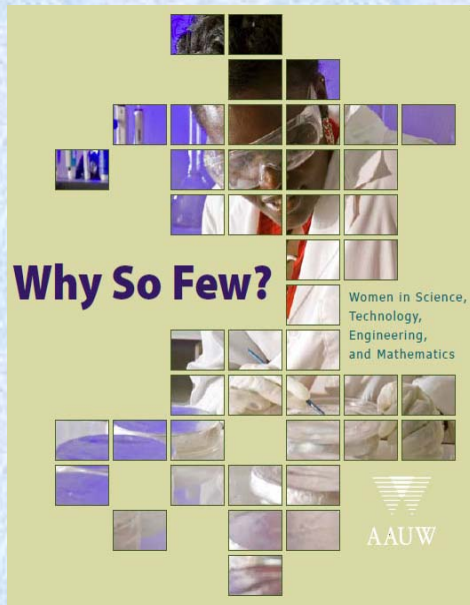


The Narrowing Gender Gap? Enhancing the Leadership of Female STEM Faculty at Liberal Arts Colleges

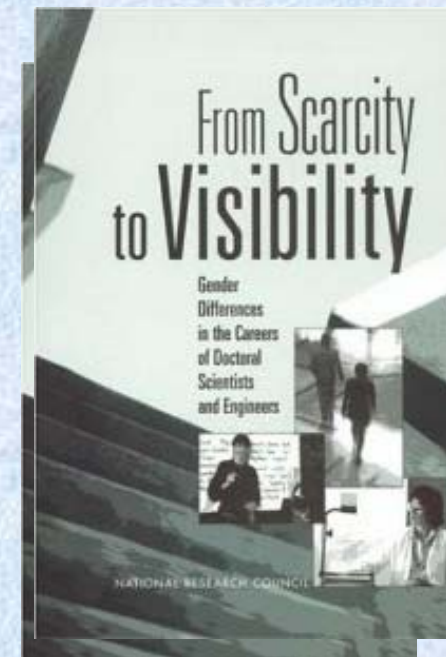
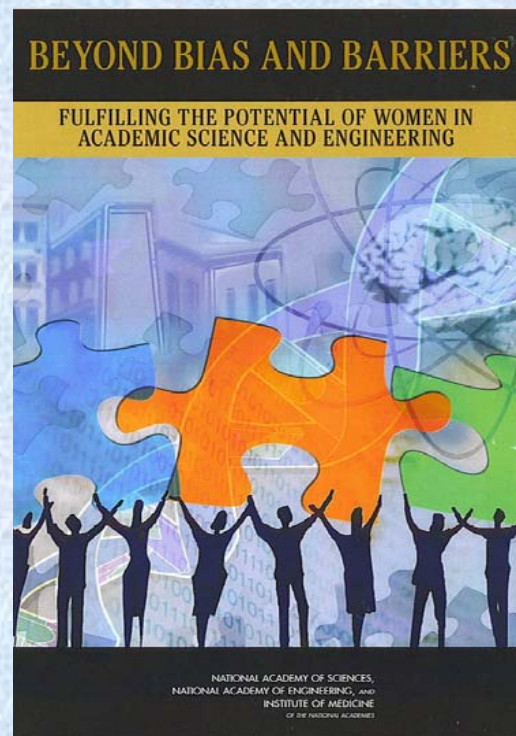
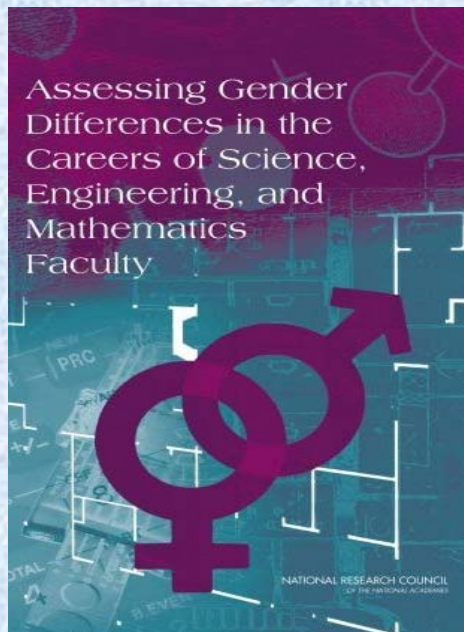
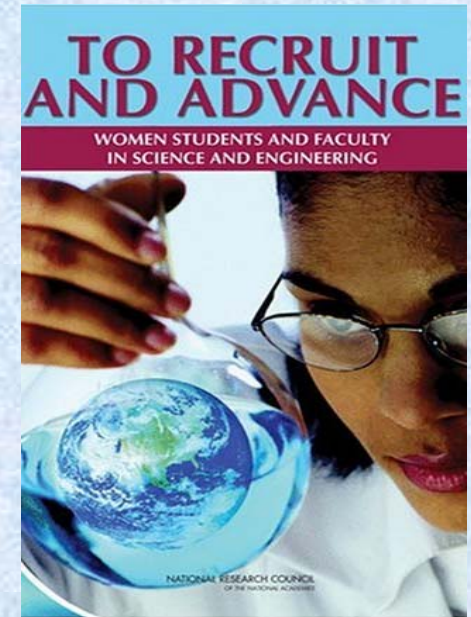
Kerry K. Karukstis
Professor of Chemistry
Harvey Mudd College



2010 ASBMB Annual Meeting



The underrepresentation of academic women in almost all science and engineering fields is a well-documented statistic.

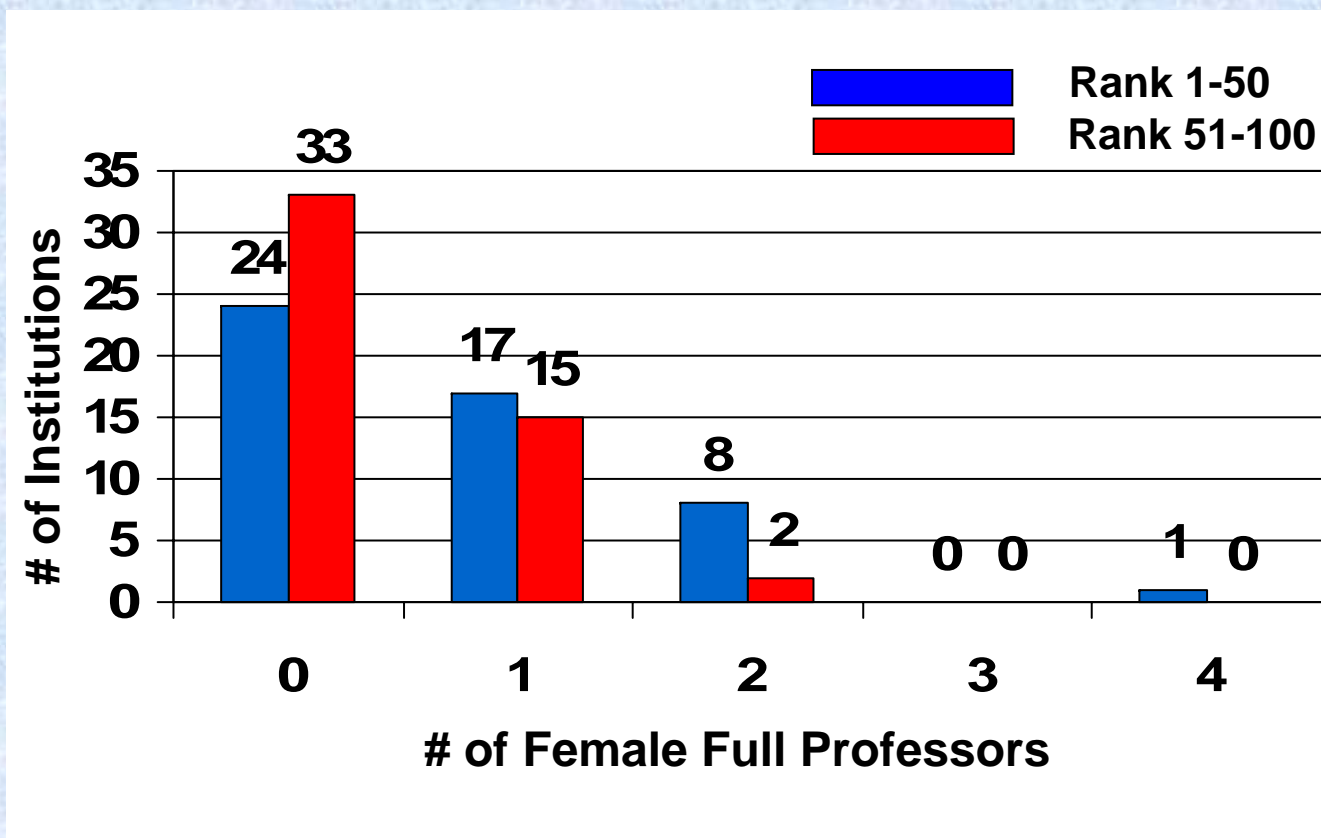


% of Female Faculty in the Top 50 Research Universities (as Ranked by the National Science Foundation According to FY2002 Research Funds Expended)

Discipline	Assistant Professor	Associate Professor	Full Professor
Chemistry	4.1%	3.0%	5.1%
Mathematics	2.8	2.4	3.1
Computer Science	10.8	14.4	8.3
Astronomy	22.0	16.5	9.5
Physics	11.2	9.8	4.6
Chemical Engineering	21.4	19.2	4.4
Civil Engineering	22.3	11.5	3.5
Electrical Engineering	10.9	9.8	7.2
Mechanical Engineering	15.7	8.9	3.2
Psychology	45.4	40.1	13.9
Biological Sciences	24.9	30.2	14.8

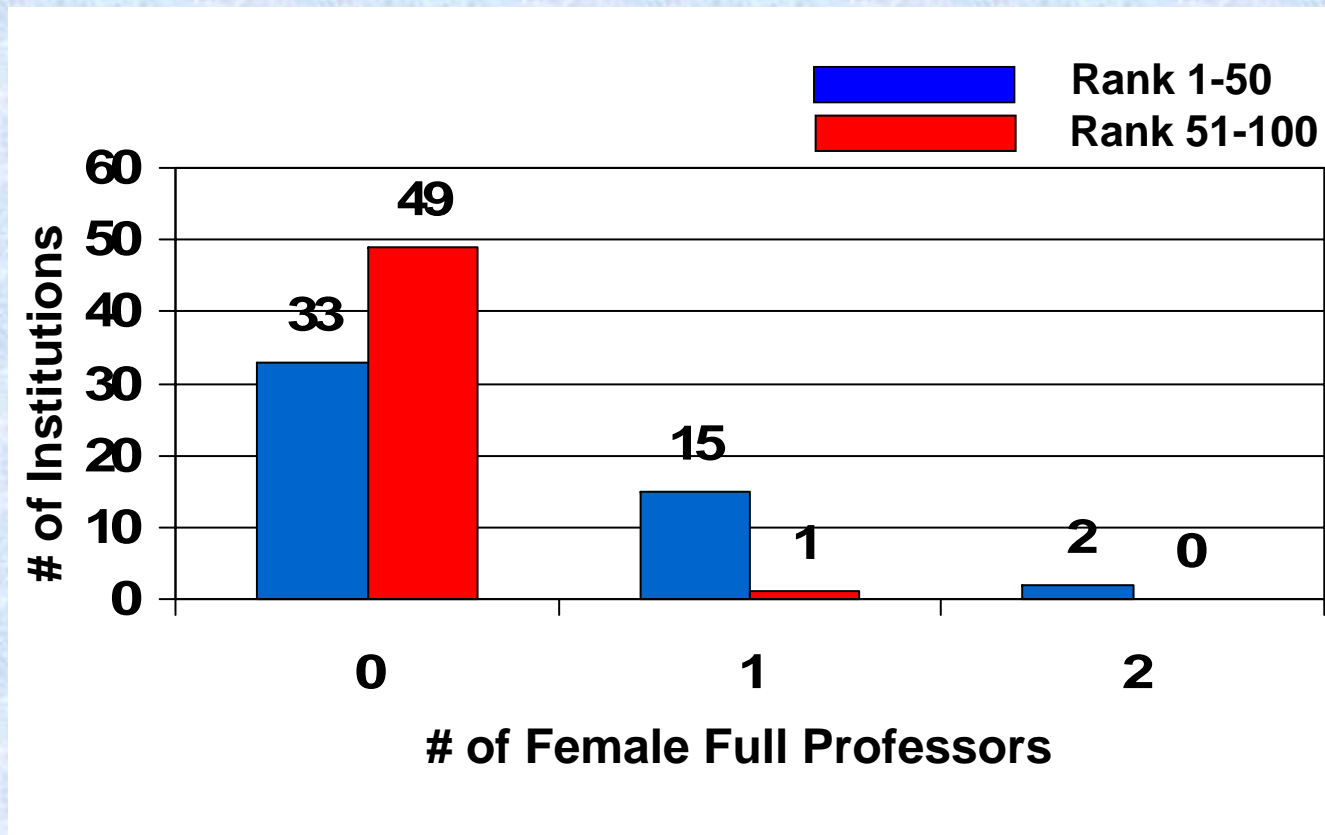
Nelson, D. and Rogers, D. (2005). *A National Analysis of Diversity in Science and Engineering Faculties at Research Universities*. University of Oklahoma, Department of Chemistry. www.now.org/issues/diverse/diversity_report.pdf

Women Full Professors in Chemistry at the US News & World Report "Top 100" Liberal Arts Colleges as of Academic Year 2006-2007



Senior women in chemistry at the top liberal arts campuses are rare: 57% of campuses have no senior women chemists; 89% of campuses have 0 or 1 female full professor in chemistry.....

Women Full Professors in Physics at the US News & World Report "Top 100" Liberal Arts Colleges as of Academic Year 2006-2007



Senior women in physics at the top liberal arts campuses are extremely rare: 82% of campuses have no senior women physicists; 98% of campuses have 0 or 1 female full professor in physics.

Two models explain women's low presence in STEM fields

1. Pipeline Model – A Supply Side Issue

Evidence

- Decreasing numbers of women at all career stages
- Gender disparity in hiring

Pell, A. N. (1996) *Fixing the leaky pipeline: Women scientists in academic science*. Journal of Animal Science, 74, 2843-2848.

<http://jas.fass.org/cgi/reprint/74/11/2843.pdf>

2. Deficit Model – A Demand Side Issue

Evidence

- Limited opportunities faced by women in a gender-biased academic environment
- Deficient work climate and negative individual experiences hinder the success of women faculty, lead to low job satisfaction, and high attrition

Bentley, J. T. and Adamson, R. (2003) *Gender differences in the careers of academic scientists and engineers: A literature review*. Special Report NSF 00-327. National Science Foundation and Mathtech, Inc., Arlington, VA.
<http://www.nsf.gov/statistics/nsf03322/>

What contributes to job satisfaction for male and female faculty members?

I 
My Job

Elements of Career Satisfaction

2008 Education Research Institute (HERI) Faculty Survey

- Survey of over 22,000 full-time faculty members at nearly 400 accredited four-year colleges and universities who are engaged in teaching undergraduates as all or part of their duties.
- An **overall job satisfaction of 74.8%** was reported
- **Autonomy and independence, job security, and freedom to determine course content** are principal factors contributing to job satisfaction for both men and women and faculty at all ranks.

2008 HERI Faculty Survey

- Both gender and rank influenced job satisfaction.
- Particular differences noted for men and women who were full professors at baccalaureate institutions.
- Men at this rank are generally more satisfied with their careers than women - 80.6% of male full professors reported high degrees of job satisfaction vs. 74.4% of female full professors.

Factor at High Degree of Satisfaction	% Males	% Females
Visibility for jobs at other institutions	62.8	54.2
Prospects for career advancement	67.2	58.2
Opportunity for scholarly pursuits	66.0	50.8
Clerical/administrative support	62.0	51.1

Additional Elements of Career Satisfaction

D. Bilimoria, et al. (2006). Journal of Technology Transfer, 31, 355-365.

- An analogous study conducted at a research university also found **gender variations in defining job satisfaction**.
- **Men** derived greater job satisfaction from the **receipt of academic resources** from their institution as well as a **“research-supportive” workload**.
 - Academic resources include research equipment, office and laboratory space, research and teaching assistance, and technical and administrative support.
 - A “research-supportive” workload protects research time and limits non-research activities such as teaching and service.
- **Women** faculty derived career satisfaction from a **supportive work environment** that is inclusive and respectful with colleagues who value one’s contributions.

Tenure-Track Faculty Job Satisfaction Survey

Conducted by the Collaborative on Academic Careers in Higher Education (COACHE) at Harvard University and reported in *Why So Few? Women in Science, Technology, Engineering, and Mathematics*, AAUW, 2010.

- Early career male and female STEM faculty report that the **nature of the work** and the **departmental climate** were the most important factors predicting job satisfaction.
- The **two factors were equally important** for both groups.

Climate Dimensions Related to Faculty Satisfaction

1. Fairness of evaluation by immediate supervisor
2. Interest senior faculty take in your professional development
- 3. Opportunities to collaborate with senior colleagues**
4. Quality of professional and personal interactions with senior colleagues
5. Quality of professional and personal interactions with junior colleagues
- 6. Fit or “sense of belonging” in one’s department *****
7. Intellectual vitality of the senior colleagues in one’s department
- 8. Fairness of junior faculty treatment within one’s department**

Women were less satisfied on all dimensions, particularly those noted in red. * Single most important climate factor predicting job satisfaction.**

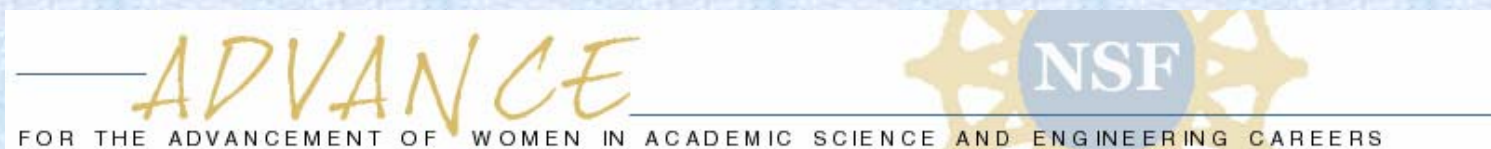
Trower, C. A. (2008, October). Competing on culture: Academics new strategic imperative. Unpublished presentation.

How can an individual find an academic climate that is conducive to career performance and to facilitating access to resources that will advance careers?

COLLABORATIVE RESEARCH FOR HORIZONTAL MENTORING ALLIANCES

*Facilitating the advancement of senior women
chemistry and physics faculty members at liberal
arts institutions to the highest ranks of academic
leadership*

National Science Foundation ADVANCE Partnerships for
Adaptation, Implementation, and Dissemination (PAID)
Awards: NSF-HRD-061840, 0619027, 0619052, and 0619150
October 2006 - September 2010



PRINCIPAL INVESTIGATORS

KERRY KARUKSTIS, HARVEY MUDD COLLEGE, CLAREMONT, CA

BRIDGET GOURLEY, DEPAUW UNIVERSITY, GREENCASTLE, IN

LAURA WRIGHT, FURMAN UNIVERSITY, GREENVILLE, SC

MIRIAM ROSSI, VASSAR COLLEGE, POUGHKEEPSIE, NY



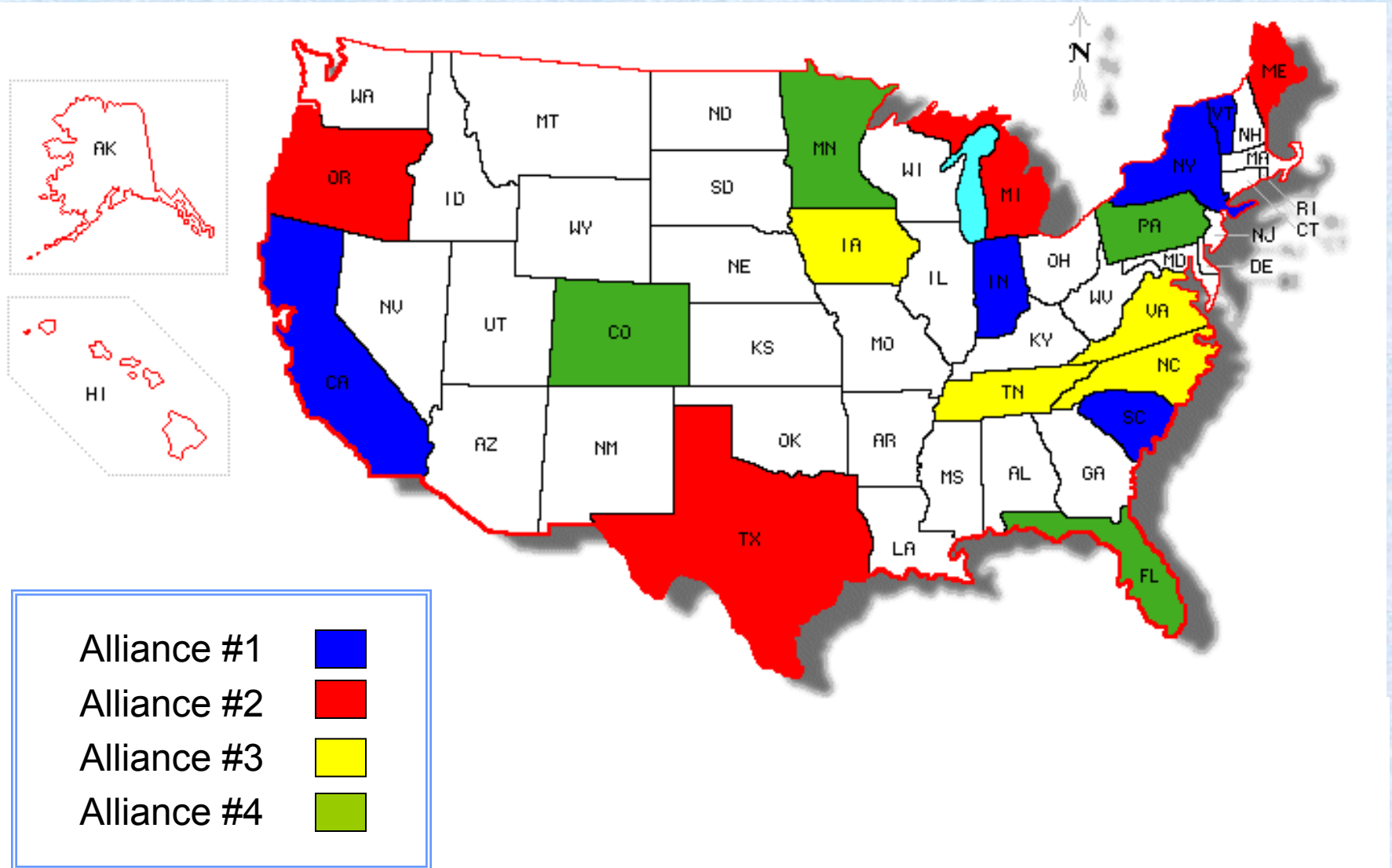
Left to right:
**Miriam Rossi,
Laura Wright,
Bridget Gourley, &
Kerry Karukstis**

ALLIANCE PARTICIPANTS

Alliance #1	Chemistry	Alliance #2	Chemistry
Sunhee Choi	Middlebury College	Janis Lochner	Lewis and Clark College
Bridget Gourley	DePauw University	Julie Millard	Colby College
Kerry Karukstis	Harvey Mudd College	Nancy Mills	Trinity University
Miriam Rossi	Vassar College	Joanne Stewart	Hope College
Laura Wright	Furman University	Melissa Strait	Alma College

Alliance #3	Chemistry	Alliance #4	Physics
Ruth Beeston	Davidson College	Cindy Blaha	Carleton College
Jill Granger	Sweet Briar College	Amy Bug	Swarthmore College
Darlene Loprete	Rhodes College	Anne Cox	Eckerd College
Leslie Lyons	Grinnell College	Linda Fritz	Franklin & Marshall College
Carol Ann Miderski	Catawba College	Barbara Whitten	Colorado College

GEOGRAPHICAL DISTRIBUTION OF ALLIANCE MEMBERS



Gender Equity Indicator – % Women STEM Faculty

% of Tenured and Tenure-Track Women STEM Faculty			
	Full	Associate	Assistant
All Project Institutions	6.3 – 45.5%	25.0- 43.8%	10.0 – 63.6%
Avg of Project Institutions	22.2%	31.9%	44.4%
Project Inst. “A”	17.1%	43.8%	52.9%
Project Inst. “B”	12.1%	27.3%	10.0%

Project Institution “A” – Currently examining success in recruiting and hiring female faculty in STEM fields to address hiring practices for a more racially-diverse faculty

Project Institution “B” – Discussions of the project participant with the Vice President for Academic Affairs have raised awareness of poor representation of STEM junior women faculty. Situation highlighted in campus newspaper.

ALLIANCE MEETINGS TO DATE

Alliance #	Date	Location
1	January 12-14, 2007	Claremont, CA
	March 22-24, 2007	Chicago, IL
	February 29 - March 2, 2008	Dallas, TX
	October 19-20, 2008	Chicago, IL
	May 29 - June 1, 2009	Seattle, WA
2	March 24-25, 2007	Chicago, IL
	June 22-26, 2007	Portland, OR
	October 19-21, 2007	San Antonio, TX
	June 20-22, 2008	Chicago, IL
	July 24-26, 2009	Waterville, ME
3	January 4-6, 2008	Davidson, NC
	March 20-22, 2009	Salt Lake City, UT
	June 11-13, 2009	Memphis, TN
4	April 12-13, 2008	St. Louis, MO
	June 24-26, 2008	Buena Vista, CO
	March 13-15, 2009	Philadelphia, PA
Network Gathering	April 5, 2008	New Orleans, LA
	March 22, 2009	Salt Lake City, UT

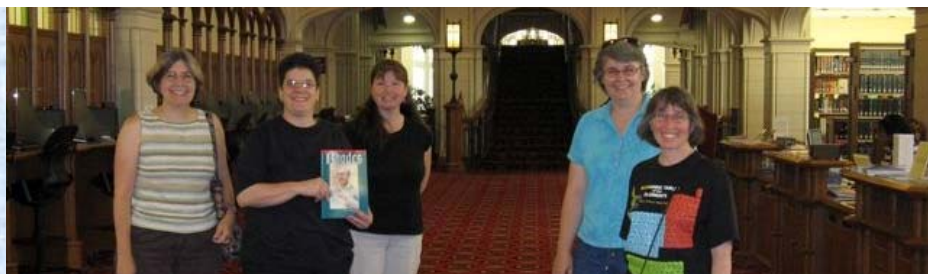


Alliance #1 in Chicago, October 2008



Alliance #2 in Portland, June 2007

← Alliance #3 in Memphis, June 2009



PROFESSIONAL DEVELOPMENT FOCUS OF EACH ALLIANCE

- **Alliance #1** – Leadership and Visibility on Campus and in Professional Societies
- **Alliance #2** – Creation of Career Development Resources
- **Alliance #3** – Exchange of Expertise and Best Practices
- **Alliance #4** – Career Directions at Liberal Arts Colleges

PERSONAL VALUE OF THE HORIZONTAL MENTORING EXPERIENCE

From initial surveys and in-depth formative interviews with alliance members by our project evaluator Anne-Barrie Hunter, Co-Director, Ethnography & Evaluation Research, UC-Boulder, some findings to date include:

Alliance members overwhelmingly view their horizontal mentoring experience as **highly valuable**.

- Participants feel as though they are “**among equal peers**” with the “**sharing of advice and ideas**;” they experience “**genuine support**” for both their “**professional and personal lives**;” they “**face the same challenges**;” they value hearing a “**different perspective, an outside viewpoint**;” alliance members have “**become friends**,” they “**trust one another**.”
- Horizontal mentoring is “**a different kind of mentoring you don't get anywhere else**.” Participation has “**increased their confidence**” and encouraged them to **think about their own professional development**.

IMPACT ON PROFESSIONAL LIVES OF PROJECT PARTICIPANTS

Confidence to Seek Leadership Positions

Department Chair
ACS Local Section Chair
President, Secretary, & Executive Board
Member of Professional Organizations
Chairs on leading Faculty Committees

Encouragement to Seek/ Accept External Recognition

Fulbright Fellowship
CASE State Professor of the Year
Professional Society Service Award

Visibility and Recognition on Campus

Endowed Professorships
Award for Meritorious Teaching
Distinguished Professorship in recognition of sustained excellence in teaching and service
Inaugural Award for Institutional Service

Support to Pursue New Directions

Reinvigoration for research and sabbaticals in new research fields
Search for VP academic affairs positions

DEVELOPMENT OF CAREER RESOURCES FOR THE BROADER ACADEMIC COMMUNITY



Balancing the Personal
with the Professional

Julie T. Millard

Strategic Career
Planning
Workshop at
Colby College,
June 2009

Time and
Stress
Management

Collaborative
Research For
Horizontal Mentoring
Alliances
NSF HRD-0619150

Kerry K. Karukstis, Professor of
Chemistry, Harvey Mudd College

For Faculty in
the Liberal Arts
College
Environment

© 2009

Future monograph from summit meeting on horizontal mentoring strategies for academic women to be held in Washington, D.C. on June 3-5, 2010.

CONCLUSIONS: Impact on personal and professional lives of alliance members.

Most commonly cited benefits include:

- sharing and receiving advice and support of peers
- increased confidence to speak up for oneself and accept due recognition for professional work and contributions
- permission to focus on one's professional goals
- genuine friendships that will last beyond the initiative
- transfer of gains and lessons learned to one's own institution
- opportunities for professional collaboration
- relief of isolation
- opportunity to expand professional interests

CONCLUSIONS: Impact on departments and/or institutions.

- new leadership provided by alliance members at both department and institutional level
- reduced teaching loads at one institution
- introduction of a new interdisciplinary course at one institution

CONCLUSIONS: Impact of campus outreach efforts

- opportunities and venues for discussions on career issues and career planning
- influence on new faculty orientation
- raised awareness of equity issues in hiring and salaries

ACKNOWLEDGMENTS

We gratefully acknowledge the support for this project from:

**Collaborative NSF-ADVANCE-PAID Awards HRD-061840, 0619027,
0619052, & 0619150**

**Project Evaluator Anne-Barrie Hunter, Co-director, Ethnography &
Evaluation Research, University of Colorado, Boulder**

**DePauw University, Harvey Mudd College, Furman University, and
Vassar College**

**Andrew W. Mellon Foundation Interinstitutional Initiative Grant for
Faculty Career Enhancement**



www.hmc.edu/nsfadvance

laura.wright@furman.edu

kerry_karukstis@hmc.edu

rossi@vassar.edu

bgourley@depauw.edu

OUTLINE

- What are the characteristics of liberal arts colleges that influence faculty roles and responsibilities?
- What faculty recruitment and career development practices and policies currently exist at the department and institutional level?
- How can a horizontal mentoring strategy provide senior women STEM faculty at liberal arts colleges with the faculty development resources that they need?
- How has this NSF-ADVANCE-PAID project begun to impact departmental and institutional policy development?

Characteristics of Many Liberal Arts Colleges that Influence Faculty Roles & Responsibilities

- A primary emphasis on **individualized instruction** with **extensive interaction between faculty and students** and among students to foster a community of scholars
- A **broad curriculum** designed to develop knowledge and understanding of the humanities, sciences, and the arts
- A conscious decision to remain small – **low total enrollment, small class sizes, low student-faculty ratios**
- A **faculty that is dedicated to teaching undergraduates**
- A focus on **residential community**
- A commitment to faculty scholarship with the idealized model of **collaborative student-faculty research and scholarship**
- An emphasis on **faculty governance**

Common Current Faculty Recruitment and Professional Development Practices and Policies at Liberal Arts Colleges

TEACHING

- Reduced teaching load in the 1st year

SCHOLARSHIP

- Research start-up packages
- Junior faculty sabbatical – 3rd or 4th year

SERVICE

- Reduced service & advising expectations in the 1st year

FACULTY DEVELOPMENT

- New faculty orientation and mentoring programs

ADDITIONAL FACULTY BENEFITS

- Housing assistance programs
- Family/parental leave

IMPACT ON CURRICULA

Catawba College – Carol Ann Miderski – Alliance #3

Carol Ann successfully uses alliance information exchange to achieve **a reduction in teaching loads for science faculty at her institution.**

Sweet Briar College- Jill Granger & Davidson College – Ruth Beeston - Alliance #3

Jill and Ruth co-teach Chemistry by Inquiry: Art and Science for high school teachers – **leads to a new Chemistry & Art course and new teacher outreach efforts at Davidson.**

Sweet Briar College- Jill Granger - Alliance #3

PAID project supports a visiting speaker to provide **professional development for faculty in the form of information about significant contemporary interdisciplinary research questions and career paths and internship opportunities for students.** Science faculty subsequently created an action plan to increase opportunities for **interdisciplinary collaboration between departments for curriculum development, faculty research, and student mentoring.**

CAMPUS OUTREACH EFFORTS

Colby College

Julie Millard - Alliance #2

A **Strategic Career Planning workshop** led by Dr. Suzanna Rose of Florida International University was held on July 24 and 25, 2009 for Alliance #2 in the NSF-ADVANCE project in collaboration with Colby's Forum for Women in Science. The workshop included individual career planning meetings with Dr. Rose and sessions on negotiation and brainstorming on critical career issues.

Furman University

Laura Wright - Alliance #1

Lunch for the women STEM faculty in July 2008 to discuss a variety of issues including the low numbers of female STEM junior faculty. As a result of the lunch, the women at Furman began a **book discussion group that meets monthly to work on leadership development** and to discuss ways to enhance each of their positions at the University.

Eckerd College

Anne Cox - Alliance #4

Reading club of the STEM women during the Fall 2008 semester to discuss the volume *Challenge of the Faculty Career for Women: Success and Sacrifice*. The overall group broke into triads that included two women in the natural sciences and one in the behavioral sciences, with one tenured woman in each group. The triads met every two weeks and the entire group of 12 women faculty members gathered at the end of the semester to reflect on the experience.

Swarthmore College

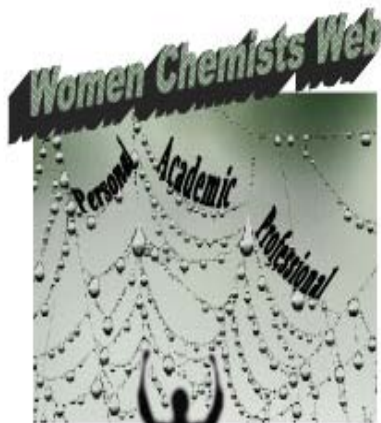
Amy Bug - Alliance #4

Meeting of the junior and senior women faculty members in STEM fields with the Associate Provost on November 10, 2008 to identify the specific needs of pre-tenure faculty that the institution or senior faculty might be able to fulfill.

CAMPUS OUTREACH EFFORTS

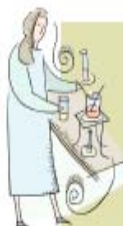
Catawba College – Carol Ann Miderski – Alliance #3

Women Chemists Web: Women Helping Women Make Connections for Success



**Building Strength
through
Connections**

**Friday, October 9
2:00—5:00 pm
Catawba College
Salisbury, NC**



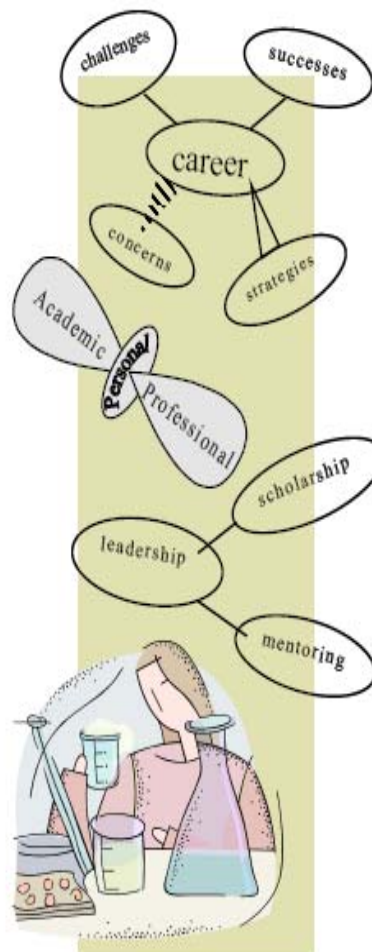
You are cordially invited to join women chemists from local four-year colleges for an afternoon of networking and discussion about career challenges and opportunities.

As women faculty in small Chemistry Departments, we have many opportunities to be "only," such as the only woman in the department or the only one to teach your flavor of chemistry.

This gathering is focused on reducing the "lonely" in being "only" by getting lots of us together from across the region. During the afternoon, we will participate in small group discussions centered around an assortment of career oriented topics.

Hopefully, these conversations will help us get to know one another better and will provide a source of outside perspective, fresh ideas, and alternative strategies for facing the academic, professional and personal challenges encountered in small college environments.

Friday Oct 9, 2-5 pm



Please contact me, Carol Ann Miderski, by e-mail "cmidersk@catawba.edu" to let me know whether or not you will be able to attend.

With your help, I would like to put together a resource network of women chemists in the area with information that you are willing to share.



Catawba College is located off I-85 about halfway between Charlotte and Greensboro. For directions go to <http://www.catawba.edu/about/directions.asp>

We will be meeting in the Center for the Environment, room 300. Signs will be posted showing where to park and guiding you to the meeting room. Following the meeting, guests are welcome to tour the Chemistry Department.

Gender Equity Scorecard - A Database focused on Liberal Arts Institutions

Our horizontal mentoring strategy aims to advance senior women faculty members at liberal arts colleges to the highest ranks of academic leadership.



Our project is compiling data on the status of STEM women faculty at liberal arts colleges - a “**Gender Equity Scorecard**”.



The impetus for establishing this database is the 2006 AAUP publication on gender equity indicators.

AAUP Faculty Gender Equity Indicators 2006,

<http://www.aaup.org/NR/rdonlyres/63396944-44BE-4ABA-9815-5792D93856F1/0/AAUPGenderEquityIndicators2006.pdf>



This information has already been vital in conversations with administrators on several alliance members’ campuses.



Gender Equity Indicator – Faculty Salaries

Female Avg Salary as % of Male Avg Salary 2007-2008			
	Full	Associate	Assistant
All Project Institutions	78.3 - 100.9%	89.7 - 107.9%	86.4 - 103.0%
Avg of Project Institutions	90.6%	100.0%	98.1%
Avg of Priv. Ind. Baccalaureate Institutions in AAUP Survey	95.4%	98.5%	98.1%
Project Inst. “A”	81.6%	98.7%	101.3%

Project Institution “A” – Vice President of Academic Affairs is leading discussions on gender equity in full professor salaries at the Department Chairs Committee level (currently an all-male committee)

Limitations of the Liberal Arts College Environment for Senior Faculty Development

*“I miss the company of other women that like science. It’s nice to be able to just have casual conversations about some of the day-to-day challenges that you’re up against, that may not be earth-shattering, but just to be able to share those experiences and hear different ways to go at it; to meet and get to know people from other institutions, to hear other ways of doing it, because **we don’t have frequent sabbaticals**, and **we don’t get a lot of new blood in through the department** and so it’s a way to get alternate perspectives and things like that. I think women in liberal arts institutions can be **extremely isolated** because **we’re in two- to four-member departments generally out in the middle of nowhere with very few other white-collar professionals in the community** and you can just really get so pigeon-holed in your own little job and keeping up with what you’re doing....”*

- a project participant

Observation:

The majority of faculty development programs and practices on liberal arts campuses today focus on junior faculty.

Hypothesis:

Faculty development programs that are faculty-driven, “bottom up” propositions rather than “top down” impositions are more consistent with the governance structure of liberal arts colleges and likely to be more effective and better received.

Query:

Where do senior faculty at liberal arts colleges, particularly women full professors in STEM fields, find the career development resources and mentors that they might seek?

Why do senior women - even successful women - seek mentoring?

- Both the professional challenges that we face as well as our career aspirations can change over time.
- New personal challenges might surface that impact our professional lives.
- Any support structure that might have existed earlier in our career may no longer be available or effective.
- Everyone benefits from the exchange of ideas and the interactions with colleagues.
- Established faculty members may neglect their own continued professional development in deference to the service needs of their department or institution