STEM Intervention Programs: The Shift from Opportunity to Merit

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Project STEP-UP

- STEM Trends In Enrollment & Persistence for Underrepresented Populations (STEP-UP)

- Examine factors that impact the entrance into, persistence in and degree attainment in the STEM fields at large, public, research universities
  - By gender
  - By race/ethnicity
  - By SES
  - By STEM field

STEP-UP: STEM Intervention Programs

- Examine the design, implementation, and impact of STEM intervention programs on underrepresented undergraduate students
  - What theories or perspectives guide the design of STEM intervention programs?
  - How are STEM intervention programs structured?
  - How are STEM intervention programs funded?
  - What are the common challenges that STEM intervention programs face?

Research Question

- How have STEM intervention programs changed over time?
  - Mission and Goals
  - Eligibility
  - Recruitment

The Context

- Large, Public, Research Universities
- Large student populations
- Increased access to higher education
- Significant producers of STEM degrees
- Conduit to STEM graduate programs & the workforce

STEM Intervention Programs

- Objectives
  - Recruitment
  - Retention
  - Encourage advancement into graduate programs
  - Aid the transition to college and choice of STEM major
  - Increase awareness of STEM majors and careers
  - Assist in transforming composition of the STEM workforce
  - Create opportunities for access and success

STEM Intervention Programs

- Types of Programs
  - Academic Bridge Programs
  - Research Opportunity Programs
  - Tutoring
  - Mentoring & Advising
  - Financial Support
  - Social Networks
  - Leadership Training
 - Living Learning Communities
  - Hybrid Programs

Meritocracy

- Students are rewarded for academic achievements through admissions policies and financial aid programs

- Measures of Merit
  - Standardized test scores
  - Class rankings
  - Academic performance (GPA)

Representation of the Study

Large, Public, Research Universities

STEM Intervention Programs

Program Purpose & Ideology
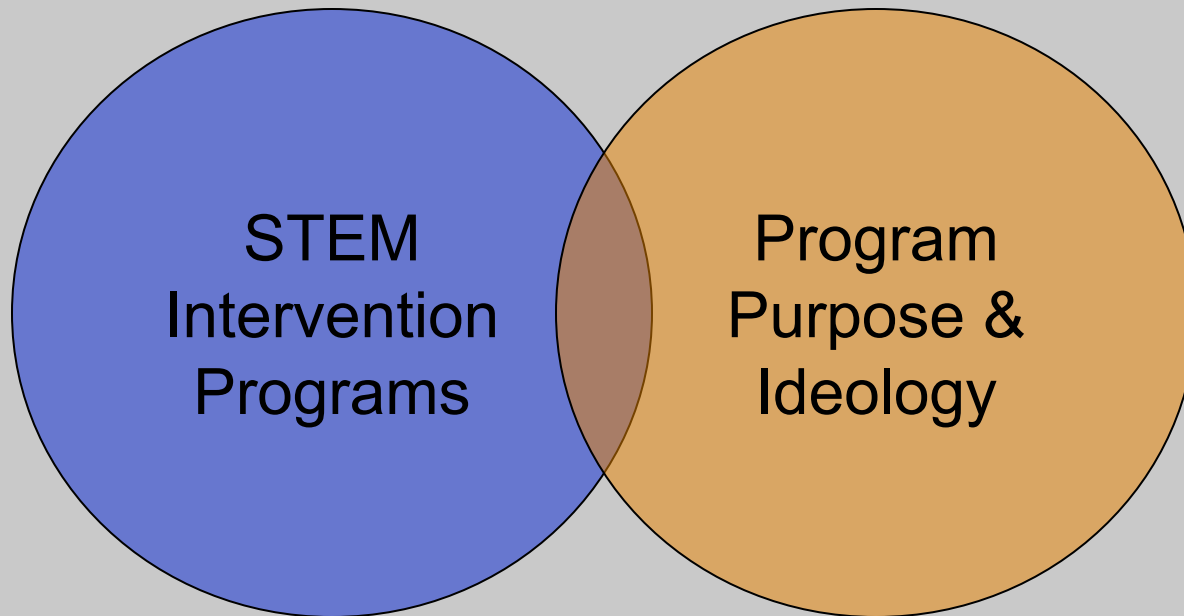
Data & Methods

- ## Data

    – Interview data has been gathered from 9 large, public, research universities.

    – 47 participants:

        - 11 male, 36 female

        - 22 white, 19 African American, 4 Hispanic, 1 Native American, and 1 Asian American.

- ## Qualitative Methods

    - Semi-structured interviews with program administrators

    - Coded for common themes and issues

Results: Change of Mission & Eligibility

The program has changed for most of [the universities that offer this program]. It was a program that was meant to provide students with an opportunity to conduct research. And so the focus wasn't necessarily on getting them into graduate school right away. Because we even took sophomores so it would be a couple of years before they could even consider that. But it was more a chance for them to work with a faculty member and to understand what graduate education was about, what research was about. And so it wasn't as rigorous of a program.

-Sandra

Results: Change of Mission

Those things have evolved and we're right now at the place where we're really wanting to see which of these students will be admitted by the departments. We know that there are many that are admissible, so we're wanting them to gain admission. That's a real—it's a more clearly stated goal than what we've had in the past. Again, in the past it was, "Let's bring these students in and give them this opportunity, and let's change the world. Let's make sure students have this kind of exposure," and at that time it was the proper legal thing to do. But now we have to look at things differently and try to correct whatever is the issue here and deal with our issue of inclusion. So, we are working toward those goals. I'd say that's where we are—working toward those goals.

-Beth

Results: Eligibility & Participant Qualifications

[W]e look at their high school class rankings and their math ACT score because our math ACT has the strongest correlation with their success in our chemistry classes, more so than science reasoning … So very much it's the math ACT. We go slightly below the average, so we go with a competitive ACT score, so the average math ACT in our chemistry classes is a 28. We go down to a 24. Below that—it's not a set formula. If they're at a 23, 24, we'll look at their science reasoning and their high school class ranking and see how, you know—it they're a valedictorian, but they're at a 23, we assume they're motivated and things. So it's not as specific, but that's about the cutoffs. Below that, our concern is that they're gonna need more remedial help.

-Michelle

Results: Eligibility & Participant Qualifications

It [the program] has changed drastically in the past three years. When I started the average GPA score for students was a 3.0. And while admissible to graduate programs in STEM fields, that's not going to get you any love. So this year we are just finalizing our cohort. We're at a 3.65 [GPA] for the students in our cohort.

-Maria

Limitations

- 9 large, four-year, research intensive, and predominantly white universities

- Participant recruitment based on publicly available information of STEM intervention programs on each institution's website

- Response rate based on self-selection

- Based on opinions of directors/administrators
  - No contemporaneous statements from students participating in programs
  - Changes may not be formally documented in program literature

Main Findings

- Shift from Opportunity to Merit
  - Change in focus from providing opportunities to rewarding merit and academic outcomes
  - Programs serving as a recruiting device
  - Institutions seeking "return on investment" and to improve graduate school yields
- Shift in program components
  - Graduate school application preparation
    - GRE prep courses
    - Personal statements

Main Findings (con't)

- Changes in how participants are selected and eligibility requirements
  - Requirements have become more rigorous and more merit-based
  - Fewer program participants
- Change in program components and structure
  - More focus on graduate application process

Implications

- Return on investment for graduate programs
- Mission of large, public, research universities
  - Serving the public
  - Providing opportunities for social mobility
  - Contributing to a skilled workforce
- Alternative explanations
  - Affirmative Action changes
  - Funding changes
  - Assessment pressures

Recommendations

- Programs should be pro-active, not re-active

- Conduct evaluations and assessments to demonstrate value and worth to department, college, and university

- Diversify funding sources to be able to serve more students

- Balance opportunities with graduate school preparation activities

Questions & Discussion

Contact Information

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