I’m Graduating This Year! So What IS An Engineer Anyway?

Center for the Advancement of Engineering Education

Holly Matusovich, Virginia Tech
Ruth Streveler, Purdue University
Ronald Miller, Colorado School of Mines
Barbara Olds, Colorado School of Mines
Data Collected Each Year for 4 Years
(Interviews, Surveys, Design Tasks)
This Research Study

Data Collected Each Year for 4 Years

(Interviews, Surveys, Design Tasks)
Impetus for This Study

• Persistence (women) important issue
• Persistence from a motivational perspective
• Persistence from a student-centered perspective

How do students’ beliefs about being engineers in the future contribute to their choices to pursue engineering degrees?
Frameworks

Gee’s Identity

Eccles’ Expectancy-Value

Case Study Methods
Simplified: Eccles’ Expectancy-Value Theory

Identity

Competence Beliefs

Importance Beliefs

Motivated Action
## Gee's Identity Categories

<table>
<thead>
<tr>
<th>Identity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discourse Identity</td>
<td>- Trait recognized through discourse/dialog</td>
</tr>
<tr>
<td>Nature Identity</td>
<td>- Develops naturally, i.e. not a matter of choice</td>
</tr>
<tr>
<td>Affinity Identity</td>
<td>- Engaging in activities believed to be characteristic of engineers</td>
</tr>
<tr>
<td>Institutional Identity</td>
<td>- Associated with being an engineer in a particular setting</td>
</tr>
</tbody>
</table>
Methods

• Multiple Case Study
• 5 male and 5 female participants
• Semi-structured interviews conducted annually
• Recorded and transcribed
• Inductive and A Priori coding
• Patterns/Categories
Results

Discourse

Nature
- Good at Math and Science
- Having Mechanical Intuition

Affinity
- Engineering Activities
- Problem-solving
- Applying knowledge

Institution
- Good communicator
- Good teamwork
Nature

Good at Math and Science

Having Mechanical Intuition
Affinity

Engineering Activities

Problem-Solving

Applying Knowledge
Institution

Good communicator

Good teamwork
Results

Discourse

Nature
- Good at Math and Science
- Having Mechanical Intuition

Affinity
- Engineering Activities
- Problem-solving
- Applying knowledge

Institution
- Good communicator
- Good teamwork
Uncertainty

**Tim**

“I don’t know what I’m gonna’ do as a [major]. There are different options but the only reason I know that is ‘cause of my internships.” (fourth year)

**Anna**

“I don’t really know what to expect so it is hard to say for sure, like, ‘Yeah, I’ll be great’.” (third year)

**Marie**

“…and the whole deciding your life direction wasn’t easy this year. ‘Cause I'm not looking at a person who has a vision of me really ten years from now.” (fourth year)
SO WHAT?
More Questions

• How do our students learn what it means to be an engineer?

• What messages we are sending about being engineers? Are these the right messages?

• Why do some students remain uncertain?
Suggestions for Practice

• Ground lectures and assignments in examples of engineering work
• Model and practice engineering work
• Represent a variety of engineering work
Acknowledgement

This material is based on work supported by the National Science Foundation under Grant No. ESI-0227558, which funds the Center for the Advancement of Engineering Education (CAEE). Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

CAEE is a collaboration of five partner universities: Colorado School of Mines, Howard University, Stanford University, University of Minnesota, and University of Washington.
Identity

What are students’ perceptions of themselves as engineers in the future?