“What you do with Experience Counts”

2015 CA STEM Symposium
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Raise your hand if you are a...

- Secondary school educator
- K-12 administrator
- STEM higher education faculty member
- STEM professional
- Other
What do you think this graph represents?

Note: Results are for OECD countries; OECD partner countries not included. Differences may not be statistically significant.
SOURCE: OECD
US Math and Science Achievement vs. other countries

PISA rankings show United States trailing other OECD countries

<table>
<thead>
<tr>
<th>Average PISA mathematics score, 2006</th>
<th>Average PISA science score, 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland 548</td>
<td>Korea 552</td>
</tr>
<tr>
<td>Korea 547</td>
<td>Finland 548</td>
</tr>
<tr>
<td>Netherlands 531</td>
<td>Canada 527</td>
</tr>
<tr>
<td>Switzerland 532</td>
<td>New Zealand 522</td>
</tr>
<tr>
<td>Canada 527</td>
<td>Netherlands 519</td>
</tr>
<tr>
<td>Japan 523</td>
<td>Australia 516</td>
</tr>
<tr>
<td>New Zealand 523</td>
<td>Switzerland 514</td>
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<td>Belgium 522</td>
<td>Belgium 511</td>
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<td>Australia 520</td>
<td>Japan 511</td>
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<tr>
<td>Denmark 513</td>
<td>Ireland 509</td>
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<td>Czech Republic 510</td>
<td>Sweden 505</td>
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<td>Iceland 506</td>
<td>Denmark 504</td>
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<tr>
<td>Austria 505</td>
<td>Poland 502</td>
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<tr>
<td>Germany 504</td>
<td>Austria 498</td>
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<tr>
<td>Sweden 502</td>
<td>Czech Republic 496</td>
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<tr>
<td>Ireland 501</td>
<td>United Kingdom 495</td>
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<tr>
<td>France 496</td>
<td>Iceland 495</td>
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<tr>
<td>United Kingdom 495</td>
<td>Poland 492</td>
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<tr>
<td>Romania 490</td>
<td>Slovak Republic 487</td>
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<tr>
<td>Hungary 491</td>
<td>Ukraine 487</td>
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<tr>
<td>Luxembourg 490</td>
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</tr>
<tr>
<td>Norway 490</td>
<td>Luxembourg 485</td>
</tr>
<tr>
<td>Spain 480</td>
<td>Slovak Republic 478</td>
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<tr>
<td>United States 474</td>
<td>United States 474</td>
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<tr>
<td>Portugal 466</td>
<td>Spain 470</td>
</tr>
<tr>
<td>Italy 462</td>
<td>Portugal 469</td>
</tr>
<tr>
<td>Greece 459</td>
<td>Italy 465</td>
</tr>
<tr>
<td>Turkey 459</td>
<td>Greece 459</td>
</tr>
<tr>
<td>Mexico 459</td>
<td>Turkey 459</td>
</tr>
<tr>
<td>Average = 498</td>
<td>Average = 494</td>
</tr>
</tbody>
</table>

Note: Results are for OECD countries; OECD partner countries not included. Differences may not be statistically significant.

SOURCE: OECD
US Math and Science Achievement vs. other countries

OECD 2012 MATH mean = 494

OECD 2012 SCIENCE mean = 501
US Math and Science Achievement vs. other countries

Breaking down the data:

1. The US has below average share of top performers in mathematics.
2. Students at the 90th percentile in the US are below the average student in Shanghai.
3. Massachusetts, the top performing state in the nation, did not come close to the top 10 in math.
5. The scores of low-income Americans are exceedingly low. The U.S. has a higher percentage of kids that can’t even hit the lowest levels on the math tests than other OECD countries do on average.
Not enough students in California are pursuing STEM fields in order to meet the demand for STEM related jobs.

Source: Teach.org
Enduring STEM achievement, access, and literacy gaps disproportionately limit low income, under-resourced, and minority student opportunities.

Ethnic Minorities Underrepresented in STEM Degrees

*Numbers do not add to exactly 100 percent because of rounding and variation in reporting ethnicity. Source: Science and Engineering Indicators, 2008*
Enduring STEM achievement, access, and literacy gaps disproportionately limit low income, under-resourced, and minority student opportunities.

Figure 9. 
**Racial and Ethnic Representation in the STEM Workforce**
(In percent. Data based on sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see [www.census.gov/acs/www/](http://www.census.gov/acs/www/))

<table>
<thead>
<tr>
<th>Race and Ethnicity</th>
<th>Total Workforce</th>
<th>STEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>White alone, not Hispanic or Latino</td>
<td>66.9</td>
<td>70.8</td>
</tr>
<tr>
<td>Black or African American alone</td>
<td>10.8</td>
<td>6.4</td>
</tr>
<tr>
<td>Asian alone</td>
<td>5.5</td>
<td>14.5</td>
</tr>
<tr>
<td>American Indian and Alaska Native alone</td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Some Other Race and Native Hawaiian or Other Pacific Islander alone</td>
<td>4.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>1.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Hispanic or Latino (of any race)</td>
<td>14.9</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Note: Native Hawaiian or Other Pacific Islander alone was combined with Some Other Race because of a small number of sample observations.
Source: U.S. Census Bureau, 2011 American Community Survey.
2015 supply of teachers is insufficient for K-12 STEM instructional needs

Challenges to Recruiting STEM Professionals into Teaching:
• Too few education majors who are both interested and capable
• Too few STEM majors who would be willing to earn less as a teacher

There were over 21,000 teaching vacancies at the beginning of this school year in California.

California alone needs 33,000 new math and science teachers over the next 10 years.
2015 supply of teachers is insufficient for K-12 STEM instructional needs

Between 2003 and 2012, enrollment in teacher preparation programs has declined 74%.
The Point

Enduring STEM achievement, access, and literacy gaps disproportionately limit low income, under-resourced, and minority student opportunities.
The jobs of tomorrow are going to involve much more science and math. If young people are not STEM proficient, their personal life options are limited.

Innovation in science, technology, and engineering is the driving force behind our economic system. Without a solid STEM backbone, society collapses.

The next generation will inherit incredible problems from us, problems that threaten humanity’s continued existence on Earth. STEM know-how is the best chance they will have to solve those problems.
The Government’s 5 year strategic plan for STEM Education
(Adopted May, 2013)

1. **Improve STEM Instruction**: Prepare 100,000 excellent new K-12 STEM teachers by 2020, and support the existing STEM teacher workforce.

2. **Increase and Sustain Youth and Public Engagement in STEM**: Support a 50 percent increase in the number of U.S. youth who have an authentic STEM experience each year prior to completing high school.

3. **Enhance STEM Experience of Undergraduate Students**: Graduate one million additional students with degrees in STEM fields over the next 10 years.

4. **Better Serve Groups Historically Under-represented in STEM Fields**: Increase the number of students from groups that have been underrepresented in STEM fields that graduate with STEM degrees in the next 10 years and improve women’s participation in areas of STEM where they are significantly underrepresented.

5. **Design Graduate Education for Tomorrow’s STEM Workforce**: Provide graduate-trained STEM professionals with basic and applied research expertise, options to acquire specialized skills in areas of national importance, mission-critical workforce needs for the CoSTEM agencies, and ancillary skills needed for success in a broad range of careers.
EnCorps’ Solution

STEM professionals, when thoroughly prepared, are uniquely positioned to meaningfully utilize their talent and real-world expertise to deliver an authentic, rigorous, and relevant STEM education to the students who need it most.

STEM Professionals:

- Know their stuff
- Are passionate about their area of expertise
- Can answer the question of relevance
- Can serve as role models
- Have access to worlds and opportunities that students do not
EnCorps’ Mission

Enduring STEM achievement, access, and literacy gaps disproportionately limit low income, under-resourced, and minority student opportunities.

STEM professionals, when thoroughly prepared, are uniquely positioned to meaningfully utilize their talent and real-world expertise as EnCorps STEM Teachers to deliver an authentic, rigorous, and relevant STEM education to the students who need it most.
EnCorps’ Mission

The EnCorps STEM Teachers Program recruits, selects, develops and supports the best and brightest STEM professionals and military veterans, as an innovative, long-term solution to the shortage of high quality, impactfulful educators for under-resourced students in high need communities.
EnCorps’ Mission

How do we accomplish this?

Collaboration

- Partnerships with K-12
- Collaboration with STEM professional associations
- Partnerships with Higher Education
- 100k in 10 – nationwide alliance of partners committed to recruiting and training 100,000 excellent math and science teachers
Partnerships with K-12

EnCorps Educators begin their experience with one semester of volunteer tutoring and one semester of guest teaching.

- High-needs middle and high schools receive free support from a content expert
- Schools develop a teaching talent pipeline
- Students are exposed to STEM careers and role models
Collaboration with STEM Professional Associations

EnCorps collaborates with local STEM professional associations to deliver our message and opportunity to a wide audience.

- EnCorps Recruitment Directors present at membership meetings and conferences, advertise our opportunity in their newsletters
- STEM professionals are granted the opportunity to give back
Partnerships with Higher Education

**Single Subject Credential**
- Cal State University CSUDH, CSUEB, Sac State, LAUTR
- Green Dot / LMU
- Aspire Teacher Residency
- UCLA Impact
- High Tech High

**CTE Credential**
- Orange County Dept. of Education
- UC Berkeley

- Mutually supportive recruitment efforts
- Intense candidate support
Over 200 partners work to support STEM educators and to train 100,000 excellent new STEM teachers by 2021

Partners take action by

1. increasing the supply of excellent STEM teachers;

2. hiring, developing, and retaining excellent STEM teachers; or

3. building the 100Kin10 movement. Partners bring expertise and program or funding capacity to advance the initiative.
Case Study

STEM Academy of Hollywood

An Innovative & Unique Solution

STEM Professional

EnCorps
STEM TEACHERS PROGRAM

Teach in a Classroom
TYRAN RICHARDS  
Industry Profession: Pharmaceutical Chemist  
Education: B.S. in Biology  
Teaching: HS Science & Robotics

The formulation chemist thrived during her 12-year career at Dow Pharmaceutical, Chiron Corporation and Alza before she was bitten by the teaching bug. Tyran believes that her corporate background and industry experience give her an advantage in maintaining order among students and juggling several concurrent learning exercises.

“Project management specifically translates into the classroom because that is what you basically are – the CEO of your classroom,” Tyran says. “Just being able to use my past career to inspire my students is tremendous.”
ED CRANDALL
Industry Profession: US Naval Nuclear Sub Officer
Education: B.S. in Physics
Teaching: HS Physics Teacher

Ed shares his Navy experiences with students in his class so that they can make the connection between what they are studying in handouts and real-life application of the material. Ed says that kids show keen interest in his first-hand accounts of engineering and physics in action, and they often ask follow-up questions.

Ed also emphasizes with his students that in a professional workplace, their decisions and the quality of their work can have significant consequences for the people around them. No one works in a vacuum, and everyone is accountable.
MIKE ERICKSON
Industry Profession: Chemist, Statistician, Systems Analyst
Education: M.S. Experimental Psychology
B.S. Computer Science / B.S. Chemistry & Psychology
Teaching: High School Chemistry & Physics

After working as a professional chemist and statistician for 29 years in the pharmaceutical and agriculture industries, Mike has experience and many stories to share with students in the small rural where he teaches.

“I always thought that teaching would be the ultimate gratifying opportunity. To influence a student’s career and life is amazing … I realize my actions have a big impact on whether and how much they learn.”
EnCorps STEM Educators come with applied math and science experiences from:

- Microsoft
- Applied Materials
- Citibank
- Smith Barney
- URS Corporation
- Southern California Edison
- Northrup Grumman
- Sun Microsystems
- IBM
- Amgen
- SpaceX
- US Air Force, Army, Navy and Coast Guard
EnCorps STEM Educators bring these competencies:

- Mission Fit with EnCorps
- Achievement in STEM Fields
- Leadership and Influence
- Resilience / Grit
- Personal Responsibility
- Growth Mindset and Lifelong Learning Orientation
- Cultural Competency
Inspiring the next generation of innovators...

EnCorps
STEM TEACHERS PROGRAM
Questions?

www.encorps.org

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