TEALS: Build a sustainable high school CS program with industry volunteers
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
2015 AP CS snapshot

Source: College Board
More than pure CS

Informed Citizens

Healthy democracy in the digital age needs digitally literate electorate and leaders.

Surveillance
Privacy
Big data
Artificial Intelligence
Digital crime
Digital currency

Computational thinking

Aspects of computational thinking will permeate everything these students will do in the future, regardless of career.

All STEM fields
Healthcare
Retail
Service
Legal
Sports
Education
But we’re in Washington state!

1,770 total for AP CS out of 84,866 total AP tests (2.1%).

Students from 52 WA State high schools out of ~750 startups everywhere!

Underrepresented Minorities:

Black: 39 (2.2%)
Hispanic: 70 (3.9%)
Female: 495 (28%)

Courtesy code.org, Sources: College Board
How about California?

8,688 total for AP CS out of 700,449 total AP tests (1.2%).

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

Underrepresented Minorities:

Black: 148 (1.7%)
Hispanic: 973 (11.2%)
Female: 2,256 (26%)

Courtesy code.org, Sources: College Board
What about my home state?

<table>
<thead>
<tr>
<th></th>
<th>DC public high schools</th>
<th>OH high schools</th>
<th>MA high schools</th>
<th>NY high schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total AP tests</td>
<td>6,127</td>
<td>114,370</td>
<td>107,925</td>
<td>269,560</td>
</tr>
<tr>
<td>AP CS</td>
<td>46 (.8%)</td>
<td>1,018 (.8%)</td>
<td>1,784 (1.6%)</td>
<td>3,126 (1.2%)</td>
</tr>
<tr>
<td>Black</td>
<td>21 (45.7%)</td>
<td>163 (16%)</td>
<td>51 (2.8%)</td>
<td>719 (23%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>7 (15.2%)</td>
<td>26 (2.6%)</td>
<td>102 (5.7%)</td>
<td>230 (7.4%)</td>
</tr>
</tbody>
</table>

Courtesy code.org, Sources: College Board
Where are all the CS teachers?

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

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

- Schools committed to offering CS but can’t find teachers with CS background
- Build and establish sustainable CS program with tech industry volunteer support
- 1st Period CS in the school schedule
- Building CS teacher capacity, committed to teacher handoff
- Full school administration buy in and support essential

**AP CS A** (year long): 1st Semester college course. Taught in Java. Based on UW CSE 142.

**Intro to Computer Science** (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 has regular **team meetings** 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?

<table>
<thead>
<tr>
<th>High Schools</th>
</tr>
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<tbody>
<tr>
<td>Urban, Suburban, Rural.</td>
</tr>
<tr>
<td>High performing, high needs, and everything in between.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diversity</th>
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<tbody>
<tr>
<td>29% Female (2X+ industry average)</td>
</tr>
<tr>
<td>20% Underrepresented Minorities (3X industry average)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aspirations</th>
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</thead>
<tbody>
<tr>
<td>93% See themselves as College Bound</td>
</tr>
<tr>
<td>70% This is their First CS Class</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extracurricular</th>
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<tbody>
<tr>
<td>55% Play a school sport</td>
</tr>
<tr>
<td>34% Volunteer</td>
</tr>
<tr>
<td>24% Academic groups</td>
</tr>
<tr>
<td>20% Music</td>
</tr>
</tbody>
</table>
Building excitement for CS

- College/career talks
- Class t-shirts
- Raffles and prizes
- Field trips
- Internships
How long has 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>18 + DC</td>
<td>5400</td>
<td>2040</td>
<td>475</td>
</tr>
<tr>
<td>2015</td>
<td>162</td>
<td>17 + DC</td>
<td>6400</td>
<td>2300</td>
<td>550</td>
</tr>
</tbody>
</table>
Where do we teach?

162 high schools from 18 States.
Wide range of school and student populations.
# The TEALS Co-Teaching Model

## All Volunteers
- Team of 4. Team teach with classroom teacher
- Each half of the team teach 2 days a week
- Done by 9:15 AM
- Volunteer stipend from school ($5000/course/year)

## Classroom teacher
- Committed and excited to learn and teach CS
- Committed to working with and building lasting relationship with volunteer team
- Must have 2+ years classroom experience
- Able to teach class independently after 2 years of partnership
- Summer PD required (in person or online)

## Teacher
- 2 per team
- Lesson planning, course planning, teaching, grading

## Teaching Assistant (TA)
- 2 per team
- Lab assistant, offer 1:1 help to students, grading
- Fully participate in TEALS community and support TEALS classroom activities (Hour of Code, T-shirts, Field Trips, etc)
- Teachers with STEM AP experience preferred for AP CS A
Other Support Models

**Teaching Assistants**

Classroom teacher is able to independently teach a CS course

Wants additional support – grading, lower student:teacher ratio, industry connection

1-2 volunteer TAs

**Consulting Support**

Classroom teacher is able to independently teach a CS course

Wants to be a part of TEALS community (curriculum support, monthly meetups, online community, industry mentor)

Online/phone volunteer mentor support, occasional guest lecture or career talk
Summary of TEALS Support Models
Recruiting and retaining volunteers

School community
(parents, alumni, board, PTA, foundation)

Local partners
(companies, chamber, econ dev offices)

Civic leaders
(mayors, state legislators, civic orgs)

National partners
(ACM, IEEE, Higher Ed, code.org, etc)

TEALS talks at local companies and orgs.

Build a **lasting relationship** with your volunteers.
Introduction to Computer Science

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
UC A-G approval
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
Industry standard Java programming language
So/Jr/Sr with Algebra II completion
Summer reading recommended
Textbook: Building Java Programs
AP Computer Science Principles (Pilot)

New course for 2016-2017
Complements (does not replace) AP CS A
Broad coverage of computing principles, issues, and creative solutions

TEALS plans to pilot this course with a small cohort of schools – indicate interest in application
Distance Learning

For schools without a local tech community
Ideal for rural schools with small classes
High bandwidth teleconferencing
Summer PD required for classroom teacher
Equipment requirements in Implementation Guide
School Responsibilities

Designate a Partnership Coordinator
Primary school-level contact, committed to growth of CS in school

Classroom observations
Class materials and equipment
Background checks, network access, parking, ID Cards
Scheduling – 1st Period Computer Science

Pay volunteer stipend or reimbursements
Back-to-school meeting in August
Embrace and support volunteers
Facilitate and encourage course handoff
Grow CS program
Expand course offerings, extracurricular opportunities (FIRST Robotics, programming club, etc)
What’s next?

- Read the Implementation Guide
- Read the Partnership Agreement
- **Apply online** (late Nov – mid Feb)
- Share information with school and local community
- Connect with local tech organizations and companies

[tealsk12.org/schools](tealsk12.org/schools)