The Case for Retention: Women in the STEM Workforce

MENTORING AS A TOOL FOR CAREER DEVELOPMENT AND RETENTION

Barbara Bogue, The AWE Project
Department of Engineering Science & Mechanics, Penn State
Building Science, Engineering and Technology Leadership Workshop

- Intentional approach to mentoring as an integral part of career development

PAESMEM Award Activity

Co-Chairs:
Barbara Bogue, Penn State
Daryl Chubin, AAAS
Yolanda Comedy, Consultant

Organizers & Hosts: Penn State & AAAS
NSF HRD 0328144

Prepared for Work, Not the Career:
Building Science, Engineering & Technology Leadership

Barbara Bogue
Yolanda Comedy
Daryl Chubin
Unique aspects

- Access the experience of proven mentors to:
  - Identify effective practices
  - Compare with formal mentoring research.
- Create idea exchange beyond typical working spheres: industry, academe, government, non-profit
  - Networking platform for professionals across sectors
- Integrate mentoring into overall career progression
  - For individuals
  - Organizationally
Who participated?

- 60 women from industry, academia, government & non profits
  - 46% were women of color
  - Waitlist of 100+
- 14 high level individuals acknowledged as effective mentors
  - Also diverse
A word on terminology

- What do we call the people being mentored?
  - Question basic to mentoring as a tool of development and empowerment
  - Existing terms encourage non-dynamic, hierarchical approach to mentoring
    - Someone is acted upon rather than developing to act

- Model: Mentor & Telemachus
  - Empowerment in addition to teaching & counseling

  The advance scout who returns to tell others on the journey where they will find ‘boulders, thickets, edible berries, fordable streams.’
More terminology: Retention??? Or development?

- **Retention** of people
  - Non-dynamic: Preservation, maintenance, running in place
  
  OR

- **Development** of people
  - Dynamic: Growth, progress, expansion
Role of Mentoring in Career Development

- Dynamic process of personal and career development
  - Benefits individuals, mentors and organizations
  - Creates platform for career progression and achievement in organization
  - Can also identify dissonance between individual goals and organizational goals
Findings: Participants

- Very talented and successful in positions
  
  Women come into the workplace as well-prepared professionals, but once there they confront the realities of career advancement, balancing personal and work life, gaining recognition for achievements and other professional challenges for which they have been little prepared.

- Conundrum:
  - Many are clearly disempowered
  - Feel must be independent/Not ask for help
  - “Heads Down” work approach evident
Findings: Issues for mid-level women

- Lack of **meta vision** of career and organization
  - Need for clear career strategies
  - Need for clear organizational perspective
  - Need to understand steps to move upward on career path
- **Narrow** view of mentoring
  - See mentoring as one-way street
  - Failure to recognize mutability of mentoring
- **Failure of formal mentoring** programs
  - Lack of mentors who “look like me”
    - Double impact for Women of Color
  - Poor match with mentors
  - Disconnect between personal/professional goals and the advice of mentors
  - Confounding of supervisor/advisor function with mentoring
Issues for mentors

Individual
- Expects “magic bullet” rather than mutual effort
- Communicates poorly
  - Lack of follow up
  - Won’t listen
  - Inability or unwillingness to perceive themselves as others do
- Demonstrates low commitment to organization
  - Fails to inspire trust
  - Low promise of success in organization

Organization
- Provides only half-hearted, short-term measures
  - Lack of commitment from the top
  - Lack of recognition for those who mentor
  - Not tied to empirical measures
Effective Practices: Individuals

- Have clear, articulated objective for mentoring relationship
- Seek multiple mentors
  - Informal and formal
  - Board of directors
- Undertake continuous career planning
- Understand organization
  - Structure: Learn organizational culture; Work within to meet personal goals
  - Constraints: Choose battles—make allies, not adversaries
- Have reasonable expectations of mentors
  - Resource, not crutch
  - Don’t confuse advising or supervising with mentoring
## Challenges for organizations

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Practical Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diminishing number of senior mentors</td>
<td>Provide peer, distributed or team mentoring</td>
</tr>
</tbody>
</table>
| Not enough diversity in available mentors | Cross race/ethnicity/gender mentoring  
Integrate social networking, relational and developmental aspects into mentoring  
Essential key components*:  
√ Training  
√ Management  
√ Formal Review |

*Important components for mentoring programs in general.
## Challenges for organizations

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Practical Solutions</th>
</tr>
</thead>
</table>
| Disproportionate “Failure to Thrive” among individuals not traditionally represented in culture | Provide **Organizational** Mentoring:  
  ✓ Recognize informal information/support networks among majority; make transparent  
  ✓ Change practices that handicap:  
    ➢ Fair start up packages, negotiations  
    ➢ Recognition & reward before poachers  
  ✓ Provide information key to success  
    ➢ Workshops for associate professor women explaining steps to full; facilitating career planning and progression |
Resources

- Prepared for Work, Not the Career: Building Science, Engineering and Technology Leadership (stores.lulu.com/sevo)
- Catalyst.org
    - Laura Sabattini and Sarah Dinolfo
    - Laura Sabattini and Michael Chamberlain
  - Making Mentoring Work (2010)
    - Sarah Dinolfo and Laura Sabattini
- WepanKnowledgeCenter.org
  - WEPAN Knowledge Center Agenda Paper: Putting Policy into Practice to Diversify Faculty
- CRA-W.org
  - Committee on the Status of Women in Computing workshops, distributed mentoring program
Thank you!

Contact Info:
Barbara Bogue   bbogue@psu.edu
PI, PAESMEM Award
Director, The AWE Project
Associate Professor of Engineering Science and Mechanics and
Women in Engineering, Penn State
212 Earth and Engineering Science Building
University Park, PA 16802
2009 statistical snapshot

**Women in Managerial & Professional Positions**

<table>
<thead>
<tr>
<th>Position</th>
<th>Women</th>
<th>Men</th>
<th>Women as % of Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Sciences managers*</td>
<td>0.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physicist Managers</td>
<td>11.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Managers</td>
<td>6.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Production Managers</td>
<td>14.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer &amp; IT Managers</td>
<td>29.0%</td>
<td></td>
<td>69.4%</td>
</tr>
<tr>
<td>Medical &amp; Health Services Managers</td>
<td>2.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fortune 500 CEOs</td>
<td>23.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall CEOs</td>
<td></td>
<td></td>
<td>50.8%</td>
</tr>
<tr>
<td>M &amp; P Workforce Overall</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


* Represents less than 1%.

**Women in the SET Workforce**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Women</th>
<th>Men</th>
<th>Women as % of Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric &amp; space scientists*</td>
<td>0.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Astronomers &amp; Physicists*</td>
<td>0.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers</td>
<td>13.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer &amp; Mathematical</td>
<td>24.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental and geoscientists</td>
<td>29.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer &amp; Mathematical Scientists</td>
<td>24.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemists and Material Scientists</td>
<td>33.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Scientists</td>
<td>52.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Scientists</td>
<td>53.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workforce Overall</td>
<td>46.7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


* Represents less than 1%.

**Women in SET Federal Positions**

<table>
<thead>
<tr>
<th>Position</th>
<th>Women</th>
<th>Men</th>
<th>Women as % of Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal-Scientists</td>
<td></td>
<td></td>
<td>33.0%</td>
</tr>
<tr>
<td>Federal-Engineers</td>
<td>13.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Workforce Overall</td>
<td></td>
<td>24.5%</td>
<td></td>
</tr>
</tbody>
</table>


**Women in Engineering Faculty Positions**

<table>
<thead>
<tr>
<th>Position</th>
<th>Women</th>
<th>Men</th>
<th>Women as % of Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Doc/S&amp;E</td>
<td>33.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistant</td>
<td>21.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>14.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Professor</td>
<td>7.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Tenure/Tenure Track</td>
<td>12.7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Women Faculty in Three Disciplines, as a Percentage of Each Rank in “Top 50” Departments

<table>
<thead>
<tr>
<th>Discipline</th>
<th>% Assistant</th>
<th>% Associate</th>
<th>% Full</th>
<th>% All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry (2003)</td>
<td>21.5</td>
<td>20.5</td>
<td>7.6</td>
<td>12.1</td>
</tr>
<tr>
<td>Computer Science (2002)</td>
<td>2.8</td>
<td>3.8</td>
<td>4</td>
<td>10.6</td>
</tr>
<tr>
<td>Mathematics (2002)</td>
<td>19.6</td>
<td>13.2</td>
<td>4.6</td>
<td>8.3</td>
</tr>
<tr>
<td>Mechanical Engineering (2002)</td>
<td>2.5</td>
<td>2.3</td>
<td>1.1</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Source: Nelson, 2007