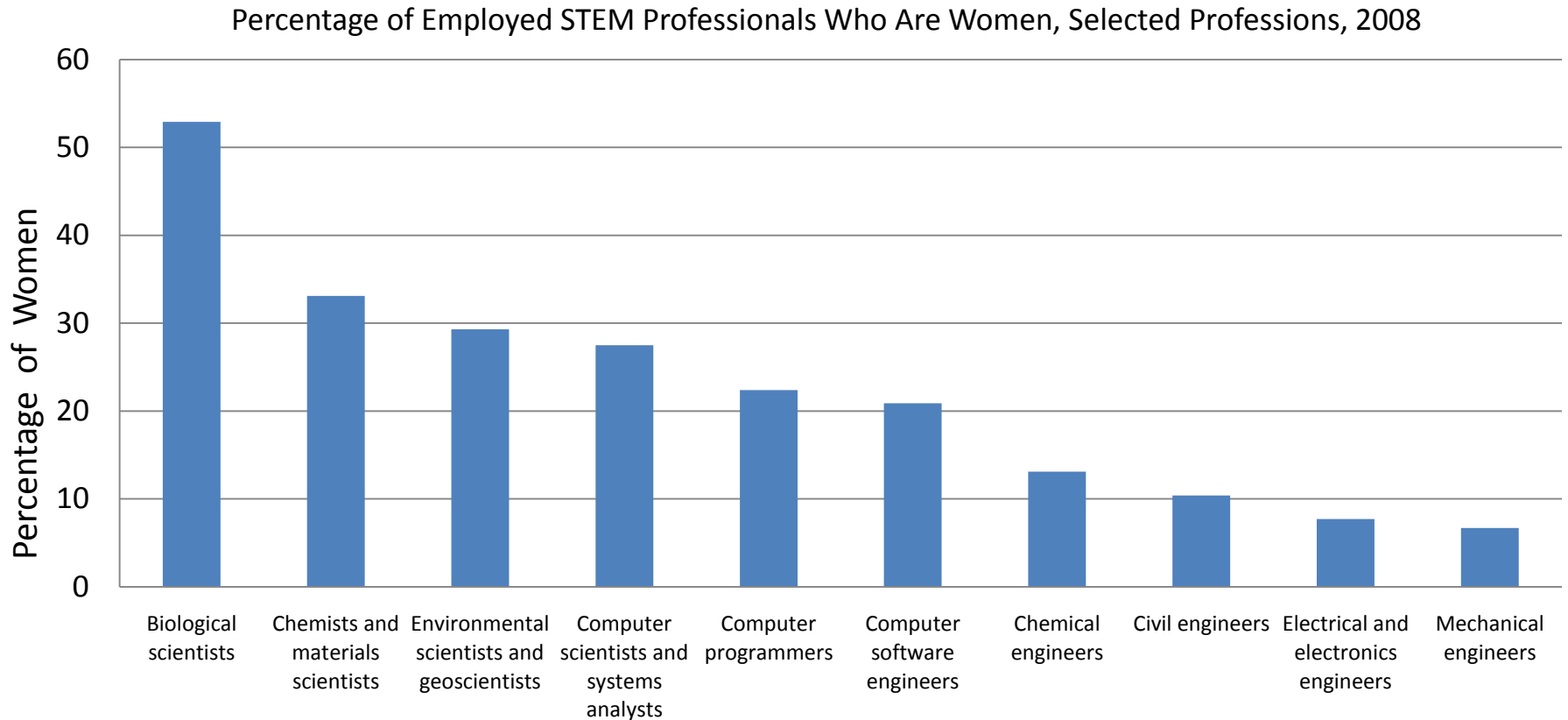


Recruiting and Retaining Females in STEM Fields: The Ohio STEM Equity Pipeline Project

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Women are underrepresented in many science and engineering occupations.



Source: U.S. Department of Labor, Bureau of Labor Statistics, 2009, *Women in the labor force: A databook* (Report 1018) (Washington, DC), Table 11.

From "AAUW Breaking Through Barriers for Women and Girls" www.aauw.org; aauw-research@aauw.org. Retrieved on 2/17/11.

MONEY MATTERS

Nontraditional Careers For Women Pay More

Traditional Jobs Employing More Women		Non-Traditional Jobs for Women	
Job	Salary	Job	Salary
Registered Nurse	\$52,330 (degree required)	Boilermaker	\$59,710
Childcare Provider (home)	\$28,500	Carpenter	\$63,300
Paralegal	\$39,130	Construction Laborer	\$48,315
Medical Assistant	\$24,610	Electrician	\$57,600
Home Health Aid	\$20,980	Sheet Metal Worker	\$52,700
Receptionist	\$25,610	Tile setter	\$52,200

From "Challenging the Gender Gap in Emerging Technologies: Strategies for Recruiting Girls and Women in the Blue and Green Collar Jobs" from the NAPE 2010 Professional Development Institute, April 13, 2010.

STEM Equity Pipeline – Root Causes

- **Education**

- Academic proficiency
- Access to and participation in Math, Science and Technology
- Curriculum
- Instructional strategies
- School/classroom climate
- Support Services

- **Career Information**

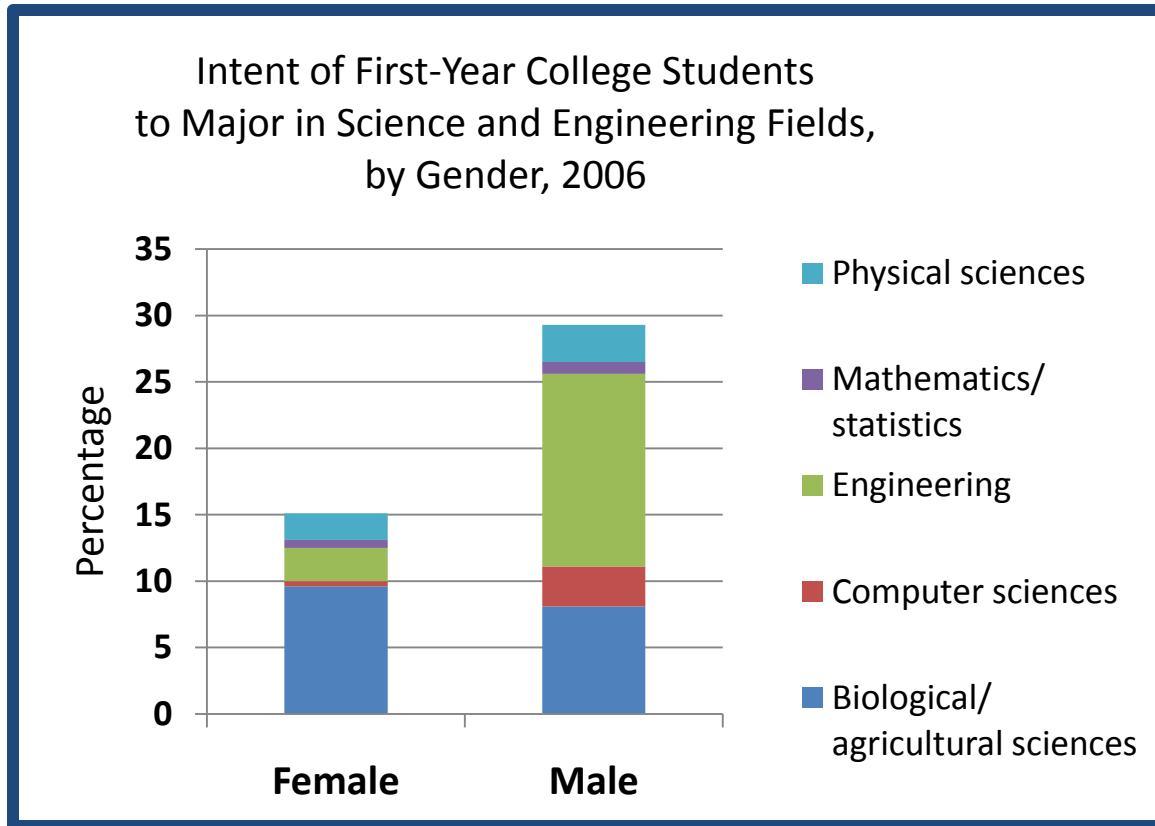
- Materials, practices, marketing and recruitment
- Early intervention
- Characteristics of an occupation/Wage potential (Careers that give back to the community can attract both females and males)

Root causes continued

- **Family**
 - Characteristics and engagement of family of origin have a strong influence on career choice
- **Internal/Individual**
 - Self-efficacy
 - Attribution
 - Stereotype threat
- **Societal Issues**
 - Media (negative/positive)
 - Peers
 - Role Models/Mentoring
 - Collaboration (between educational and community organizations key)

The climate of science and engineering departments at colleges and universities is especially important for women—both students and faculty.

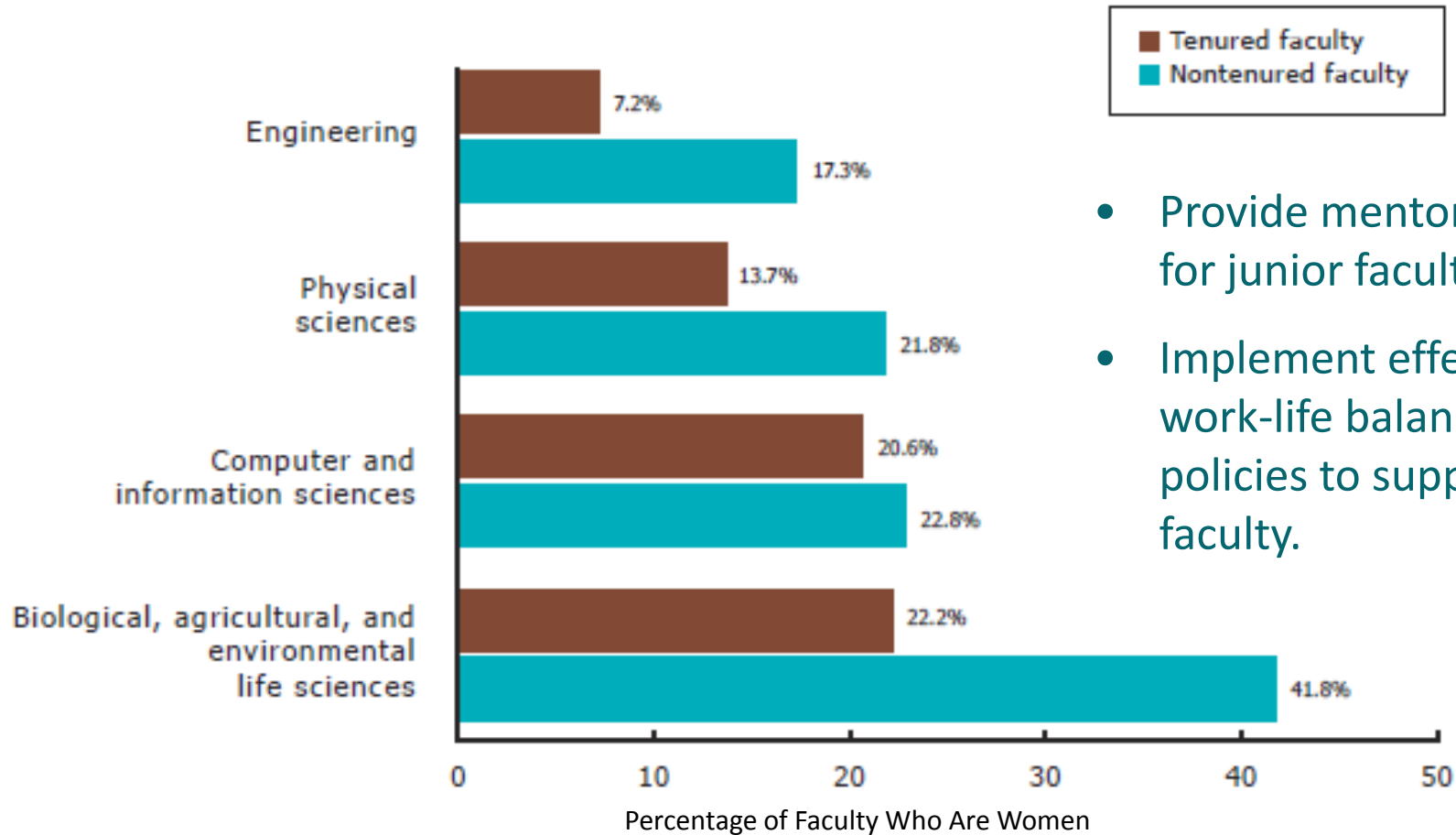
At colleges and universities, small changes can make a big difference in attracting and retaining women in STEM.



- Actively recruit female students.
- Emphasize broad applications of science and engineering in introductory courses.
- Review admissions policies to ensure that departments are not unintentionally “weeding out” potentially successful students.

Source: Higher Education Research Institute, 2007, *Survey of the American freshman: Special tabulations* (Los Angeles, CA), cited in National Science Foundation, Division of Science Resources Statistics, 2009, *Women, minorities, and persons with disabilities in science and engineering: 2009 (NSF 09-305)* (Arlington, VA), Table B-8.

STEM departments in colleges and universities should focus on “fit” to improve female faculty satisfaction.



- Provide mentoring for junior faculty.
- Implement effective work-life balance policies to support faculty.

Source: National Science Foundation, Division of Science Resources Statistics, 2009, Characteristics of doctoral scientists and engineers in the United States: 2006 (Detailed Statistical Tables) (NSF 09-317) (Arlington, VA), Authors' analysis of Table 20.

**Bias, often unconscious,
limits women's progress in
scientific and engineering fields.**

Implicit Bias

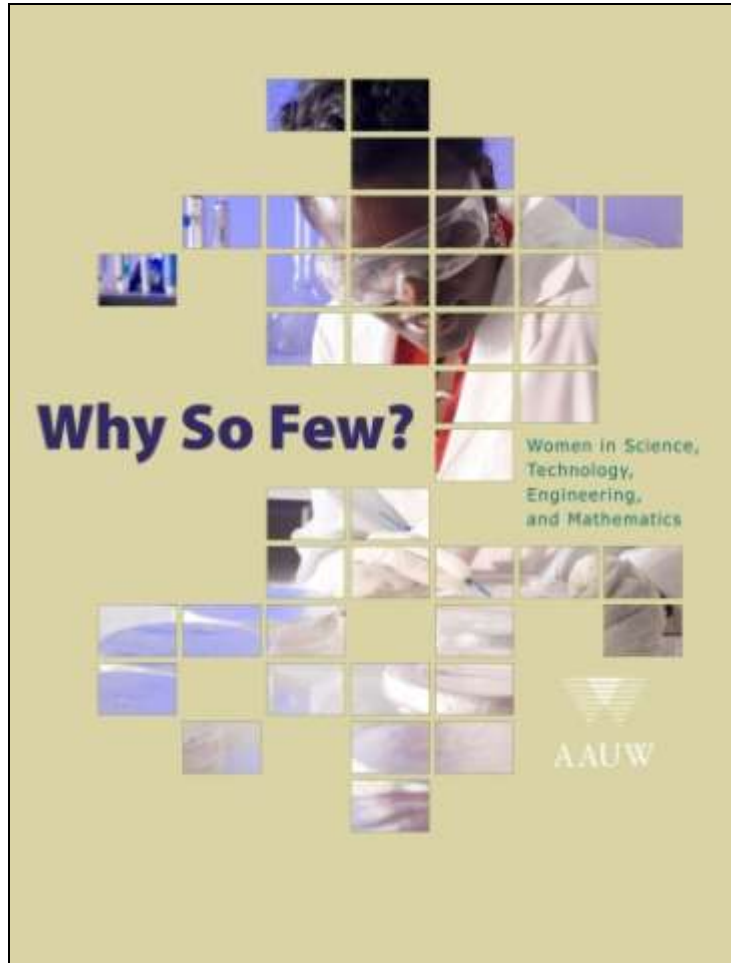
Most people associate science and math fields with “male” and humanities and arts fields with “female.”

- Take a test to learn about your unconscious bias at <https://implicit.harvard.edu>.
- Take steps to address your biases:
 - Learn more about female scientists and engineers
 - Have positive images of women in science in your office, classrooms and homes

Bias against Women in Nontraditional Fields

- Women in “male” jobs are viewed as less competent than their male peers.
- When women are clearly competent, they are often considered less “likable.”
 - Raise awareness about bias against women in STEM fields.
 - Create clear criteria for success.

Why So Few? Women in Science, Technology, Engineering, and Mathematics



To download the report:

www.aauw.org

To contact the researchers:

aauw-research@aauw.org

Other resources to help educate young women about STEM Careers, especially those in Engineering

- ASPIRE - <http://aspire.swe.org/>
- Engineering Go For It - <http://www.egfi-k12.org/>
- Engineer Your Life - <http://www.engineeryourlife.org/>
- Introduce a Girl to Engineering Day! - <http://www.eweek.org/site/News/Eweek/girlsday.shtml>

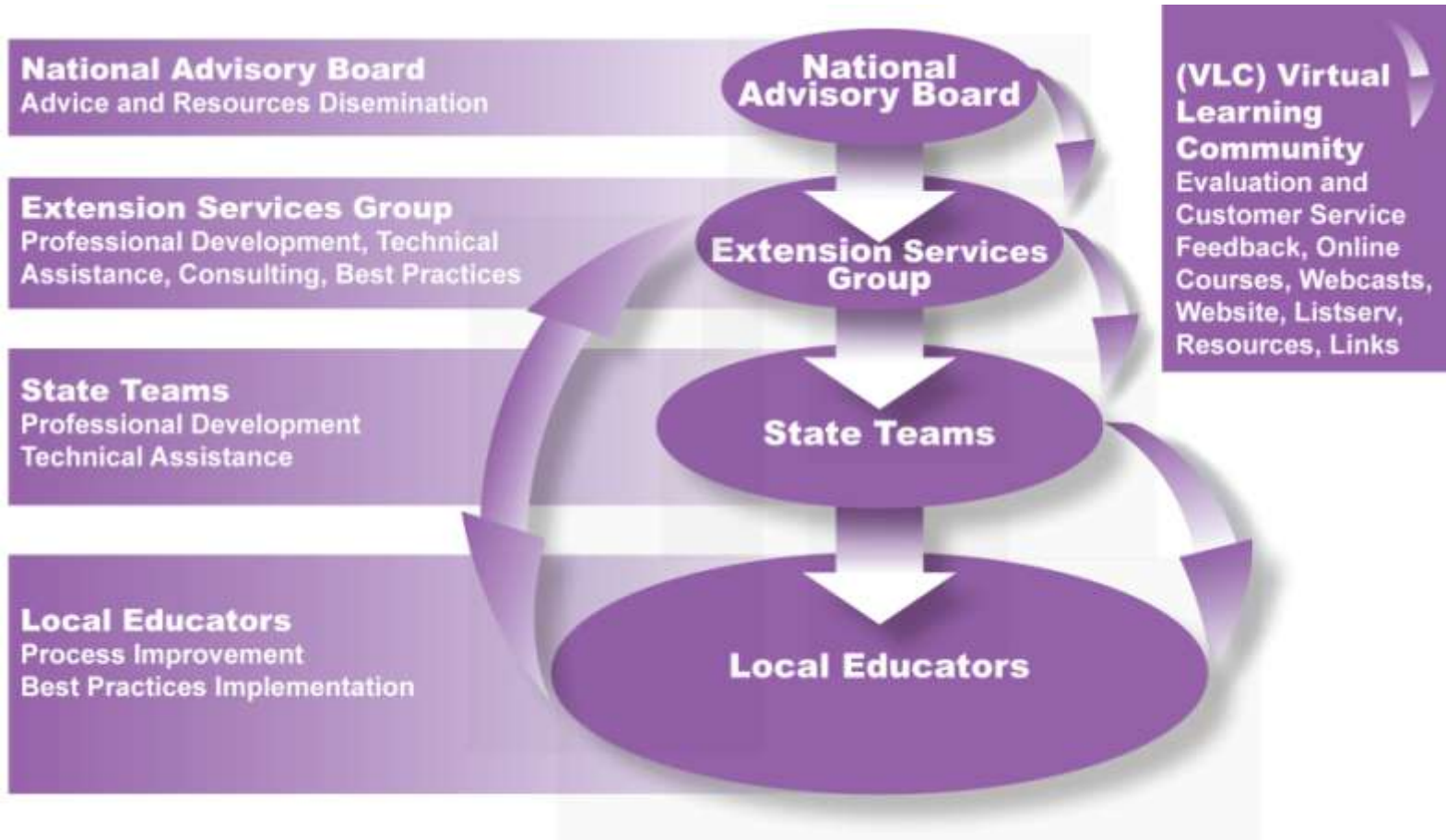
Ohio STEM Equity Pipeline Project

- National Science Foundation (NSF) grant-funded project through The National Alliance for Partnerships in Equity (NAPE)
- Purpose:
 - Increase access, participation, degree completion, and job placement for women in STEM fields
 - Particular emphasis on affecting Perkins Nontraditional measures for secondary and postsecondary students (of particular interest to Columbus State and the state)
- Begun Autumn 2009

STEM Equity Pipeline Goals

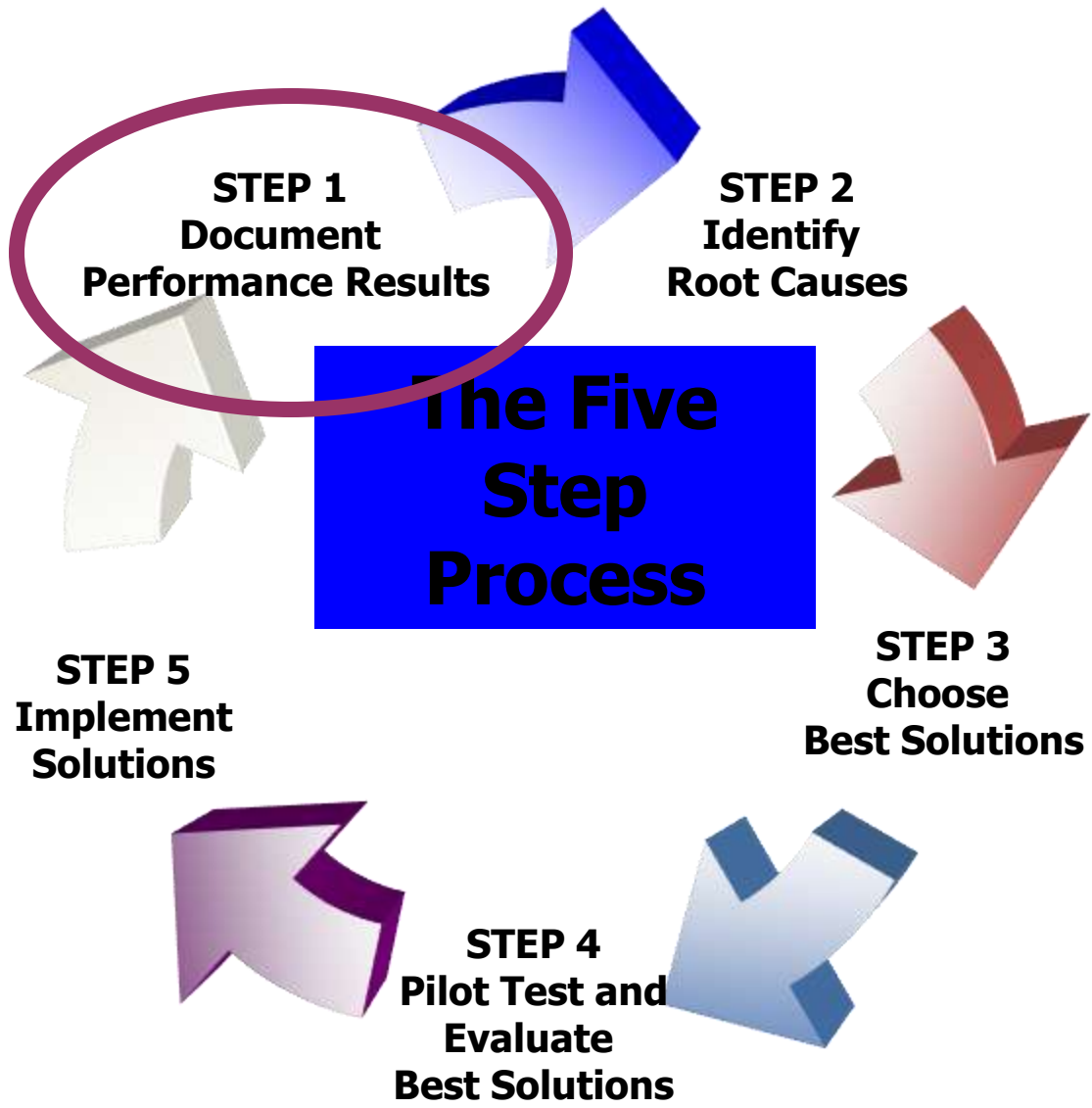
- Build the capacity of the formal education community
- Institutionalize the implemented strategies by connecting the outcomes to existing accountability systems
- Broaden the commitment to gender equity in STEM education

Model



Ohio Plan

- Pilot 3-4 community colleges and their feeder programs for career and technical secondary education: Currently:
 - Dayton – Ponitz Career and Technical Center to Sinclair Community College
 - Cincinnati – STEM Pipeline from Elementary School through College
 - Marietta – Secondary pipeline into the Associate of Science program at Washington State Community College
- Use 5-Step Process as outlined in the STEM Equity Pipeline
 - see [NAPE webpage](http://www.stemequitypipeline.org/) at <http://www.stemequitypipeline.org/>



Perkins Act Accountability

Core Indicators on Nontraditional CTE

- Participation in CTE programs preparing students for nontraditional fields (**6S1/5P1**)
- Completion of CTE programs preparing students for nontraditional fields (**6S2/5P2**)

Nontraditional Fields

Occupations or fields of work, including careers in computer science, technology, and other current and emerging high skill occupations, for which individuals from one gender comprise less than 25 percent of the individuals employed in each such occupation or field of work.

Training

- Part I – Oct 15th and Oct 25th, 2010
 - Step One: Document Performance Results
 - Step Two: Identify Root Causes

- Part II – Conduct March and April 2011
 - Step Three: Select Strategy
 - Step Four: Develop Evaluation
 - Step Five: Implementation

On-site Work

- After Part I training
 - Conduct additional data analysis
 - Conduct root cause research
- After Part II training
 - Implement solution
 - Conduct evaluation
- Pilot site Showcase
 - Share results statewide

Sinclair's Pilot

Participants

- **Jennifer Spegal**, Pilot Lead
- **Linnae Clinton**, Director, Curriculum Dayton Public Schools
- **Dave Andrews**, Engineering Faculty, Ponitz Career Technical Center
- **Doug Walters**, Construction Faculty, Ponitz Career Technical Center
- **Niki Ross**, Allied Health, Ponitz Career Technical Center
- **Steve Wendel**, Director, National Center for Manufacturing Education; Director, Project Lead the Way - Ohio Affiliate
- **Al Wahle**, Professor, Civil Engineering Technology, Sinclair Community College
- **Bev Smith**, Program Manager, Tech Prep, Sinclair Community College
- **Mortenous Johnson**, Interim Senior Director, Pre-College Programs, Sinclair Community College
- **Alisha Mitchell**, Program Coordinator, Pre-College Programs, Sinclair Community College

Sinclair's Process

- Pilot participants met to review data
 - SCC College Level Data
 - Tech-Prep Secondary Level Data
- Questions Discussed:
 - What barriers does the team think the students are facing
 - What action research method will we use to validate this theory?
 - Who will we engage in our research method?

Sinclair Process Continued

- Began to develop projects to address “root causes”
 - Focus groups
 - Female students at Ponitz Career Technical Center
 - Middle School Counselor
- Identified possible leaks
- Finish Orientation to 5 Steps

After initial pilot

- Share Best Practices
- Utilize 5-Step Process with other institutions
- Develop a state mechanism for bringing participants and those interested together:
 - State Conference/Meeting
 - On-line communities
 - Ohio Perkins Coordinators' Network

Ohio Vision Statement

Vision Statement

The Ohio STEM Equity Pipeline Project will systematically increase participation of underrepresented citizens in Science, Technology, Engineering and Mathematics (STEM) careers.

<http://www.stemequitypipeline.org/StateTeams/OH.aspx>

Ohio Mission Statement

The mission of this project is to use a research-based model to collaboratively and systematically increase the participation, educational completion and career placement of girls and women, and other underrepresented citizens, in Science, Technology, Engineering and Mathematics (STEM) fields in the state of Ohio.

Ohio State Team Goals

- Increase public awareness and create opportunities for girls and women in Science, Technology, Engineering and Mathematics (STEM).
- Increase participation of girls and women in non-traditional STEM fields (as identified by 25% or fewer of that gender represented in the workforce).
- Increase persistence, retention and completion of girls and women in STEM programs at the secondary and postsecondary levels.
- Increase job placement of females into STEM careers in Ohio.
- Increase participation, certificate and degree completion, and job placement in STEM fields for other underrepresented groups.
- Collaborate with and engage key stakeholders in improving opportunities for STEM.

Questions?

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