

Effects of College Degree Program Culture on Female and Minority Student Science, Technology, Engineering, and Mathematics (STEM) Participation

NSF STEM Talent Expansion Program (STEP II) Award #0525408

Purpose and Objectives

Problem: Under-representation in STEM

- Career opportunities in STEM continue to increase
- Not enough graduates in STEM fields to keep up with the workforce demand
- Women and minorities are underrepresented in many STEM fields

Project Objectives

- Identify aspects of *culture* and *climate* of STEM programs that affect retention of undergraduates
- Understand how these factors affect underrepresented groups, such as minority students and women

Importance of Culture and Climate

- Culture represents the programs' fundamental ideologies and values
- Climate represents peoples' perceptions of programs
- Culture and climate can play a large role in retaining students in STEM programs
- Aspects of STEM program culture may adversely effect underrepresented groups
- Need a better understanding of culture/climate and those aspects most important in retention

Project Methodology

Multi-phase Research Plan

- **Phase #1** – Initial focus on engineering programs at five Florida public universities
- **Phase #2** – Telephone interviews with students who have exited the programs
- **Phase #3** – Three site visits to each program to study climate and culture
- **Phase #4** – Replication with other undergraduate STEM programs
- **Phase #5** – Inclusion of community college programs

Research Methods

- **Observations** of physical environment (hallways, classrooms, offices)
- **Analyses** of artifacts (i.e. recruitment literature, program curriculum, textbooks)
- **Interviews** with faculty, students, administration, and graduates
- **Activities** such as workshops, focus groups, and surveys

University Site Visits

Visit #1 – Begin assessing the program culture

- Initial interviews with faculty and administrators
- Collection of program artifacts
- Observation of the physical environment and interpersonal interactions

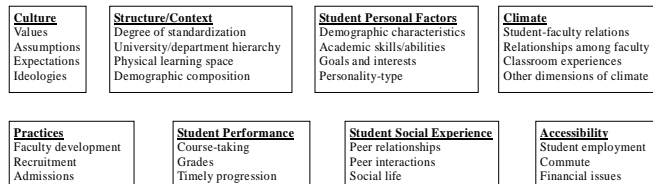
Visit #2 – Continue qualitative investigation

- Structured interviews with faculty, department chairs and program deans
- Focus groups with students
- Student and faculty narratives

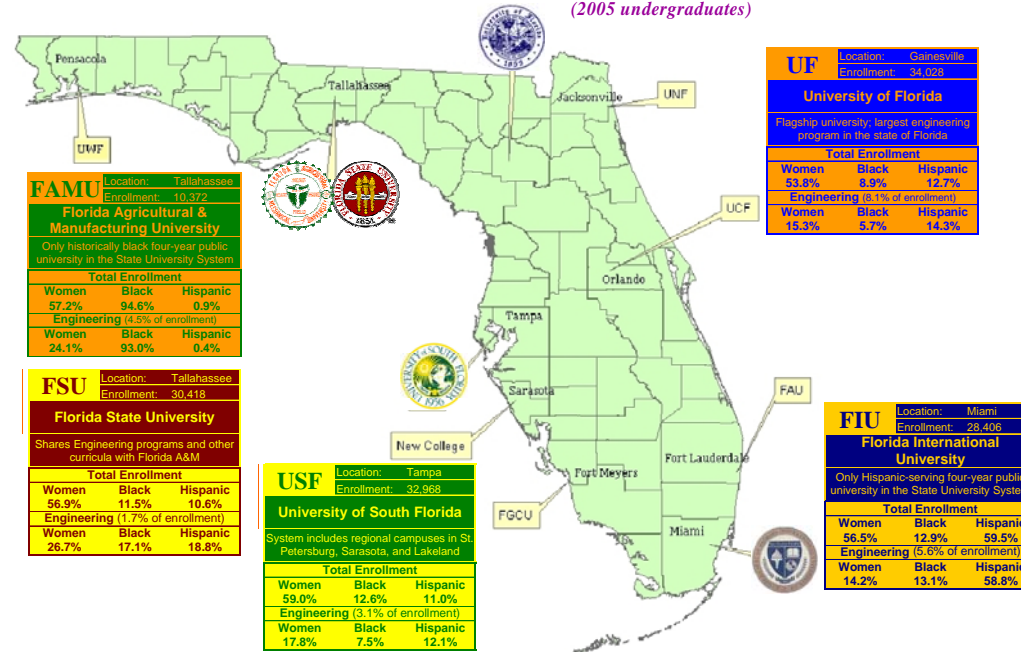
Visit #3 – Collect quantitative data

- Surveys based on data collected in visits #1 and #2
- Climate measure of STEM academic environment
- Program culture measure using values of faculty, department chairs, and program deans.

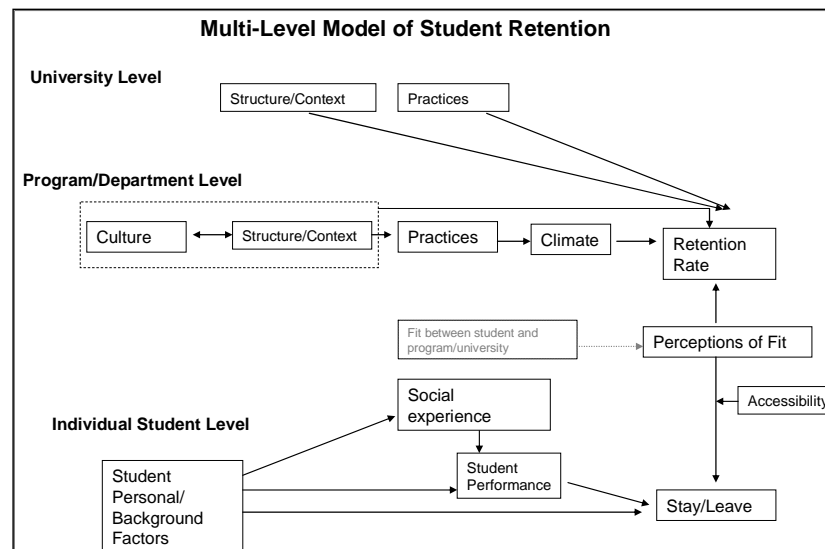
Factors Affecting Student Retention



Targeted Florida Four-Year Public Universities (2005 undergraduates)



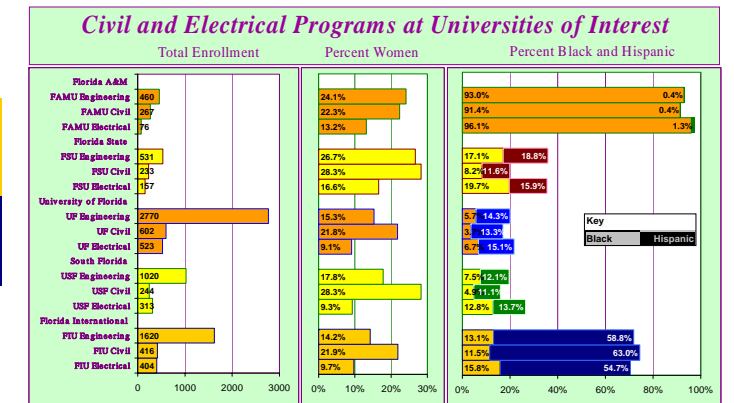
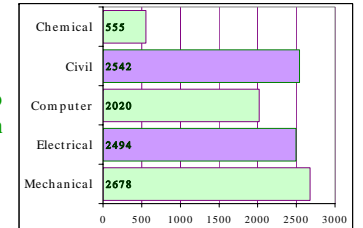
Multi-level Model of Student Retention



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Civil and Electrical Engineering Programs

The initial focus of this project is bachelors degree engineering programs at five universities of interest. *Civil* and *Electrical* are two of the largest engineering program in Florida. Each university has a distinct demographic profiles as shown below.



Summary of Project Strengths

Opportunities Available in Florida

- Demographic profile similar to the nation as a whole
- Extensive State University System (SUS) with many STEM degree programs
- Excellent Community College System
- Statewide databases available to track accession, course-taking and retention

Multiple Perspectives

- Conceptual framework grounded in the literature includes multiple levels of analysis
 - University
 - Program
 - Student
- Multiple waves of data collection
- Qualitative and quantitative data collection/analysis techniques

Partnerships

- Engineering departments throughout Florida
- Florida Department of Education
- NSF-funded Florida Georgia Louis Stokes Alliance for Minority Participation in Science, Technology, Engineering, and Mathematics (FGLSAMP)

Interdisciplinary Research Team

- Educational and institutional researchers
- Sociologists
- Anthropologists
- Organizational Psychologists

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