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

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Biomedical Engineering

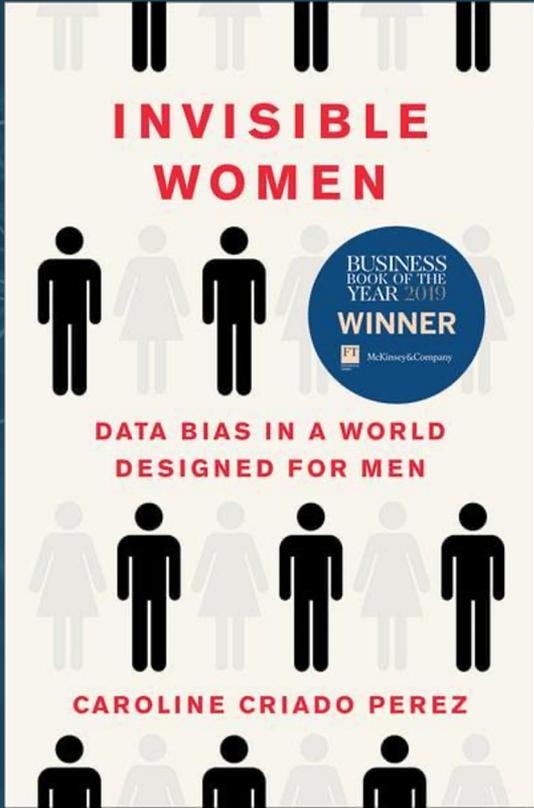


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Caroline Criado Perez





**Systems of oppression, inequality,
and inequity are by design. Therefore,
they can be redesigned.**

- Antoinette Carroll, Creative Reaction Lab

Creative Reaction Lab is a nonprofit educating and deploying youth to challenge racial and health inequities impacting Black and Latinx populations. Within this role, Antionette has pioneered an award-winning form of creative problem solving called Equity-Centered Community Design

Please, do this now:

jot down as many examples of non-inclusive engineering designs that you can think of.

Breakout Group Time!

Open this google slideshow
(link is in the chat)

Go to your room's slide

Follow the instructions on the slide

Have fun!

ROOM

1

ROOM #:

1

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Do the following with your breakout group:

- Each person quickly (< 30 seconds) share one non-inclusive design idea.
- As a team, choose one of these non-inclusive designs to focus on.
- Prepare a brief about this non-inclusive design using the template on the next slide. Choose a spokesperson who will report out to entire group.

ROOM #:

1

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- What is the name and purpose of the design? (e.g., hip implant).
- Describe how it works. Cut and paste an image or diagram if it helps.
- 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”)
- Spokesperson - post this title in the chat when you return to the main room.

Let's Share

tinyurl.com/1p6ps7a2

Our story-driven EM curriculum:

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Embark

Experience

Explain

First year course

- Introduce
- Habituate
- *Try it out*

Middle year courses

- **Signature EML experiences**
- Collect eliciting artifacts
- ***Practice the 3Cs***

Third year course

- Review artifacts
- **Create/share stories**
- *Clarify EM self-concept*

Why do we use stories to drive learning? Because stories are about...

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- Simulate experiences
- Provide models to emulate
- Promote self-reflection

Increase **motivational empathy**:
to create value for others who can
be very different from oneself



Produce changes in **self-concept**:
in attitudes, beliefs, and behaviors

GRIT

Today we will share...

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Embark

Experience

Explain

First year course

- Introduce
- Situate
- Habitualize
- *Try it out*

Middle year courses

- Have signature EML experiences
- Collect eliciting artifacts
- *Practice the 3Cs*

one of our **story-driven EML experiences** in a core course

Third year course

- Review artifacts
- Create/share stories
- *Clarify EM self-concept*

BMED 2110 signature assignment: the hook

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Learning Objective

The Hook

Problem Finding

Value Creation

Cognitive

Affective

- Introduce the problem of non-inclusive designs

- **Story 1: Personal experience**

- Find and critique of existing design

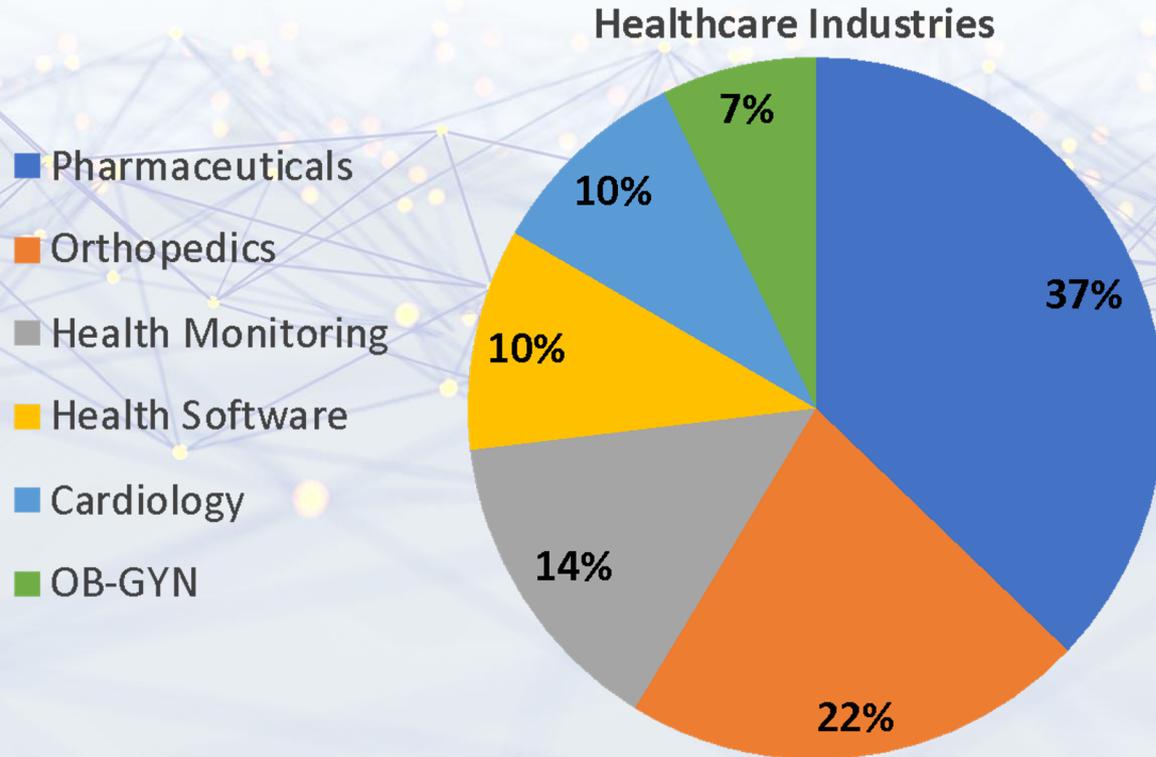
- **Story 2: Harm to a specific person**

- Analyze and propose a more inclusive design

- **Story 3: Good done for a specific person**

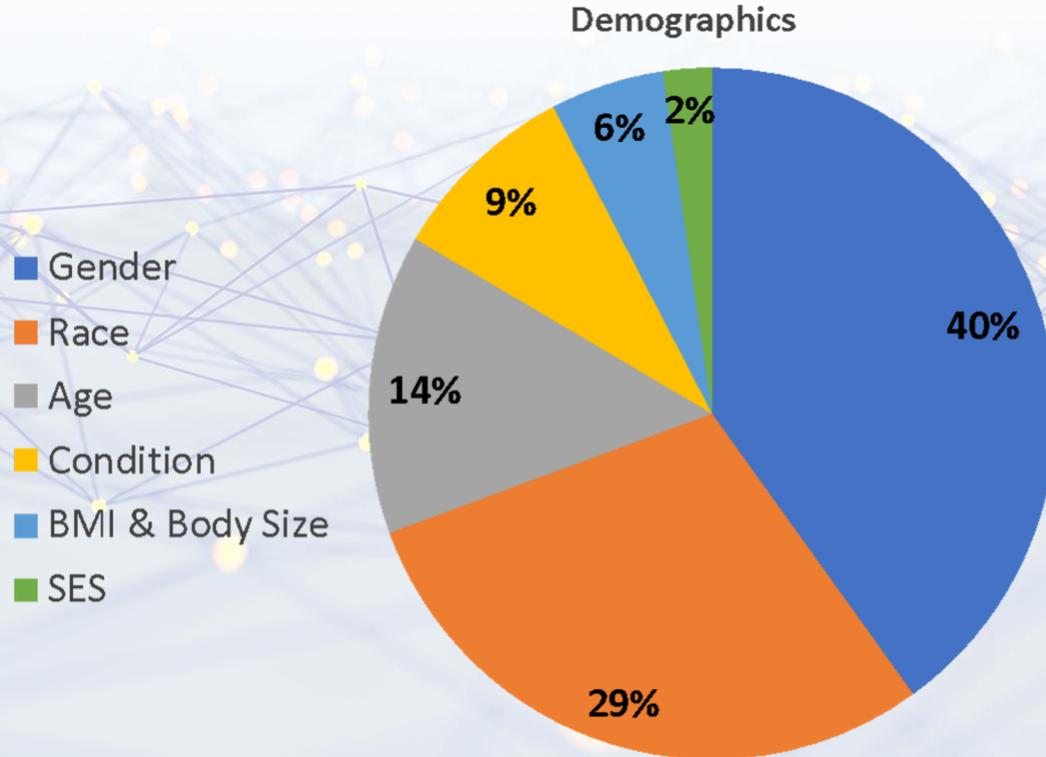
Summary of the non-inclusive designs our students identified:

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Summary of the non-inclusive designs our students identified:

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Signature assignment: problem finding

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Learning Objective

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- Introduce the problem of non-inclusive designs

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To promote learning stories must...

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- There must be transformation
- Start at the end – then begin with the main character far from that transformed "state"
- Land the plane (situate it in a specific time, place, event)
- Add sticky details - so we can SEE IT
- Show emotions – so we can FEEL IT

Now, YOU get to craft and share a story!

**HINT: use Janece's WORKSHEET
in your workbook**



Please, do this now:

Think of a non-inclusive design

Use the story design worksheet to draft an outline of a story that helps others “see” and “feel” the adverse impact this design has on a specific person

Time to share!

- **Person 1 is the person with longest hair**
- **Person 1 tells their story (3 minutes).**
- **Person 2 listens carefully**
- **Person 2 gives appreciative feedback (2 minutes)**
 - **What did you like? Share.**
 - **Share ideas to strengthen the story**
- **Switch roles and repeat**

**Who heard a story we
need to hear?**

Signature assignment: Creating value

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Learning Objective

The Hook

Problem Finding

Value Creation

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Affective

- Introduce the problem of non-inclusive designs

- **Story 1: Personal experience**

- Find and critique of existing design

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- Analyze and propose a more inclusive design

- **Story 3: Good done for a specific person**

Examples of Our Students' Work

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“Many east Asians find it difficult to put contacts in”

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.

“People with darker skin tone are diagnosed less accurately for skin cancer”

We improved the original diagram by introducing the “pigmentation test” system. The purpose of this system is to improve the sensitivity of the device towards the color of skin (in the input image). We also used the conservation of energy equation to quantify the input and output of the pigmentation test.

Prozac can have dangerous side effects – mostly for women

I was dizzy, nauseous, and sweaty which at “first” I thought it was just a reaction after the ride, but I have never had such issues before. Then I was getting chest pain and it got harder to breath. Apparently, I had many risk factors, but the main cause was found to be my antidepressant medication. I couldn’t believe that the medication that seemed to be working so well could cause that bad of a side effect.

Our students valued the experience

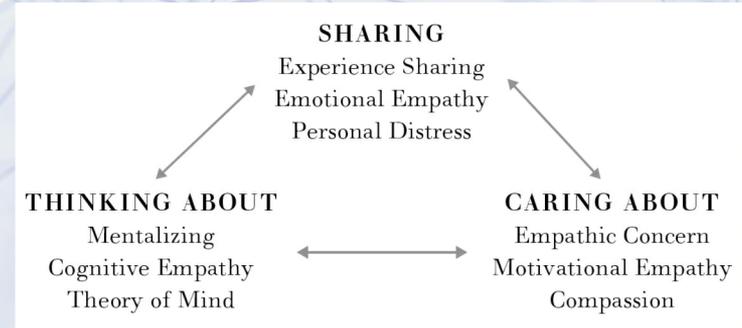
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- We asked "Our hope was that the project would be a meaningful learning experience for you. Was it and explain why?"
- 99 of 129 students responded. 93 said it was meaningful
- Four representative quotes (note the 3Cs!):
 - It wasn't just about something for the class, it also had a meaningful impact and **helped us discover** a case of bias in the medical world which I think is really cool
 - I think that as engineers, it is important to **interconnect our learning to our outside world**, and this project gave us a glimpse of that
 - I learned a lot about the **importance of including many different people in trials** so ensure there is no bias. The hardest part was created the **engineering diagram**.
 - We took a problem that exists in the real world and **used some of the new concepts we learned in class to create solutions**.

Future? Share Frameworks:

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- Inclusive design principles
 - Practice harms modeling
 - Seek out points of exclusion
 - Identify situational challenges
 - Recognize personal biases
 - Offer different ways to participate
 - Provide equivalent experiences
 - Extend the solution to everyone
- One way stories create value → motivational empathy
 - Jamil Zaki's model of empathy



Want to learn more?

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- Faculty Development Workshops this summer:
 - Harness the Power of Story (June 14-18)
 - The Problem-Solving Studio (May 25-27, 2021)
- Check out our EngineeringUnleashed.com cards such as:
 - Non-inclusive engineering designs: "Who are we creating value for?"
 - Learn the Art of Telling Your Story (& How Story-Driven Learning Promotes Entrepreneurial Mindset)
 - A Vertically Integrated Portfolio Process to Foster Entrepreneurial Mindset Within a BME Undergraduate Curriculum

Questions? Comments? Ideas?

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- How can you use story in your teaching or work?
- How does story promote entrepreneurial mindset and value creation?
- Do you have suggestions for us?

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CONTINUE THE CONVERSATION AT
ENGINEERINGUNLEASHED.COM

Selected examples of non-inclusive designs:

- 1. Sex Differences in Treatments, Relative Survival, and Excess Mortality Following Acute Myocardial Infarction: National Cohort Study Using the SWEDEHEART Registry**
- 2. “Brave Men” and “Emotional Women”: A Theory-Guided Literature Review on Gender Bias in Health Care and Gendered Norms towards Patients with Chronic Pain**
- 3. Gender in the Gym: Evaluation Concerns as Barriers to Women’s Weight Lifting**
- 4. Age bias: A cause of underutilization of breast conservation treatment**
- 5. The Persistent Exclusion of Older Patients From Ongoing Clinical Trials Regarding Heart Failure**
- 6. Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites**
- 7. Ethnic Differences in the Use of Peritoneal Dialysis as Initial Treatment for End-Stage Renal Disease**
- 8. Ethnic and Racial Differences in Diabetes Care**