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# Exploring Issues Faced by Students in STEM Fields: First-Year Focus and First- Generation Focus

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The results and corresponding suggestions developed from asking first-year and first-generation STEM students about their college experience at a small (<2000) undergraduate university

**STEPHANY COFFMAN-WOLPH**

Lecturer, The University of Texas at Austin

[sscw@cs.utexas.edu](mailto:sscw@cs.utexas.edu)

**KIMBERLYN GRAY**

Assistant Professor, West Virginia University Institute of Technology

[kimberlyn.gray@mail.wvu.edu](mailto:kimberlyn.gray@mail.wvu.edu)

# Abstract



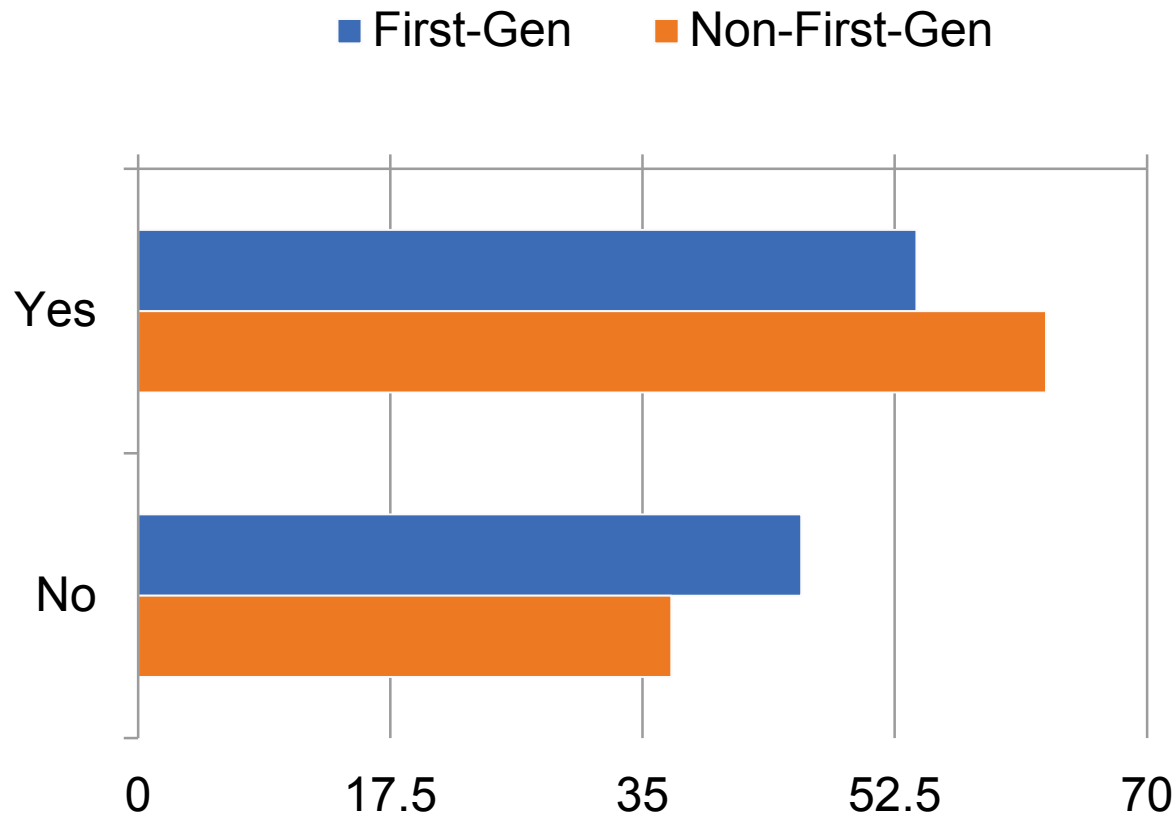
- WVU Tech is a small school that heavily recruits from the local area (i.e., small towns and rural areas) and does not have a specific first-year engineering program so looking to incorporate these concepts into existing or new courses, student orgs, or student services
- This paper will:
  - Explore and assess the experiences of first-year and first-generation undergrad students in STEM fields or changed from STEM fields
  - Provide results of data analyzed for recurring themes among the students experiences (both positive and negative)
  - Make recommendations on actions STEM and first-generation programs can take to increase the number of these students graduating with a STEM field degree

# Population



Approximately 1600 students	Approximately 600 students are STEM majors
35% are first-generation students	66% are either first-generation or low-income
Most students attended high school while living in towns with a population of 5,000 or less	Only 19% of the Fall 2017 cohort had a general ACT score above 23

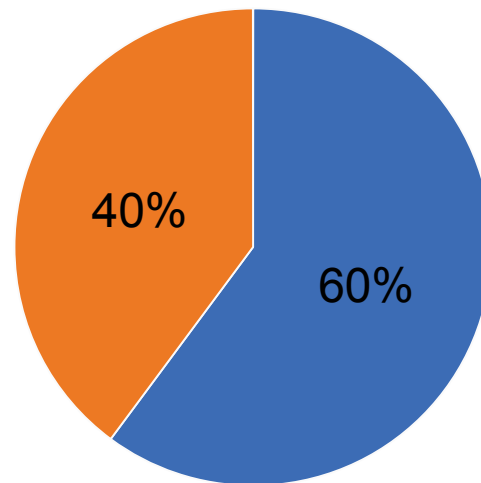
Surveyed Students  
STEM Majors



# The Participants

- Undergrad students enrolled at WVU Tech during the Spring 2018 semester
- 138 Total responses

■ First-Generation ■ Non-First-Generatio



# Example Survey Questions

Are you majoring (or planning to) major in a STEM field?

Yes

No

Are you or have you been a member of any STEM organizations?

Yes

No

Suggestions for what WVU Tech or student organizations could do to help you stay in your current major and/or complete college?

Why do you feel it is important to encourage people to stay in STEM fields? Or not encourage people to stay in STEM fields?

Who was a significant source of encouragement for you to pursue a college education?

Has there been anyone who has been a significant source of discouragement for you to pursue your major?

Yes

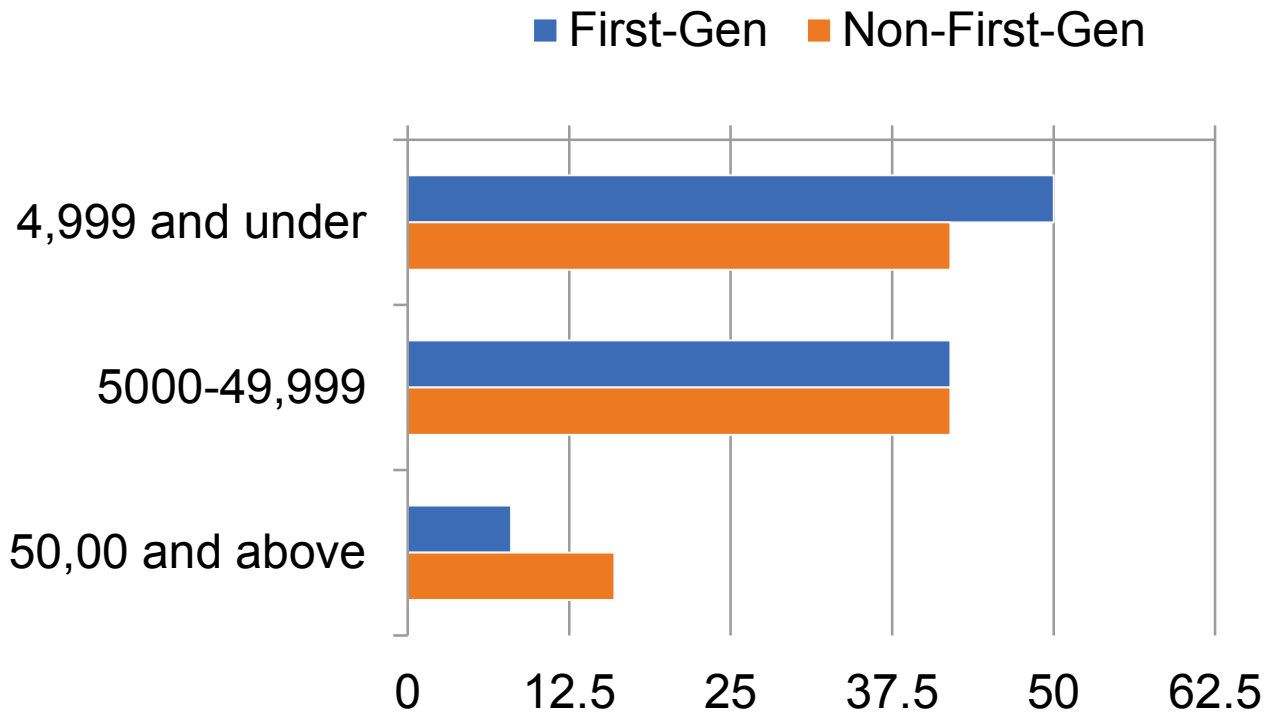
No

Do you feel there was skills or background your fellow students knew that you did not?

Yes

No

# Surveyed Students Population Differences



# Summary of Themes for First-Year, First- Generation Students

Topic	Results
Encouragement to Pursue College	Majority cited Family with others citing Friends and Teachers
Encouragement to Pursue Major	Family, Faculty/Teachers, Mentors, and Self
People Discouraging Staying in College	22% Yes, 78% No
Discouragement to Pursue College	Too Expensive, Good Paying Jobs without a Degree, Not College Material, and Flawed Educational System
Discouragement to Pursue Major	Lack of Financial Gain, Inability to Accomplish Goals
Top Three Campus Services Used	Advising, Tutoring, TRIO
Missing Background Differences	Mentoring and Science
Method of Hearing about Events	Email, Facebook, and Posted Flyers



63% of both populations felt their backgrounds were different than an average college student

- Similarities:
  - “Because I have to work all the time, I am not allowed the time I wish to work on school”
  - “Because of my financial status, I have to work more than the average student”
  - “Because I am much older than a traditional college student”

63% of both populations felt their backgrounds were different than an average college student

- First Generation
  - “My middle and high schools ... were not considered to be very good schools in general”
  - “High school did not prepare me for college math”
  - “Classes seem a lot harder for me”
  - “I feel like other students had a better idea what college would be like”

# 63% of both populations felt their backgrounds were different than an average college student

- Non-First Generation
  - “I have a really strong background...”
  - “I grew up with a family in the engineering field so I have seen a lot of the practical applications of the things we learn in class”
  - “My father is a retired professor...I was brought up in an academic environment”
  - “I learned mechatronics...and had basic and some advanced knowledge in electrical and mechanical engineering”

More of the first-generation students felt it is important to encourage people to go to college (95% vs. 77%)

- “Because it opens the door to so much more than what others expect of you”
- “Having a college degree is essential to having the dream job you want”
- “I think everyone deserves the chance to better their lives”

More of the first-generation students felt it is important to encourage people to go to college (95% vs. 77%)

- “Too many kids come to college because they were told to go and do not have a passion for it”
- “While one must become learned in something to become financially successful, that doesn’t always mean college”

Half of the students in both populations thought all genders were represented equally in STEM fields

- Among STEM majors only 50% think this
- Among non-STEM majors 81% think this

# Sources of Encouragement to Attend College

- While both groups often cited their family as a source of encouragement, first-generation students were much more likely to list professors, teachers, friends, and other non-family members

# Tutoring

- First-Generation students were more likely to use tutoring services
  - TRIO students have access to additional tutoring services



# Other Observations

- Female students are less likely to join TRIO
  - 50% of eligible female students joined and 70% of eligible male students joined
- First-Generation students are using career services at half the rate of non-first-generation students

# Conclusions



- TRIO has a significant impact on its students
- With so many first-generation students reporting feeling unprepared for introductory STEM classes, we are hoping to add similar programs to help students with math, computer, and science skills to help attract and retain first-generation students in STEM majors

# Changes/Suggestions



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- Recruitment efforts are already in place for the incoming first-year students in the fall to make sure they are aware of TRIO
  - Female students and staff will be leading these efforts
- Offering more scheduled tutoring outside of TRIO would help all first-year students
- We are encouraging STEM organization to start mentorship programs for first-year students

# Future Work



- Survey students in depth on these issues to gain better understanding of the challenges faced
- Explore backgrounds & experiences of STEM students to identify first-year STEM courses
- Extend study to larger survey population at other universities
- Re-survey students after implementing changes at WVU Tech to see effects they have on the students

# Reference

1. WVUIT Common Data Set 2017-2018. West Virginia University, 2017 [Online]. Available:

[https://planning.wvu.edu/files/d/8ed4b6a2-1eed-43c4-8c17-2992915bca00/wvuit-cds\\_2017-2018.pdf](https://planning.wvu.edu/files/d/8ed4b6a2-1eed-43c4-8c17-2992915bca00/wvuit-cds_2017-2018.pdf). [Accessed: 16-Mar-2018]