

The **Center for the Advancement of Engineering Education** is a higher education Center for Learning and Teaching funded by the Directorate for Education and Human Resources and the Directorate for Engineering (ESI-0227558). Initially funded January 2003-December 2007, supplemental funding from NSF will support research activities into 2008.

CAEE research is being undertaken by three interdependent research elements:

- **Scholarship on Learning Engineering (SoL)** has the goal of gaining significant insight into the learning of engineering across diverse student populations and environments.
- **Scholarship on Teaching Engineering (SoT)** seeks to enhance the effectiveness of strategies used to help engineering educators improve their teaching.
- The **Institute for Scholarship on Engineering Education (ISEE)** is fostering a diverse cadre of leaders and change-agents in engineering education who can conduct high impact research.

Research Through September 2007

Longitudinal study of the engineering learning experience *from the students' perspective*.

Academic Pathways Study (APS): four research Cohorts

160 undergraduate engineering students on 4 CAEE Campuses (Cohort 1)

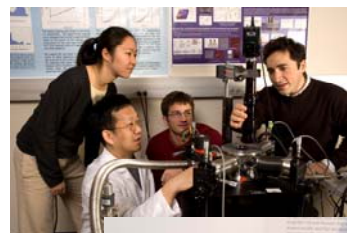
- Data collection through 4 academic years.
- Four primary data collection methods: survey, structured interviews, ethnographic interviews/observations, and engineering design tasks; additional data sources are student academic transcripts and exit interviews.

National surveys expand and validate Cohort 1 results (Cohorts 3 and 4)

- 800+ engineering students on 4 CAEE campuses surveyed Spring 2007 (Cohort 3).
- Survey planned in early 2008 to students from approximately 20 US universities of varying characteristics (Cohort 4).

Investigations of the transition from engineering undergraduate to practicing engineer (Cohort 2).

- 30 early career engineers and 6 managers interviewed at a large automotive manufacturing firm during 2006-07.
- 11 entry level engineers in their first year interviewed at 3 aerospace firms and 2 public agencies during 2007.



Insights into engineering teaching practices.

Studies of Engineering Educator Decisions (SEED)

- SEED research uses a decision-making lens to understand and impact engineering educators' approaches to teaching.
- Data collection began in Fall 2006; interviews with 33 faculty completed by early 2007.

Engineering Teaching Portfolio Program (ETPP)

- Developing an understanding of how teaching portfolios help participants advance their teaching knowledge and abilities.
- Helping graduate students and postdoctoral fellows increase their preparation for engineering teaching; 150 participants in 7 offerings.



Research instruments and models.

Research instruments

- Broad interest from 2007 ASEE Conference attendees in using APS instruments on their campuses.
- APS Research Processes and Procedures: version for use by other researchers in work.
- Engineering Teaching Portfolio: curriculum and supplemental materials available on CAEE website.

Models on how to conduct rigorous engineering education research.

- Aspects of the ISEE model have been adapted and extended for use in other engineering education research training programs.
- Planning underway to have ISEE (week-long Summer Summit) materials available to the engineering education research community via CAEE website.

Growth of the community of engineering education research scholars.

Institute for Scholarship on Engineering Education (ISEE)

- A year-long, intense, interactive, and hands-on approach for impacting engineering education in a scholarly way.
- 47 Scholars have participated in the three Institutes, representing 23 academic institutions; third and final Institute cycle concluding in 2007.
- Special interactive session at the 2007 FIE Conference featuring the 2006-07 Scholars discussing their ISEE research projects.

CAEE Research Team

- 43 faculty members, 22 graduate students, and 28 undergraduate students from across the country have participated in CAEE research.

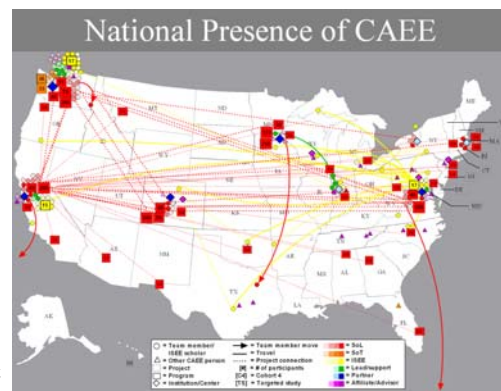
Data-driven impact locally on CAEE campuses and nationally.

Impact on CAEE campuses

- UW College of Engineering advising changes, CSM curriculum review, Stanford engineering fundamentals review, University of Minnesota Cohort 1'.

National presence

- 2007 ASME chairs workshop; 2007 AGEPE meeting lessons learned; 2007 AERA symposium; 18 papers/posters at 2007 ASEE conference; 2007 CASEE Symposium plenary address and Workshop; 2007 FIE Conference special sessions on APS and ISEE; 7 papers in 2008 JEE Special Edition.



Investigators: Cindy Atman (PI), Reed Stevens, Jennifer Turns, Phil Bell, University of Washington; Lorraine Fleming, Howard University; Larry Leifer, Sheri Sheppard, Stanford University; Ron Miller, Barbara Olds, Colorado School of Mines; Karl Smith, University of Minnesota/Purdue University; Ruth Strevler, Robin Adams, Purdue University

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), CIRTL (Center for the Integration of Research, Teaching, and Learning)

