.

An exert from the final syllabus, outline a weekly activity, can be seen on the following page.

syllabus excerpt

9 Prototype like a Pro

Prototype

Students will take partake in the 5 Chairs prototyping exercise to learn the importance of prototyping and material selection through the creation of chair design based on a user's needs.

Learning Objectives

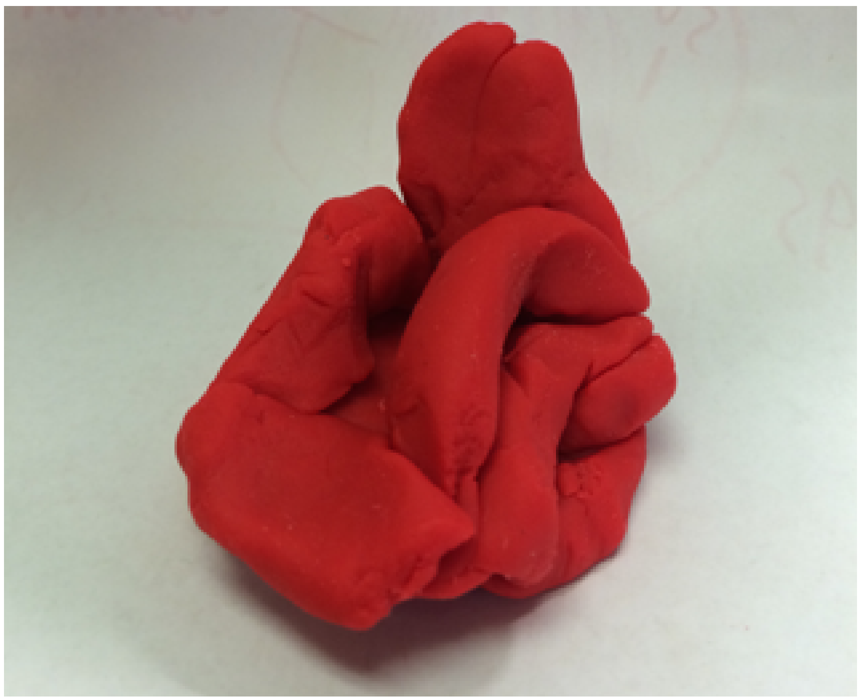
- Practicing how to assess and meet user needs
- Understanding different prototyping methods and their importance
- Learning the importance of iteration and it's benefits in the design process

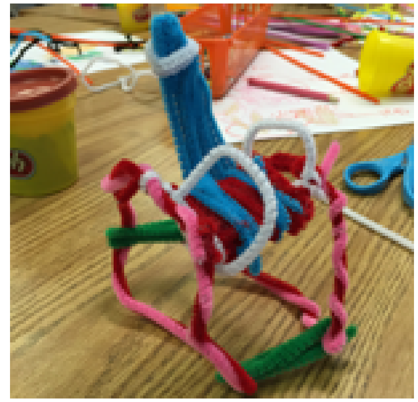
Materials Needed

- Newspaper
- Pipe Cleaners
- Legos/K'Nex
- Play-Doh
- Cardboard
- Glue
- Tape
- Paper

Pre-Class Prep

Plan to invite eight professors to class to embody a persona for the five chairs activity.





How To

1 | Professors will pair student groups with facilitators who will embody a predetermined persona.

2 | Groups will then interview their personas using the research methods they have used in previous weeks to assess their needs.

3 | Once students have assessed their user's needs, each group member with individually brainstorm and sketch 3-5 designs.

4 | Students will then present within their groups and discuss the positives and negatives of each design. Once the students have properly assessed each design, students will create an iterative chair design as a group.

5 | Students will then present to their user and create another iteration of their chair.

6 | Then, students will present to the class to receive feedback and the opportunity to critique other groups in the class.

7 | Once all groups have received feedback, students will begin rapid prototyping their design. Students will prototype their design with five different materials in the order as listed below:

- Build with newspaper
- Build with pipe cleaners
- Build with Legos/K'Nex
- Mold from Play-Doh
- Build from cardboard

8 | Students will then discuss their iterative design process with the class and discuss the benefits and shortcomings of each method.

9 | Ultimately, students will assemble their own final model with any/multiple materials of their choice.

Debrief Questions

- Discuss the reason why students used different materials
- Review user prompt for 5 chairs exercise
- Have students explain why they designed the chair the way they did to develop empathy

key insights & takeaways

Through redesigning Rensselaer's Introduction to Engineering course, we were all able to grow as engineers and designers. The exercise not only allowed us to learn more about engineering and design thinking methodologies we had not been previously exposed to, but allowed us to deeply examine the areas we felt that we did not grow enough during our undergraduate education. This provided all three of us with growth areas to pursue post-graduation, whether in the professional workplace or through continued education.

All literature research and ideation was conducted as a group for the Re:IED project. Additionally, the syllabus was accompanied by a Design Document outlining a literature review, methods, and implementation of the project - which was equally split as well. My principal responsibilities included research and presentation of engineering and design thinking activities, final decision making on activities, and the final design and development for the Syllabus document. Despite having a strong background of design thinking methodologies before the project, this project enable me to greatly expand my own understanding of design thinking methodology and engineering education.

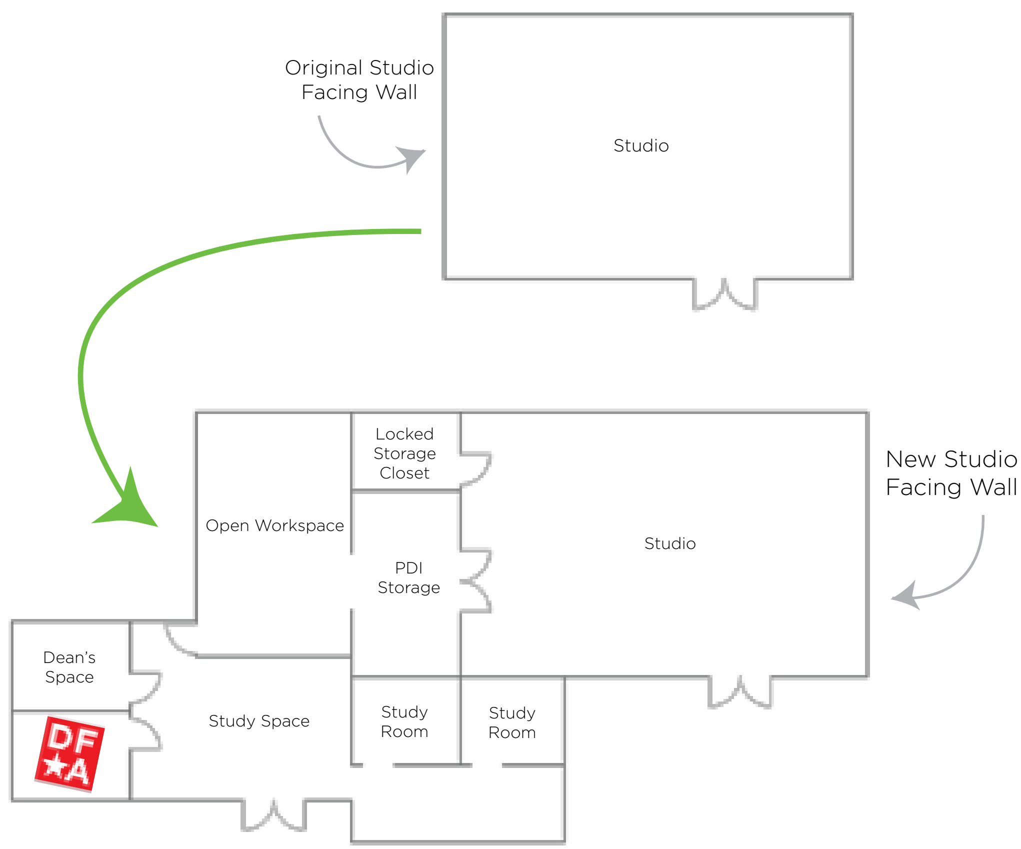
pdi studio: revitalized

The Design, Innovation, & Society Studio (commonly called the Product Design & Innovation Studio) has been through a state of flux throughout the last two years. With increased dedicated space and new materials being allocated to the Design, Innovation, & Society (DIS) Program, the culture of the program has shifted. The PDI Studio: Revitalized project took a critical look at the past and current culture in order to create impactful change guided by Organizational Culture and Workspace Culture methodology.

defining the problem

Throughout the past four years, the Design, Innovation, and Society program has grown and adapted more deeply and vastly than ever before. The program has seen the emergence of a new Dean, the leave of a supplementary advisor, the loss of a key professor, the addition of new space, and the adoption of new tools and materials – and that is just scratching the surface. These growth and adaptations have altered the physical Design, Innovation, and Society Space, and in turn altered the respective community and culture of those who inhabit the space.

While many and most of these strides have been positive, some of the cultural changes incurred have not been to the program's benefit. Increased space has moved students and all prototyping supplies out of the original Studio Space and into a new Auxiliary space. This migration of students and materials has led the Studio to lose the life it once had and become less of a living breathing space. The lack of prototyping supplies leave the Studio as a stark lifeless room, and the migration of students has led to less-cross year communication.



user & organizational theory research

The most integral part of the Studio Revitalization project was understanding user constraints and social theory to inform decision making during the design and development project. While user research, academic literature research, and student engagement were extensive, this information has been distilled to the necessary key points.

Users

- Professors
- PDI Students
  - Studio Classes
  - STS Senior Project
- Non-PDI Students
  - Academic:
    - Inventors Studio
    - Consumer Culture
  - Extra-Curricular:
    - Design for America
    - The Foundry
- Prospective PDI Students

Use Cases

- Studio Classes
- Non-Studio Classes
- Extra-Curricular Club Meetings
- PDI Related Events
- Work and Study Space

Constraints

A number of constraints bind Rensselaer, the DIS program, and the respective projects that can be done to improve the DIS program and PDI space. Past obvious constraints – ensuring all changes and improvements are legal, etc. – there are a number of additional constraints imposed on potential improvements.

- Walls cannot be moved, painted, or physically/structurally altered.
- Dedicated space cannot be undedicated.
- Improvements cannot be costly – short term or long term.
- Manpower within the DIS program is limited.
- The design of these changes must compliment the space.
- Changes must be easily moveable.
- Improvements must be sustainable (and therefore, reusable).
- Collaborative tools must be plentiful enough that multiple student groups can capitalize on them without infringing upon one another's ability to collaborate.
- Collaborative tools must be easily accessible and storable.

Shein's Model of Organizational Culture & Elsbach and Bechky's Categories of Workspace Improvement

The Schein Model of Organizational Culture dissects and inspects what makes, augments, and grows organizational culture from a number of angles. Schein's extensive research takes these corporate characteristics and potential change catalysts into three master groups:

Physical and Social Context: Artifacts or Explicit Communication

Espouse Values or Official Values

Basic Assumptions: How Individuals Perceive the Organization or Core Principles Underlying World Views[1]

The most sensible subset of Schein's Model to explore in order to enact meaningful organizational change is the Physical and Social Context level. By effecting things can that be physically touched, seen, and interacted with, the best chance to affect a cultural change is achieved. When looking at tangible options to improve the Studio Space and in turn, the PDI culture, the best model to turn to is Kimberly Elsbach and Beth Bechky's categories of workspace improvement. Elsbach and Bechky break down these improvements into three main types; Instrumental Symbolic, and Aesthetic,[2] which can best be translated to; Functional, Creative or Collaborative, and Inspiring. These areas were my inspiration moving forward.

As Functional and Collaborative improvements were underway under the guidance of Dean of the School of Humanities, Arts, and Social Sciences, I chose to work within the Inspirational Improvement area. This provided me with the unique opportunity to create the first piece of art that would live in the studio space.

[1]Yilmaz, Gamze. "Let's Peel the Onion Together: An Application of Schein's Model of Organizational Culture." 2014. Communication Teacher.
[2]Elsbach, Kimberly D. & Bechky, Beth A. "It's More than a Desk: Working Smarter through Leveraged Office Design." Winter 2007. California Management Review.

final inspirational improvement

When determining the proper aesthetic improvement necessary to enact the desired cultural change in the studio space, a number of immediate needs emerged. First and foremost, the need to break the room's ubiquitous grey tone. Secondly, the need to ensure that the manifestation and implementation of the aesthetic change was in line with DIS student's interests, values, and understanding of the DIS program – something that students truly felt a connection with, that Professors felt was in line with the DIS program's goals and mission, and that prospective students would be interested in. Finally, that the aesthetic improvement was in fact aesthetically pleasing – in design and placement – as to not be distracting, but a presence felt in the room. While the first and third needs were undoubtedly easy to fulfill, the second need required the most attention to ensure it was properly met and executed.

The numerous surveys conducted with DIS students, however, made the choice clearer than one would expect however. The most prominent trends from these interviews and surveys were Burt Swersey's - a late professor's - impact on DIS students experience as students and the overarching mission of the DIS program to "Make Great Stuff & Do No Evil". As these two themes prevailed, it was obvious that an inspirational centerpiece in the Studio would have to reflect them both.

Burt Swersey was known for his Swersey-isms, or common sayings. Burt constantly reminded students of the importance of the need to design for a better world, to be socially conscious, to do good – and these reminders came out in a number of trademark quotes:

> Start With What Exists - Make It Better
> Don't Ask Permission
> Not If, How?
> Don't Do Nonsense
> See Opportunities Everywhere
> People Over Profit
> Challenge your Assumptions

These trademark Swersey-isms, and many others, informed many PDIer's experiences within the program and with Burt as professor – yet one rings more loud and true than any of the others. Burt's greatest Swersey-ism, "Don't Do Nonsense".

"Don't Do Nonsense" speaks volumes about the DIS Program – as it is placed within a Science and Technology Studies program – a program which values informed decision making and proper planning. The quote reaches deep into students' experiences and values, as we all aim to great something meaningful, something impactful. At its core, "Don't Do Nonsense" is DIS. The final design was created to be hung in the back of the PDI studio, on the west facing wall. The project is still underway and final plaque will be laser cut and hung above the back doors of the studio. The project is being sponsored by leftover funds from a sunsetted DIS student indicative, the Re:Design Scholarship.

design thinking edu.

During my time in Providence, I had the awesome experience of working with Brown's Design for America Chapter. In a group of four, we worked to research Design Thinking methods and educational models in order to create and execute a Design Thinking Workshop. We had the opportunity to carry our project through DFA's Human Centered Design Process (Identify, Immerse, Reframe, Ideate, Build, & Test).

scope

As we were all designers and engineers, Design Thinking education was something that all effected us personally. We all spoke about our own educational experiences and converged at one question, "Why didn't I know about Design Thinking sooner?" This question became exactly what we wanted to combat and the fueled our ambition for the project.

To begin our understanding of Design Thinking, Design Thinking Education, and its importance, we began to list our assumptions. We questioned where design thinking could be important, why it was important, and even if it was important. These questions aided us in understanding not only why Design Thinking curriculum isn't in place at a K-12 level, but how it could best be integrated.

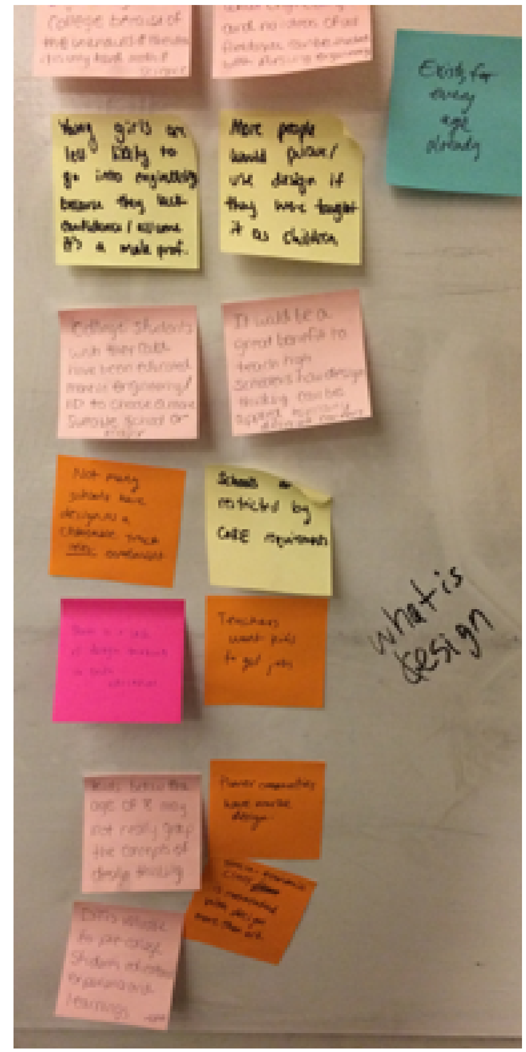
Additionally, to aid in our scoping, we brainstormed 'How Can We' statements as well. After brainstorming individually, we converged as a group and came to a list of three priorities we wanted to tackle throughout the semester-long project:

How Can We...

empower kids who lack creative confidence and access to tools and support?

equip kids with the proper design thinking tools to help them gauge personal interest in design?

prevent the split between "creative" and "non-creative" self-labeling?

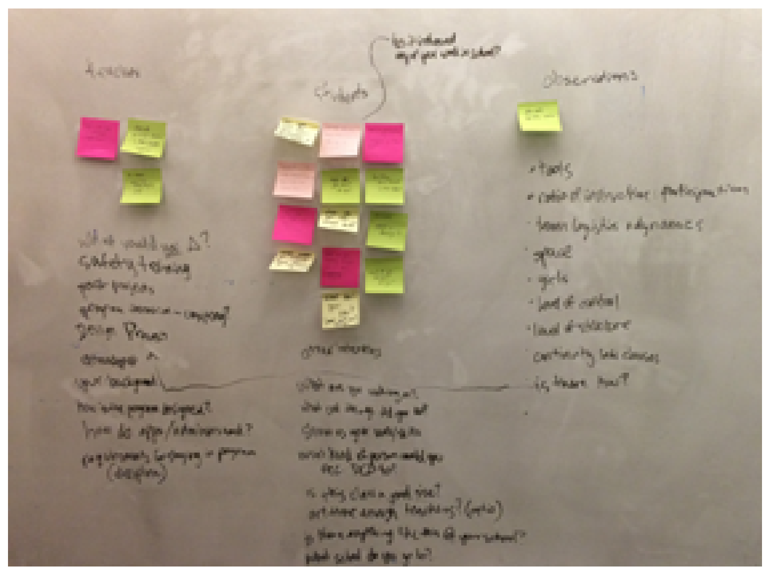


research

Once we had assessed our assumptions and understood our initial scope, we moved forward to the research phase in order to better understand Design Thinking and K-12 educational models. These models include the current Rhode Island educational model, Common Core, Montessori Education, and a number of private school curricula. After understanding the primary methods of K-12 education, we took a deeper look into supplementary educational models and extra-curricular offerings.

This research led us to speak with Jessica Artiles, a Masters student at Massachusetts Institute of Technology researching Design Thinking Education, and to touring DownCity Design in Providence, Rhode Island, a non-profit that utilizes the design process to teach students how to design and create their own products through the use of new tools and processes. Artiles spoke with us about her research and the importance of prototyping during the design process, while DownCity design showed us their space and spoke about many of the logistical considerations of facilitating these programs in the Providence area.

After understanding Design Thinking and Design Thinking Education from the point-of-view of instructors, we worked to interview students from our own lives on their familiarity with, understanding of, and interest in these concepts to best understand where to go. At the same time, we began reaching out to additional Providence educational and design-centered initiatives to find the proper setting to test the findings from our research.



implementation

After synthesizing our research, we found it most beneficial and impactful to work with students at the 9th grade level. Students at the 9th grade level are just beginning to think about what they want to do for a profession. We wanted to work with these students to open their eyes to alternate ways of learning and understanding, as well as alternate career options that are rarely spoken of at a high school level. Our initial implementation focused on the educating students on how a product is made, a system is conducted, etc. and then enabling them to take part in these processes on a smaller scale. This implementation was chosen in order to display to students the number of professional opportunities available as well as the benefit of utilizing alternate processes for research, synthesizing, and testing. However, despite our extreme interest in working with this age group, we were unable to connect with an initiative able to give us some time to test our final implementation with this age group. For this reason, we had to rescope our implementation and testing.

As we were most readily able to work with students from the 5th grade level, we created a plan around where they were in their educational journey. The typical public school educational models tends to teach students that there is only one correct answer or method to tackle a problem, stunting creativity, innovation, and individuality. As a group we decided it was most important to combat this methodology as we wanted students to learn that there are a wealth of ways to tackle a problem. Additionally, we wanted to teach students about empathy on a base level and how to navigate constraints. We found the best method to teach these principals was the 5 Chairs activity. (Please see Re:IED Syllabus: Week 9 for details.)

Overall, our workshop had mixed reactions. While some students were eager to take part in the activity, other students were disgruntled and vocalized their disinterest in participating throughout the project. For the most part, students disinterest waned when the activity progressed from paper and pen to physical building - strengthening the argument that education needs to be more hands on. During the debrief, students expressed that they enjoyed being able to not only create and build, but create something that didn't have a right or wrong answer. Students felt empowered by their design process and wanted to share it with not only us but their parents - with many students taking their projects home with them at the end of the day.

key insights & takeaways

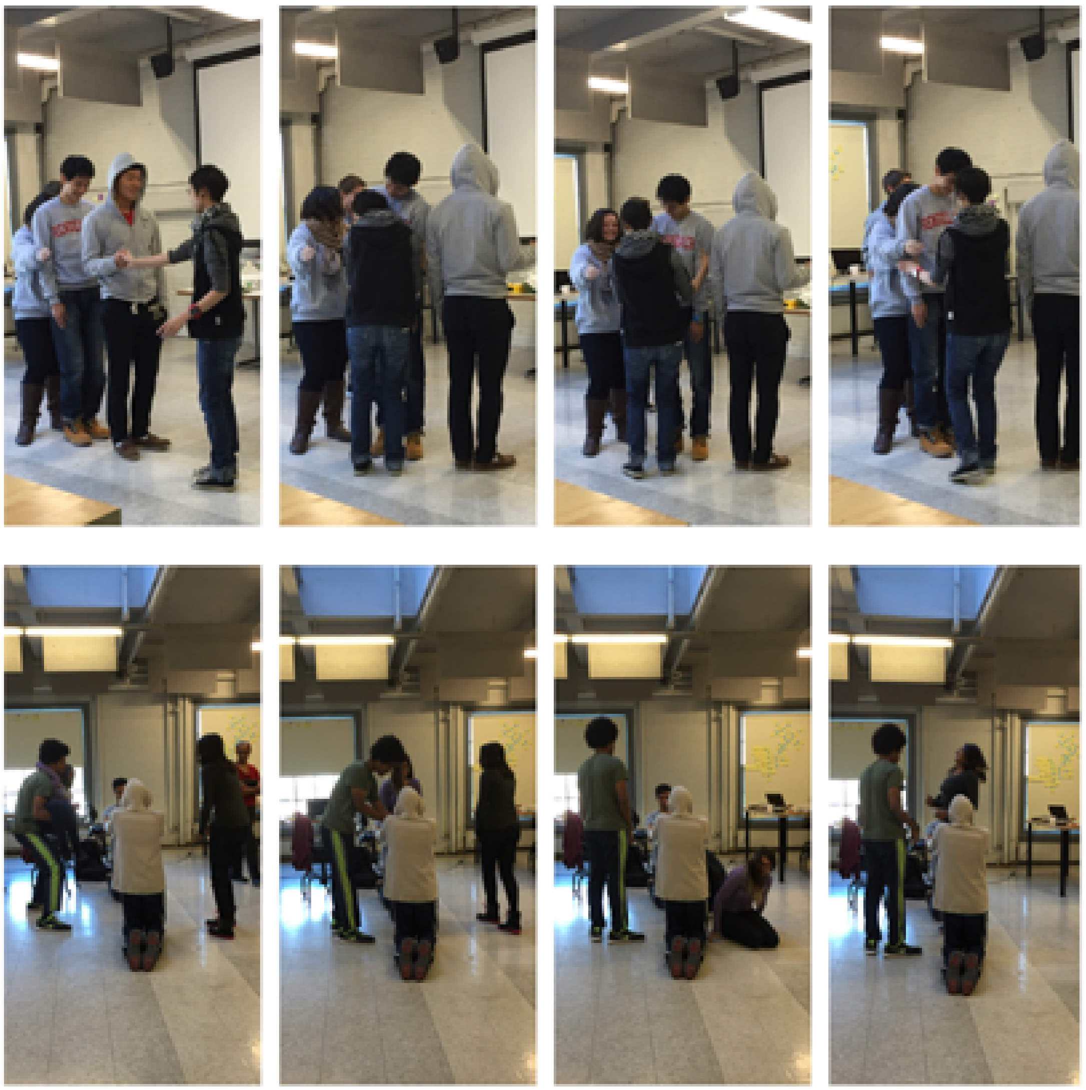
While our work is presented here in a very clearly and concisely, this is not how the design process always goes, or how our design process progressed throughout the three month duration of our project. As we were in the beginning stages of the project, research was constantly conducted to ensure we were moving in the proper direction. Furthermore, we chose to test early and test often - as we found this feedback integral to our design and understanding. Therefore these and other steps were not conducted in a linear progression, but as needed and found to be illuminating to the project.

Additionally, while I am no longer in Providence and cannot participate in the project, it has been picked up by the Design for America (DFA) Chapter at Brown University once again. Our research, testing, and contacts have created a foundation for this group and DFA intends on running the project for following semester.

Rebecca Raha Radparvar
rebeccaraha.com

dt workshops

Just a taste of some of the Design Thinking Practices & Activities I've lead and participated in the last five years!



bodystorming

Bodystorming is an interactive design thinking method that falls into the Experience Prototyping category. The activity calls for participants to physically act out a product, system, or experience - embodying the human and non-human pieces to replicate the respective product, system, or experience.

I teach this method as one of my Design Thinking Modules for Product Design Innovation Studio I. In addition to getting students physically moving - and therefore, typically more engaged - it also forces students to think of products, systems, and experiences in a way they wouldn't before. Students are forced to confront components or interactions they would usually neglect or take for granted - illuminating important aspects of these products, systems, and experiences.

100 questions

100 Questions is a research and scoping activity used as a diagnostic tool to find gaps in knowledge and to assess areas of exploration necessary for improvement. The 100 questions are meant to be exhaustive and in turn, pressure the user to think outside of the current features and characteristics being developed.

honey badgers, flash floods and mustard gas

Better World by Design (BWxD) | 2013

At the 2013 Better World by Design, I had the opportunity to participate in a workshop unlike any other design thinking activity I had done before.

The Honey Badgers, Flash Floods, and Mustard Gas, led by Ryan Clifford an Associate Director of Center for Design Practice at Maryland Institute College of Art, essentially forced participants to think incorrectly. Clifford asserted, "Humans have the capacity for developing ingenious solutions to these challenges. How do you unlock the ingenuity that exists within people and organizations by thinking wrong?"

He channeled this mission to misleading a room of fifty design thinkers into creating the worst ideas possible. He then forced these teams to turn these seemingly terrible ideas into advertising methods for a brand of his choice.

While I don't remember the exact details of this activity, what it did teach me was to embrace ideas that make you think - whether they are good, bad, or somewhere in between. We often dismiss ideas because we don't *think* they're a good idea, but when we are able to find value in these ideas as stepping stones - as opposed to final solutions - they will enable us to develop solutions that are truly groundbreaking.

mockuptionary

Mockuptionary is a rapid design and prototyping activity which asks participants to develop inventions to fix nonsensical problems. These problems are defined by randomly picking two cards - one indicating a user and the other indicating a problem. To make the activity more difficult, sometimes a third pile of cards containing an additional constraint is included.

This forces participants to develop ridiculous solutions to combat ridiculous problems, with the ultimate goal of enabling participants to entertain these ridiculous ideas when brainstorming for long-term projects.

Some examples of pairs that have been randomly chosen are below:

- A scuba diver can't stop crying.
- My chemistry book is on fire.
- My TA's can't stop, won't stop dancing.
- My cat keeps prank calling the president.
- My piano ran away from home.

card sorting

When starting a project, card sorting can help define areas for opportunity by allowing group members the opportunity to list and combine facets of a problem, product, or system.

Card sorting begins with group members listing as many facets as possible onto different index cards or post-its. Group members then converse and combine cards which have the same statements on them. They are then asked to categorize these cards however they see fit. This enables groups to create clusters of similarity and find the biggest areas for improvement.

I often use card sorting at the beginning of a project to enable team members to find areas of cognitive convergence and divergence in order to allow them to better understand each other assumptions and understanding of the problem statement.

mind-mapping

While simple, Mind-Mapping is a very important design thinking tool. Mind-Mapping is a exploitative technique for visually connecting ideas and information. They are commonly used in Design Thinking to better explore a central question, topic, or problem area, and further understanding the connections of other aspects pertaining to this problem.

I commonly begin all of my projects with a mind map, as it allows me to see a problem statement and it's connections more holistically.

Want to see more?

rebeccaraha.com

Thank you for your consideration!