TEALS: Computer Science in Every High School

TEALS is hosted by Microsoft YouthSpark
1,000,000 Unfilled Jobs by 2020

$500 billion opportunity

1,000,000 unfilled programming jobs

400,000 computer science graduates

Courtesy code.org Sources: BLS, NSF, Bay Area Council Economic Institute
The Job/Student Gap

Computer Science Students

- 2% University computer science students
- 98% University students in all other math and science majors

Computing Jobs

- 60% Jobs in computing sectors
- 40% Jobs in all other math and science sectors

Courtesy code.org, Sources: College Board, Bureau of Labor Statistics, National Science Foundation
Fewer CS majors than 10 years ago (and many fewer women)

Courtesy code.org Sources: National Science Foundation
2014 AP CS snapshot

- English: 887504
- US History: 459197
- Calculus: 383788
- Government: 289244
- Psychology: 252673
- World History: 242793
- Biology: 207466
- Statistics: 178014
- Econ: 173597
- Spanish: 152962
- Physics: 149587
- Chemistry: 143058
- Human Geography: 134691
- Environmental Science: 128829
- Euro History: 108554
- Art: 46412
- CS: 37327
- Art History: 22639
- French: 19202
- Music: 17411
- Chinese: 8669
- Latin: 6523
- German: 4698
- Italian: 2203
- Japanese: 1942
But we’re in Washington state!

1,048 total for AP CS out of 79,567 total AP tests (1.3%).

Students from 54 WA State high schools out of ~750

Underrepresented Minorities:

Black: 23 (2.2%)
Hispanic: 25 (2.4%)
Girls: 260 (24.8%)
How about California?

4,964 total for AP CS out of 632,571 total AP tests (0.78%, 1 in 130 tests).

251 AP CS high schools in CA out of 2,649 public and private high schools

Underrepresented Minorities:

- Black: 1.5% (74)
- Hispanic: 7.8% (392)
- Girls: 21.6% (1,074)
### What about my home state?

<table>
<thead>
<tr>
<th>DC public high schools</th>
<th>VA public high schools</th>
<th>MA public high schools</th>
<th>NY public high schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Students: ~15,000</td>
<td>Total Students: ~400,000</td>
<td>Total Students: ~220,000</td>
<td>Total Students: ~860,000</td>
</tr>
<tr>
<td>Total AP tests: 5,439</td>
<td>Total AP tests: 136,626</td>
<td>Total AP tests: 74,132</td>
<td>Total AP tests: 210,863</td>
</tr>
<tr>
<td>AP CS: 30 (23 TEALS AP CS)</td>
<td>AP CS: 1,595</td>
<td>AP CS: 748</td>
<td>AP CS: 1,650</td>
</tr>
<tr>
<td>AP CS %: <strong>0.55%</strong></td>
<td>AP CS %: <strong>1.2%</strong></td>
<td>AP CS %: <strong>1%</strong></td>
<td>AP CS %: <strong>0.78%</strong></td>
</tr>
<tr>
<td>42,000+ high schools in the US.</td>
<td>16 million+ enrollment.</td>
<td>Policy changes, institutional changes, heavy lift.</td>
<td>All politics is local, all education is local too.</td>
</tr>
</tbody>
</table>
Hard for districts to recruit CS teachers

Huge industry demand for EE CS majors.
No pathway to teaching CS.
High Schools don’t recruit at CS career fairs.
TfA used to not distinguish CS majors for CS teaching placement.
Big financial sacrifice to teach.

No CS teachers.
No CS courses in course selection sheet.
No students.
No perceived demand.
True Industry & School Partnership

Schools committed to offering CS but can’t find teachers with CS background.

Build and establish sustainable CS program, build CS teacher capacity. Committed to handoff.

Full school administration buy in and support.

1st Period CS in the school schedule.

**AP CS A** (year long): 1st Semester college course. Taught in Java. UW CSE 142. Or Udacity CS046 for flipped classroom model

**Intro to CS Principles** (semester long): High school survey course. Based on UC Berkeley CS 10.
Wait, how much time?

20 hours
We hold training sessions and **meet ups** once a month during the school year.

50 hours
20 hours of in-person and online summer **training**, plus team meetings and homework.

60 hours
TEALS adds some time to your **commute**. Perhaps 20 minutes in each direction per visit.

10 hours
Each team is part of a cohort that meets for 30 minutes twice a month to share issues and strategies.

80 hours
**Teaching** hours over 90 visits 50 minutes, alternating days for 36 weeks

80 hours
At least one hour of **prep/grading** time outside of class for each hour in class.
Who do we teach?

High Schools

Diversity
25% Girls (2X Industry average)
24% Underrepresented Minorities (3X Industry Average)

Aspirations
79% See themselves as College Bound
76% This is their First CS Class

Extracurricular
3/5 Play a school sport
1/3 Volunteer
1/4 Academic groups
1/5 Music
Make CS fun and awesome

- College/career talks
- Class t-shirts
- Raffles and prizes
- Field trips
- Internships
How long have this been going on?

<table>
<thead>
<tr>
<th>Year</th>
<th>Schools</th>
<th>States</th>
<th>Students</th>
<th>AP Students</th>
<th>Volunteers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1</td>
<td>1</td>
<td>12</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2010</td>
<td>4</td>
<td>1</td>
<td>250+</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>2011</td>
<td>13</td>
<td>1</td>
<td>800+</td>
<td>67</td>
<td>40</td>
</tr>
<tr>
<td>2012</td>
<td>35</td>
<td>7</td>
<td>1500+</td>
<td>400+</td>
<td>100</td>
</tr>
<tr>
<td>2013</td>
<td>70</td>
<td>12</td>
<td>3385</td>
<td>1278</td>
<td>280</td>
</tr>
<tr>
<td>2014</td>
<td>131</td>
<td>19</td>
<td>6600+</td>
<td>2200+</td>
<td>490</td>
</tr>
</tbody>
</table>
Where do we teach?

131 High schools from 19 States.

Wide range of school and student populations.
## How the model works

### All Volunteers

- Team of 4. Team teach with classroom teacher.
- Each half of the team teach 2 days a week.
- Done by 9:15AM.
- Travel stipend from school ($1250), fully integrated into faculty.

### Classroom teacher

- Committed and excited to learn and teach CS with industry volunteers.
- Committed to work and build lasting relationship with volunteer team.
- Must have 2+ years classroom experience.
- Hand off class in 2 years time.

### Teacher

- 2 per team
- Lesson planning, course planning, teaching. Grading.

### TA

- 2 per team
- Lab assistant. Grading.
- Could be TA for TEALS alumni school.

### Teachers with STEM AP experience preferred for AP CS A.

- Summer PD is required.
- Sufficient prep time during school year to master content.
- Fully participate in TEALS community and support TEALS classroom activities (Hour of Code, T Shirts, Field Trips, etc).
Recruiting and retaining volunteers

1. School community (parents, alumni, board, PTA, foundation)
2. Local partners (companies, chamber, econ dev offices)
3. Civic leaders (mayors, state legislators, civic orgs)
4. TEALS talks at local companies and orgs.

Build a lasting relationship with your volunteers.
Intro to CS Principles

- UC Berkeley CS 10 course adapted for HS.
- 1 Semester course (run Fall and Spring).
- Survey course akin to Conceptual Physics.
- Block programming language.
- All grade levels with Geometry completion.
- UC A-G approved.
- Textbook: Blown to Bits
AP Computer Science A
- UW CSE 142/143 course. Collegiate level.
- Year long course with AP exam in May.
- AP level course akin to Calc BC.
- Hardest and most rewarding AP.
- Industry standard Java, and professional IDE.
- So/Jr/Sr with Algebra II completion.
- Summer reading recommended.
- Textbook: Building Java Programs
- Also flipped version with Udacity and SJSU
Distance learning for rural schools

- For schools without a local tech community.
- Ideal for rural schools with small classes.
- High bandwidth tele conferencing.
- Summer PD required for classroom teacher.
- Equipment requirements in Implementation Guide.

TEALS volunteers visiting Lower Yukon, AK
School responsibilities

1. Dedicated district and building contact person for TEALS.
2. Classroom observations.
3. Class materials, equipment, tested and ready to go.
4. Background checks, network access, parking, ID.
5. Back to school meeting in August.
6. Embrace your volunteers.
7. Facilitate course handoff
8. Grow CS program.
What’s next?

Read the implementation guide
Read the agreement
Apply online (late Dec – mid Feb)
Socialize with school and local community

Connect with us via contact form

Connect with local tech organizations
Connect with local companies