

The **Center for the Advancement of Engineering Education** combines research into the undergraduate engineering student experience with efforts to strengthen the research, leadership, and teaching skills of the engineering faculty and graduate student communities.

- Goals**
- Understand and enhance the **engineering student learning experience**
  - Integrate the **needs of diverse faculty and diverse students** into engineering education
  - Strengthen the **engineering education research base**
  - Expand the **community of leaders** in engineering education
  - Promote **effective teaching** for current and future faculty

**Colorado School of Mines**  
**Howard University**  
**Stanford University**  
**University of Minnesota**  
**University of Washington (lead)**

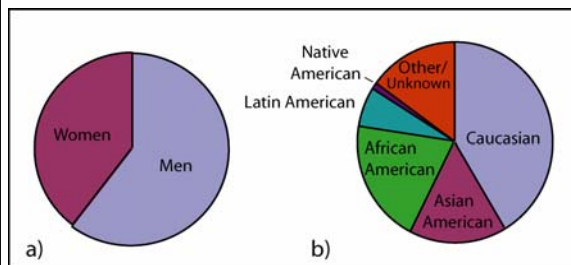
### Academic Pathways Study (APS)

A multi-year, multi-method study of engineering undergraduates on 4 CAEE campuses (Colorado School of Mines, Howard University, Stanford University, and University of Washington) and collaborating national universities.

- Four Cohorts of research participants; Cohort 1 is currently under study.
- Four primary data collection methods: survey, structured interviews, ethnographic interviews/observations, and a performance task.
- Additional data sources: student academic transcripts; exit interviews with those leaving the study.
- Data collection through 2007; data analysis is on-going through at least 2008.

#### **Research Questions**

- 1) **Skills:** How do students' engineering skills and knowledge develop and/or change over time?
- 2) **Identity:** How do these students come to identify themselves as engineers? How does this identity change as they navigate their education?
- 3) **Education:** What elements of students' engineering educations contribute to changes observed in questions 1) and 2)?
- 4) **Workplace:** What skills do early career engineers need as they enter the workplace?



**Demographic proportions of original APS Cohort 1 participants.**

#### **Cohort 1 – 160 undergraduate engineering students on 4 CAEE campuses**

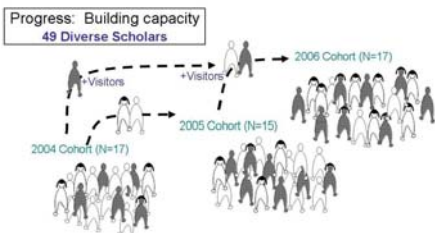
- Data collection began Fall 2003 on the 4 campuses with 160 entering freshmen (40 per campus).
- Data collection for Years 1 through 3 is complete: 6 survey administrations, 3 sets of structured interviews, 3 sets of ethnographic interviews/observations; 3 performance tasks.
- Year 4 data collection began Fall 2006; Years 1-3 data analysis is on-going.
- 71% of the original 160 participants still planned on an engineering major as of Fall 2005.

#### **Cohorts 3 and 4 – expanding the study with a national survey**

- Larger scale surveys in 2007 and 2008 will validate Cohort 1 results.
- Cohort 3: a minimum of 400 engineering students on the 4 CAEE campuses (Spring 2007 survey deployment).
- Cohort 4: a minimum of 1080 participants from a select group of national institutions that include significant underrepresented populations (January 2008 targeted for survey deployment).

### Institute for Scholarship on Engineering Education (ISEE)

ISEE is a year-long, intense, interactive, and hands-on approach for impacting engineering education in a scholarly way. The program's mission is to build capacity (people and models) to advance engineering education.



- Institutes hosted at U Washington (2004-05), Stanford (2005-06), and Howard (2006-07).
- UW Institute emphasized "class as lab." Stanford Institute emphasized "campus as lab" and "scholarship of impact." Howard Institute is emphasizing "nation as lab" and "diversity."
- Howard Institute selected participants nationally with topic areas that included: the global engineer and intercultural awareness; social justice; the impact of socially relevant examples; transitioning from community colleges to 4 year colleges; professional identity and conceptions of engineering; and various perspectives on the needs of diverse student populations.

#### **Growing the Community of Engineering Education Researchers**



Scholars working together during the Summer Summit at Howard University, July 2006.

### Studies of Engineering Educator Decisions (SEED)

SEED uses a decision-making lens to understand and impact engineering educators' approaches to teaching.

- Pilot interviews were conducted in spring 2006 and analyzed to inform refinements to the interview questions in preparation for data collection.
- Recruitment for SEED is happening in fall 2006. Participants are being drawn from engineering faculty at the University of Washington.

#### **Engineering Teaching Portfolio Program (ETPP)**

ETPP is designed to concurrently 1) develop an understanding of how teaching portfolios help participants advance their teaching knowledge and abilities through research and 2) help graduate students and postdoctoral fellows increase their preparation for engineering teaching.

- Data collection began Summer 2003 and ended Fall 2005; analysis is on-going.
- There are a total of 135 participants since program inception.
- Data collection Years 1 through 3: 5 survey administrations, 5 sets of semi-structured interviews, 2 sets of video process data of sessions, and 2 sets of concept maps.



Engineering graduate students discussing their teaching philosophy statements during an ETPP session at the University of Washington.

- ETPP materials are available through the CAEE website at <http://www.engr.washington.edu/caee/etpp-sessions.html>.

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**National Affiliates:** NACME (National Action Council for Minorities in Engineering), WEPAN (Women in Engineering Programs & Advocates Network), CASEE (Center for the Advancement of Scholarship on Engineering Education)