



Dichotomies in a STEM course: How they might be working against your inclusive strategies

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1. Explore the many dichotomies that are either spoken or unspoken in STEM fields and education.
2. Discuss ways they could be barriers to inclusive classrooms.
3. Share ways to overcome these barriers and/or bring light to them.

GOALS



*WHAT DICHOTOMIES?





IDENTIFY EXISTING DICHOTOMIES IN STEM

This can be perspectives,
pedagogy, content,
practice, etc.





“The role of the teacher is to create the conditions for invention rather than provide ready-made knowledge.”

-Seymour Papert

“Creativity is the secret sauce to science, technology, engineering, and math.”

Ainissa Ramirez, Science Evangelist



WHEN THEY'RE SHOWN WHAT ENGINEERS DO,



76% of GIRLS
get interested in
ENGINEERING.





Other Dichotomies in STEM



humanities vs. technology

rigor vs. relevance

experiential learning vs. formal education

theory vs. practice

students as passive objects vs. active subjects

science vs. non-science

fundamental vs. applied science

technology vs. non-technology

analytical vs. design

linguistic vs. numeric

qualitative vs. quantitative

cognitive (rational) vs. social

“Left brained vs. right brained”





02

* HOW DOES THIS PLAY
OUT IN THE CLASSROOM?





Jamboard Exercise:

Inclusive Classrooms

Rigorous Classrooms



Assumptions/Bias:

Inclusive Classrooms

Rigorous Classrooms

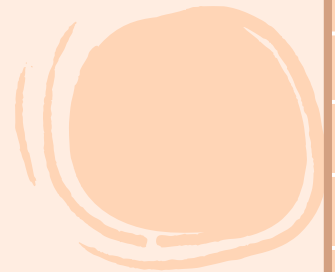


03

WHO ARE YOU AS AN
ENGINEER*?



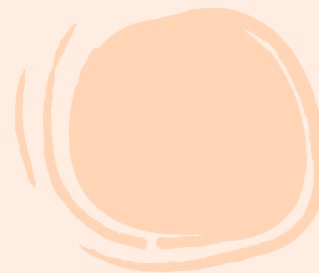
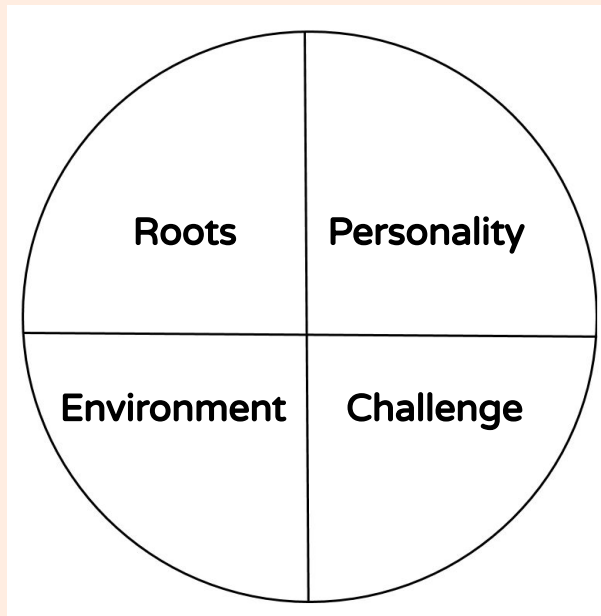
Revealer Activity





Revealer Activity

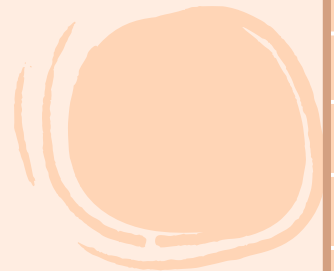
IN ONLY
PICTURES





REFLECTIONS:

- **ROOTS** - How or what sent you in the direction to become an engineer?
- **PERSONALITY** - What parts of your personality do you think make you a good engineer?
- **ENVIRONMENT** - What environment helps you to excel as engineer?
- **CHALLENGE** - Where do you struggle as an engineer?





Overcoming Barriers



Caution: Entangling becoming an engineer with giving up some aspect of who they are.



Could it be possible that there are... -



- Different ways of knowing, being, generating knowledge, deepening knowledge?
- Different reasons for becoming an engineer (scientist)?
- Different conceptions of what an engineer is and does?





Consider...



- **Language that demonstrates bias**
 - “Soft” skills vs. “hard” skills - which do we value?
 - Technical vs. non-technical
 - Innovator/Inventor vs. Public
Servant/community-focused
 - Disabled vs. a person who uses a wheelchair
 - Smart in math and science vs. ????
 - How do our words/actions reflect what we mean when we say “rigor”?





A PICTURE
ALWAYS
REINFORCES
THE CONCEPT





Example Barriers...



Stereotype Threat



Many required courses in STEM
Curriculum is outcomes based

**“This academic task is a
measure of your ability and
intelligence”**

free



“Problem Solvers”

Leaves an overly reductionist reality
Limits our ability to tackle root causes
Turns engineers into technical tools in
service to others
Leaves out invaluable assets
Misses a lot of context
What about building the public good?





Our experiences and identities shape our pedagogy

- Acknowledge different motivations
- Introduce yourself and your identities
- Give students choice in assignments
- Highlight diverse scientists and examples
- Bring in SJ criteria

What's important to your students?

- Learn about students before semester
- Provide community-based challenges or have them solve based on something in their own community
- Stress creating value over solving problems

Overcoming Stereotype Threat

- Give constructive feedback, with high standards, and assure they are capable
- Ask about skills they are proudly developing in class
- Provide opportunities for them to reflect on their assets, what they are proud of, their values



What Else?





THANKS!



Questions?

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