

CA PERKINS JOINT
**Special
Populations**
ADVISORY COMMITTEE

Promoting **Equity & Student Success**
Through Career Technical Education

STEM, Equity, & Access: Why, Who, and How

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Agenda



1. Introductions
2. What are we talking about?
3. Why do we focus on STEM?
4. Who is missing from STEM classrooms and industry?
5. How to we begin to move the needle?

Introductions

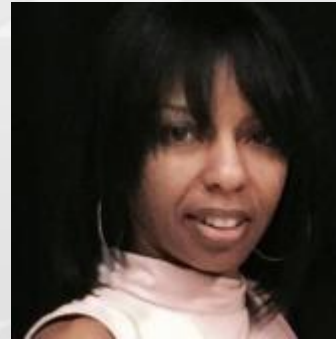


Elizabeth Wallner

Elizabeth has been working with the CA Perkins JSPAC for 17 years. She has a passion for ensuring the access and opportunities

for each student in the community college CTE programs and beyond.

Elizabeth is a graduate of Cosumnes River College and CSU, Sacramento. She has a BA in Liberal Studies, a minor in women's studies, and a MA (ABT) in Public Policy. She is a proud single mother of one CCC student.



Tonette Salter

Tonette, is a seasoned grant manager with emphasis on developing educational programs. She has lead faculty

from K-14 in developing a region wide education plan to address students in ESL, Short Term CTE, and Adult with Disabilities. Tonette is pretty clever at finding ways to achieve what may seem impossible. Her ingenuity comes from a creative spirit and her credence to Listen – Learn – Connect- Implement – Achieve. She is an advocate for teachers and knows first-hand that teachers have the ability to see the effectiveness or inefficiencies of education and are vital players in educational reform.



Audience Introductions

- A = K-12
- B = Adult Ed.
- C = Community College
- D = Other



Audience Introductions

A. = Teacher

B. = Counselor

C. = Administration

D. = Student Services

E. = Program Coordinator/Other

STEM → STEAM → STEMM → STREAM



- A = Art and Design
- M = Music
- R = Reading
 - Apple
 - Media
 - Web design
 - Software design and applications

CA STEM Learning Network



Definition

- STEM = Science, Technology, Engineering, and Math
- Skills & knowledge in each discipline are essential for student success
- STEM is an interdisciplinary and applied approach
- Coupled with hands-on, problem-based learning.

STEM Literacy

- Innovator and critical thinker
- Meaningful connections between school, community, work, & global issues.

www.clsnet.org



Other STEM Initiatives

- CA STEM Service Learning Initiative -- <http://www.calstem.org/>
- CA Dept. of Ed.'s STEM Taskforce -- <http://www.cde.ca.gov/eo/in/stemtf.asp>
- OC STEM Initiative -- <http://ocstem.org/Default.aspx>
- STEM Education Coalition -- <http://www.stemedcoalition.org/>
- US DOE's STEM: Education for Global Leadership -- <http://www.ed.gov/stem>
- Teach For America's Math and Science Education Initiative <https://www.teachforamerica.org/our-organization/special-initiatives/math-and-science-education-initiative-stem>
- STEM to STEAM -- <http://stemtosteam.org/>
- STEM Career: For Those Seeking and Promoting STEM Careers <http://stemcareer.com/>



Economic Need

- Do we need more STEM students or employees?
- What occupations are growing? Which STEM Fields?
- Many lists and resources
 - **CA LMI**
 - All but a few occupations *earning at least \$25,000* and having the greatest numerical growth in 2012 – 2020 are in STEM/CTE
 - **US News and World Report (2012):**

Data	Computer	Finance
Scientific	Engineering	Management
Research	Veterinarians	Entrepreneurship
Counseling	Environmental and Conservation Science	



Shortage or NO shortage?

- Domestic v. Guest Workers
- Women
- Other under-represented students

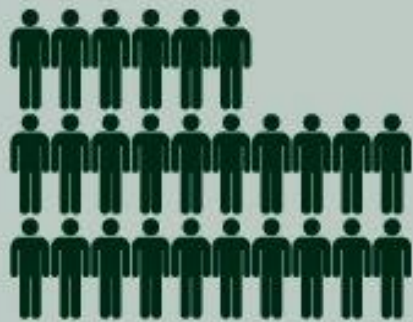
- <http://www.businessinsider.com/the-real-truth-about-the-stem-shortage-that-americans-dont-want-to-hear-2013-5> – Business Insider, Walter Hickey June 1, 2013
- <http://www.theatlantic.com/education/archive/2014/03/the-myth-of-the-science-and-engineering-shortage/284359/> - Michael Teitelbaum, Research Associate, Harvard Law, March 19, 2014
- <http://blogs.seattletimes.com/northwestvoices/2014/10/03/stem-education-myth-of-job-shortages-discourages-those-pursing-stem/> - Ruth Ann Mullen, Seattle Times, Editorial, October 3, 2014
- <http://spectrum.ieee.org/at-work/education/the-stem-crisis-is-a-myth> - August 30, 2014



Previous STEM studies have neglected the many blue collar and technical jobs that require considerable STEM knowledge. But this study finds that

50%

of STEM jobs **do not require** a bachelor's degree. As a result, STEM knowledge plays a much larger role in our economy than previously thought:



There are

26 MILLION

STEM jobs in the U.S.



STEM jobs comprise

20%

of all U.S. jobs.

20%

10%

1850











2011

The share of jobs requiring STEM knowledge has











doubled

since the Industrial Revolution

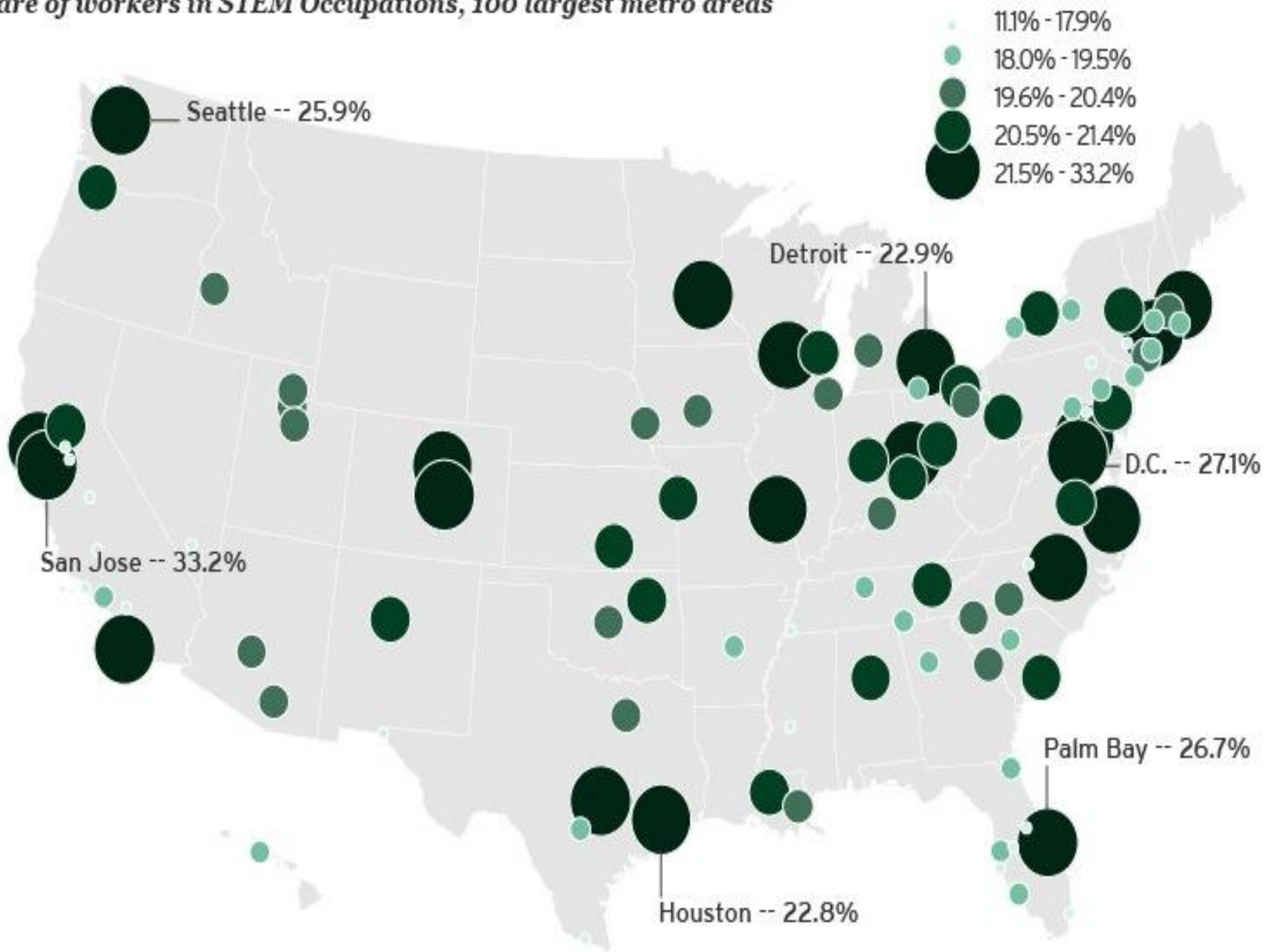
STEM occupations requiring the most knowledge

<i>Occupation</i>	<i># of jobs</i>	<i>avg. wages</i>
 Biomedical Engineers	16,590	\$88,360
 Chemical Engineers	27,860	\$99,440
 Biochemists and Biophysicists	25,160	\$87,640
 Engineers, All Other	125,590	\$92,260
 Nuclear Engineers	18,430	\$105,160
 Agricultural Engineers	2,650	\$78,400
 Materials Scientists	7,900	\$86,600
 Engineering Teachers	33,660	\$97,260
 Hydrologists	6,960	\$79,070
 Materials Engineers	22,160	\$86,790

Most common STEM occupations requiring less than an Associate's Degree

<i>Occupation</i>	<i># of jobs</i>	<i>avg. wages</i>
 Registered Nurses	2,724,570	\$69,110
 Auto Techs and Mechanics	589,570	\$38,560
 Carpenters	578,910	\$44,330
 Supervisors of Prod. & Ops. Workers	559,350	\$56,890
 Electricians	512,290	\$52,910
 Computer Systems Analysts	487,740	\$82,320
 Supervisors of Mechanics, etc.	418,530	\$62,190
 Machinists	368,510	\$40,520
 Plumbers, Pipefitters, Steamfitters	349,320	\$51,830
 Welders, Cutters, Solderers, Brazers	316,290	\$37,920





Share of workers in STEM Occupations, 100 largest metro areas



Metro areas with higher STEM knowledge have stronger economies

Workers not only do better economically when they work in STEM fields, but the overall economy appears to benefit as well.

Metropolitan areas by STEM concentration quartile:

	Top	Second	Third	Bottom
 <i>Patents per million residents, 2011</i>	1.27	0.72	0.48	0.37
 <i>Unemployment rate, 2011</i>	8.3%	9.0	9.9	10.3
 <i>Median household income, 2011</i>	\$58,482	54,005	46,575	44,184
 <i>Exports as share of GDP, 2011</i>	10.8%	8.9	8.5	7.4
 <i>Employment growth rate, 2008-2012</i>	-2.8%	-3.7	-5.4	-5.2
 <i>Tech. sector employment share, 2011</i>	6.2%	4.4	3.0	2.3



Who is missing from STEM?

- Women
- Blacks/African Americans
- Hispanics/ESL
- (dis)Abled
- Low SES

Q & A



Q: African Americans, American Indians, and Latinos comprise 34% of the US population and only _____ of undergrad degrees in engineering.¹

A:

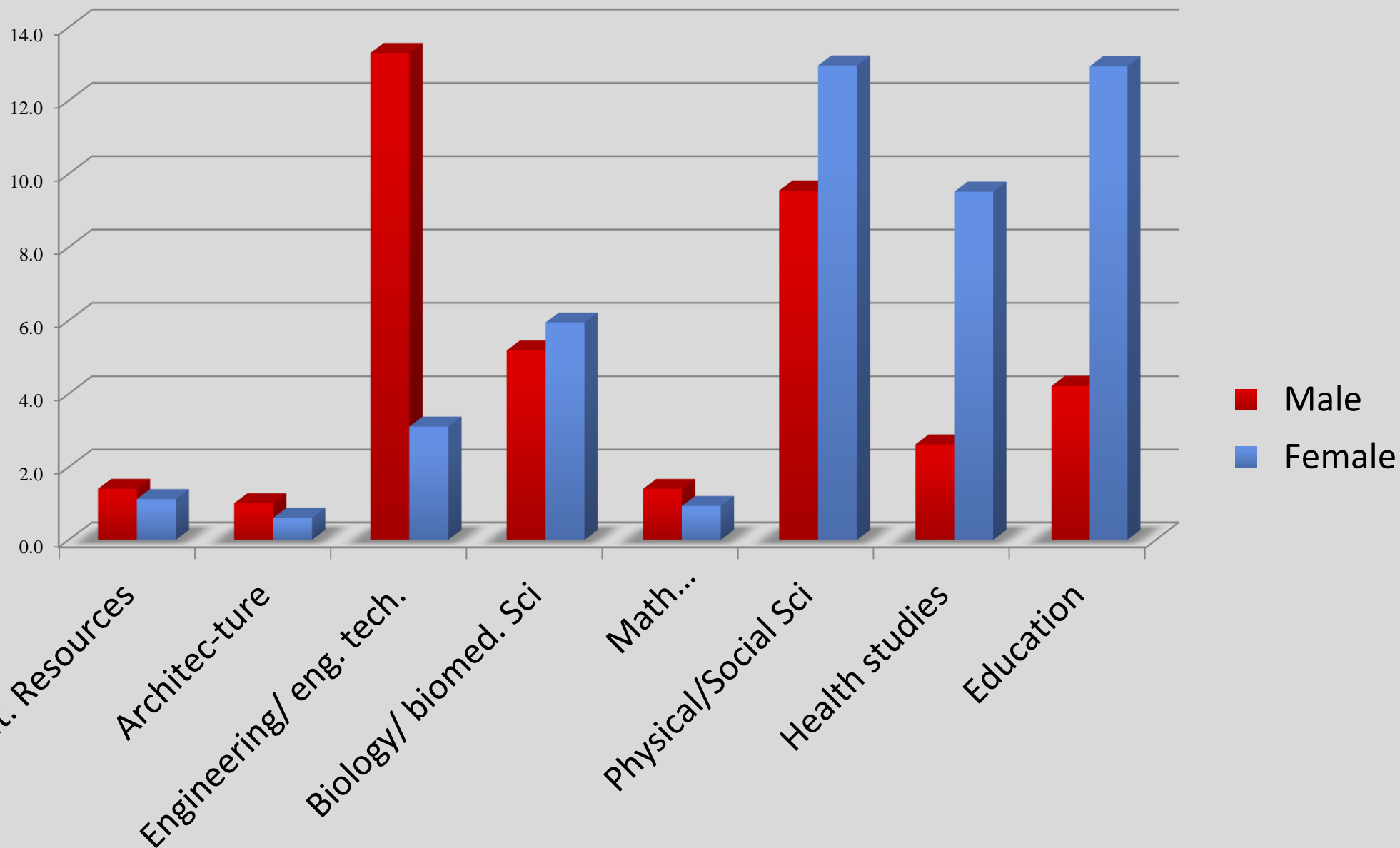
Q: Women account for one-half of the US workforce but only _____ of US engineers?¹

A:

Number of persons by gender 25-24 with BA+, 2011

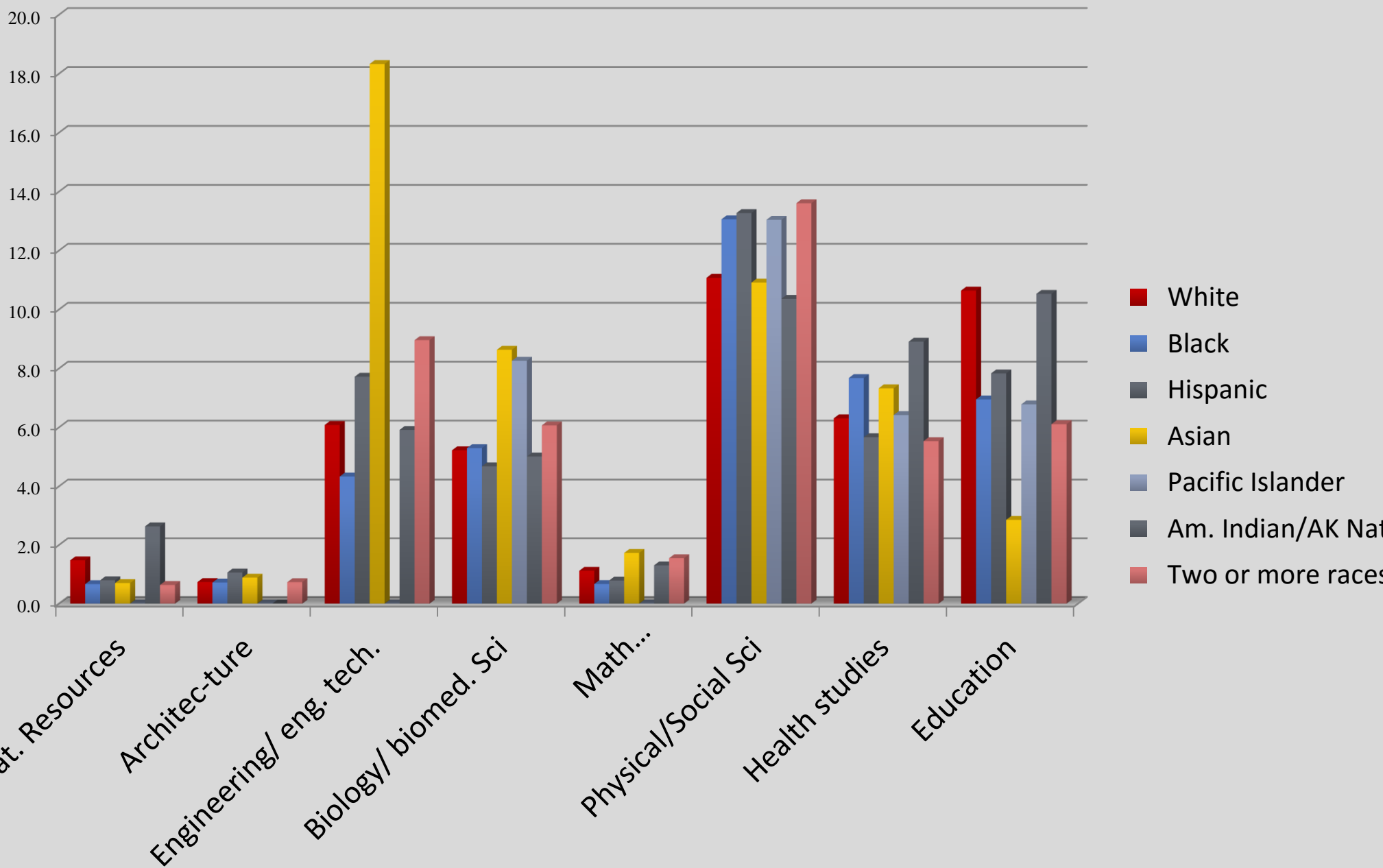


http://nces.ed.gov/programs/digest/d13/tables/dt13_104.61.asp?current=yes



Number of persons by race, 25-24 with BA+, 2011

http://nces.ed.gov/programs/digest/d13/tables/dt13_104.61.asp?current=yes



How do we begin to Improve?



- **No Silver Bullet!**
- Most effective schools = equity is integrated seamlessly into the community, curriculum, and programs.
- Environmental Scan
- Micromessages
- Root Causes & Strategies

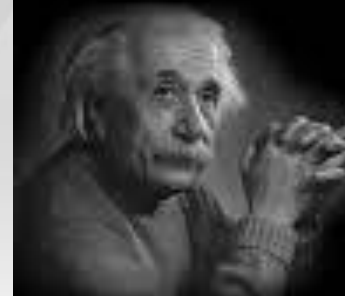


Environmental Scan



- **Why?**
- **When?**
- **How?**
 - National Alliance for Partnerships in Equity (www.napequity.org)

We can't solve
problems by using the
same kind of thinking
we used when we
created them.



Albert Einstein
German Theoretical Physicist
(1879-1955)

QuantelD.com



Micromessages

“...apparently small events which are often ephemeral and hard to prove, events which are covert, often unintentional, frequently unrecognized by the perpetrator...”
Mary Rowe, MIT

- Micro-inequities v. Micro-affirmations
- Micro-disadvantages and micro-advantages
- Intent v. Impact

Mircomessaging To Reach and Teach Every Student

- <http://www.napequity.org/professional-development/teacher-training/>

Mary Rowe, MIT

- <http://ombud.mit.edu/sites/default/files/documents/barriers.pdf>

Stephen Young -- [*MicroMessaging: Why Great Leadership is Beyond Words.*](#)

Career/Occupational Information



- **Materials, practices**
 - Professional Development for Counselors
 - Project Implicit
 - <https://implicit.harvard.edu/implicit/takeatest.html>
 - JSPAC e-Seminar: **Improving STEM and NT Career Advising**
 - <http://jspac.org/training-e-seminars#Advising>
 - Comprehensive characteristics & benefits of **STEM** and/or **NT**
 - STEM focused materials
- Early Counseling Intervention



Family Characteristics

- I cannot be what I **cannot see**
- Love or hate **parents career?**
- **Other influences on student decisions**
- **Perceived barriers and rewards** from a career choice
- <http://www.parachute4teens.com/blog/51-how-culture-and-family-affect-career-choice.html>
- <http://www.nsfengineerstudy.org/webdocs/scct.pdf>



Internal/Individual

Self-Efficacy

- The ability to see ones self as being successful in a career

Attribution Theory

- The way in which a student attributes success and failure
- Bernard Weiner
 - Internal v External
 - Stable v. Unstable

What does this look like in your classroom?

Are the students “correct” in their attributions?

How does this relate to STEM education?

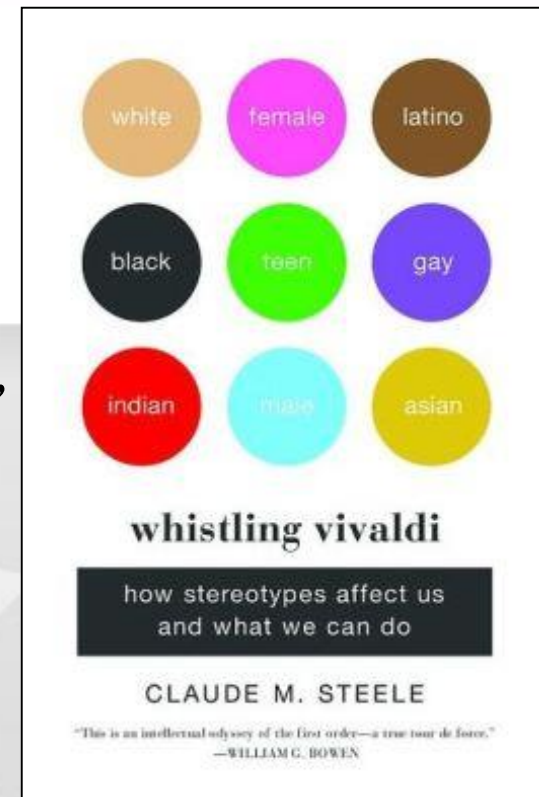
Stereotype Threat

“Refers to being at risk of confirming, as self-characteristic, a negative stereotype about one's group”

Claude Steele, [Whistling Vivaldi](#)

- Leads to self-handicapping strategies
- Leads students to choose different careers
- To Reduce:

Reframe	Role Models	Critical Mass
Deemphasize	Incremental intelligence	“You’re from Stanford!”
Encourage self Affirmation	External Attributes for difficulty	“Passing”
Emphasize high standards & the belief that one can meet them!		



<http://reducingstereotypethreat.org/reduce.html>

<http://www.npr.org/player/v2/mediaPlayer.html?action=1&t=1&islist=false&id=125859207&m=125859195>

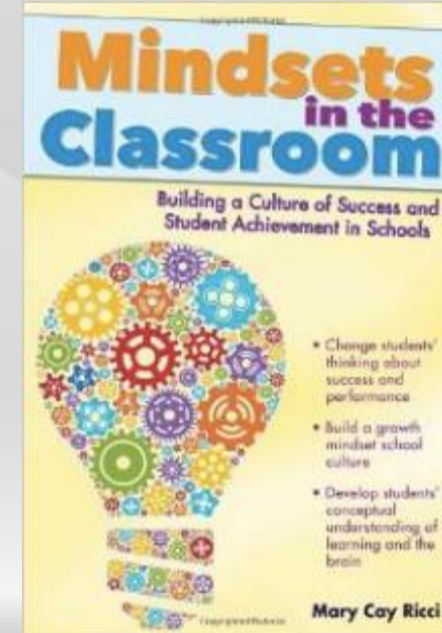
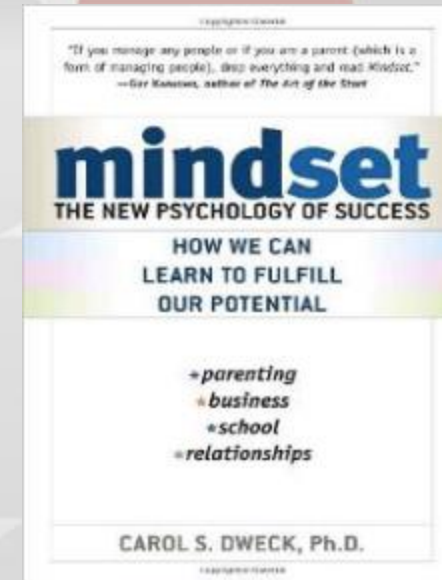
Mindset



By: Carole Dweke, Stanford

Fixed mindset people believe their basic qualities, like their intelligence or talent, are simply fixed traits.

Growth mindset people believe that their most basic abilities can be developed through dedication and hard work—brains and talent are just the starting point.





Resources

- CA Perkins Joint Special Populations Advisory Committee
 - www.jspac.org
- National Alliance for Partnerships in Equity
 - www.napequity.org
 - www.stemequitypipeline.org
- CA Stem Learning Network
 - <http://www.cslnet.org/>
- NSF.GOV
 - <http://www.nsf.gov/statistics/seind14/index.cfm/chapter-3/c3h.htm>
- Map of Regional STEAM effort
 - <http://stemtosteam.org/wp-content/uploads/2013/07/STEAM-by-US-region.pdf> -
- IWITTS -- www.iwitts.org

Research Studies Mentioned



- **Male biology students consistently underestimate female peers, study finds – Feb 11, 2016**
 - <http://phys.org/news/2016-02-male-biology-students-underestimate-female.html>
- **Reducing Stereotype Threat**
 - www.reducingstereotypethreat.org



JSPAC Conference 2016

Save the date!

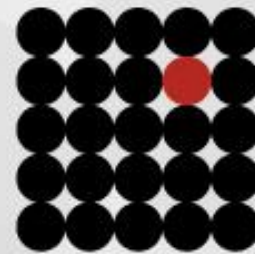
- December 1-2, 2016
 - November 30 – preconference
- Additional details to be posted to www.JSPAC.org ASAP





- Questions
 - Reflections
 - Evaluations

Thank you!



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