Underrepresented Undergraduates in STEM at Large Research Universities: From Matriculation to Degree Completion

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Project Summary
This three-year study examines the matriculation, persistence, and degree attainment of full-time, first-time women, students of color, and low-income undergraduate students in the STEM fields at a consortium of large, public, research universities.

Quantitative and qualitative methods are used to comprehensively examine individual, institutional, and cross-cutting factors and programs that impact the (under)representation of these students in STEM fields at universities that are significant producers of the nation’s STEM degrees. Longitudinal data on students who began college in 1999 at eight universities allows for examination of their selection into a STEM field, movement in and out of STEM majors and postsecondary outcomes. New qualitative data gathered from administrators and directors of STEM intervention programs at ten universities will focus on the design and delivery of such programs. Finally, students currently enrolled at the ten universities are being surveyed to assess what factors influence their choice of major and the impact of program intervention participation.

Collectively these data will allow the researchers to identify factors that influence students to opt in, are filtered out, and persist in STEM majors at large, public, research universities.

Data and Methodology
The project uses mixed methods to analyze the following quantitative and qualitative data:

Longitudinal Data (6 universities)
- Data originally gathered by the Mellon Foundation
- Follows students who began college in Fall 1999 for up to six academic years
- Social background, academic qualifications, semester-by-semester major and GPA, and financial aid information

STEM Program Intervention Data (10 universities)
- Interview directors and administrators
- Examine design, implementation, impact on students, and benefits of programs
- Gather existing data, reports, and evaluations from participating programs

Undergraduate Student Survey Data (10 universities)
- Survey current undergraduate students
- Examine factors that influence choice of major and persistence in major, including:
  - Participation in intervention programs
  - Pre-College experiences
  - College experiences
  - Financial Aid
  - Influence of peers, family members, teachers, and counselors

Preliminary Results
The results of this study thus far focus on the analysis of the 1999 cohort data. Findings include high levels of participation and persistence by women and non-Asian minorities when a broad definition of STEM, which includes Biological, Agricultural and Health Sciences, is used. There is also considerable movement within STEM fields even though students may not have persisted in Math & Engineering.

Challenges and Opportunities

Challenges
- Determining what undergraduate majors to include in “STEM”
- Balancing a broad definition of STEM with varying requirements of math and science courses of undergraduate majors

Opportunities
- Create a grid of required coursework by type of major at each institution included in study; examine common course requirements (e.g., units of math, number of lab sessions)
- Conduct meta-analysis of higher education literature to determine how others define STEM; critically examine what fields are most commonly included/excluded and on what basis

Project Goals
- Examine entrance, persistence and attainment of the following groups into STEM fields at large, public, research universities:
  - Females
  - Non-Asian minorities
  - Non-Asian females
  - Low-income students
- Examine movement in, out, and within STEM between students’ enrollment and degree attainment
- Disaggregate STEM
- Examine the design, implementation, and impact of STEM intervention programs on underrepresented undergraduate students
- Understand the reasons for and influences on students’ choice of major and persistence in major, including participation in intervention programs

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