

**USING A RESEARCH
CENTER-BASED MENTORING
PROGRAM TO INCREASE THE
PARTICIPATION OF AFRICAN
AMERICANS, HISPANICS AND
NATIVE AMERICANS IN
ENGINEERING**



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The challenge as identified by NSF

- Minorities are underrepresented in faculty positions
- A disproportionately low fraction of minority students graduating with PhDs in engineering become faculty
- NSF recognizes that to attain a diverse engineering workforce diversity must increase in academic ranks

NSF's Broadening Participation in Engineering (BPE) program supports knowledge-based and knowledge-generating projects striving to increase diversity in engineering research and education

The challenge as identified in UK

UK College of Engineering minority enrollment

Term	African American	Hispanic	Native American	Total UG Enrollment	Minority % of the total
Fall 2008	49	18	10	1,818	4.24%
Fall 2009	58	21	5	2,087	4.02%
Fall 2010	69	33	6	2,344	5.46%
Fall 2011	62	41	5	2,481	5.16%
Fall 2012	81	61	7	2,729	7.15%

UK College of Engineering minority graduates

Class	African American	Hispanic	Native American	Total BS Graduates	Minority % of the total
2008	5	1	0	324	1.85%
2009	10	3	0	298	4.36%
2010	2	3	0	337	1.48%
2011	7	5	1	346	3.76%
2012	7	2	1	349	3.44%

Minority enrollment and graduation rates fall well below state and national demographics (11.6 and 31.2%)

BPE – Our strategy

- Harness the resources of university research centers
- Complement mentoring in traditional engineering departments, which are challenged by:
 - > Faculty role strain
 - > Relatively low faculty-to-student ratios
 - > A less topical, applied or coherent research portfolio
- Liaise with other university units to help students develop the skills they need to succeed

Lower teaching workloads of non-faculty research staff creates propitious conditions for effective mentoring

BPE – Our objectives

- Investigate if **mentoring in research centers** offers advantages over traditional engineering departments
- Motivate **African American, Hispanic and Native American students** to choose **engineering** and help them graduate with engineering degrees
- **Help** these students **acquire** the **skills** they need to become engineering **professionals, academics, leaders and role models**

A CAER-based mentoring program described

Recruitment

- The program will be promoted during recruitment
- 10 UGs will be recruited each fall starting 2015
- 1 or 2 graduate students will be recruited each year

Mentoring

- Co-PI → counselor at the UK CoEng
- PI → contact at UK CAER
- Students tour CAER and hear from ADs
- Students follow-up with prospective CAER mentors
- Students are matched with a CAER research mentor
- Students are matched with a CoEng academic mentor
- Students are helped to acquire the skills they need to succeed

Graduation

- Mentoring relationship continues
- Contact and interaction with established networks continues
- Students further the cause of BPE

Skills to be developed through mentoring

Participant's level Year	Undergraduate				Graduate			
	F	S	J	S	1	2	3	4
Skills to be developed								
1. Academic and study skills	■							
2. Research skills	■	■			■			
3. Communication skills		■	■			■	■	
4. Teaching skills			■	■	■	■		
5. Funding procurement and project management skills							■	■
6. Outreach skills	■	■	■	■	■	■	■	■

When the development of different skills will be prioritized

- CAER mentors will be involved in 2, 3, 5 and 6 above
- The Co-PI will be involved in 1 and 4 above
- Engineering faculty will be involved in 1, 4 and 5 above

Development of skills are strategically distributed

Role of engineering faculty

Academic skills

- Each mentored student will be paired with a faculty member in the most relevant engineering department
- Faculty members will co-advise students along with CAER mentors and College of Engineering academic advisors

Teaching skills

- Faculty will provide opportunities and guidance for interested students to TA the classes and labs they teach
- Faculty will coordinate with UK's Preparing Future Faculty Program and the Center for the Enhancement of Learning and Teaching to support students interested in the latter

Procuring funding

- Faculty will collaborate with CAER researchers to procure funding for research in which mentored students can participate
- Faculty can also help procuring funding for student support

Faculty will work collaboratively with CAER mentors to develop the skills the student needs to succeed and procuring funding for research and student support

Role of engineering faculty – Reporting

- Engineering faculty will be asked to provide some information semi-annually on each African American, Hispanic and Native American student working in their laboratories:
- Name, ethnicity, gender, major, classification (freshman, sophomore, junior, senior, 1st year graduate, etc.), publications, presentations, grants, awards or scholarships

This information will be used for comparative research purposes . Notably, UK's ORI and IRB have approved this project's protocol, meaning that the latter is in full compliance with all rules and regulations

Benefits to engineering faculty

- Collaborative opportunities with CAER researchers to procure funding for research in which mentored students can participate
- This would constitute a compelling broader impacts section for NSF-type proposals and make the latter more competitive
- Collaboration with CAER should make the funded work more productive and less onerous than traditional single investigator awards

Engineering faculty will have chance to develop more competitive proposals by tying in to the NSF BPE award all while establishing collaborative relationships with CAER and CAER researchers

Timeline and funding

2015		2016		2017		2018	
Summer	Fall	Spring	Fall	Spring	Fall	Spring	Fall



UG engineering students engaged in research at CAER

Year	2013	2012	2011	2010	2009
Eng. UGs supported	35	35	49	63	48

CAER's track record of support for engineering UG research shows the capacity to support 40 students

NSF BPE student support

Student support from other sources

Albeit the NSF BPE grant has some initial student support the latter is meant to shift to other sources

Acknowledgement & Disclaimer



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