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### First-Generation College Students and "Othering" in Undergraduate Engineering

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## Presenter Information

Dr. Harriet Hartman; Dr. Stephanie Farrell; Dr. Ralph Dusseau; Dr. Kauser Jahan; Sarah Bauer; Dr. Tiago Forin; Dr. Beena Sukumaran; Stephanie Lezotte, CRA; Danilo Zeppilli, EIT; and Theresa Bruckerhoff

# First-Generation College Students and “Othering” in Undergraduate Engineering

Harriet Hartman, Sociology & Anthropology

*and the rest of the RevED\* team:*

Stephanie Farrell, Experiential Engineering Education

Ralph Dusseau, Kauser Jahan, Sarah Bauer, Tiago Forin, Beena Sukumaran (also VP Research), Civil/Environmental Engineering

Stephanie Lezotte, Education

Danilo Zeppilli, Engineering

Theresa Bruckerhoff, CRE

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# “Othering” among university students

- Feeling “other” or different than the mainstream, the “typical” student
  - Perceiving oneself and others like you as not belonging
  - Feeling insecure or inadequate academically, socially, or professionally
  - Feeling uncomfortable about your identity when among others
  - Reluctance to commit to a future in the major or profession



# Research Questions

- ▶ Do First-Generation College Students (**FGCS**) in undergraduate engineering at Rowan identify as “other”?
- ▶ In what ways *are* they “other”?
  - ▶ Are they less prepared academically for undergraduate engineering?
  - ▶ Do they share other “minority” statuses?
- ▶ Do they participate in the engineering and university student communities?
- ▶ Are they as self-confident as Continuing-Generation College Students (**CGCS**) in undergraduate engineering at Rowan?
- ▶ Do they feel as if they don’t belong in engineering?
- ▶ Are they less committed to a future in the major or the profession of engineering?



# Data

2016 (-7) survey of all engineering students  
n=293

- ▶ Visible and invisible minority identities
  - ▶ Gender
  - ▶ Sexual orientation
  - ▶ Race/ethnicity
  - ▶ Social class
  - ▶ Disability
  - ▶ Religion
  - ▶ First-generation college status
- ▶ Pre-college background
- ▶ Climate of diversity and inclusion (comfort in variety of situations)
- ▶ Extra-curricular activities
- ▶ Self-confidence as engineer
- ▶ Satisfaction with courses, program
- ▶ Future plans for degree, job

# In what ways are FGCS “other” than CGCS in undergraduate engineering?

	FGCS	CGCS
% low SES growing up	<b>52.8</b>	27.7
% whose parents made <\$100,000 last year	<b>52.9</b>	29.0
% confident they'll have \$ to complete college	<b>37.7</b>	53.8
% women	21.2	<b>30.6</b>
% LGBTQ+	19.0	15.1
% white, non-Hispanic	90.9	88.5
% non-Christian	46.4	54.1
% disabled	8.5	10.9
% transfers	<b>14.2</b>	4.3
% English not first language	<b>6.6</b>	1.6
	(n=105) ( <b>36%</b> )	(n=180) (64%)

# Pre-College Preparation

	FGCS	CGCS
% Top 10% of class rank	59.6	60.5
% Math SAT score 750+	17.3	18.4
% Critical reading score 750+	8.3	2.0
Mean GPA in high school (4-point scale)	3.61	3.78
Honors STEM Activities Index	<b>1.78</b>	2.22
AP STEM Activities index	<b>1.23</b>	1.64
HS extracurricular STEM activities Index	1.0	.8



## Experiences at Rowan

FGCS

CGCS

**Extra-curricular engineering related activities Index (Mean)** (*e.g., projects, engineering service clubs, student professional societies, engineering learning community, mentoring programs*)

1.9

**2.2**

**Extra-curricular non-engineering related activities index (Mean)**  
(*e.g. volunteer work, the Honors program, collegiate or intramural athletics*)

1.1

**1.6**

**% employed during academic year**

56.7

58.1

# “Othering”

- ▶ **FGCS in engineering do NOT feel “othered” more than CGCS in engineering** in terms of being uncomfortable
  - ▶ Being the only one of their (race/ethnicity, gender, SES, religion, sexual orientation)
  - ▶ Being with others in their (race/ethnicity, gender, SES, religion, sexual orientation)
  - ▶ Speaking about their (race/ethnicity, gender, SES, religion, sexual orientation)
  - ▶ Being with others who are different than their (race/ethnicity, gender, SES, religion, sexual orientation)
  - ▶ Saying what they think about (race/ethnicity, gender, SES, religion, sexual orientation)

▶ **BUT→**



There is an interaction between being FGCS and women, and being FGCS and LGBTQ+

- Women and LGBTQ+ who are FGCS DO feel more uncomfortable than FGCS men and heterosexuals
- Women and LGBTQ+ who are FGCS DO feel more uncomfortable than CGCS women and LGBTQ+

**Therefore, being FGCS and a woman, or FGCS and LGBTQ+ increases the vulnerability of being a minority engineering student**



# Self-Confidence

- ▶ FGCS do NOT differ from CGCS in terms of
  - ▶ Academic self-confidence
  - ▶ Employability self-confidence



# Belonging in Engineering

- ▶ FGCS do NOT differ from CGCS in
  - ▶ Feeling they are part of an engineering community
  - ▶ Feeling that they belong in this engineering environment



# A Future in Engineering

- ▶ FGCS do NOT differ from CGCS in terms of
  - ▶ The highest academic degree they expect to get in engineering
  - ▶ Their expectations that they will be employed in engineering ten years from now



# Conclusions

- ▶ FGCS in engineering DO differ from CGCS in terms of
  - ▶ SES
  - ▶ Transfer status
  - ▶ Pre-college Honors and AP STEM courses
  - ▶ Pre-college extra-curricular STEM activities
- ▶ FGCS in engineering do NOT differ from CGCS in terms of
  - ▶ Class rank
  - ▶ SAT math score



## Conclusions (cont'd)

- ▶ Engineering FGCS DO differ from CGCS in terms of participating in
  - ▶ Extra-curricular activities related to engineering
  - ▶ University-wide extra-curricular activities not related to engineering





## Conclusions (cont'd)

- ▶ Engineering FGCS do NOT differ from CGCS in terms of
  - ▶ Comfort about their identities in terms of gender, race/ethnicity, religion, socio-economic status, or sexual orientation
- ▶ Women and LGBTQ+ who are FGCS DO feel less comfortable about their gender and sexual orientation when compared to
  - ▶ FGCS men and heterosexuals
  - ▶ CGCS women and LGBTQ+



# Conclusions (cont'd)

- Engineering FGCS do NOT differ from CGCS in terms of
  - Feeling that they belong to Rowan's engineering community
  - Academic self-confidence in engineering
  - Employability self-confidence
  - Future plans to stay in engineering as a major and as a career

# CONCLUDING CONCLUSIONS

- ▶ So, for the most part, even though engineering FGCS differ from CGCS in significant ways, they are able to draw on strengths that allow them to belong to the engineering community, develop an engineering identity, and believe in themselves as engineers
  - ▶ Some research refers to the strong “grit” and perseverance that FGCS have
  - ▶ Other researchers refer to a special sense of social capital than FGCS draw upon, which differs from the social capital of CGCS but is no less effective
  - ▶ However, being FGCS interacts with some minority statuses (gender, sexual orientation) to increase vulnerability



# QUESTIONS FOR DISCUSSION/RESEARCH

- ▶ Are engineering FGCS (and CGCS) at Rowan representative of all Rowan FGCS (and CGCS)?
  - ▶ What *is* the social capital FGCS use to succeed in engineering at Rowan?
  - ▶ Do all FGCS draw on the same type of social capital to succeed?
  - ▶ How can that social capital be strengthened?
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