

Computing Education for School Children

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Outline

- Why it matters
- Lack of CS teachers
- Three approaches
 - Scratch for middle school (Colleen Lewis, HMC)
 - Explore CS for high school (Jane Margolis, UCLA)
 - Code.org for K-12 (Hadi Partovi, code.org)
- Closing thoughts
- Discussion

Why it matters

- Equitable access to careers
- Meeting current and long term demand for CS
- Diverse perspectives produce better and more ideas

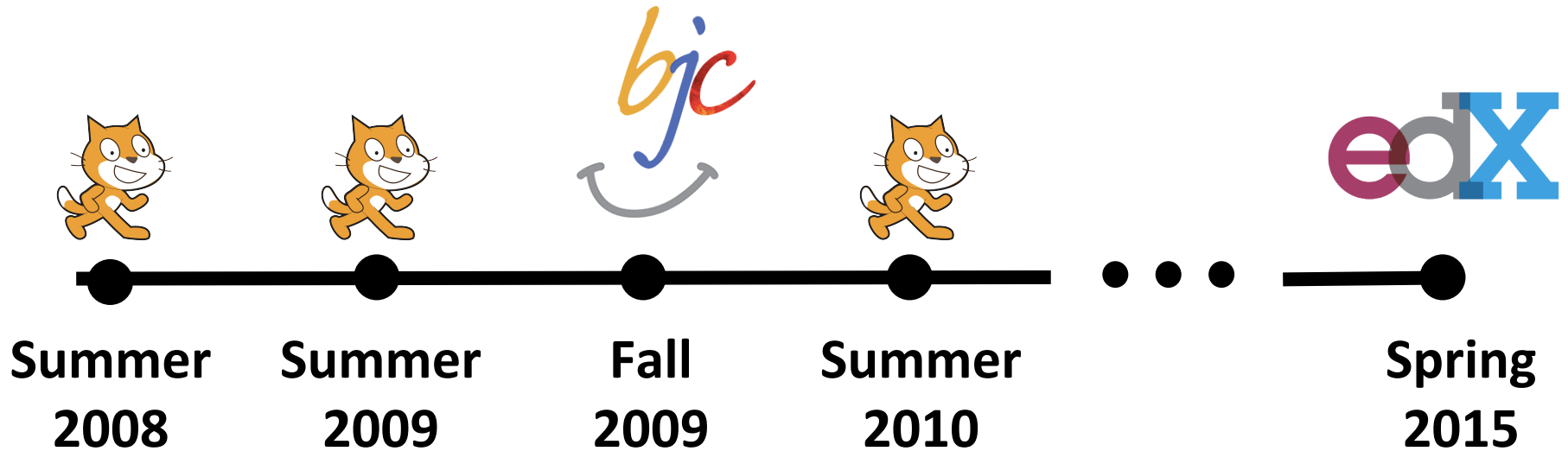


Lack of CS teachers in the US

- NYC licensed science teachers in 2016:

– Biology	1587	17%
– Chemistry	568	6%
– Computer Tech	23	0%
– Earth Science	405	4%
– General Science	1267	14%
– Mathematics	4993	55%
– Physics	246	3%

Scratch for middle school (Colleen Lewis, HMC)



*Curriculum
Development
Supported by*



Programming in Scratch on



- 70+ videos 1-3 minutes
- 30+ hours of curriculum
- Designed for advanced middle-school students
- Emphasis on “Iteration”
- **Enrollment in EdX 2015: 29K (Feb), 33K (May)**

Links:

- edx.org Search for: Programming in Scratch
- youtube.com/user/ColleenMLewis/



Exploring Computer Science

(Jane Margolis, UCLA, supported by NSF)

- UCLA – Los Angeles School District collaboration
- Increase access to CS for females, students of color
- Year-long intro CS high school course covering:
 - HCI, problem-solving, web design, programming, robotics, computing, data-analysis

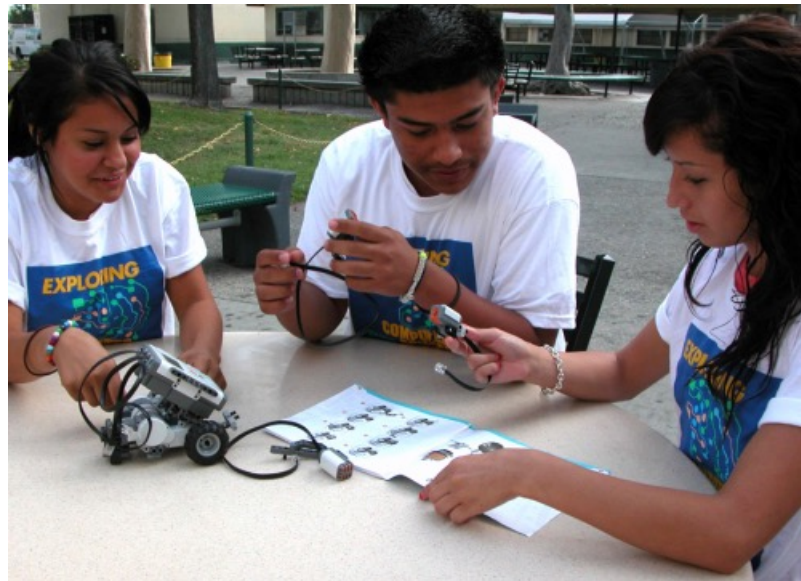


Making it happen

- Curriculum development
- Teacher professional development
- Working with school leaders
- Learning community among teachers
- Student assessment
- Policy

ECS students in Los Angeles

	TOTAL	FEMALE	LATINO/A	BLACK
2010-2011	1,377	564 (41.0%)	971 (70.5%)	133 (9.7%)
2011-2012	2,136	923 (43.2%)	1,649 (77.2%)	200 (9.4%)
2012-2013	1,927	877 (45.5%)	1,566 (81.3%)	126 (6.5%)
2013-2014	2,365	1,084 (45.8%)	1,705 (72.1%)	255 (10.7%)
2014-2015	2,390	1,005 (42.1%)	1,762 (73.3%)	209 (9%)



Findings in 2014-15 for ECS students

- Self-assessment of proficiency in ECS topics significantly increased, especially in programming and robotics
- Gains especially pronounced for female students
- Change from fixed mindset to growth through practice

Expansion

ECS is currently in the 7 largest school districts in the United States, with many additional sites nationwide.



Code.org

(Hadi and Ali Partovi)

- Non-profit launched in 2013
- Every child should have access to a quality CS education, not just a lucky few
- Has many partners (e.g. ACM) and builds on decades of work by others



Code.org efforts

- Annual hour of code (over 225M students so far)
- Video endorsements by tech celebrities



- Contracts with school districts to train teachers
- Working with states to give science credit for CS
- Many online CS courses on website

Closing thoughts

- Computer scientists can and should play a key role in developing curriculum and training teachers.
- Should share knowledge broadly across countries

Discussion

