Why you and it matters

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Computing is about creation and problem solving

CS studies computers and problem-solving processes, including their principles:

- Designs
- Applications
- Impact

CS is an intellectual activity that asks questions like...

- Which information is relevant to solving a problem?
- How do data become knowledge?
- What method will solve this type of problem?
Computing occupations pay well

**Median Annual Wage for Major Occupational Groups**

- Management
- Computer and Mathematical
- Legal
- Architecture and Engineering
- Business and Financial Operations
- Healthcare Practitioners and Technical
- Life, Physical, and Social Science
- Education, Training, and Library
- Arts, Design, Entertainment, Sports, and...
- Installation, Maintenance, and Repair
- Community and Social Service
- Construction and Extraction
- Protective Services
- Office and Administrative Support
- Production
- Transportation and Material Moving
- Healthcare Support
- Sales and Related
- Building and Grounds Cleaning and...
- Personal Care and Service
- Food Preparation and Serving
- Farm, Fishing, and Forestry

(Thousands of Dollars)
Computing occupations let you have a life

**Average Hours Per Week for Major Occupational Groups**

- Management
- Protective Services
- Farm, Fishing, and Forestry
- Legal
- Transportation and Material Moving
- Production
- Business and Financial Operations
- Arts, Design, Entertainment, Sports, and Media
- Installation, Maintenance, and Repair
- Sales and Related
- Architecture and Engineering
- Computer and Mathematical
- Healthcare Practitioners and Technical
- Construction and Extraction
- Life, Physical, and Social Science
- Community and Social Service
- Education, Training, and Library
- Personal Care and Service
- Office and Administrative Support
- Food Preparation and Serving
- Healthcare Support
- Building and Grounds Cleaning and Maintenance
- Average Hours Per Week: 37-45
BUT COMPUTING HAS A PROBLEM. IT ATTRACTS TOO FEW PEOPLE.
BLS Projected 2022 employment: Jobs requiring degree

- Meeting, convention, & event planners
- Mental health & substance abuse counselors
- Personal financial advisors
- Public relations specialists
- Medical & health services managers
- Medical & clinical laboratory technologists
- Mechanical engineers
- Market research analysts & marketing specialists
- Logisticians
- Industrial engineers
- Human resources specialists
- Healthcare practitioners
- Graphic designers
- Graduate teaching assistants
- Financial analysts
- Environmental scientists & specialists, including
- Engineers, all other
- Computer hardware engineers
- Cost estimators
- Civil engineers
- Child, family, & school social workers
- Accountants and auditors
- Aerospace engineers
- Biological technicians
- Chemists
- Computing occupations 27%
- Electronics engineers, except computer
- Electrical engineers
- Computer software engineers
- Engineers, except computer
2015 Intended Major (national sample)

- **Health Professions**, 11.3%
- **Arts and Humanities**, 10.1%
- **Social Sciences**, 10.8%
- **Other Majors**, 4.9%
- **Undecided**, 8.9%
- **Computer Science**, 3.8%
- **Education**, 4.2%
- **Math and Other CS**, 1.6%
- **Physical Science**, 2.6%
- **Engineering**, 13.1%
- **Business**, 13.2%

Let’s compare...
Demand and low production explains the CS initiatives

• January 30, 2016: President Obama introduced the “Computer Science for All” initiative

• CS curricula will become compulsory in:
  – primary and middle schools in San Francisco
  – primary schools in New York City
  – and for high school graduation in Chicago

• High schools in Arkansas, Texas, and New York City now must offer a CS course

• Virginia Standards of Learning must incorporate Computer Science
BUT COMPUTING HAS A PROBLEM.
IT ATTRACTS A NARROW RANGE OF PEOPLE.
## Women’s Presence in STEM Disciplines Varies

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Percent of BS Awarded to Women in the U.S. 2014</th>
<th>Total Degrees Awarded to Men and Women 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>59%</td>
<td>Biology</td>
</tr>
<tr>
<td>Chemistry</td>
<td>48%</td>
<td>Computer &amp; Information Sciences</td>
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<tr>
<td>Mathematics &amp; Statistics</td>
<td>42%</td>
<td>Mechanical Engineering</td>
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<tr>
<td>Biomedical Engineering</td>
<td>40%</td>
<td>Mathematics &amp; Statistics</td>
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<tr>
<td>Geology</td>
<td>40%</td>
<td>Chemistry</td>
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<tr>
<td>Chemical Engineering</td>
<td>34%</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Management Information Systems</td>
<td>26%</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>22%</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>Physics</td>
<td>19%</td>
<td>Management Information Systems</td>
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<tr>
<td>Computer &amp; Information Sciences</td>
<td>17%</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>Computer Science</td>
<td>15%</td>
<td>Physics</td>
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<tr>
<td>Mechanical Engineering</td>
<td>13%</td>
<td>Geology</td>
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<tr>
<td>Electrical Engineering</td>
<td>12%</td>
<td>Computer Engineering</td>
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<tr>
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<td>Men</td>
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<td></td>
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<td>Women</td>
</tr>
</tbody>
</table>

Percent of Degrees Awarded 2013, Major Occupations: Women and Underrepresented Minority Men

Source for Employment Data: NSF, Women, Minorities, and Persons With Disabilities: 2015, Table 9-7
Source for Degree Data: IPEDS via WebCASPAR, omit for-profits
SO, WHY SHOULD THAT MATTER?

WHY DOES IT MATTER TO YOU?
The Value of Diversity to Computer Science

Enhances innovation
Expands the qualified employee pool
Improves the bottom line

Promotes equality
Reflects user/consumer base

ncwit.org/businesscase
WHY DOES HIGH SCHOOL MATTER SO MUCH?
High school is an important time for developing education & career goals.

Most college students majoring in STEM make that choice during high school.

![Graph showing the probability of CS interest at the end of high school based on career interest at the beginning of high school.]

Source: Unpublished data from Ward & Sonnert


Similarities and differences among high school girls and boys

Similar Math
- Grades
- Test Scores
- Attitudes
- Course Taking

Different Influence
- Math courses more strongly predicted girls’ likelihood of majoring in STEM


Experience increases success

Experienced students get better grades in Intro CS. Experience typically assumed.
AP-takers are more likely to major in Computing Major

- CS AB: 32%
- CS A: 19%
- No CS AP: 3%
Girls are well qualified.

Girls take many engineering/CS pathway AP tests:

- 60% of all AP Biology
- 49% of all AP Calculus AB
- 42% of all AP Calculus BC
- 48% of all AP Chemistry
- 55% of all AP Environmental Science
- 40% of all AP Physics 1
- 52% of all AP Statistics

But fewer specific tests:

- 22% of all AP Computer Science A
- 32% of all AP Physics 2
- 24% of all AP Physics Electricity/Magnetism
- 27% of all AP Physics Mechanics

Source: AP Program Participation and Performance Data 2015 (collegeboard.org)
Why do teachers matter?

Offering, but not requiring, CS courses is unlikely to overcome the biased belief systems that keep students from taking them in high school. Taking CS courses that don’t create sense of belonging is likely to cement negative attitudes.

Teachers can create an environment that fosters interest, ability, learning, sense of belonging, and occupational identity.