

Career trajectories in engineering education – Where are they now?

Robin S. Adams, Tyler Cummings-Bond, Jr.

University of Washington

Center for the Advancement of Engineering Education
(CAEE)

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Motivation

- Building capacity in engineering education scholarship
 - Increase community
 - Rigorous contributions to engineering education scholarship
 - Engineering education as a professional endeavor
 - Models
- Examples
 - Institute for Scholarship on Engineering Education (CAEE)
 - Center for the Advancement of Scholarship in Engineering Education (NAE)
 - Schools of Engineering Education (Purdue, Virginia Tech)
 - Rigorous Research in Engineering Education (ASEE, PI)
 - Bootstrapping in Computer Science Education (Tenenbergs, PI)
- A challenge – What do we know about engineering education as a career?

We know...

- Leadership support essential
- “Balancing act” (e.g., Colbeck, 2002)
- Diversity issues
- SRI study on the Coalitions (Coward et al, 2000)
 - Cultural change “spotty” and “immature” – examples of
 - Increased valuing of engineering education contributions
 - Shifts from a research-only culture
 - Tenure and promotion success

We don't know...

- Few rigorous studies, much anecdotal
- Career trajectories in engineering education
 - Who is this population?
 - Career choices?
 - Challenges?
 - Navigation strategies?
- Use
 - Support policy and culture change
 - Provide resources for successful career trajectories

A Pilot Study

What do we know about career trajectories in engineering education?

For a sample population with different career pathways

- What is their current employment in academia?
- What are the institutional characteristics at this position?
- Are there trends in where subjects received doctorates?
- Are there patterns across groups in the sample?

Study Design

- Descriptive study
- Timeline ranges from 1990 to 2003
- Publicly available data (replicability)
- 3 “pathway” populations to maximize insight

PhD Group	AFG Group	CAREER Group
Engr educ thesis Interdisciplinary Non-traditional research	Engr educ award Not in tenure track Mixed research	Engr educ grant In tenure-track Integrated research and education plan

Measures

Focus	Measure
Career types	Current position
<i>Institutional characteristics</i>	
Research / Teaching focus	Carnegie classifications
Likelihood of community support	Coalitions schools
Likelihood of community support	Engineering focused Teaching & Learning Centers

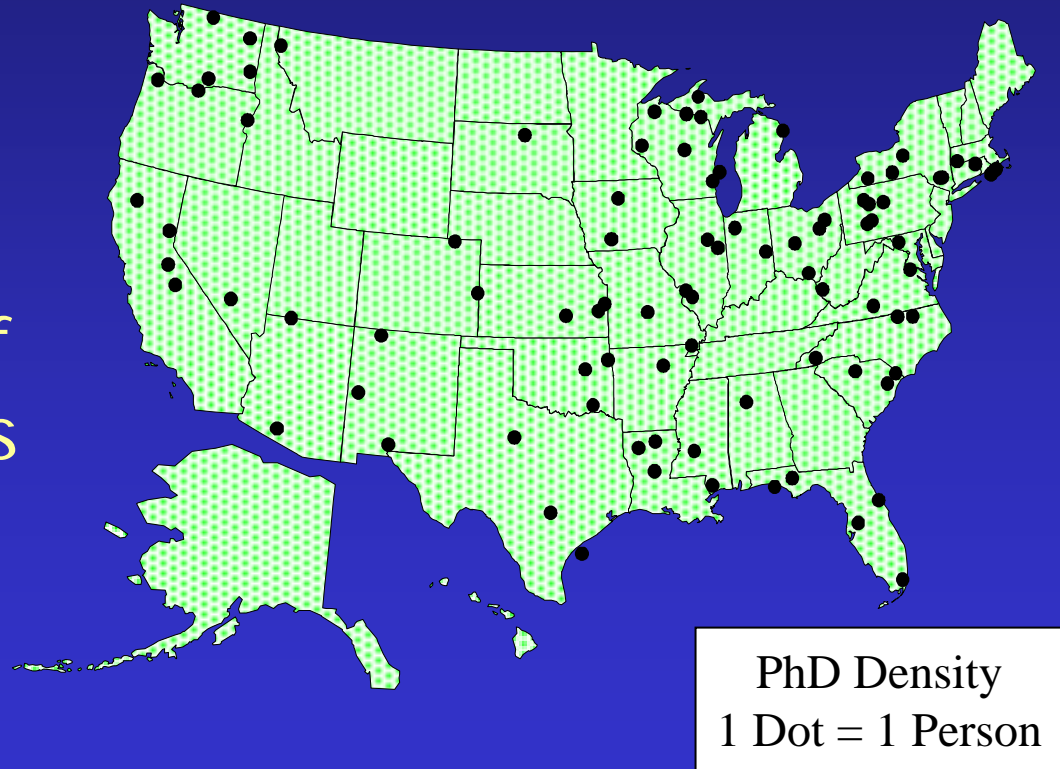
Locating Subjects

Group	Located	Employed in academia	Final N
PhD	66%	73%	91
AFG	96%	88%	21
CAREER	94%	96%	416

- Cross validated web-based searches
- Greater difficulty in locating PhD subjects
- AFG more likely than CAREER to work outside of academia

Geographic Dispersion (PhD group)

Consistent
with
geographic
distribution of
US institutions



Results

- Current academic position
- Institutional characteristics
 - Research / teaching focus
 - Likelihood of community / supports

Current Academic Position

Position	PhD (N=91)	AFG (N=21)	CAREER (N=416)
Prof	19%	0%	8%
Assoc Prof	20%	0% (10%)*	40%
Asst Prof	21%	43% (33%)*	50%
Lecturer	3%	19%	0%
Prof Staff	29%	14%	1%
Grad Student	2%	19%	-
Other	5%	0%	1%

Current Academic Position

- Current position
 - All groups have tenure track subjects
 - AFG more likely to have Professional Staff and Lecturers
 - PhD more likely to have Professional Staff
 - CAREER most likely pathway for tenure track / tenured

Examples

- PhD
 - Professor and Associate Dean of Student Affairs at Research Extensive school, thesis on minority retention in engineering
- AFG
 - Asst. Professor at Research Extensive school
 - Director of an engineering learning and teaching center at Research Extensive school
- CAREER
 - Assoc. Professor at Research Extensive school, grant integrates research on microelectronics and computer-aided curriculum
 - Assoc. Professor at Research Intensive school, grant integrates research on student design processes and related learning intervention
- 3 subjects in more than one group
 - All women
 - All received doctorates at Coalition schools
 - 2 employed at school with Teaching / Learning center

Research / Teaching Focus

- Carnegie definitions
 - Research Extensive
 - 15+ disciplines, graduate 50+ PhD's / year
 - Research Intensive
 - 1+ discipline, graduate 20+ PhD's / year
 - Master's Level I
 - 3+ disciplines, graduate 40+ Master's / year
 - Other
 - Baccalaureate Colleges, Associate Colleges, Specialized Schools

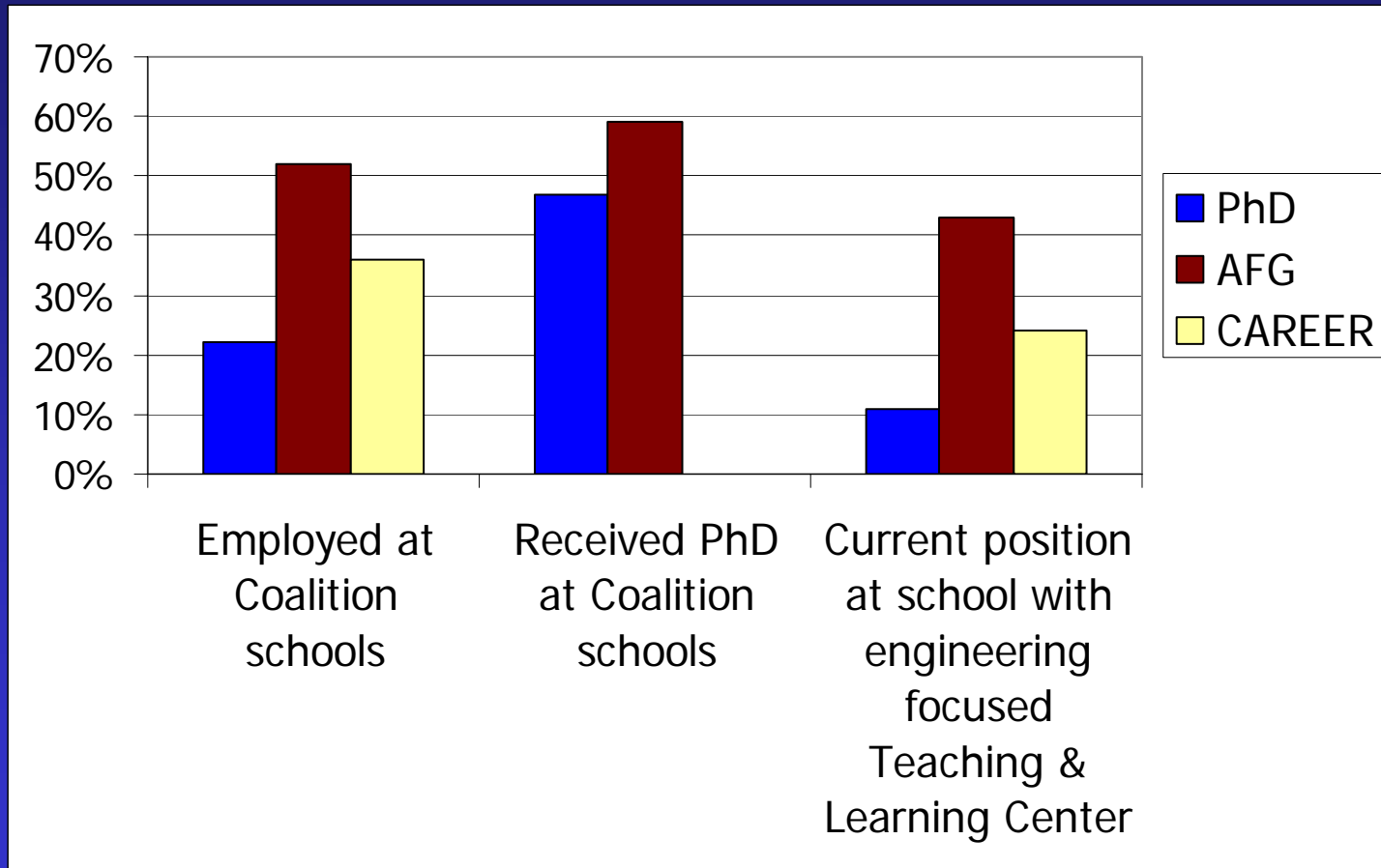
Research / Teaching Focus

CARNEGIE	GROUP	PROF						
		PRO F	ASSOC PROF	ASST PROF	LECTURE R	STAF F	GRAD	OTHE R
RESEARCH EXTENSIVE	PhD	4	9	9	2	20	1	3
	AFG	0	0	6	4	2	4	0
	CAREER	27	149	183	0	3	0	3
RESEARCH INTENSIVE	PhD	2	2	1	1	3	0	0
	AFG	0	0	0	0	0	0	0
	CAREER	3	13	19	0	0	0	0
MASTER'S I	PhD	4	6	6	0	2	1	1
	AFG	0	0	2	0	1	0	0
	CAREER	0	2	3	1	0	0	0
OTHER	PhD	7	1	3	0	2	0	1
	AFG	0	0	2	0	0	0	0
	CAREER	3	4	3	0	0	0	0
TOTAL		50	186	237	8	33	6	8

Research / Teaching Focus

- All most likely at Research Extensive
 - PhD (53%), AFG (76%), CAREER (88%)
- PhD's more dispersed across classifications
- AFG's and CAREER's most likely at research schools

Community Support



Community Support

- On average, half of the subjects in the PhD and AFG groups received their doctorates at Coalition schools
- More than 20% of CAREER subjects are employed at a school with an engineering focused Teaching and Learning centers (even though these schools represent 13 out of 350 possible schools)
- More than a third of AFG and CAREER subjects are employed at Coalition schools

Summary

	PhD	AFG	CAREER
Academic	63%	88%	98%
Non-academic	27%	12%	2%
Tenure-track	21%	43% (33%)	50%
Tenured	39%	0 (10%)	48%
Prof Staff	29%	14%	1%
Carnegie class	53% Research Dispersed	76% Research	88 % Research
Employed at Coalition school	22%	52%	36%
Received PhD at Coalition School	47%	59%	NA
Employed at Teach / Learn Center school	11%	43%	24%

Implications

- Short term – “mountain top” view
 - Multiple pathways into engineering education careers
 - Coalitions appear to be a good pipeline
 - Professional Staff positions reflect diversity of careers
 - CAREER most likely pathway for tenure track / tenured
 - May be gender dimensions
- Long term – “sea level” view
 - A database of subjects!
 - Understanding choices, challenges and navigation strategies
 - Choices between faculty and professional careers
 - Social networks
 - Working across disciplines – interdisciplinary agents

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