“The Elephant in the Room”

Issues of Access and Equity in STEM

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Group discussion:

Take 3-5 minutes to answer the following question:

Why STEM?
Why STEM?

$2.5$ TRILLION

The U.S. would gain an extra $2.5$ trillion in Gross Domestic Product between now and 2050 if its students scored at the international average on math and science tests.

The aging STEM workforce

In 2014, many engineers and workers in advanced manufacturing were 45 or older. Even computer professionals were no longer much younger than the population as a whole.

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>51%</td>
</tr>
<tr>
<td>Advanced Manufacturing</td>
<td>48%</td>
</tr>
<tr>
<td>Non-STEM</td>
<td>43%</td>
</tr>
<tr>
<td>Computing</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: Change the Equation, “The Diversity Dilemma,” 2015
Why STEM?

Will the STEM movement improve the lives of our typical California students?
60% of California students are socio-economically disadvantaged...

2014-15 CDE (California Department of Education),
What about ethnicity and such?

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Number of Students</th>
<th>Percent of Total Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic or Latino of Any Race</td>
<td>3,344,431</td>
<td>53.64%</td>
</tr>
<tr>
<td>American Indian or Alaska Native, Not Hispanic</td>
<td>36,755</td>
<td>0.59%</td>
</tr>
<tr>
<td>Asian, Not Hispanic</td>
<td>545,720</td>
<td>8.75%</td>
</tr>
<tr>
<td>Pacific Islander, Not Hispanic</td>
<td>31,513</td>
<td>0.51%</td>
</tr>
<tr>
<td>Filipino, Not Hispanic</td>
<td>158,224</td>
<td>2.54%</td>
</tr>
<tr>
<td>African American, Not Hispanic</td>
<td>373,280</td>
<td>5.99%</td>
</tr>
<tr>
<td>White, Not Hispanic</td>
<td>1,531,088</td>
<td>24.55%</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>175,700</td>
<td>2.82%</td>
</tr>
<tr>
<td>None Reported</td>
<td>38,809</td>
<td>0.62%</td>
</tr>
<tr>
<td>Total</td>
<td>6,235,520</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

61% of CA students are either Latino or African American....

2014-15 CDE (California Department of Education),
A picture of a gap in attainment...

The Higher Education Pipeline, By Race/Ethnicity

Percent of public high school graduates, 2011-2012 school year

- 59% White
- 18% Hispanic
- 16% Black
- 6% Asian
- 1% Other

Percent of 18-24 yr olds enrolled in college, 2012

- 58
- 19
- 14
- 7
- 2

Percent of 25-29 yr olds with a bachelor's degree or higher, 2012

- 69
- 9
- 9
- 11
- 2

Note: Hispanics are of any race. Whites include only non-Hispanics. For the high school graduate and bachelor's degree attainment figures, blacks and Asians include only non-Hispanics. For college enrollment figures, blacks and Asians include both Hispanics as well as non-Hispanics. "Other" includes small groups such as American Indians and those identifying as multiracial.


PEW RESEARCH CENTER
Further exacerbated at the Graduate level.
And representation in the workforce...

Whites and Asians still dominate the STEM workforce

Between 2001 and 2014, whites and Asians declined from 74 to 69 percent of the working-age population. Yet their dominance in critical STEM occupations continues unabated.

90% 89% 86% 85% 84% 83%

Engineering Computing Advanced Manufacturing

Source: Change the Equation, “The Diversity Dilemma,” 2015

African Americans and Latinos have lost ground in STEM

African American/Latino Percentage of:
- the U.S. working-age population
- the advanced manufacturing workforce
- the computing workforce
- the engineering workforce

Source: Change the Equation, “The Diversity Dilemma,” 2015
What to make of this?

-The elephant in the room is the reality that we have not dealt with issues on inequity in our state and country well enough...

-STEM has seemingly heightened the problem, as a point of further disparity and differentiation...

-To best address such issues, we have to go beyond ourselves, and understand the problem in a different context...

How can we conceptualize and understand the inequity that leads to being disadvantaged?
A student is disadvantaged then:

- Because of cultural and familial realities...
- Because of economic and income disparities...
- Because of how society is structured and how it informs them...
- Because of an educational system that also is not structured to promote social advancement...

Disadvantaged students often lack the knowledge, wherewithal and support to succeed in terms of their societal context…
In terms of educational research...

-We call these types of assets and information “capital” in educational research...

-”Cultural Capital,” for example, was coined by Pierre Bourdieau, and essentially refers to practices and norms of institutionalized groups that are reproduced and transmitted across generations¹

-”Social Capital” can be regarded as social networks or relationships whereas one can derive institutional support and sometimes privileged information²

Are we as educators doing what we can to meet the capital needs of our students?

Disadvantages of students:

- Our students do not usually have parents with salaried, professional jobs, and are not exposed to the norms and habits of those types of workers.
- Our students’ peer social groups are not conducive to promoting a college going mindset, i.e. low-tracked classes, gangs, drug culture.
- Our students do not have parents or siblings that attended college, and therefore have no models which to follow.

How capital is provided:

- Exposing students to the field of engineering (in the classroom and in competitions), and through advising and mentoring, the practices and habits they need to succeed in engineering careers.
- Classrooms and clubs help create a new network of students that value academics and are preparing themselves for college.
- Advising programs that provide students higher education information and strategies... Mentoring programs that provide students with role models for which to follow.

Examples of how to meet these needs...
How UCR MESA meets those needs

Being financially accessible...
Purposefully working to keeping school and student costs low or non-existent...

Focusing on the classroom...
Focusing on improving classroom content, learning and relevancy through engineering curriculum and activities...

Making STEM palpable and tangible...
Hands on projects contested at the College of Engineering help students realize that they can have success in engineering, and that creativity and workmanship are valued

Building relationships...
Through empowered teachers, caring mentors and amiable MESA staff, students build powerful relationships with their many educators

Striving for quality...
We strive to give students the best. From the quality of food to the time invested in our events, our students should never feel shortchanged. It should be explicit that we care for them...

STEM with a disposition and sensitivity for the typical CA students…
Further recommendations for change...

Focus on career/college relevant skills and practices for students...

Focus on changing teacher paradigms and dispositions...

Provide an enriching, STEM learning environment in every California classroom...

Personal relationships must be fostered through these classrooms and/or out of class STEM opportunities...

Encouraging culturally empowering and relevant networks among under-represented students and their educators...

Components that any successful STEM program/classroom should have to affect and impact our students populations ...
Questions? Comments?

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