

The Impact of Extra-Familial Relationships on STEM Major Selection

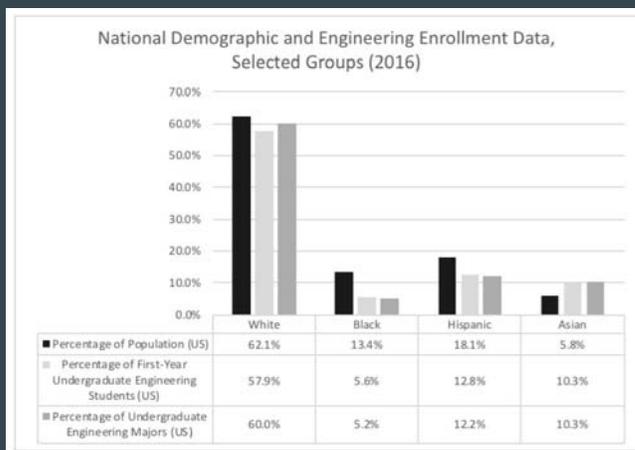


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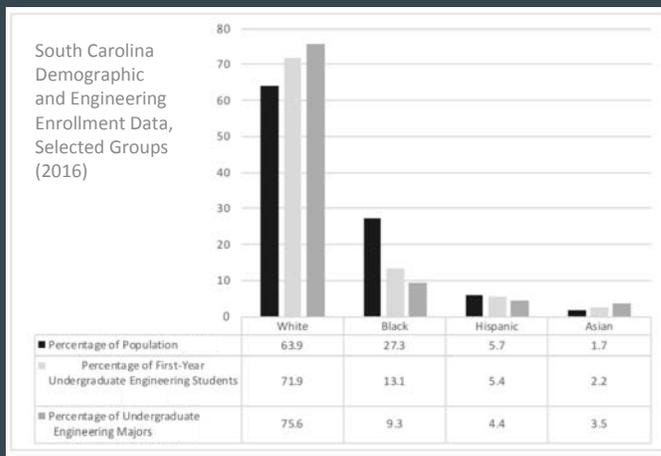
Engineering Careers are Not Accessible to Everyone



- Freshman enrollment in engineering programs among minoritized populations is below representation levels

Figure 1. National demographic and engineering enrollment data for selected populations (2016). Source: United States Census Bureau 2016 Community Survey Report; National Center for Education Statistics Integrated Postsecondary Education Data System.

Engineering is Desirable but Not Accessible to Everyone



- South Carolina reproduces national trends, with a particularly striking disparity in engineering participation for Black students

Figure 2. South Carolina demographic and engineering enrollment data for selected populations (2016). Source: United States Census Bureau 2016 Community Survey Report; National Center for Education Statistics Integrated Postsecondary Education Data System.

Project objective:

To to broaden participation in engineering in South Carolina by examining factors associated with major selection, mathematics preparation, placement, and performance

This presentation reports on: Results identifying individuals influential to students' decision to major in STEM fields

Methods

1: Data Provided by IHEs

Institutional data was provided from the 16 two-year technical schools and 4 public four-year colleges with ABET-certified engineering programs

This data was used in focus group selection

2. Focus Group Selection

Students sorted into "calculus-ready" and "below-calculus-ready"

Students intentionally selected from the "Corridor of Shame" for participation

Interviews conducted at two 4-year and two 2-year IHEs

3. Descriptive Coding

Research team conducted open coding for themes related to academics, social interactions and family

Developed code book and assigned codes to the text

Repeated passes to reach 100% inter-rater agreement

Major Results

1. Social capital enabled or inhibited students' career exploration options.

2. Students attending two-year IHEs often expressed the desire for resources and knowledge guidance counselors possess.

Trends

Students at Two-Year IHEs...

- Had parents who did not attend college
- Did not have family, social, or professional relationships with engineers
- Wanted guidance counselors to help them find funding for higher education and to help with career exploration

Students at Four-Year IHEs...

- Had parents who attended college and had white-collar jobs
- Were related to an engineer, either directly or through family social networks
- Wanted guidance counselors to suggest when to take classes

Differences in Utilization of Family Networks



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Differences in Utilization of Family Networks

Direct Access to
Engineer

Aram (4-year): *In my family, my stepbrother is a nuclear engineer and my stepfather could definitely pass for one if he chose to.*

Career Exploration

Robin (4-year): *I have a family friend as well who is a computer engineer, and during summers I would work with him.*

General Support for
Completing Secondary
Education

Goku (2-year): *I mean, [my mother's] intentions were for me to graduate high school, but for as long as I can remember she always worked third shift. So it was just like, during the day it was me and my brother there at the house. I would just look at her and be like, "I'm not living that life. I guess I'm gonna just go to college."*

Differences in Reliance on Guidance Counselors



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Differences in Reliance on Guidance Counselors

Students' Perception
and Attitudes Towards
Guidance Counselors'
Expertise

Pablo (2-year): *Advisors should be in high school more like they are in college, like ... to point you in the direction of what you're good at and what you're not.*

Interviewer: *Isn't that what a guidance counselor is supposed to do?*

Bob Guy (2-year): *Yeah, but nobody takes them seriously.*

Victoria (4-year): *When I went to my guidance counselor to schedule classes and stuff, I basically already knew what I wanted and would just tell them and they would maybe say "hey, maybe you shouldn't do that" and I'd be like "no, like, I know what I wanna do" (laughs).*

Differences in Reliance on Guidance Counselors

Desire for Career
Exploration

Amy (2-year): *[Gwen, an English major aspiring to be a teacher] had teachers to look up to for her career choices, but I've never had the chance to look at, or have someone come in, like, I didn't even know what engineering was. What if I wanted to do that? They never had anybody else from other careers come in and talk to us, or us to go out and follow around for maybe a few hours to see if that's something we're even in – because, when they asked us what we wanted to do in the ninth [grade] I'm sitting there like, "Oh, does this singer count? I wanna be Hannah Montana." [...]*

Differences in Reliance on Guidance Counselors

Mismatch Between
Guidance Counselors'
and Students' Objectives

Gwen (2-year): *I spent a lot of time in my guidance counselor's office [...] I was behind in credits, so she helped me get back on track to where I needed to be. It wasn't so much college prep though, which I kinda wished there was. It was a lot of "how do we get you to graduate on time?" It was the main focus. I wish that somebody would have told me how serious that high school was.*

Amy (2-year): *And more advising [from] the guidance counselor, not just [in] the ninth grade, "what do you wanna do?" And we didn't ever pick classes in high school, it was always just, "Oh, here's your schedule for the next semester. This is what you're gonna take, this is what you need to take."*

The Importance of Peers



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The Importance of Peers

Impetus to Continue
Education

***Bob Guy (2-year):** Typically, my friends were also on, like, the same kind of level of education that I was. So, [I was] just kinda trying to keep up with them, be in a similar place as they were. Uh, just kinda motivation.*

Guidance in Career
Selection

***John (2-year):** High school was kind of when it was time to pick what I was gonna major in. It was, “Well, I’ve got a good friend that’s an engineer that’s a few years ahead of me, some of my friends are going into engineering, I enjoy math” ... I’ll stop there, but it was kind of a “I need to do something, so engineer will be the starting point.”*

The Importance of Peers

Pressure to Conform

Pablo (2-year): Whenever I was in sixth grade, I got moved to the advanced [classes], and then whenever I went to the private school, I dropped back down to the regular ones. Because ... I didn't really feel the need to. Like, honestly, I had negative peer pressure [...] to not even go to school. Like, most of my boys dropped out. Now they're all having to go back and get GEDs instead of just taking it then. But I don't know. It's on what group you choose to hang out with. But then, once you choose that group, it's kinda like you don't ever leave the group you start with whenever you're young.

Suggestions

- Take student desires for postsecondary education more explicitly into account when advising
- Couple IGPs with targeted career exploration
- Inform students about resources available for career finding and navigating postsecondary education

Next Steps

- The initial study has formed the basis of a large-scale survey to be administered statewide to the students at all 20 participating IHEs
- The data will be consolidated into a usable format
- More information about SC:SUPPORTED can be found at our website:

cecas.clemson.edu/scincludes