# Transforming Institutions to Diversify STEM:
## Preliminary Findings from a Process Evaluation of NSF's ADVANCE Program

**Clemencia Cosentino de Cohen**

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MATHEMATICA
Policy Research

# ADVANCE

- **An NSF program created in 2001**
  - **Goal of "increas[ing] the representation and advancement of women in academic science and engineering careers, thereby contributing to the development of a more diverse science and engineering workforce" (NSF website)**
  - **Awarded over $130 million in support**

# NSF's Mandate and National Legislation

- **1950** **NSF created to help foster science and build up the scientific workforce**
  (National Science Foundation Act)
- **1972** **Civil rights protections prohibit discrimination on the basis of sex in education programs and in activities receiving federal assistance**
  (Title IX)
- **1980** **NSF receives standing authority to improve the participation of women and minorities in science and engineering**
  (Science and Engineering Equal Opportunities Act)

# Research Evidence

- **Gender inequities are well-documented and have received national attention**
  - **The 1999 MIT report: *A Study on the Status of Women Faculty in Science at MIT***
  - **The 2000 report of the Congressional Commission on the Advancement of Women and Minorities in SET Development: *Land of Plenty***

# Research Evidence (cont'd.)

- **Recent work shows some improvements**
  - **The 2004 GAO Report: *Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX***
  - **The 2010 National Academies report: *Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty***
- **But inequities persist**

# The 1999 MIT Report

**"I learned…important lessons from this report…. I have always believed that contemporary gender discrimination within universities is part reality and part perception. True, but I now understand that reality is by far the greater part of the balance."**

**—Charles M. Vest, President**
**Massachusetts Institute of Technology (MIT)**
**The MIT Faculty Newsletter, March 1999**

# NSF's Response

- **To develop a portfolio of programs that includes:**
  - **Visibly targeted efforts (like ADVANCE)**
  - **Less-visible efforts (assessing "BP" impact of nontargeted efforts)**
  - **Research efforts (providing financial support for research and commission studies)**

# Problem Targeted

- **General: Underrepresentation of women in science and engineering**
  - **Women constitute (2008)*:**
    - 50 percent of bachelor's degree recipients in STEM
    - 46 percent of master's degree recipients in STEM
    - 41 percent of doctoral recipients in STEM
    - 26 percent of scientists and engineers
- **Specific: Underrepresentation and inadequate advancement of women in academic science and engineering**
  - **Women constitute (2006)**:**
    - 28 percent of tenured / tenure-track faculty
    - 19 percent of tenured professors

Sources: *NSF. *Women, Minorities, and Persons with Disabilities in Science and Engineering* (2011). **Burrelli. NSF 08-308 (2008).

# Scholarly Literature

- **Predominant explanations for gender inequities focus on institutional barriers**
  - **Bias in recruitment and hiring**
  - **Unsupportive institutional / departmental climate**
  - **Inequitable promotion and tenure policies and practices**
  - **Inadequate resolution of work-family conflicts**

# The ADVANCE Program

- **NSF's response to the complex problem of gender inequity**
  - **Targeted flexibility**
    - Institutions define the problem and
    - Select strategies to address it
  - **Institutional transformation**

# Transformation Is an Important Outcome

- **ADVANCE is not just intended to diversify the workforce (ultimate goal)**
- **Equally important is the main mechanism selected to achieve that goal: institutional transformation**
- **Today, I will focus on our study of that mechanism—strategies and processes used to:**
  - **Influence gender representation in academic STEM departments**
  - **Transform institutions so that, in time, ADVANCE will no longer be needed**

# The Process Evaluation

- **Focuses on processes of institutional change**
- **Relies on qualitative methods**
  - **Reviewed the scholarly literature**
  - **Reviewed project documents (proposals, reports, etc.)**
  - **Interviewed principal investigators**
  - **Hope to conduct case studies and a cross-case analysis**
- **Included cohorts funded by 2008**
  - **19 institutional transformation awards (2001, 2003)**

# Preliminary Findings

1. Getting support
2. Defining the problem
3. Addressing the problem
4. Problems encountered in implementation
5. Effective strategies to address problems
6. Some outcomes

# 1. Getting Support

- **Over half of the projects were spearheaded by one or two individuals**
  - **A handful were started by established groups on campus**
  - **Proposals were a group effort**
- **The majority were built on ongoing efforts**
  - **But a few "started from scratch"**

**"There were two female [faculty] who had read about the RFP from NSF…[but] had no senior faculty in those departments at the time…. So they approached me [a senior female in the provost's office]."**

**—ADVANCE PI**

# 2. Defining the Problem

- **Numerical representation of women faculty in STEM departments, especially:**
  - **In leadership or senior positions**
  - **Among new hires**
- **Institutional environment**
  - **Climate (isolation)**
  - **Policies and practices (resources, family-friendly policies, transparent tenure-review practices)**

# 3. Addressing the Problem

- **35 specific strategies implemented**
- **Examples:**
  - **Faculty search committee training**
  - **P&T committee training**
  - **Mentoring and visiting scholars programs**
  - **Family leave and stop-the-clock policies**
  - **Gender-equity studies**
  - **Data collection systems**

# 3. Addressing the Problem (cont'd.)

- **35 strategies address six problem areas:**
  - **Recruitment**
  - **Retention and advancement**
  - **Work-life support**
  - **Networking and professional development**
  - **Institutional and departmental climate change**
  - **Data collection and monitoring**
- **Six areas represent three approaches:**
  - **Policies and practices re: faculty representation, progression and experiences**
  - **Institutional supports for faculty**
  - **Monitoring indicators of equity**

# Typical ADVANCE Model

- Transform policies and practices
- Provide support
- Monitor equity

# Typical ADVANCE Model (cont'd.)

- **Transform policies and practices**
  - Faculty search committee training
  - P&T committee training
  - Research on and adoption of best practices
- **Provide support**
  - Research support
  - Mentoring and career-development programs
  - Leadership training
  - Professional networking opportunities
  - Visiting scholars program
  - Chair/administrator training (climate change)
  - Equity-awareness workshops
- **Monitor equity**
  - Data monitoring and reporting requirements
  - Climate surveys

# 4. Problems Encountered

- Resistance from faculty and administrators
- Leadership turnover
- Economic downturn

"We got some resistance on campus from those who thought it was unfair that the awards were only going to women."

—ADVANCE PI

# 5. Effective Strategies

- **Use of evidence**

**"Use data. Scientists listen to data."**

**"We also found that data did not support some of our concerns…. We thought that women were not being promoted at the same rate as men, and that turned out not to be true."**

**—ADVANCE PI**

# 5. Effective Strategies (cont'd.)

- Use of evidence
- Congruence with institutional goals

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- Use of evidence
- Congruence with institutional goals
- Buy-in (including extending benefits to men)

**"We knew the biggest hurdle, here and elsewhere, is to get buy-in from university stakeholders. So the strategy we used is that our initiatives would improve lives of all faculty and not just women in STEM."**

**—ADVANCE PI**

# 5. Effective Strategies (cont'd.)

- Use of evidence
- Congruence with institutional goals
- Buy-in (including extending benefits to men)
- Leadership support

# 5. Effective Strategies (cont'd.)

- Use of evidence
- Congruence with institutional goals
- Buy-in (including extending benefits to men)
- Leadership support
- Strong team (including social scientists)

"Bring the social sciences to the table."
—ADVANCE PI

# 6. Some Outcomes

- **Gender-friendly climate**
- **Diversity-focused structural changes**

# 6. Some Outcomes (cont'd.)

- **Gender-friendly climate**
  - **Use of climate surveys**
  - **Adoption of family-friendly policies**
  - **Reoriented recruitment efforts**

**"Due in part to ADVANCE, now you would never see a search that just brought in all white males or hire a dean who didn't have a track record of or believe in diversity."**

**—ADVANCE PI**

# 6. Some Outcomes (cont'd.)

- **Diversity-focused structural changes**
  - **New services provided**
    - Day care centers, lactation facilities
  - **New committees, units, and offices created in support of gender equity**
    - Vice provost for faculty development and diversity (sustainability and visibility)
  - **New processes or practices adopted**
    - Establishment of data collection process
    - Training of promotion and tenure committee members
    - Gender considerations in selection of leadership

# 6. Some Outcomes (cont'd.)

**"[Data] is a problem we are still working on. We had percentages and numbers, but we didn't have promotion rates, attrition, or anything like that."**

**—ADVANCE PI**

**"Leaders may change, but now the job description [remains] intact."**

**—ADVANCE PI**

# Limitations

- **Incomplete work (case studies are pending OMB clearance)**
- **Did not include an independent assessment of outcomes (done by Westat)**

# Contributions

- **Document how institutions addressed their gender-equity problem through institutional reform**
- **Provide a comprehensive review of barriers to gender equity in STEM**
- **Identify strategies used to address barriers and bring about institutional change**

# Contributions (cont'd.)

- Describe conditions that enhance or hinder institutional change (e.g., decentralized vs. centralized institutions)
- Contribute to the knowledge base on effective practices to support institutional transformation

# Data-Driven Change

**"At MIT, we like data, especially data that advance our understanding of an important problem. In the 1990s, a group of MIT's women faculty perceived patterns of inequitable resource allocation between them and their male colleagues. They collected data that demonstrated and quantified the problem…. Compelled by the evidence, MIT responded. Today, a new *Report*…delivers the encouraging news that the process launched by these faculty women has made a lasting, positive difference for women faculty at MIT." *(emphasis added)***

**—Susan Hockfield, President, MIT**
**Letter to the MIT Community, March 20, 2011**

# For More Information

- **Please contact:**
  - **Clemencia Cosentino**
    - ccosentino@mathematica-mpr.com

# Scholarly Literature

- **Theories of institutional change**
  - **Lewin/Schein's change theory**
  - **Transtheoretical model of change (Levesque, Prochaska, and others)**
  - **Dual agenda (Rapoport et. al)**
    - Small wins (Meyerson and Fletcher)
  - **Theories of cultural change (Bertquist, Tierney)**
  - **Processes of institutional change (Eckel, Green, and Hill)**