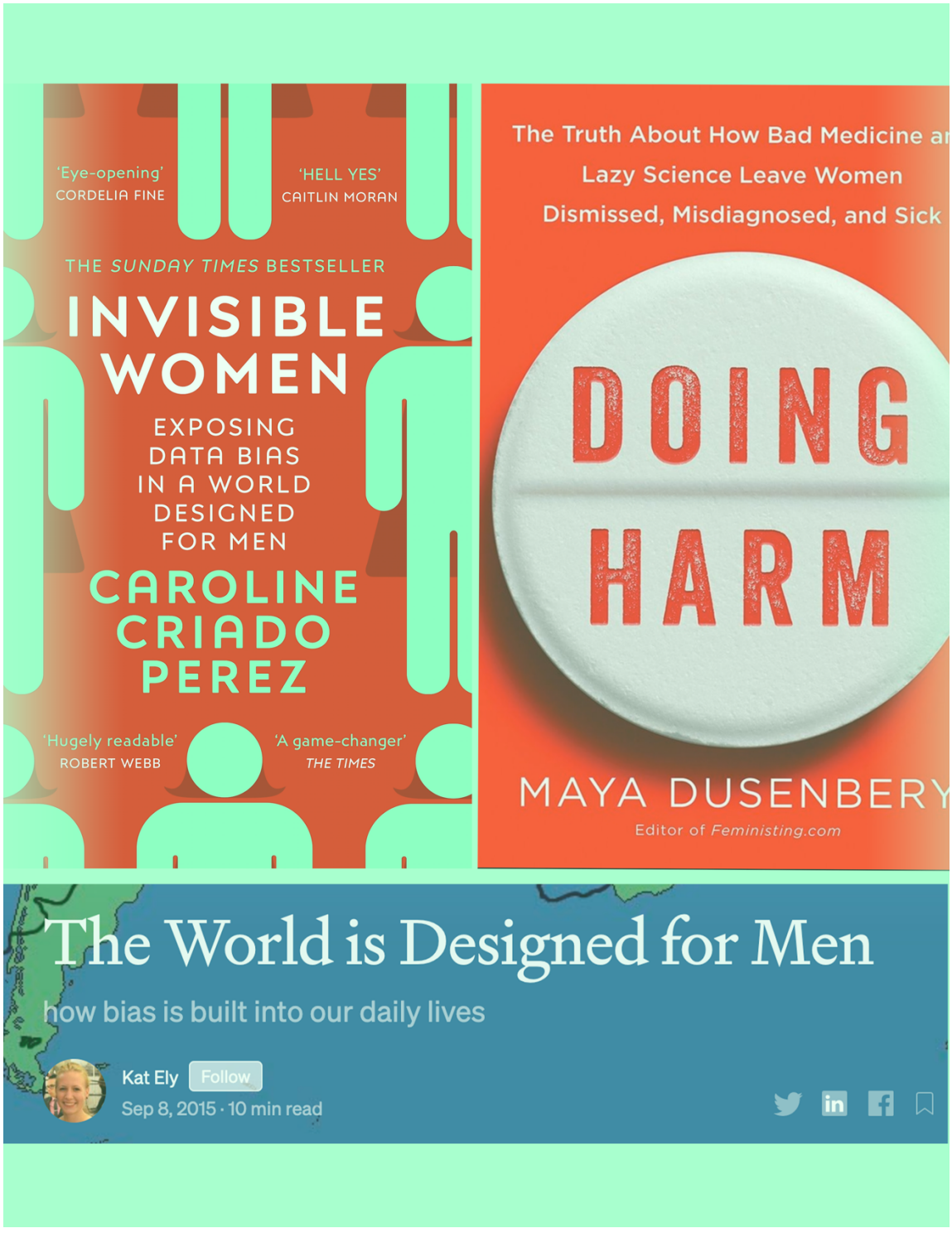
Social Justice and Entrepreneurially Minded Learning: Who Are We Creating Value For?

Wallace H. Coulter Department of Biomedical Engineering
Georgia Tech College of Engineering & Emory School of Medicine



KEEN National Conference
February 5, 2021

Georgia Tech | Wallace H. Coulter Department of Biomedical Engineering | Georgia Tech College of Engineering and Emory School of Medicine | EMORY UNIVERSITY

Table of Contents

Workshop Schedule

The bolded and italicized "scenes" of this "script" require your active participation. More information about your role is provided below as part of this workbook. They are identified as **acts** and **scenes** as if they are part of a play. Thank you for your engagement. Have fun!

Act 1: Identify and share non-inclusive designs

1. Welcome!
2. ***How many examples can you think of?***
3. ***Breakout group – share ideas, choose one to share.***
4. Share with the room.

Act 2: Our program's story

Act 3: Tell the story of someone impacted by a non-inclusive design

1. ***Write your own story.***
2. ***Pair up with someone. Alternate sharing your story and giving appreciative feedback.***
3. Share with the room.
4. How did the presentations in Act 1 and Act 3 compare?

Act 4: Our students' work and thoughts

1. Examples of student work
2. What our students said about this assignment
3. Closing remarks

Introduction

Welcome to our workshop. The purpose of this workshop is to share with you an approach we've experimented with to build students' entrepreneurial mindset in one of our major-required courses: by challenging students to identify and revise a non-inclusive engineering design. We also share how we use story-driven learning to help students personally connect to this work and to build their empathy for people harmed or otherwise affected by these flawed designs. This workbook contains information and instructions you will use during the workshop, as well as additional information and resources for your use later.

You can find this workbook and our slides in our engineeringunleashed.com card entitled "Social justice and entrepreneurially-minded learning: who are we creating value for?" If you have any questions, comments or ideas, please let us know - we want this workshop to be interactive and responsive to your needs and interests.

Workshop takeaways

- An engineeringunleashed.com card named "Non-inclusive engineering designs: Who are we creating value for?" with all the contents of our signature assignment. This card includes:
    - project description and instructions
    - statement that prompts students to reflect on, or tell their story of, a non-inclusive engineering design and how it has impacted someone they know
    - examples of student work
    - brief bibliography of related papers
    - slides from the workshop that includes the workshop's activities and contact information
- An understanding of the key characteristics of impactful stories
- A draft story you've shared with others and received appreciative feedback for
- Ideas for how you might use the study of non-inclusive designs to foster entrepreneurial mindset within your students.
- Ideas for how to use story-driven learning to help your students connect their personal experiences to your course's content

Georgia Tech's Story-Driven Learning EM program

Why stories? We see stories as a means to foster students' entrepreneurial mindset because storytelling is central to how people think and feel. Stories help people share and build culture and knowledge in ways vital to individual and group development. Specifically, stories do three things that matter to building EM:

Engage: Stories spark interest and bring facts to life. They promote the expression of perspectives *and* ideas *and* feelings in ways that are complex and deep.

Construct: Stories help students reflect on their past experiences and begin to see themselves as people who take action to create value for others.

Reveal: Stories make known what is important and what was, or should be, noticed. Stories often challenge taken-for-granted assumptions.

In summary, stories help students make sense of their experiences. In so doing students learn more about themselves: they learn how they fit in and how they stand out; they find value in experimentation, design thinking, analysis and modeling, and how to learn from failure. Most important, they come to see themselves as being entrepreneurially minded engineers who proactively use their engineering skills to create value for others.

Janece Shaffer's (storyready.com) tips to create powerful stories:

1. **Story-worthy.** To tell a meaningful story, as obvious as it sounds, something has to happen. Stories need a beginning, middle and end. They need individuals who are changed by the events of the story. Look for challenges that must be overcome or a powerful want or desire that causes a person to take action. Transformation is compelling.

2. **Land the plane.** The more specific a story, the more universal it is. Focus your story on a specific day, a specific moment. Telling a story broadly or at 10,000 feet is not as vivid. If you have to do a broad overview, be sure to include specific moments or events.

3. **Start with the Last.** Start the process by writing your final sentence of the story. If the goal is a big transformation, then knowing your final sentence allows you to craft an opening that allows for big change. If your story ends with triumph, perhaps you start with insecurity, indecision, fear.

4. **Make it sticky.** Details are what make stories come alive. Yes, you want to be time sensitive, but a few compelling details make a story delicious, specific and real. So, help the listener "see" your story (like they are watching a movie).

5. **See it, see it, feel it.** Deliver an emotional experience by telling your listener what you are feeling in response to what's happening in the story. Are your hands sweating, your heart pounding, your stomach churning? If you feel it, we will too.

Act 1.2: How many examples of non-inclusive designs can you think of?

Working on your own, list as many examples of non-inclusive engineering designs that you can think of.

Act 1.3: Share your ideas with others

We routinely ask our students to work collaboratively with others in teams. This helps students get into what Michi Chi calls the "interactive mode of cognitive engagement". People in this mode of cognitive engagement co-construct new knowledge with others which makes it more likely they will be able to transfer their new knowledge. That is, that they will be able to use their new knowledge in different contexts from where it was first learned.

Breakout group instructions:

1. Each person quickly (< 30 seconds) share one non-inclusive design idea.
2. As a team, choose one of these non-inclusive designs to focus on.
3. Prepare a brief about this non-inclusive design as follows:
   - What is the name and purpose of the design? (e.g., hip implant).
   - Briefly describe how it works. Cut and paste an image or diagram in here if you feel it will help you explain how it works.
   - MOST IMPORTANT: Explain why this design is not inclusive.
   - Create a title for this case that concisely tells what it is and how it is not inclusive. (eg. "Car driver seat design puts women at risk")
4. Choose a spokesperson to share your brief.
5. Spokesperson: post your title in the chat when you return to the main room.

Suggestion for sharing your brief:

First, give your title, then describe the other three bullet point in the order listed above.

Act 3.1: Now it's time to write your own story!

Instructions: Think of a non-inclusive design that has adversely impacted you or someone you know OR choose one of the non-inclusive designs you just heard about from a colleague. Use the prompts below to draft an outline of a story that helps others "see" and "feel" the adverse impact this design has on those people whose needs were not considered when it was created.

Shout out to Janece Shaffer (storyready.com) who created this worksheet!

In one short sentence, what is this story about? (Think Golden Book title…)

How will you conclude your story? Write your final sentence.

With the ending in mind, how might you open your story? Since story is about transformation, write your opening sentence to describe a starting point that is far removed from the situation as described in the final sentence.

Include at least two sticky details. Don't forget to think full sensory…

Is there an emotional component to your story? What are you feeling and where in your story will you cue us in on your emotions?

Here is some extra space to noodle on…

And, for extra credit 😊:

What makes this story significant?

When could you share this story?

Act 3.2: Share your story with someone else

We will send you to a breakout group with one other person. Alternate sharing your story and giving appreciative feedback on your partner's story.

We routinely ask our students to share their stories with each other and the entire class when they want to. This is a form of "social pedagogy" which is critical to learning the art of telling your story. Students learn how to deliver a story in an engaging way, and they soon realize how much they have in common with each other, which can be deeply gratifying.

Instructions

- Decide who has the **longest hair**. This is person 1.
- Person 1 tells their story in about (3 minutes).
- Person 2 listens carefully.
- Person 2 shares their reaction with person 1 (2 minutes)
    - What did you like?
    - What do you want to learn more about?
    - Is there something you can suggest to them to help them strengthen their story (look at Janece's 5 tips)?
- Switch roles. Person 2 tells their story (3 minutes).
- Person 1 listens carefully.
- Person 1 shares their feedback as above (2 minutes)

Selected Examples of Student Work

Story 1 examples: the first story we asked students to write was a story about a personal experience with a non-inclusive design or process

Story 1, example 1: "Many east Asians find it difficult to put contacts in"

The summer before college comes with lots of excitement for everyone. From moving away from home, to redefining your personality, to becoming independent, there are many changes that everyone knows are soon to come. For me, one of the biggest changes that I wanted to make was lose my glasses in exchange for contacts. I was excited to lose the bulky glasses that always seemed to weigh me down anytime I wanted to casually lay down on the couch, or play some pickup basketball. Like every person who tries to put on contacts though, I had to go to the ophthalmologist to prove my abilities to put on contacts. Normally I'm not one to blink an eye (no pun intended) at pushing my boundaries and I thought putting on contacts would be no big deal-- I thought it would be as simple as walking in the door, putting them on and taking them off, and boom, I'd finally get rid of my glasses in an easy five minutes. However as I entered the office and tried putting them on for the first time, and then the second time, I started losing hope. Thirty minutes turned into one hour, which turned into two grueling hours of trying to place a plastic half-sphere into each eye. Unlike most people, touching my eye was not the hardest part. Instead, opening my eyes big enough to be able to place the contacts on them was actually the hardest part. According to the doctor, like many people of east Asian descent, I possessed what is known as an epicanthic fold on each eye. This fold makes the surface area available to place a contact on my eye significantly smaller, thereby contributing to the difficulty I was experiencing. I did a good amount of research that afternoon. Many east Asians find it difficult to put contacts in, and contact sizes are designed in a one-size fits all sort of manner. For those with average eye size, this is no problem, but for those with smaller eyelids like me, it makes putting in contacts significantly more difficult. Especially in America and much of the western world, the average size of a contact is proportionally too big for those with smaller eyes, and most contact lens providers do not widely offer smaller diameter contacts. Only in certain locations in east Asia are small contacts offered on a large-scale basis, and unfortunately these were not available to me. Thus, I believe that contacts are designed to be an alternative for glasses or eye surgery for the average eye size, but do not accommodate those with smaller eyelids. As a result, I was unfortunately never able (and still have never been able to) put on contacts, but I've learned to live more and more with glasses as a result.

Story 1, example 2: "Gay men are not allowed to give blood"

My senior year of high school was an interesting time for me. I was applying to colleges and finishing my final credits to graduate from high school. Every fall the SGA (Student Government Association) holds a blood drive to support the local hospitals. I never participated in the blood drive before, but then I figured out I could get out of band, so I jumped at the chance. I hated band class, which is saying something because I was in marching band. When I went to sign up for the blood drive everything went fine, and I got my little permission slip. The next day, I went about my day like normal. I went to all my classes and when I got to band class, I put down my bag and got my permission slip and headed to the gym. When I got to the gym, I was not nervous or anything, I was just excited not to be in band class. When I was escorted to my seat, I noticed how uncomfortable the chairs were. A nurse walks over and greets me. She asks me about my personal information (age, gender, weight, which arm I preferred). Then she asked me what my sexuality was. I was very confused on why this question need to be asked. I answered honestly and said, "I am gay". She looked at me for a moment and said, "Wait here one moment". She went and got the head nurse for the blood drive. The head nurse came up to me and explained to me that I could not give blood. I then proceeded to ask, "why not". She then further explained that it was against the rules and regulations for a gay male to give blood due to the increased risk of HIV. I explained to her that I have never had sex before, but I was still turned down. At this point I was feeling angry and embarrassed. I was sweating because everyone was looking at me, and I stormed off in anger. After I got back to class, I sat in the back of the band room, and I started to research these "regulations". Apparently gay men are not allowed to give blood if they have had sex with another gay male in the past year, and if they want to give blood, they would have to be abstinent for about 6 months. These regulations were put in place back in the eighties when we did not have great testing for HIV. However, now we have a quick and accurate test for HIV. I was angry because I did not understand why I could not give blood even they test the blood anyway. This was the only experience of bias I have ever endured in the medical field.

Second story examples: we asked students to create a fictional story that illustrates the adverse impact that the design that is the subject of their case study has on some groups of people

Story 2, example 1: Prozac can have dangerous side effects – mostly for women

As the months dragged on, it felt like there was no one to turn or anyone who could help. I got so tired of being inside all the time and even when I did get out, I could hardly socialize because of social distancing due to the ongoing COVID-19. As much as I loved being with my family, I lost energy and motivation to spend time with them. After another month, I lost my appetite and was sleeping and lying in bed most of the day. Some restaurants and social gatherings had restarted with social distancing guidelines, but I just didn't feel like going out anymore. Then, once I realized I hadn't been outside on a whole month, I realized I wasn't just having the normal blues anymore. This was worse than the grief I went through after my grandma died from a heart condition a few years ago. I decided to seek help from my doctor.

After talking to him about what I've been going through, he recommended fluoxetine (Prozac), a very popular antidepressant medication that has even been said to be more effective on women. I figured there could be no harm in trying. After another month, I was getting back to being myself again. Prozac helped me in some ways that I didn't even know I needed. I was excited and adventurous again. I even decided to enroll in some online classes in order to get my masters. It was also just in time for my favorite holiday, Halloween! My family has a tradition of going to Six Flags for Fright fest and since I was finally ready to get out of the house, we decided to go (with masks). After going on my favorite ride once we got there, I suddenly didn't feel right. I was dizzy, nauseous, and sweaty which at first I thought it was just an unusual reaction after the ride, but I have never had issues before. Then I was getting chest pain and it got harder to breath. The next thing I remember, I was waking up at the hospital. The doctor came in to tell me that I had TdP, a heart condition of abnormal heart rate where the sections of the heart beat out of sync, which can potentially cause fatal cardiac arrest. I was lucky to be alive. But why now? Apparently, I had many risk factors, but the main cause was found to be my new antidepressant medication. I couldn't believe that the medication that seemed to be working so well could cause that bad of a side effect. Later on, I realized I wasn't the only one, but what surprised me was that most of the cases of TdP from antidepressants were women.

Story 2, example 2: Emergency contraceptives sometimes fail to work for women with a high body mass index

Amaya had just graduated college in May 2018 and landed a spot at a prestigious law school in Manhattan. This was the beginning of the stressful new life of a law student preparing for the bar exam in the booming city of Manhattan, New York. Amaya had been suffering from a lot of stress inflicted upon her due to her studies and she started to gain weight, reaching 190 pounds, because she stopped taking care of herself by only working and eating unhealthy. The two things that kept her going was her ambition and her boyfriend, Dimitri, that had been supporting her for the past 3 years, who was attending dental school in Manhattan.

One night, her boyfriend and she weren't very careful when they were together and decide to use what little money they had to pay $50 for emergency contraceptive, also known as Plan B. They continued on with their lives for three months and Amaya was too focused to realize that she had not gotten her period recently. Sometimes stress can trigger late periods, so she thought that it was normal. Nevertheless, Amaya started to feel sick every morning and was nauseous when she smelled the food carts as she commuted to her law school facilities. In fear of the worst, Amaya decided to take a pregnancy test with her boyfriend at her side. To her surprise, she held in her hand a positive pregnancy test as she wept on his shoulder.

The first thing that she thought of was, "How could this have happened?" When she went to visit the gynecologist, she learned that emergency contraceptive wasn't as efficient for women above a certain BMI and she happens to be in that range. She was petrified because she thought that emergency contraceptive would work if she took it early enough. She cried and cried, screaming that it was unfair that people with higher BMI's should have a higher risk of emergency contraceptive not working. Despite her contempt for the situation, she didn't want to abort the child. Amaya decided to give up on her dream of becoming a lawyer to raise her daughter while Dimitri finished dental school. She made this decision because Amaya and Dimitri couldn't afford school and a baby at the same time.

She felt betrayed by the bias in plan B that increased her chances of unwanted pregnancy, but in the end, she was blessed with a bouncing baby girl. Amaya never regretted giving birth to her daughter, Maisley, but she did regret giving up on law school when she did because of a flaw that leads to an accidental pregnancy.

An invitation to join our effort…

Thank you for attending our workshop. We hope you enjoyed the workshop as much as we have enjoyed preparing and presenting it. One last thing: we are looking for **partners** to collaborate with to use story-driven learning to promote our students' self-concepts as entrepreneurially minded engineers. We want to grow the impact of EML ***and*** improve our understanding of how our program's practices can be adapted and further developed for use in disciplines and institutions different from our own.

Please feel free to contact either of us at any time. We'd love to hear ***your stories*** and learn more about your ideas and interests. Here is our contact information:

Joe Le Doux
joe.ledoux@bme.gatech.edu

Maysam Nezafati
Maysam.nezafati@bme.gatech.edu

Resources:

- Gendered Innovations:
  - https://genderedinnovations.stanford.edu/
- Community Needs assessment
  - https://www.cdc.gov/globalhealth/healthprotection/fetp/training_modules/15/community-needs_pw_final_9252013.pdf
- The growing collection of free Cases in Global Health Delivery:
  - https://www.globalhealthdelivery.org/case-collection
- Needs assessment in public health. A practical guide for students and professionals
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1732103/

Some medical examples of non-inclusive designs:

- Sex Differences in Treatments, Relative Survival, and Excess Mortality Following Acute Myocardial Infarction: National Cohort Study Using the SWEDEHEART Registry
- "Brave Men" and "Emotional Women": A Theory-Guided Literature Review on Gender Bias in Health Care and Gendered Norms towards Patients with Chronic Pain
- Gender in the Gym: Evaluation Concerns as Barriers to Women's Weight Lifting
- Age bias: A cause of underutilization of breast conservation treatment
- The Persistent Exclusion of Older Patients From Ongoing Clinical Trials Regarding Heart Failure
- Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites
- Ethnic Differences in the Use of Peritoneal Dialysis as Initial Treatment for End-Stage Renal Disease
- Ethnic and Racial Differences in Diabetes Care
- Drug dosing: women were overdosed on Ambien for 20 years.
- Research studies, done on men, to study cancer of the uterus!
- Women's heart attack symptoms less likely to be diagnosed / treated