

# KEYS TO SUCCESSFUL STUDIO PROJECTS

## A GRADUATE INDUSTRIAL DESIGN STUDIO CASE STUDY

**GEORGE K. CHOW**  
UNIVERSITY OF HOUSTON

*Looking for an impactful project for your studio class? Design educators often look for projects that are impactful, meaningful, motivational, engaging, relatively low cost, fit within the time frame, and produce results that are testable and are publishable/patentable. There is no shortage of problems in the world to solve, however, as this case study reveals, the key to a successful studio project may not be focusing on a problem to solve, but rather starts by finding the right person to help and to be helped by that person.*

*Keywords: Stroke, Industrial Design, Educators, Motivational, Low cost*

### 1. INTRODUCTION

As industrial design educators, we may find ourselves on a continual search for projects where our students will be highly motivated to learn and engage, will have transformational learning outcomes, will produce results that have real-world positive impacts for users and society, produce ideas or solutions that could be potentially published and/or patented, have concepts with testable results, have a low financial burden for our students, and can fit within the timeframe of our scheduled courses. Do such projects exist? This paper describes a case study of an industrial design graduate studio which centered around trying to help a stroke survivor that lost the ability to move her right arm (elbow and hand) and right ankle, with some of her highest priority day-to-day tasks including tying her hair in a ponytail, and cutting her fingernails. The intention was to help her with her day-to-day struggles, however, she helped the studio team just as much, if not more, with the challenges they faced in developing the solutions. The journey described in this case study was one of mutual benefit for all parties involved which resulted in an engaging and impactful design studio, and established good working relationships for potential future research partnerships.

### 2. SETTING THE STAGE

The industrial design professor began preparing for the course by contacting and requesting permission from an occupational therapist at a local clinic to bring the class to conduct observational research. The graduate industrial design studio team, which consisted of four graduate students and the professor, visited the clinic and conducted initial observational research with three occupational therapists. One of the occupational therapists introduced the team to a stroke patient who had lost control in her right

arm (her dominant arm) and right ankle and has to use a walker to walk around. The patient is currently in her early 50s and had a stroke in 2020. The patient was in the final few months of her occupational and physical therapy. The professor asked if she would be open to allowing the team to visit her in her house to observe some of her day-to-day challenges and to work with her over the duration of the semester to potentially develop solutions to address some of her challenges. She agreed to it and during the first meeting in her house, the class asked the survivor to list and demonstrate the tasks that she had difficulty with during a typical day. The survivor listed the following top 10 tasks based on priority of importance to her: 1. Tying her hair in a ponytail, 2. Straightening her hair, 3. Clipping fingernails and toenails, 4. Applying eyeliner, 5. Opening jars and bottles, 6. Writing, 7. Driving, 8. Fixing her bed, 9. Tying her shoes/sneakers, and 10. Food preparation- especially cutting items.

### **3. POWERFUL MOTIVATION**

The survivor talked about and demonstrated the difficulty she had with each of the tasks with only the use of her non-dominant left arm and hand. It was immediately evident from her descriptions and demonstrations how challenging it was to perform even simple tasks with functional control of only one leg and one arm, especially a non-dominant one. Even more painful for the class was to hear how the emotional and mental toll of the stroke seemed to match or exceed the physical toll on the survivor. The survivor explained that after the stroke, not only did she lose mobility in her right arm and leg, she also lost her self-confidence and independence. She said that she felt very self-conscious having her right ankle in a brace and having to use a walker to move around and at times, no longer felt independent as she had to rely on others to perform simple tasks. She said that she “no longer felt beautiful” and in the past, she sometimes wished she hadn’t survived the stroke because of the pain she experienced, both physically and mentally. At some of her darkest moments she even considered taking her own life due to the despair and hopelessness that she felt from her situation. She said that if it wasn’t for her family, especially her three grown sons, she may not still be alive. She explained that she prioritized the top four tasks of tying her hair, applying eyeliner, straightening her hair, and cutting her fingernails, because they are all things that help her to be and feel beautiful and therefore could impact her self-esteem and self-confidence as well. The team was heartbroken to hear of the emotional and mental trauma that the stroke caused in addition to the obvious physical trauma. Her story provided the most powerful motivation for the team to try their best to help the survivor as much as possible.

### **4. NARROWING THE SCOPE**

Out of the top 10 tasks that the survivor described, driving was determined to be out of scope for the course in terms of liability, cost, and time frame of the one semester studio so the team focused on the remaining nine tasks. The graduate students began the discovery process with background secondary research on strokes such as causes, symptoms, current treatments, and products currently on the market for stroke survivors. It was apparent from their initial research and competitive market analysis that there were already many products on the market that effectively addressed several of the daily

challenges that the survivor described. Still, it was important to verify that these existing products would indeed address the survivor's challenges satisfactorily so in the following visits to the survivor's home, five different existing products were brought to the survivor to test if they would work well for her. Starting towards the top of the prioritized list, the existing products included a Revlon brush-style hair straightener (revlonhairtools.com, 2020), a Revlon roll-on eyeliner applicator (Revlon, 2020), a bottle/jar opener grip pad (Amazon, 2022), a PenAgain ergonomic wishbone-design pen that doesn't require the user to grip tightly (PenAgain, 2019), and a version of Lock Laces, elastic no-tie shoelaces that turn shoes/sneakers into slip-on style shoes/sneakers (Lock Laces, 2022). The brush-style hair straightener seemed to be effective at straightening her hair with high heat and a slow brushing motion with her left hand. The roll-on eyeliner applicator also seemed effective in applying eyeliner with one hand. It was still a challenge due to her using her non-dominant hand, however, it was still possible and with practice, the survivor believed she could do it effectively by herself. The bottle/jar opener grip pad seemed to work effectively when placed on a table top and the bottle or jar was placed on top of the grip pad. Some downward force had to be applied to provide enough friction between the pad and the jar but she managed to open both jars and 2-liter bottles with it. The PenAgain pen was a little bit confusing to use at first due to its product semantics, however, once instructed on how to use it, she had little difficulty writing with her non-dominant left hand. The shoe/sneaker no-tie laces were quite effective in turning her sneakers into slip-on style sneakers. For fixing the bed, the survivor later explained that she could do it on her own without a product aid but she just found the task tiring at times with one working hand and leg. For food prep, one of the survivor's sons bought her a mandolin slicer which allows for one-handed cutting. The students also found several one-handed cutting tools such as a one-handed rocker knife that could be effective for one-handed patients. When the survivor confirmed that all of the existing products that she tested worked well enough to address her challenges, the students stopped pursuing those challenges so they could focus their attention on addressing the two issues where there were no existing satisfactory products for her: #1. Tying her hair in a ponytail and #3. Cutting her fingernails. There are products that help people to tie hair in a ponytail but all of them still require the help of another person, use of two hands, or one hand and the use of another prosthesis, residual limb, mouth, or physical structures such as a door handle, door jamb, or wall. As for cutting fingernails, there are several products that exist which allow people to cut their fingernails and toenails with one hand, such as the ClipDifferent nail clipper (McMullen, 2022) and PediClipper (Pedi Clipper, 2017), however, the class quickly realized after testing some of their own nail-cutting prototypes that the main issue for the survivor was uncurling the fingers of her curled right hand and keeping them uncurled so that her fingernails could actually be trimmed by her left hand. This led the class to pivot from one-handed fingernail and toenail clipping, to developing an assistive brace that helps the survivor to keep her fingers uncurled so that she can trim her fingernails.

## **5. SOLO-TIE, A ONE-HANDED HAIR TIE**

The students ideated many different concepts and prototyped more than 15 iterations before arriving at SoloTie, a one-handed hair tie concept. After each prototype was developed, it was tested with the

survivor as soon as possible for further refinement. The final concept consists of three parts: an elastic hair tie cord, a large bead, and a small metal crimp. The cord is fed through the large bead and forms one large loop on one end and one small finger lasso loop on the other.



Figure 1. SoloTie, A one-handed hair tie. Rendering by Eskinder Abebe, 2022.

The larger loop is for holding the hair and the smaller loop is used as a finger lasso to pull and tighten the larger loop around the hair. To use SoloTie, a user places the larger loop on their ear or chin and stretches the loop over their head and wears the loop like a necklace. Then the large bead is placed on top of the head and the user hooks a finger through the small loop and pulls and winds the cord until it completely cinches around the hair in a tight ponytail.



Figure 2. Stroke survivor placing SoloTie over her head and cinching her hair. Video stills courtesy of Olivia Wilczek, 2022.

Then the user winds the excess cord around the large bead or multiple times around the pony tail and pushes the small finger loop over the large bead to keep it in place. To remove, the process is reversed. The SoloTie prototype was tested with the survivor and she was able to successfully tie her hair in a ponytail in approximately 40 seconds with her non-dominant left hand and without the aid of another limb or any additional external physical structures. With practice, she could most likely do it even faster.



Figure 3. Stroke survivor winding cord around ponytail and placing small loop over the large bead. Video stills courtesy of Erika Lopez, 2022.

## 6. HOLD-MY-HAND ASSISTIVE BRACE

At first, the students developed various one-handed and single-foot operated nail clipping prototypes to test with the survivor, however, while testing one of the prototypes, the survivor lifted up her right leg with her left arm and demonstrated that she could actually position her right foot on her left knee and could reach her right foot toe nails to clip them without any assistance from another person or product. Also, the competitive product analysis revealed several existing products that could already trim fingernails with one hand so the team pivoted from designing fingernail trimming devices to developing a brace that could assist the survivor to help keep her fingers uncurled for trimming. The students generated many different concepts and more than a dozen iterations before arriving at the final Hold-My-Hand Assistive Brace concept. After each prototype was developed, it was tested with the survivor as soon as possible for further refinement. The brace consists of 7 parts: a bent metal bracket, a Velcro pad (loop), two Velcro straps (hook), a clamp knob with threaded rod, a clamp plate, and a thin piece of foam to prevent damaging clamping surfaces and to provide extra friction to prevent sliding. To utilize the brace, it is first clamped securely onto a piece of furniture such as a table or desk with one hand. Then the user uncurls the fingers of the curled hand and slides their hand into the brace. The user secures the Velcro straps to keep the hand in the brace. The user can then proceed to clip the exposed fingernails with a regular nail clipper.



Figure 4. Hold-My-Hand Assistive Brace and exploded view parts diagram. Renderings by Suochun Fang, 2022.

## 7. KEYS TO A SUCCESSFUL STUDIO PROJECT

After the completion of the final prototypes, a final presentation was given at the end of the semester where the occupational therapist (from the start of the project) and the stroke survivor were able to attend. The survivor demonstrated how to use the prototypes in person. When asked for any final comments regarding the project, the survivor expressed her sincere gratitude for all the help and replied, “I’ll miss all of you.” The team reciprocated those feelings for the survivor. A successful project leaves all the parties involved more encouraged, with strengthened relationships, and better off than when they first started the project. Reflecting on this case study, here are some key points that can contribute towards a successful studio project:

- Find the right person to help:** The success of the project largely depended on finding a local occupational therapist and stroke survivor who was willing to test all of the prototypes with the team for the duration of the semester because the continual testing-refining loop was critical for developing real-world solutions that would actually work well for the survivor. The “right” person is usually very willing and available to help. The team was fortunate to find and work with a stroke survivor who was so willing and available to help. The team definitely would not have been able to complete the projects without the help of the stroke survivor. Finding the right user tester/s is one of the most important keys to a successful studio project.
- Get students out of the classroom:** Get students out into the real world and observe real-world problems. In general, students love field trips, so take as many as possible. Have students engage with people outside of their normal relational spheres. Experiences are the best teachers. For this project, the team visited the stroke survivor at her house on a regular basis for user testing. Her house became the new real-world classroom for the students.
- In-context observational research:** Sometimes issues are not mentioned in interviews but can be observed when a user demonstrates pain points and challenges around the house or in their specific context. The team can also witness first-hand all of the issues instead of relying on an

oral description of the issue. For example, the team was able to observe the stroke survivor as she tried to open bottles with one hand on her dining table in the context of her house.

- **Keep the user tester to student ratio low:** When there are too many students and too few user testers, the students can't have more personal interactions with the user and trust can't as easily be built. There are also physical space limitations in peoples' homes. For larger studios, finding one user tester for every two to four students is recommended especially for small research teams because each student can have a role such as the interviewer, photographer, videographer, etc. For this case study, there was four students and one primary user tester, the stroke survivor.
- **Channel emotions to motivate students:** Motivation can sometimes be an issue when students are not so interested in the theme or topic of the project but when students empathize with their users, especially ones that have gone through significant hardships, it can be some of the most motivating driving forces for student energy and engagement. Oftentimes, pain or anger can be channeled as powerful fuel for positive change. The best projects are ones where the students are self-motivated and don't require a "carrot" or "stick" from the instructor to complete the work. For example, when the team heard how the stroke survivor considered taking her own life due to the hopelessness and discouragement she felt after the stroke, they deeply empathized with her and her pain became the motivational fuel for the team to try to help her as much as possible.
- **Prototype as much as possible:** Nothing is as convincing as a working prototype. Also, students learn the most from their failures so encourage them to prototype rapidly and fail as fast as possible to learn as fast as possible. For example, the team learned much more from the major prototype failures than the minor prototype refinements.
- **Keep Costs Low:** Students generally don't have excess money so they appreciate it when out-of-pocket costs can be kept to a minimum. Cost can be kept relatively low by focusing on challenges that can actually be addressed with relatively low cost solutions and within the time frame. Challenges that were deemed out of scope such as driving in this case study, were removed from the student task list. Of course, if you have extra funding and time, it is a different story altogether and this key may not apply as much. The costs for prototyping and solutions in this case study were kept to a minimum and the students appreciated it very much.
- **Focus more on solutions that don't exist:** It's ok to refine and make incremental improvements on existing products but the most exciting, novel, patentable work comes from working on solutions that don't exist yet. Students are generally more motivated to work on such solutions. For example, out of the top 10 problems identified by the stroke survivor, only two did not have existing solutions that addressed the problems adequately, so the team focused mostly on solving those two problems.
- **Apply for Patents:** Sometimes novel ideas can come out of a successful studio project where the team is focused on developing solutions that don't exist, as was the case for the concepts in this case study. Many Universities have departments dedicated to helping students get their work

patented. Patents have been filed for both concepts in this case study and is recommended for any teams that may have patentable work. Any awarded patents can help with pursuing other business opportunities or grants for more successful future studio projects.

## 8. CONCLUSION

For industrial design educators, it is often difficult trying to find projects that result in potential real-world positive impacts for users, have strong learning outcomes, are highly motivating for the students, are relatively low cost, and have publishable and/or patentable outcomes. This case study is an example of a powerful hands-on learning experience where students engaged with real users, addressed real-world problems, developed real-world solutions for a relatively low cost and have publishable/patentable outcomes. The journey was a win-win scenario which brought all the parties involved closer together, built relationships, and left all the parties better off than when they started. The stroke survivor expressed feeling depressed and discouraged after her stroke, but through this project she was greatly encouraged knowing that she played a significant role in helping to refine and develop products that could potentially help other survivors like herself. Through this project, her negative stroke experience could be turned into something positive. The team that worked on this project knew that they could not solve all of the survivor's problems, however, they were successful in helping the survivor to effectively address her top 10 tasks by giving her existing products that addressed the challenges and developing two new products to address two of her top three challenges: tying her hair and clipping her fingernails. Even though they are seemingly simple tasks, they can give independence, dignity, physical help and most importantly help the stroke survivor and other survivors emotionally and mentally with their self-confidence. Finding the best project for your studio may start with finding the right person to help because that person will most likely be of utmost help to you in your project. In this case study, the team certainly could not have completed the projects without the survivor's help. Survivors who may think they are no longer valuable to society, can be extremely valuable and impactful, especially for the hundreds of thousands of other survivors like themselves.

## 9. REFERENCES

- Amazon. (2022). *Amazon.com: Multi-purpose Jar Gripper lid opener, non slip*. Multi-Purpose-Gripper-Opener-Rubber-Bottle. Retrieved May 2, 2022, from <https://www.amazon.com/Multi-Purpose-Gripper-Opener-Rubber-Bottle/dp/B086SQ9LJS>
- Lock Laces®. (2022). *The original elastic no-tie shoelaces*. Lock Laces®. Retrieved May 2, 2022, from <https://www.locklaces.com>
- McMullen, T. (2022, April 25). *Automatic nail clipper for people of all abilities - clipdifferent™*. ClipDifferent. Retrieved May 2, 2022, from <https://clipdifferent.com>
- Pedi Clipper*. *Pedi Clipper™*. (2017). Retrieved May 2, 2022, from <http://www.pediclipper.com>
- PenAgain. (2019). Penagain. Retrieved May 2, 2022, from <https://penagain.net>
- Revlon. (2020). *Colorstay exactify™ Liquid Eyeliner, Waterproof Eye Makeup*. Revlon. Retrieved May 2, 2022, from <https://www.revlon.com/eyes/eyeliner/colorstay-exactify-liquid-liner?shade=matte-black>
- Revlon. (2020). *Salon one-step straight and shine XL heated hair brush*. SALON ONE-STEP STRAIGHT AND SHINE XL HEATED HAIR BRUSH. Retrieved May 2, 2022, from [https://www.revlonhairtools.com/us\\_en/straighteners/lightweight-straightening-xl-heated-hair-brush](https://www.revlonhairtools.com/us_en/straighteners/lightweight-straightening-xl-heated-hair-brush)