CS Pathways: Socially-Relevant Computing in Middle Schools

Fred Martin
University of Massachusetts Lowell

About

CS Pathways is a partnership between the Everett and Medford (MA) public schools and UMass Lowell to create a lasting computer science curriculum in the middle school grades.

The project is funded by a 3-year NSF ITEST grant awarded in 2014.

UMASS LOWELL
Learning with Purpose

Team

University of Massachusetts Lowell
Fred Martin (PI)

Lijun Ni (research consultant)

Mark Sherman, Farzeen Harunani (graduate students)

Tri-City Technology Education Collaborative
Molly Laden (PD)

Akira Kamiya (Teacher Learning Center Director)

Evaluation Analysis Solutions, Inc.
Diane Schilder

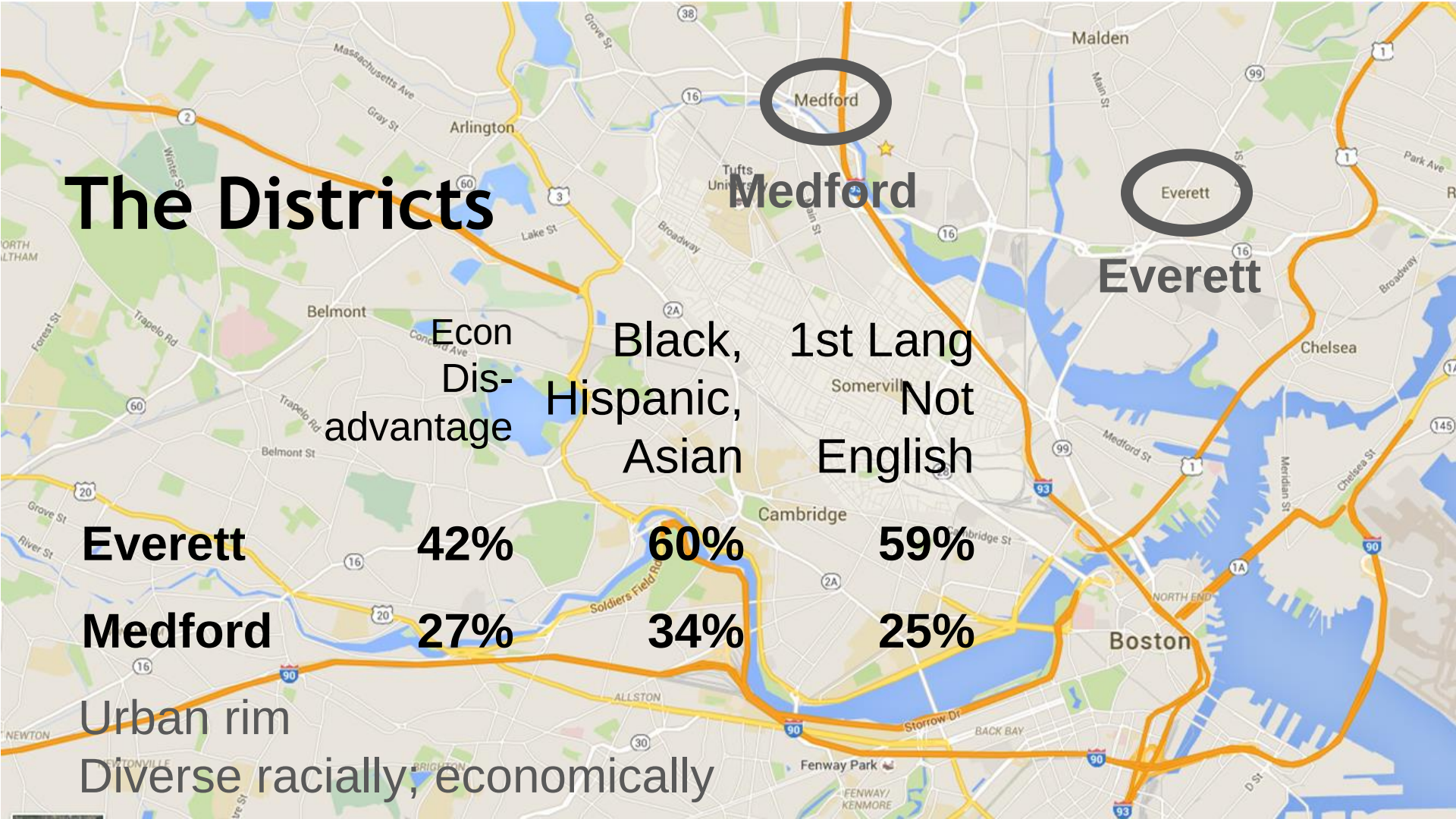
Goals

Development of a sustainable program:

- Lasting curricular changes in the districts' technology courses (and others)
- Computer science activities to reach all middle school students districtwide

Research findings on effective interventions for middle school students that can be replicated

The Districts



	Econ Dis-advantage	Black, Hispanic, Asian	1st Lang Not English
Everett	**42%**	**60%**	**59%**
Medford	**27%**	**34%**	**25%**

Urban rim

Diverse racially; economically

Designed to appeal to ALL students

Community problem-solving focus—kids making apps to address social needs

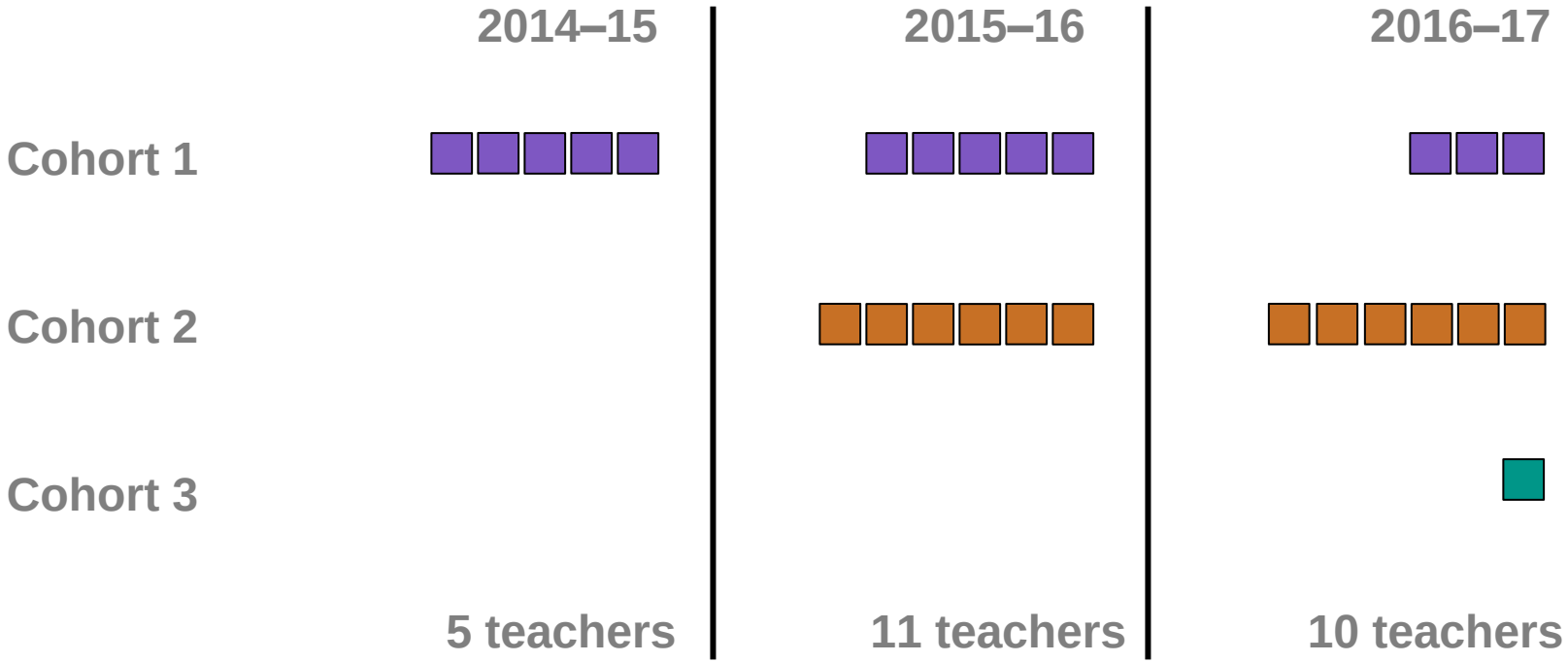
A combination of digital literacy and computer science

Based on use of MIT App Inventor

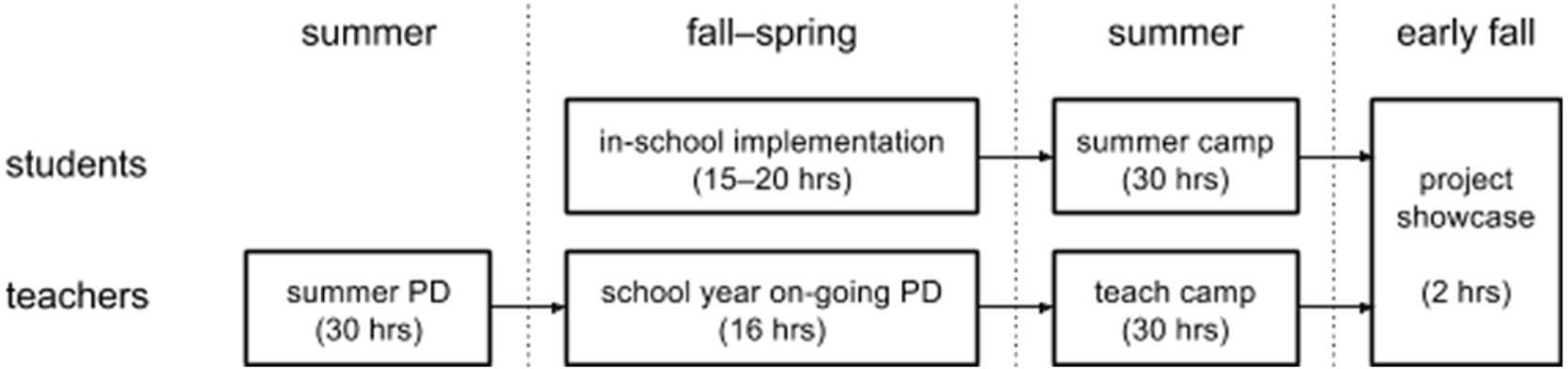
Curriculum based on practical needs in creating mobile apps

15– to 20–hour school year module, integrated into technology, engineering, library, art, or math specialist classes

Teacher cohort model



PD and implementation plan



Note: we moved showcase to end of finishing school year rather than start of next.

Professional development

First year

Technical – making apps with App Inventor; working with images and sound; event handlers

Pedagogical – pair programming; being OK with not knowing

Curriculum and standards – CSTA K-12 standards; teachers' own standards; preparing lesson plans

Second year

Technical – variables and lists

Pedagogical – assessment; PCK of computing (self-reflection); societal impact of computing

Curriculum and standards – revision to new MA DLCS K–12 standards; assessment

Key aspects of curriculum

Integration with existing curricula

digital literacy skills (media; audio; IP rights)

personalization (TalkToMe; I Have A Dream)

whole-class adaptation (from HelloPurr to AI Zoo; AI Orchestra)

collaboration (pair programming)

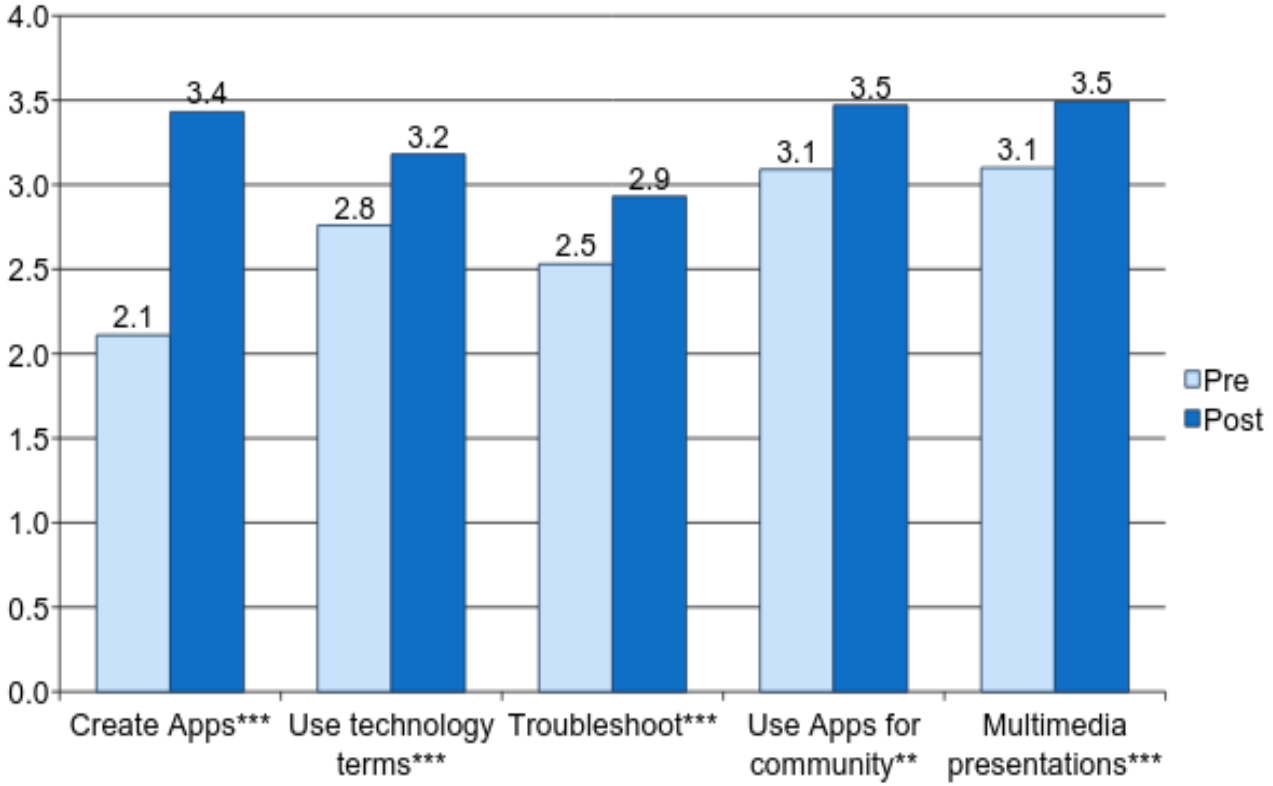
facilitating design process

encouraging students to design apps for education and social good

school or classroom app fair for students to highlight their accomplishments

Student Apps

Student Findings (Academic Year)



Student Quotes (Academic Year)

“It makes me think about all of the work that goes into making a computer and I am more interested in computer science.”

“It’s increased my knowledge on the subject by not as much my interest.”

“It has not changed my thinking but it is good to learn because many people don't know what to do when they have a problem.”

“It helps me further understand the time and dedication [needed to develop an app].”

“It inspired me to want to do a computer science job in the future.”

“I learned that its harder than I think [sic].”

To discuss…

Which grade level? (6th, 7th, or 8th)

CS knowledge is different from IT knowledge

Broadening definition of socially-good: not all students were excited about making community apps

Acknowledgments

Collaborators: Farzeen Harunani, Akira Kamiya, Molly Laden, Fred Martin, Lijun Ni, Diane Schilder, Mark Sherman

Teachers: Courtney Bell, Lori Blank, Mark Cheffro, Debbie Corleto, Dawn Munro, Erin Natale, Azita Pourali-Bacon, Harlan Root, Denise Salemi, Michael Scarola, Andrea Twardzicki, Jillian Weil

NSF: This material is based upon work supported by the National Science Foundation under Grant No. 1433592.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.