

Strategies to Increase Access and Success for Underrepresented Students in Career and Technical Education & STEM

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The webinar will begin promptly at 11:00 a.m. PST/2:00 p.m. EST

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<http://bit.ly/webinar-relnw-june2017>

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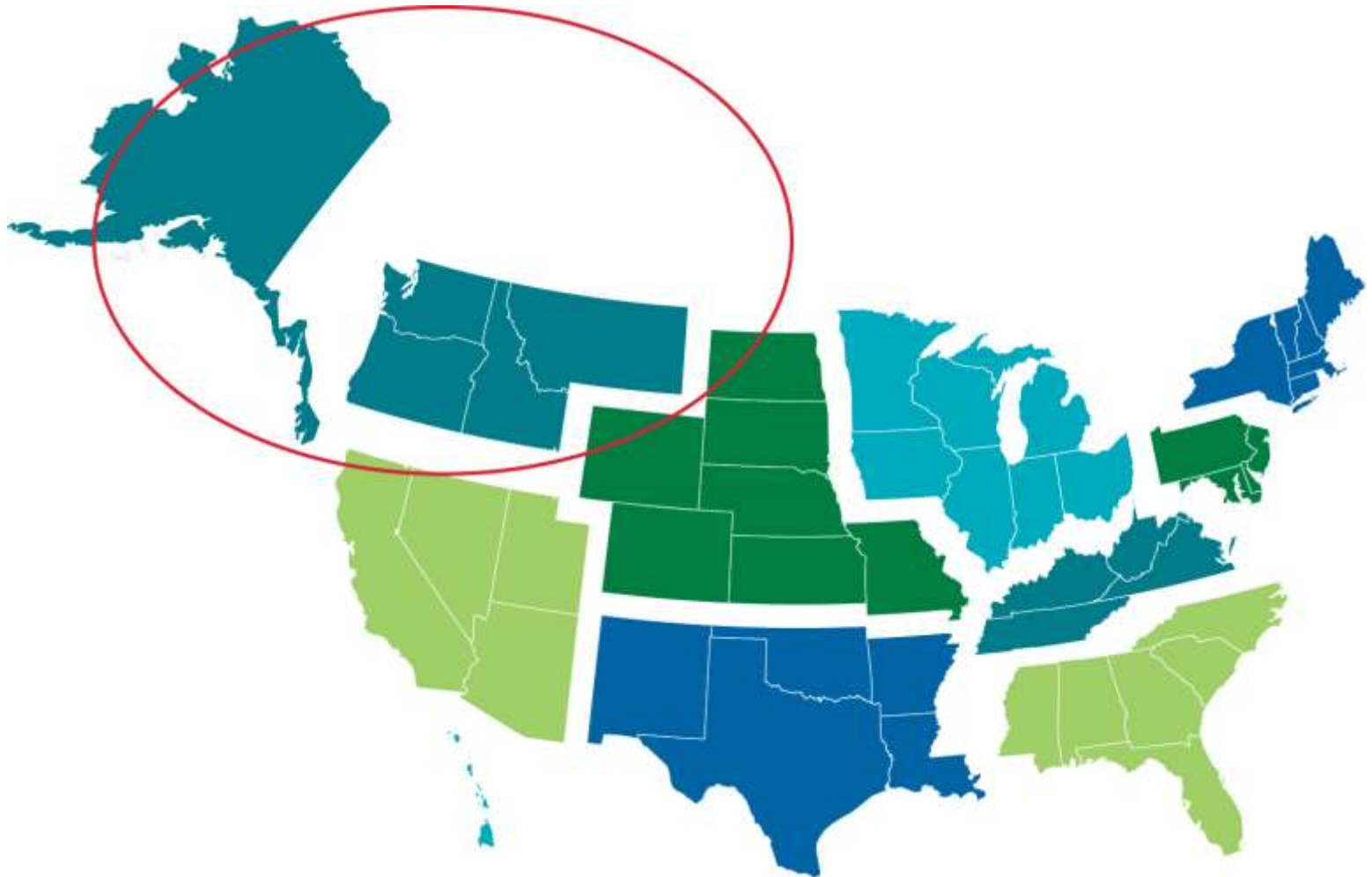
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Strategies to Increase Access and Success for Underrepresented Students in Career and Technical Education & STEM

June 15, 2017

REL Northwest Region



Today's Presenter



Ben Williams
Director of Special Projects
National Alliance for
Partnerships in Equity (NAPE)

REL Northwest Webinar Series
Thursday, June 15, 2017

STRATEGIES TO INCREASE ACCESS AND SUCCESS FOR UNDER- REPRESENTED STUDENTS IN CAREER AND TECHNICAL EDUCATION & STEM

Ben Williams, Ph.D., *Director of Special Projects*

@NAPEquity | @BenWilliamsPhD | #NAPEPD



N A P E

National Alliance for
Partnerships in Equity

Objectives for Today

- Learn how to use NAPE's PIPE™ as a framework for continuous improvement focused on access & equity
- Explore the power of “micromessages” and their effects on students' perceptions of career pathways
- Identify effective strategies to increase access and success for students from groups historically under-represented in high-skill, high-wage, and high-demand STEM career pathways through CTE, especially Native American students
- Integrate one to two strategies into your own personal or institutional plan for the 2017-2018 academic year



R A D I O

Reflect
on bias and
stereotypes

Anticipate
impact of
decisions,
words, and
behaviors

Discover
and address
negative
micromessages

Identify
ways to give
positive
micromessages

Offer
high
expectations
and wise
feedback



NAPE's Mission

We build **educators' capacity** to implement **effective solutions** for increasing student **access**, educational **equity** and workforce **diversity**.

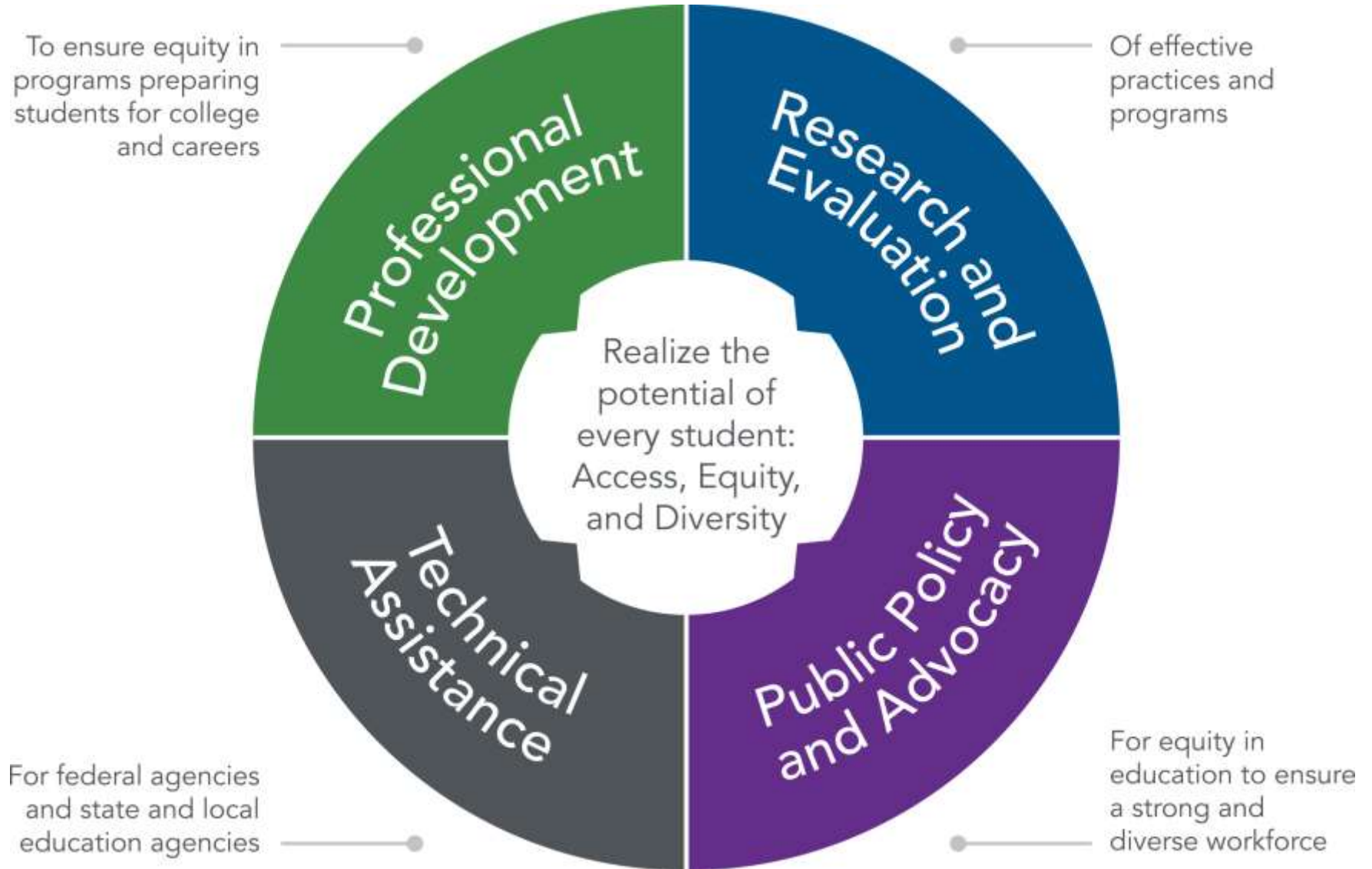
equity

access

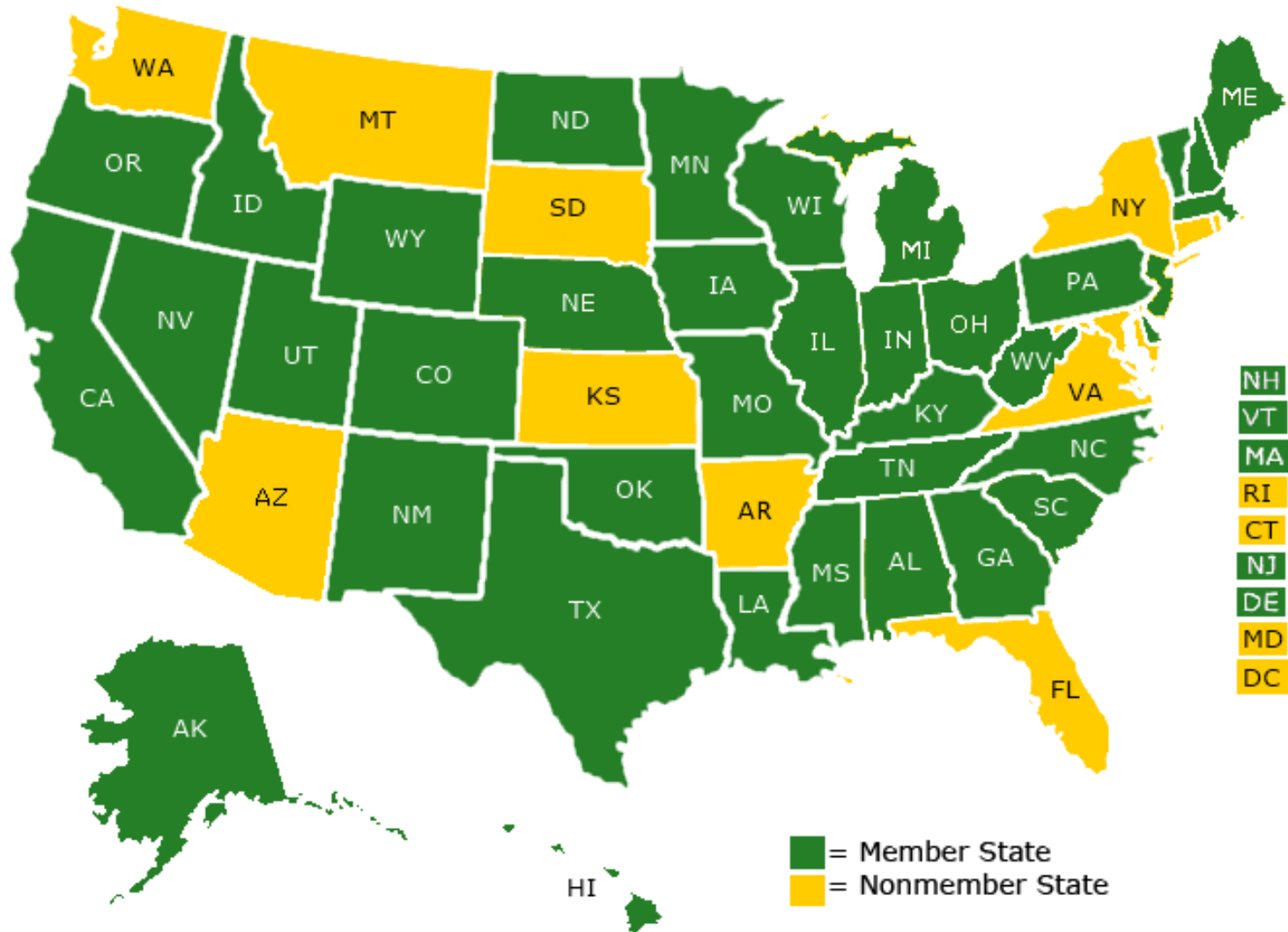
diversity



What We Do



NAPE Member States (39)



The Process We Employ





LET'S THINK OF HIGH-
SKILL, HIGH-WAGE,
AND HIGH-DEMAND
CAREERS

**WHAT ARE THE
OPPORTUNITIES IN
THESE FIELDS IN YOUR
REGION OR COMMUNITY?**



N A P E



Fast Facts from 2014 to 2024

- Computing jobs will grow by **16%**
- Engineering jobs will grow by **11%**
- Advanced manufacturing jobs will grow by **12%**
- Of all job openings, **51% will require training at the middle skill level**

Sources: <http://vitalsigns.changetheequation.org/>;
<http://www.nationalskillscoalition.org/state-policy/fact-sheets>

Opportunities

Across post-secondary pathways

- For the next 55 million job openings (until 2020):
- 35% will require at least a bachelor's
- 30% will require some college or an associate's
- 35% will not require education beyond high school

Note: At the current production rate, the US will fall short by 5,000,000 workers with post-secondary education.



Source: Carnevale, A.P.; Smith, N.; & Strohl, J. (2013). Recovery: Job growth and education requirements through 2020. *Georgetown Public Policy Institute*. Georgetown Center on Education and the Workforce.

EXECUTIVE SUMMARY

CAREER AND TECHNICAL EDUCATION FIVE WAYS THAT PAY

September 2012



ALONG THE WAY TO THE B.A.

Anthony P. Carnevale
Tamara Jayasundera
Andrew R. Hanson

IVIC
ENTERPRISES

GEORGETOWN UNIVERSITY
Georgetown Public
Policy Institute
Center for Education and the Workforce



PATHWAYS TO PROSPERITY

MEETING THE CHALLENGE OF
PREPARING YOUNG AMERICANS
FOR THE 21ST CENTURY

PATHWAYS TO PROSPERITY PROJECT

HARVARD
GRADUATE SCHOOL OF EDUCATION

FEBRUARY 2011

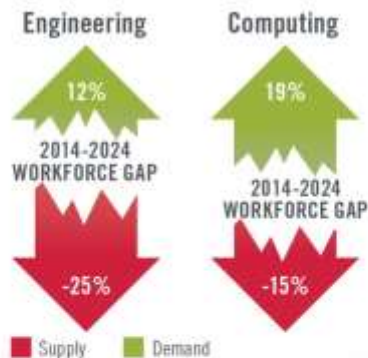
DEMAND FOR STEM WORKERS EXCEEDS SUPPLY

Science and engineering are the fastest growing occupations

U.S. scientists and engineers with a PhD



Most cyber security and anti-terrorism jobs require U.S. citizenship and a PhD. In 2010, the number of U.S. scientists and engineers with a PhD was nearly half that of foreign-born.



The existing STEM workforce is aging; 46 percent of STEM jobs are held by those older than 45. When they retire, they take their knowledge with them.

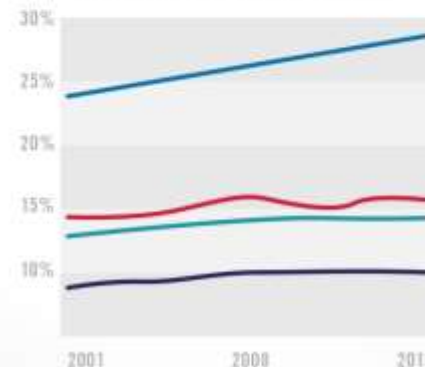
Rotimiye, J. 2015 (September 15). Short on STEM talent. U.S. News & World Report. Available at www.usnews.com/stories/articles/2014/09/15/the-stem-worker-shortage-is-real.
National Science Foundation. 2014. Science and engineering labor force. Science and Engineering Indicators. Available at nsf.gov/statistics/seind14/content/chapter-3/chapter-3.pdf.
Change the Equation. 2015. Solving the Diversity Dilemma. Available at change-the-equation.org/solving-diversity-dilemma.

WORKFORCE GAP

Women's participation in STEM jobs has plateaued since 2001

2001	VS.	2014
13%	Engineering	12%
27%	Computing	26%
10%	Advanced Manufacturing	10%

African Americans and Latinos are grossly underrepresented in U.S. STEM jobs

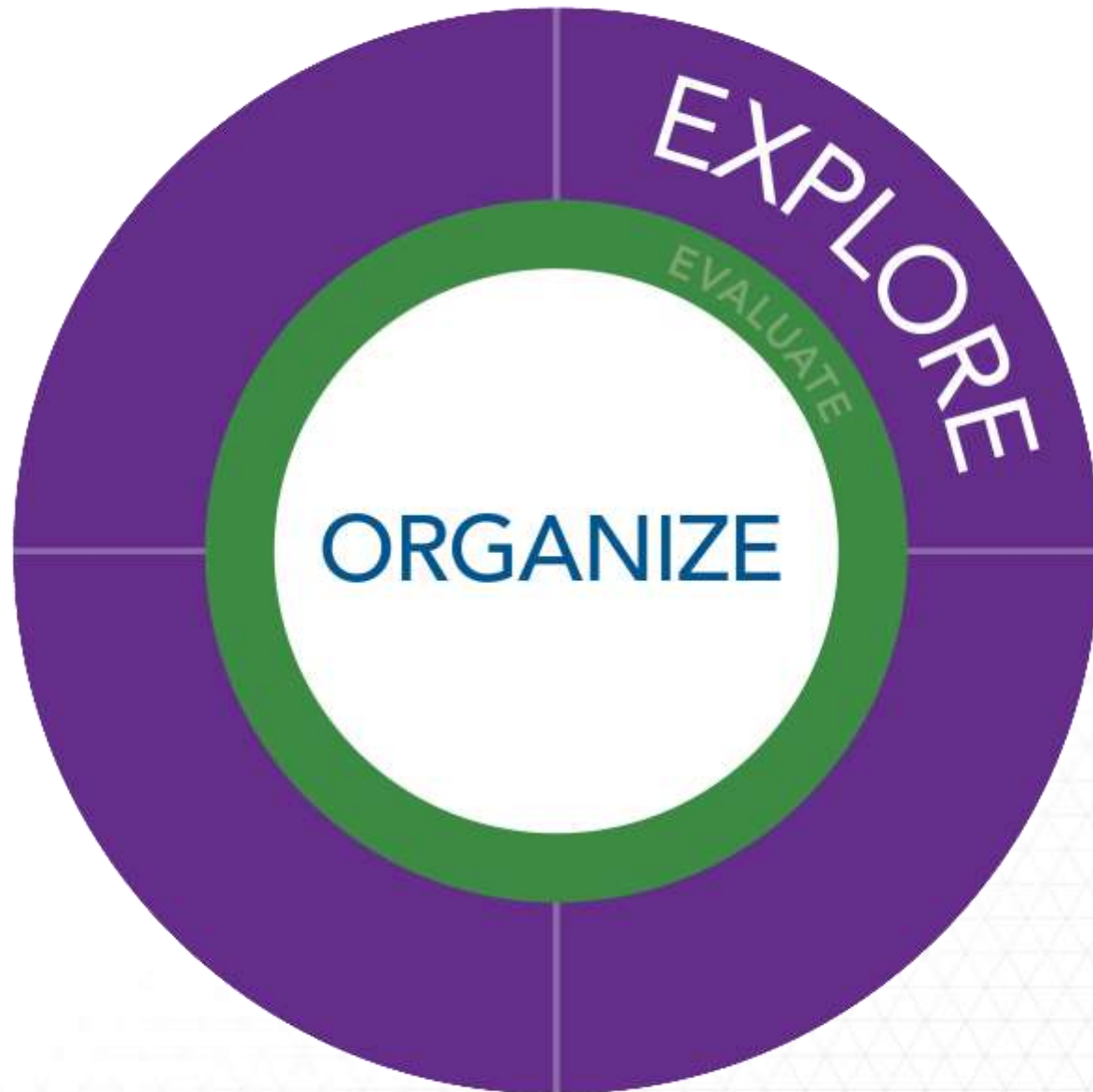


African American/Latino Percentage of:

- U.S. working-age population
- Advanced manufacturing workforce
- Computing workforce
- Engineering workforce

Change the Equation. 2015. Solving the Diversity Dilemma. Available at change-the-equation.org/solving-diversity-dilemma.





What We Do



Performance



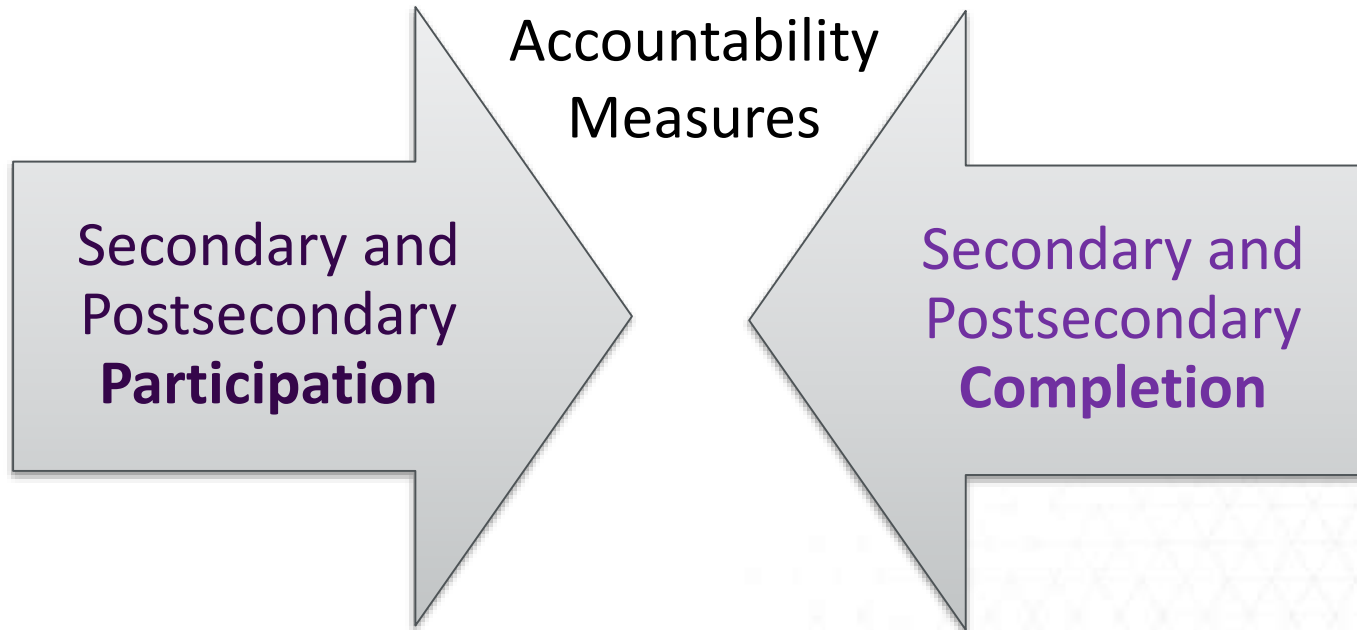
Participation



Pipeline



The Perkins Act



Data Collection

Disaggregation required in Perkins IV

Gender

- Male
- Female

Race/Ethnicity

- American Indian or Alaskan Native
- Asian or Pacific Islander
- Black, non-Hispanic
- Hispanic
- White/non-Hispanic

Special Populations

- Underrepresented gender students in a nontraditional CTE program
- Single parent
- Displaced homemaker
- Limited English proficiency
- Individuals with a disability
- Economically disadvantaged



When are the intersections of equity important?

Data Collection

Recommended Analysis

Current Context

- National level data
- State level
- Best performer in state
- Selected peer benchmark
- Set your own benchmark

Site Specific

- District
- School/College
- Programs

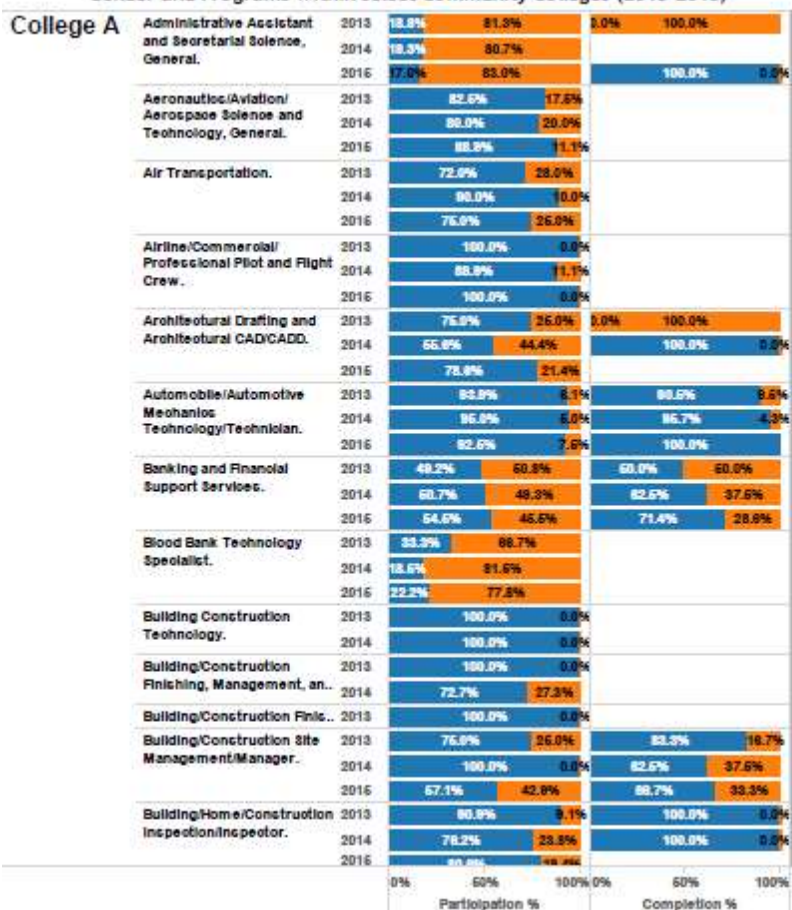
Trends

- At least 2 years
- Prefer 3-5 years



Data Dashboard

Graph of Non-traditional Participation (5P1) and Non-traditional Completion (5P2) by Gender and Programs within select Community Colleges (2013-2015)



Gender
 Female
 Male

College Name
☒ College A
☒ College B
☒ College C
☒ College D

Program Name

☒ Accounting Technology/Technician...
☒ Accounting...
☒ Administrative Assistant and Sec...
☒ Aeronautics/Aviation/Aerospace S...
☒ Agricultural Business and Manage...
☒ Air Transportation...
☒ Airline/Commercial/Professional Pi...
☒ Architectural Drafting and Architec...
☒ Architectural Engineering Technol...
☒ Architecture...
☒ Autobody/Collision and Repair Tec...
☒ Automobile/Automotive Mechanic...
☒ Banking and Financial Support Serv...
☒ Blood Bank Technology Specialist...
☒ Building Construction Technology...
☒ Building/Construction Finishing, M...
☒ Building/Construction Finishing, M...
☒ Building/Construction Site Manage...
☒ Building/Home/Construction Inspe...
☒ Building/Property Maintenance...
☒ Business Administration and Mana...
☒ Business/Commerce, General...
☒ CAD/CADD Drafting and/or Design T...
☒ Carpenters...
☒ Cinematography and Film/Video Pr...

Year

☒ 2013
☒ 2014
☒ 2015

NonTrad Group

☒ NTF
☒ NTM

CIP Code

☒ 01.0101
☒ 01.0803
☒ 01.0805
☒ 04.0200
☒ 04.0201
☒ 04.0401
☒ 04.0801
☒ 04.0801
☒ 08.0701
☒ 10.0203
☒ 10.0303
☒ 11.0100
☒ 11.0200
☒ 11.0201
☒ 11.0301
☒ 11.0801
☒ 11.0802
☒ 11.0700
☒ 11.0801
☒ 11.0801
☒ 11.0801
☒ 11.1002
☒ 11.1003
☒ 11.9999
☒ 12.0600
☒ 12.0603
☒ 13.1001
☒ 13.1200
☒ 13.1202
☒ 13.1208
☒ 13.1210
☒ 14.0100
☒ 14.0101
☒ 14.0800
☒ 15.0000




WHAT DO YOU EXPECT TO SEE?



NAPE





WHAT BARRIERS KEEP STUDENTS FROM PURSUING PROGRAMS THAT LEAD TO THESE STEM JOBS?



NAPE

Review Research Summary



Nontraditional Career Preparation ROOT CAUSES & STRATEGIES



The goal of Nontraditional Career Preparation is to assist you in recruiting and retaining more students into nontraditional careers through the most effective means possible. This chart provides a "quick find" to the research and is intended as a summary. Online and downloadable versions of the complete document are available on the NAPE website at www.napequity.org/root.

	ROOT CAUSE	THEORY	STRATEGIES
EDUCATION	Academic Proficiency When female students are academically proficient, they are more likely to persist in choosing nontraditional careers, while the opposite is more predictive for male students.		<ul style="list-style-type: none"> • Teach students that ability can be expanded. • Intervene to revise underachievement. • Provide math camps for female students. • Identify and assist students who aspire to science and engineering careers but lack academic proficiency. • Create incentives for taking AP courses. • Teach visual-spatial skills. • Use age appropriate video games that appeal to female individuals.
	Access to and Participation in Math, Science, and Technology Encourage participation and success in math, science, and technology courses, especially those taught in an equitable and "hands-on" manner.		<ul style="list-style-type: none"> • Utilize real-life teaching strategies. • Knead and sustain interest in math. • Make math and science a requirement. • Make other programs available such as after-school or weekend or summer camps. • Invite, involve, and educate parents.
	Curriculum Essential elements of a bias-free curriculum include relevancy, inclusive images and text, and hands-on instructional practice.		<ul style="list-style-type: none"> • Foster interest and curiosity, as well as skill, in math and science. • Provide comprehensive professional development. • Stress professional development self-assessment. • Utilize intervention programs for information technology (IT) in formal education. • Identify and correct bias in curricular and professional materials.
	Instructional Strategies Female students prefer learning experiences that they help to design, that are learner centered, and that involve them in a community.		<ul style="list-style-type: none"> • Provide comprehensive pre-service and in-service professional development relating to gender issues. • Stress professional development self-assessment. • Utilize intervention programs for IT in formal education. • Incorporate student experiences in the instructional process. • Utilize either virtual or hands-on science activities.
	School/Classroom Climate Students who experience a school climate supportive of nontraditional careers and gender equity are more likely to participate in nontraditional careers.		<ul style="list-style-type: none"> • Facilitate informal support groups. • Enforce civil rights and sexual harassment policies and practices. • Address climate issues. • Practice inclusive hiring processes. • Heed recommendations. • Strengthen support systems and eliminate barriers. • Schedule students in nontraditional programs in cohorts whenever possible. • Support nontraditional student clubs and after-school activities.
	Support Services Students enrolled in nontraditional career and technical education programs who receive support services are more likely to succeed.		<ul style="list-style-type: none"> • Provide tutoring, child care, transportation, and tuition assistance. • Post tutoring locations and hours in a highly visible area of the classroom. • Make loaner laptops available to students.
FAMILY	Family Characteristics Characteristics and engagement of family of origin have a strong influence on career choice.		<ul style="list-style-type: none"> • Design activities to promote family roles in gender-neutral career guidance. • Invite, involve, and educate parents. • Involve parents in developing their child's career plan. • Engage male and female students by providing activities that they may not have been culturally socialized to participate in.

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www.napequity.org | www.facebook.com/napequity | www.twitter.com/napequity

Key barriers to Success

- Stereotype Threat
- Low expectations
- “Inappropriate pedagogies that lack the incorporation of technology and ignore students’ cultural experiences.” (Upadhyay, 2005)
- “Instructional methods that fail to encourage or incorporate a ‘connected, relational understanding’” (Boaler, 2012, p.135)
- Lack of role models and mentors in whom students can see themselves mirrored



Sources: Upadhyay, B. R. (2005). Using students’ lived experiences in an urban science classroom: An elementary school teacher’s thinking. *Science Education*, 90, 94–110. Boaler, J (2012). Both referenced in Advancing Equity in CTE Literature Review (Draft).

MICROMESSAGES



N A P E

The Lens We Apply





WHAT ARE CULTURAL STEREOTYPES?









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Dreamstime.com

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Dreamstime.com





Download from
Dreamstime.com

istockphoto
Kubarc (Dreamstime.com)





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Dreamstime.com

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What **cultural stereotypes** are prevalent at your institution?

What is the **impact** of these stereotypes on **students**?

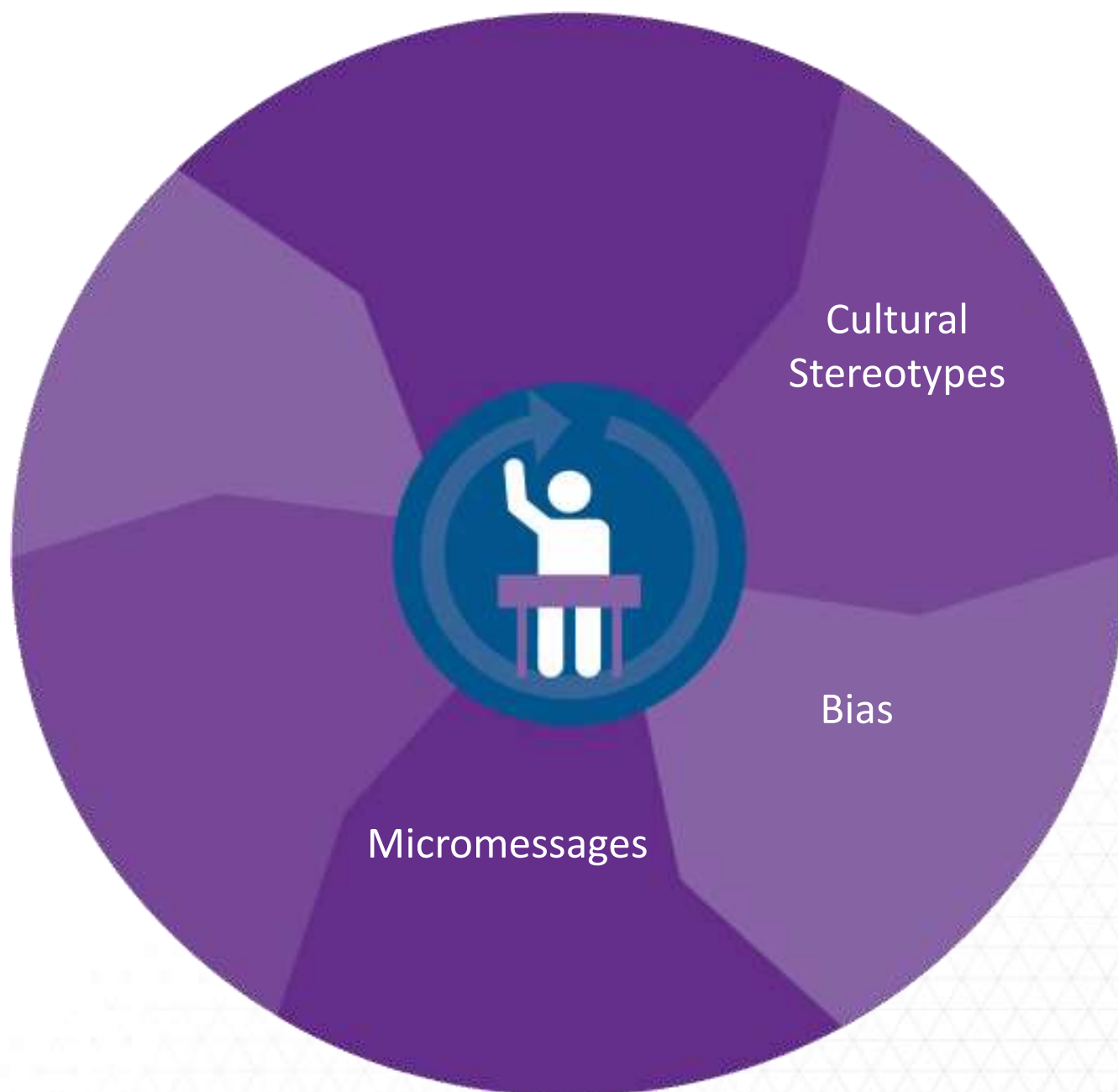
*“The **single story** creates stereotypes, and the problem with **stereotypes** is not that they are untrue, but that they are **incomplete**. They make one story become the only story.”*

Chimamanda Adichie: [The Danger of a Single Story](#), TedTalk

Reflection Questions



- What are the stories we tell about students and our cultural assumptions of their career interests, pursuits, and pathways?
- What is the impact of single stories, or cultural stereotypes on your students (current and prospective)?



Verbal

Para-verbal

Non-Verbal

Contextual

Omission

Praise & Criticism

*Small, subtle,
unconscious messages*

*sent and received when
we interact with others*

Micromessages

Micro-Affirmations

Micro-Inequities

Valued

Included

Encouraged

Intentional

Positive

Excluded

Devalued

Unintentional

Negative

Discouraged







Self-Efficacy



Self-confidence does not equal self-efficacy!

Inspire the Courage to Excel



self – efficacy

*is the belief one holds in
their ability to perform a
specific task*

Inspire the Courage to Excel



ACHIEVEMENT

INTEREST & MOTIVATION

ENGAGEMENT

PERSISTENCE

PERFORMANCE

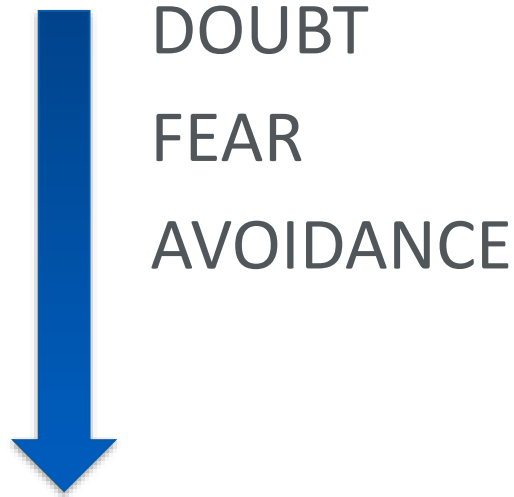


self – efficacy

*is the belief one holds in
their ability to perform a
specific task*

*An individual with high self-
efficacy is more likely to adopt
and commit to more
challenging goals.*

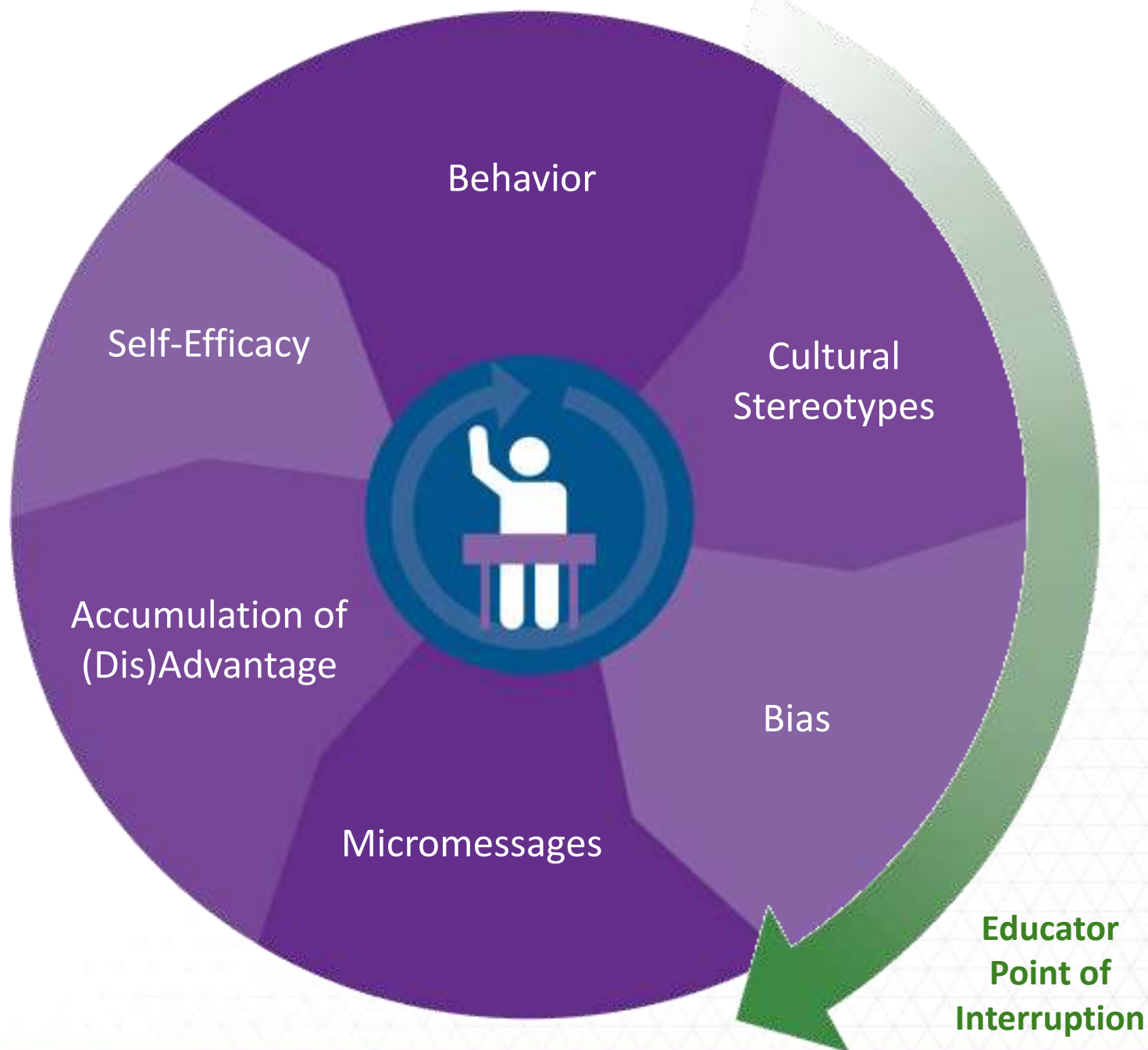
Inspire the Courage to Excel



self – efficacy

*is the belief one holds in
their ability to perform a
specific task*

*An individual with low self-
efficacy is more likely to avoid
challenges.*



Why Think About Micromessaging?

Teacher/Advisor

Student

Intent

Micromessages

IMPACT

Performance
& Outcomes

Impact is more important than Intent!



Root Cause Analysis Through Action Research

Root Causes

- Surveys
- Equity Audits
- Interviews
- Focus Groups





Research- and Evidence-based strategies with links: www.napequity.org/root



National Alliance for Partnerships in Equity

The Equity Professionals

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EARLY INTERVENTION

Review the [Theory and Evidence](#).

Recommendations and Strategies*

- *Conduct interventions for middle school students:* NSF's New Formulas for America's Workforce 2 Projects provide programming for American girls for whom timing of their future plans can have an ill-timed conjunction with eroding self-efficacy and greater awareness of social messages, about femininity.
- *Target elementary and middle school students, especially for math interventions:* "Intervention programs should be started early to counteract the belief that 'mathematics is a matter for boys.'"
- *Intervene early in youth's development:* Interventions that address occupational factors may be vital to getting students ages 10- 13 more interested in an *Informative Technologies*. This is especially true for math and science.



Root Causes

[Support Services](#)

[Academic Proficiency](#)

[Early Intervention](#)

[Access to and Participation in Math, Science and Technology](#)

[Characteristics of an Occupation: Job Satisfaction/Career-Family Balance/Occupational Perception/Wage Potential](#)

[Curriculum](#)

[Family Characteristics](#)

[Instructional Strategies](#)

[Internal/Individual](#)

[School and Classroom Climate](#)

[Societal Issues](#)

[Materials and Practices: Assessment,](#)



Super Strategies to Effectively Serve Native American Students in CTE and STEM

- **Group**

- Design group activities based on successful teamwork
- Assign group roles contrary to first instinct

- **Cooperation**

- Balance cooperative activities with competitive ones
- Allow students to grade based on cooperation

- **Give and Share**

- Encourage and value sharing of information/knowledge



Source: Handout (downloadable today). Authors: Wren Walker-Robbins, PhD, Meagan Pollock, PhD, and resources from <http://literacynet.org/lp/namericans/values.html>

Super Strategies to Effectively Serve Native American Students in CTE and STEM

- **Patience**

- Employ strategies to call on every student
- Wait 15 seconds after a question before any prompts

- **Listen**

- Model and teach to notice and listen first, and then question
- Create a classroom welcome to listeners as well as talkers

- **Flexible Time**

- Allow time for low-pressure learning not tightly restricted
- Although order is important, be empathetic when it comes to time



Source: Handout (downloadable today). Authors: Wren Walker-Robbins, PhD, Meagan Pollock, PhD, and resources from <http://literacynet.org/lp/namericans/values.html>

Super Strategies to Effectively Serve Native American Students in CTE and STEM

- **Work Value**

- Explain value and purpose of every lesson and activity (relevance)
- Encourage learning and effort towards it over performance

- **Communities of Practice**

- Peer observation
- Small group professional development
- Action research



Source: Handout (downloadable today). Authors: Wren Walker-Robbins, PhD, Meagan Pollock, PhD, and resources from <http://literacynet.org/lp/namericans/values.html>







EXPANDING PERCEPTIONS OF CAREER PATHWAYS

Roseburg High School, Douglas ESD, Oregon

Select: Strategies

- ☐ **Welding instructor buy-in**
- ☐ **Welding equipment**
- ☐ **Freshmen Cruise**
- ☐ **“Pride Night” (Open House)**
- ☐ **Explore Nontraditional Careers**



Results

Fall 2015: 4 female students enrolled in Welding

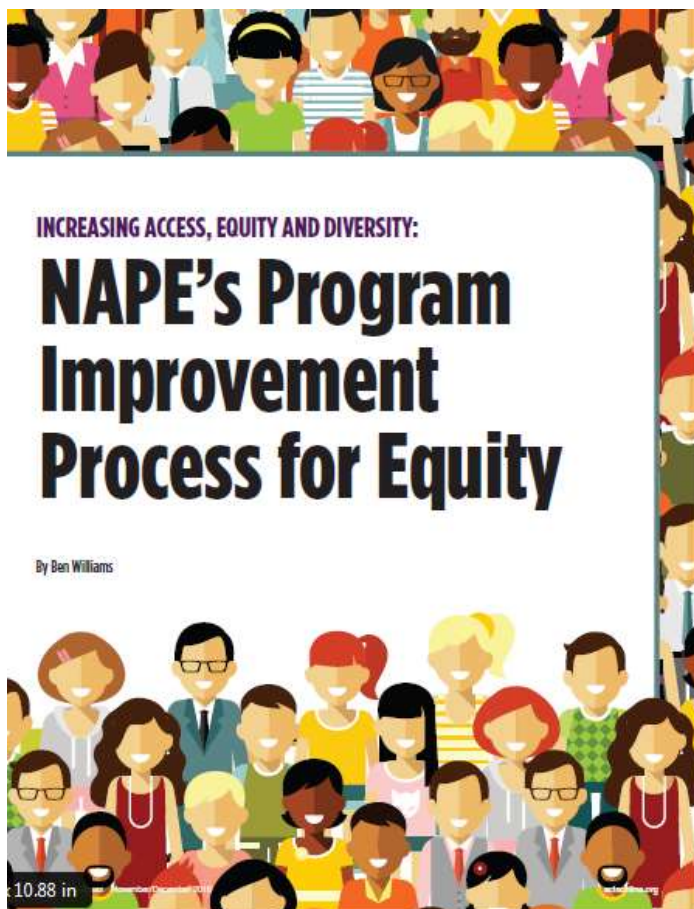
Spring 2016: **38 female students enrolled in Welding (800% increase!)**



Students this fall



Recent ACTE Techniques Article



The demand for a skilled and educated STEM (science, technology, engineering and math) workforce continues to increase. Over the next five years, companies will need to replace 945,000 U.S. workers who have basic STEM literacy and 633,000 U.S. workers who have advanced STEM knowledge (Business Roundtable & Change the Equation, 2014). Yet, the participation of women, people of color and individuals from "special populations" (i.e., individuals with disabilities; individuals considered to be economically disadvantaged; individuals with limited English proficiency, including English language learners, single parents, displaced homemakers, and individuals pursuing programs that lead to nontraditional occupations) has stagnated in some cases and dropped in others. For example, from 2001 to 2014, the participation of women in engineering, computing and advanced manufacturing remained flat, and the participation of African-Americans and Latinos in those fields relative to the U.S. working-age population declined (Change the Equation, 2015).

The U.S. Department of Education's Office for Civil Rights (OCR) and the Office of Career, Technical, and Adult Education (OCTAE) released a "Dear Colleague" letter on June 16, 2016, to provide "significant guidance" in addressing the critical need for state and local education agencies (SEAs and LEAs) to increase gender equity in career and technical education (CTE).

The letter states the following: Ensuring equitable access to CTE by eliminating discriminatory practices and taking proactive steps to expand participation of students in fields where the sex is underrepresented can increase overall participation and success in high-growth fields, such as nursing, advanced manufacturing, information technology, computer science and cybersecurity, for both men and women. (U.S. Dept. of Education, 2016)

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins) requires every SEA to set negotiated performance measures and annually report its progress to OCTAE. If a state does not meet at least 90 percent of its negotiated target,

it is required to develop and implement an improvement plan outlining the action it will take to improve its performance.

Included in the Perkins accountability system are two measures directed toward gender equity in CTE. Those measures are focused on increasing the participation and completion rates of underrepresented gender students in programs that lead to nontraditional occupations, i.e., those with less than 25 percent of one gender represented in the workforce, such as women in engineering technology and men in nursing. These accountability provisions also apply to every LEA receiving Perkins funds.

NAPE's Solution: The Program Improvement Process for Equity™ (PIPE™)
The National Alliance for Partnerships in Equity (NAPE) Education Foundation has designed a highly effective process to translate current research on gender equity in CTE into practice and transfer this knowledge to and through state offices of education, especially those responsible for the implementation of Perkins.

PIPE is a research-based institutional change model and professional develop-

ment program designed to increase the participation and success of underrepresented students in nontraditional CTE programs, including girls and women in STEM (Williams, 2014). PIPE training includes five modules: Organize, Explore, Discover, Select and Act.

Module 1: Organize
PIPE is most effective when a cross-functional team representing the CTE and STEM education and workforce pipelines in the local community is assembled. Team members typically include administrator(s), teachers and staff members (including counselors and advisors) from local high schools and/or career centers, community colleges and middle schools, as well as community partners and employers. Also part of each PIPE team is a site team leader from NAPE who orients and prepares the team for training.

Module 2: Explore
The data typically provided in Perkins coordinators' relative to their institution's performance on the Perkins accountability measures are aggregated at the institutional level. For example, an institution's



(FIGURE 1) PIPE training includes five modules: Organize, Explore, Discover, Select, and Act.

Check the RADIO,
and tune-in to micromessages!



R A D I O

Reflect
on bias and
stereotypes

Anticipate
impact of
decisions,
words, and
behaviors

Discover
and address
negative
micromessages

Identify
ways to give
positive
micromessages

Offer
high
expectations
and wise
feedback



Take-Aways and Questions



“I am only one, but still I am one. I cannot do everything, but still I can do something; and because I cannot do everything, I will not refuse to do something I can do.”

-Edward Everett Hale



Thank you for your participation!

Ben Williams, PhD

Director of Special Projects

bwilliams@napequity.org

[@NAPEquity; @BenWilliamsPhD](#)

www.napequity.org



This webinar recording will be made available online.

This webinar will be archived on the IES You Tube channel.

Watch for an announcement about its availability in your e-mail inbox!

For more information about upcoming events from the Regional Educational Laboratory Program, go to:
<https://ies.ed.gov/ncee/edlabs/>.