Montana Engineering Education Research Center

# Lost in Translation: From Engineering Norms to Identities

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# Lessons are everywhere

**In a similar way, what is learned in the classroom goes beyond what meets the eye.**

**Students absorb lessons in a school that may or may not be part of a formal course of study**

**Examples:**

- How they should interact with peers, teachers, other adults?
- How they should perceive different races, groups, or individuals?
- What behaviors are considered acceptable or unacceptable?

http://theconversation.com/concussion-recovery-isnt-just-about-getting-back-on-the-field-its-also-about-getting-back-to-the-classroom-35143

# Four Forms of Lessons Learned in a Classroom

1. **Explicit (or Formal):** Set of written requirements, rules, policies, and practices that serve as the official guidelines for how to engage with individuals and evaluate their quality of work.
   - *Example*: syllabus, program of study, student contracts, and written expectations

2. **Informal**: Learning that occurs via personal interactions in the classroom or in work spaces
   - *Example:* What students learn on a team project.

3. **Null:** Composed of what is not taught due to mandates from higher authorities, a teacher's lack of knowledge, or deeply ingrained assumptions and biases.
   - *Example*: Teachers opting to not cover political topics in a class.

4. **Hidden:** Represents how particular assumptions about how schooling manifest in practice.
   - *Example:* If an instructor decides to not emphasize a topic in class, a student may learn that this concept is not important.

# Not all Hidden Curriculum is Bad!!


Understanding hidden curriculum can allow working and learning environments to equivalently communicate information for the benefits of all its members. If the communication is inclusive, then positive outcomes (e.g., retention) can surface.

# Hidden Curriculum: Why is it called "hidden"?

- Described as "hidden" because it is usually **unacknowledged or unexamined** by students, educators, and the wider community.
  - Composed of implicit "attitudes, knowledge, and behaviors, which are conveyed or communicated without aware intent" Alsubaie, 2015, p. 125

- Since the **status quo** determines the values and lessons that are reinforced, it may be **assumed** that these "hidden" practices and messages do not need to change….
  - Unstated norms, values, and beliefs that promote hierarchic and authoritarian social relations that are transmitted to students through the underlying educational structure Giroux, 1977, p. 42

- ……even if it leads to **undesirable behaviors and results**
  *Bullying, conflicts, low graduation rates, college enrollment rates, etc.*

# Some Perspectives of Hidden Curriculum

- **The Functionalist Perspective**
  - Focused on how schools played their part in maintaining social order and stability.
  - Views schools as vehicles through which students learn the social norms, values and skills they require to function and contribute to the existing society.

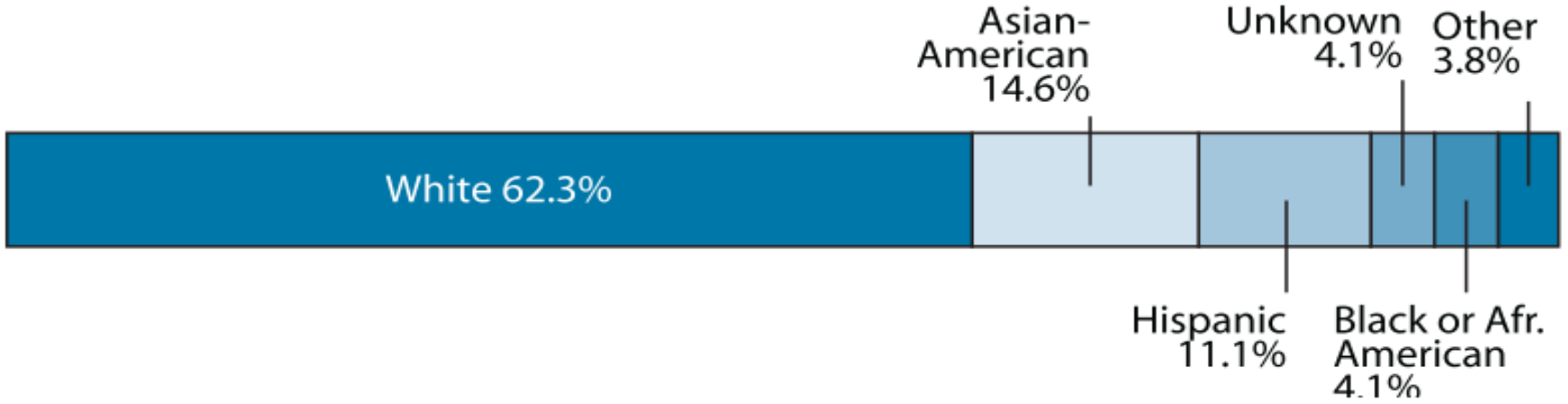
- **The Liberal Perspective**
  - Focuses on those taken-for-granted assumptions and practices of school life which although being created by various 'actors' within the school (for example, teachers and students), take on an appearance of accepted normality through their daily production and reproduction.
  - School rules and codes of discipline; learning, and teacher-student relationships and interactions.

- **The Critical Perspective**
  - The key problematic for critical research into the hidden curriculum is to address how schooling functions to reproduce various inequalities in society. It recognizes that 'official' or formal curriculum statements of schools support notions to those hidden or unintended consequences of schooling which leads to social injustice

## Bachelor's Degrees by Gender, 2017


| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|
| Female | 18.1% | 18.0% | 17.8% | 18.1% | 18.4% | 18.9% | 19.1% | 19.9% | 20.9% |
| Male | 81.9% | 82.0% | 82.2% | 81.9% | 81.6% | 81.1% | 80.9% | 80.1% | 79.1% |

## Bachelor's Degrees by Ethnicity, 2017*




*Yoder, B. L. (2017). Engineering by the Numbers. Retrieved from https://www.asee.org/documents/papers-and-publications/publications/college-profiles/2017-Engineering-by-Numbers-Engineering-Statistics.pdf*

# How do you search for and find HC?

- A hidden curriculum is not something one just finds but sometimes, one must go and search for it.
- HC is not identified by what happens as a by-product or outcome of the same setting.
- Rather, HC stems from what is learned as a result of practices, procedures, rules, relationships, structures, and physical characteristics in a given setting and examining what is learned from them.
- Learning is closely tied to values, beliefs, attitudes, assumptions, and biases of that setting and the people involved in that setting. As such, HC is contextual and can be individual.

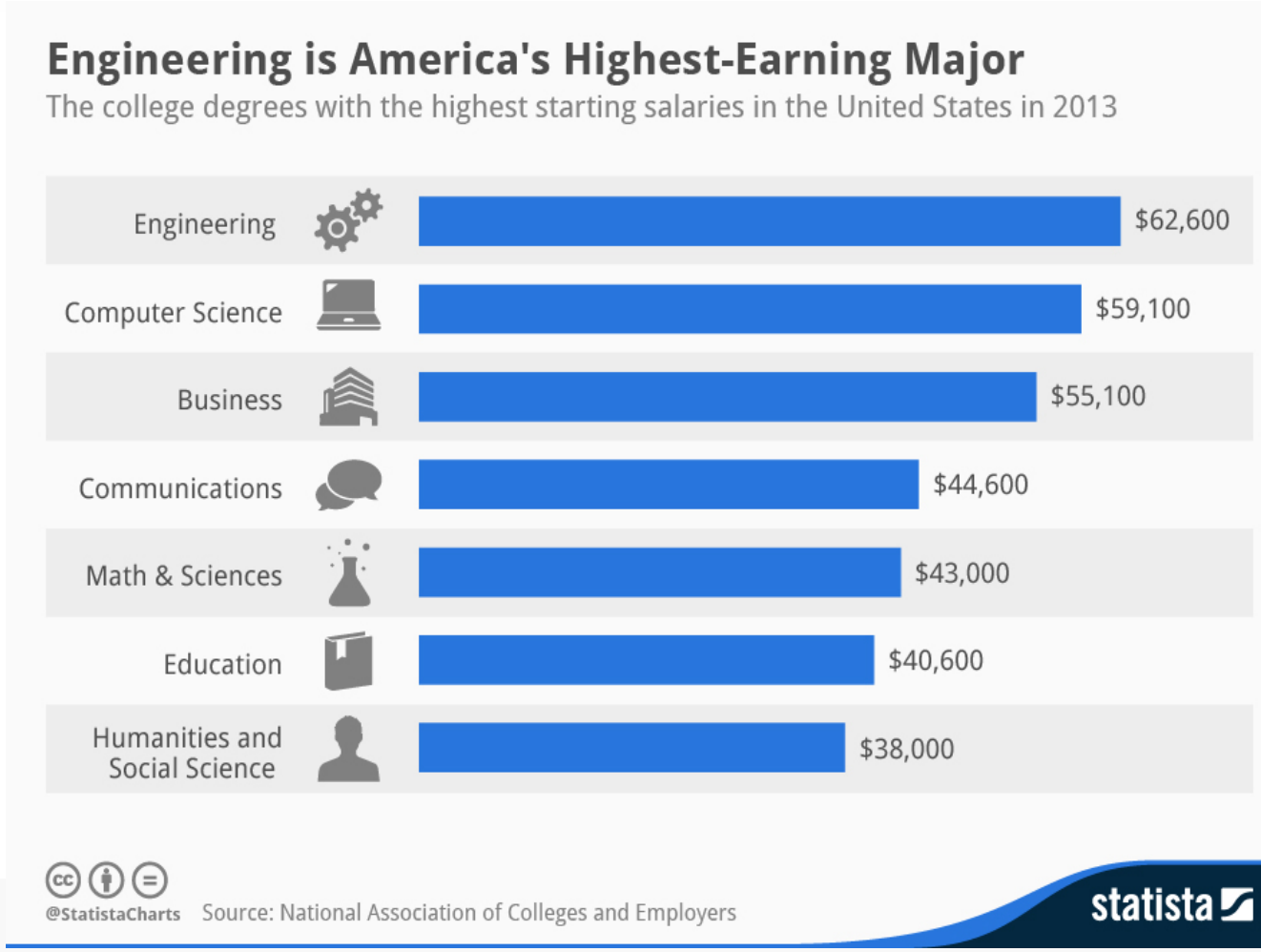
# Searching for the hidden: Engineering Images in Universities and Courses

A website to promote Civil Engineering Education….

# Searching for the hidden: Engineering Images in Universities and Courses

## College of Engineering Admission Requirements for Freshmen

- **Automatic:**
  - 3.60+ high school GPA
  - 1000+ composite SAT I
  - 530+ math SAT I
  - 1 year of math beyond Algebra II
  - 1 year of chemistry with a lab or physics with a lab
- **Supplemental:**
  - Predicted First-Year GPA (PGPA) of 2.50 or higher
  - Calculated using high school GPA and SAT I score
  - No minimum high school GPA or SAT I is required
  - 1 year of math beyond Algebra II
  - 1 year of chemistry with a lab or physics with a lab
- **Engineering (Prep):**
  - Available to all UC eligible students



# Example 1: Finding the norms behind HC

- **Instructions: Read the following statement from a student and answer:**

1. **What hidden curriculum did you find?**
2. **What was the norm expressed?**

***<u>An undergraduate student talks about the value of having respectful engagements with professors (adapted from Smith, 2014, p. 75-76):</u>***

**I think a lot of times when I have done bad, part of it is the professor and part of it is me…[…] Because the professor, most of the times, can't really change you and really you have to modify yourself to deal with certain different demands of people whether you like it or not […] If you piss them off or say something or show disinterest, then they are not going to be willing to put their neck out for you. That has helped me in some of my classes….[…] really, granted you (referring to the professor) wanted me to learn and remember this (referring to the class), but ultimately, I have to do what you want to get a grade, that is just as honest as this game is…[…] Sometimes, that is just the price you pay for a higher education.**

# Example 2: Finding the outcomes of HC

**What would your students in your class say the functions of engineers are?**

| **Mediator** (1300-1550s) | **Designer/Tinkerer** (incepted in 1880's) | **21st century-Social Servant** (2004 to present) |
|---|---|---|
|  |  |  |
| Engineers trained as mediators of science, math, and technological innovation | Engineers trained to be designers and planners of industrial processes | Engineers trained to be 21st century professionals meeting humanistic-social needs |

# Previous Engineering Professional Courses

- 275 undergraduates in engineering (mainly juniors)
  - 84% Male, 16% Female
- Self Identified as engineers, however could not accurate explain the requirements of the field
- 91% of students identified as a Mediator

| **Mediator** (incepted in 1802) | **Designer/Tinkerer** (incepted in 1880s) | **21st century** (2004 to present) |
|---|---|---|
| Engineers trained as mediators of science, math, and technological innovation | Engineers trained to be designers and planners of industrial processes | Engineers trained to be 21st century professionals meeting humanistic-social needs |

*I. Villanueva and L. Nadelson. "Are we preparing engineers of the future or the past?" International Journal of Engineering Education (2017)*

| Course | Mediator (1300s to 1550s) | Designer/Tinkerer (incepted in 1880s) | 21st century- Social Servant (2004 to present) | |
|---|---|---|---|---|
| **(Prior Work- All engineering disciplines- juniors)** | 91% | 6% | 3% | N=275 |
| Technical Communication (all engineering disciplines-juniors) (Week 8) | 18% | 47% | 35% | N=24 |
| Women in Engineering (all engineering disciplines, 1st & 2nd year) (Week 8) | 16% | 42% | 42% | N=20 |
| Women in Engineering (all engineering disciplines, 1st & 2nd year) (Week 15) | 13% | 45% | 42% | |

*I. Villanueva, L. Nadelson, J. Bouwma-Gearhart, K. Youmans*, S. Lanci, & A. Lenz*. (2018). Exploring students' and instructors' perceptions of engineering: case studies of professionally-focused and career exploration courses, Proceedings of the American Society of Engineering Education Annual Conference & Exposition, Liberal Education/Engineering Studies Division, June 24-27, 2018, Salt Lake City, UT, Paper ID # 21891, p. 1-14.*

# Let's think about this and reflect….

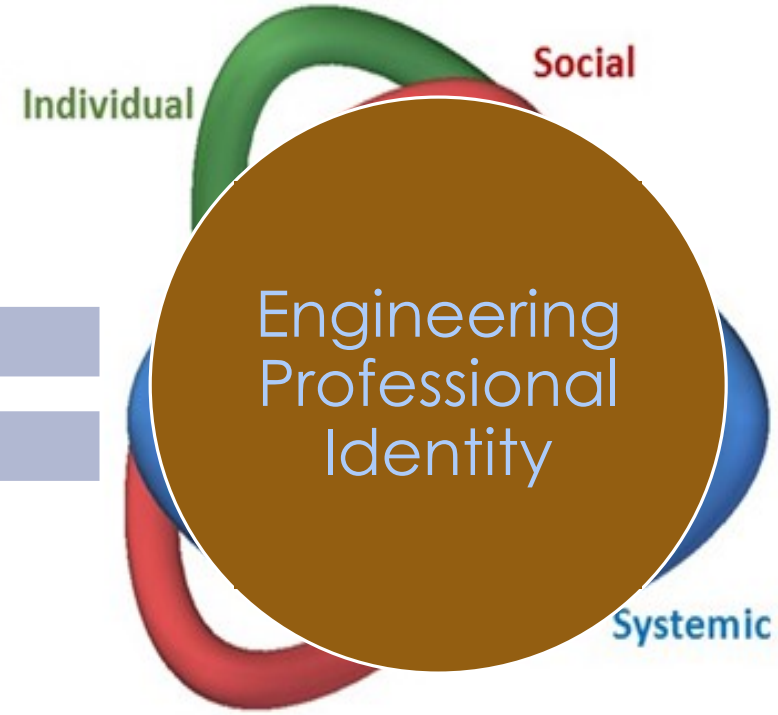
## Courses do matter in how students change their perceptions, beliefs, and attitudes towards engineering

Formational Identity [in Engineering]

+

Perceptions [about Engineering]

=




- Internalization of norms, behaviors, language, values, and practices of engineering
- This process of internalization is heavily dependent on the hidden curriculum present

# What do you do when you find HC?

- Is this something that affects one student, one course, one major, or all students?
- Is this an "easy" change or one that will take multiple people/policy changes/meetings?
- Can I leverage my position as [faculty, administrator, director of undergraduate studies] to change this HC?
- Is there someone whom I think could help me in the process?
- What would be the ideal learning outcome?
- What are the possible downsides to addressing this HC?

# Steps to gain additional HC awareness and communicate it to engineering

## *STEP #1: Gain Awareness about HC in Engineering*

1. Begin to understand or annotate what is described as "common sense" information in engineering at your institution.
    a. Look at the missions and policies of your college or talk to peers, particularly around what is considered important for an engineering student's education.
    b. Ask yourself if there are assumptions made about these missions or policies, how inclusive are these assumptions, and whether you can help debunk some of these in your existing role.
    - Ex: Syllabus, Start of a Lecture, and Assignments are great places where you can explain more the motivation and rationale for a given topic or concept as they relate to the field of engineering.

# Steps to gain additional HC awareness and communicate it to engineering

## *STEP #2: Assess if HC is influencing students perceptions*

2. Periodically assess the perceptions and beliefs about the norms of engineering that students have acquired in courses or student organizations you are involved with.

- Ex: A short self-reflective assignment or essay on how a given topic or activity will be important in engineering can be informative.
- Ex: Ask TAs or other student observers help you gather information about the sentiment of a given group about engineering or engineering group activities (e.g., capstone)
- Ex: Do a "minute-paper" in class and ask about what students believe engineering is about and what questions they have about the profession.

# Steps to gain additional HC awareness and communicate it to engineering

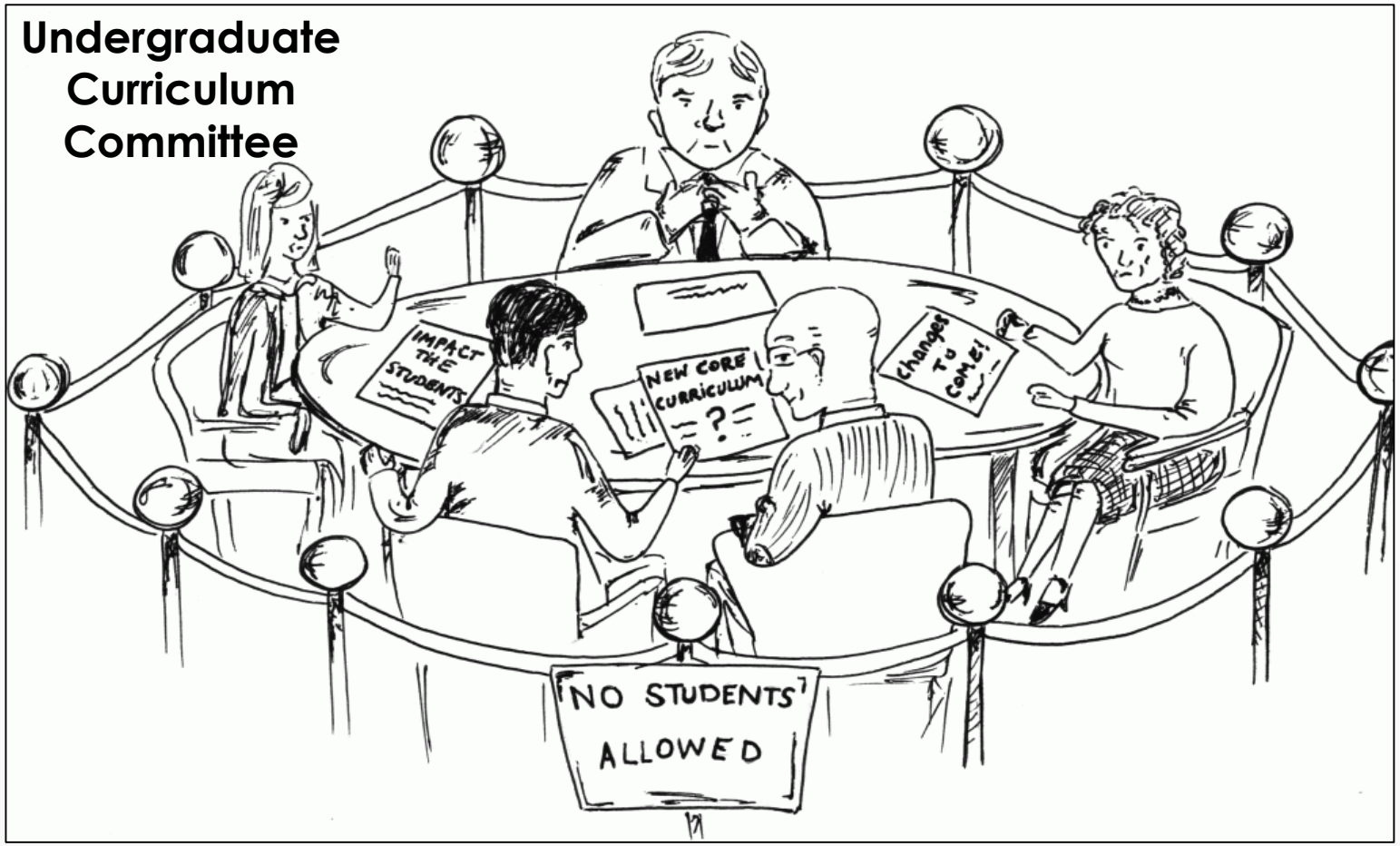
***Step #3. Expose HC and communicate it to accountability partners before taking action-***

3. Share your findings with others (e.g., peers) you trust and find ways to develop purposeful classroom or organizational activities that would convey the message that students need to learn.
4. Before taking any action, think of how your communication of a specified HC may be understood by others and how they may (un)support systemic inequities; it is recommended that you have an accountability partner to share these actions with first.

Hidden Curriculum involves not what happens but rather what is **learned**
- Martin, 1976

*This material is based upon work supported by the National Science Foundation (NSF) No. EEC-1653140 and EEC-1664274. Any opinions, findings and conclusions or recommendations expressed in this material do not necessarily reflect those of NSF.*

**Food for thought: What is the hidden curriculum in this image?**




# Thank you!

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*https://jessedowns.wordpress.com/2011/06/22/811/*