CS Pathways: Socially-Relevant Computing in Middle Schools

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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.
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

Everett

Medford

Econ Disadvantage
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

<table>
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<tr>
<th>Cohort 1</th>
<th>Cohort 2</th>
<th>Cohort 3</th>
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<tbody>
<tr>
<td>5 teachers</td>
<td>11 teachers</td>
<td>10 teachers</td>
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[Diagram of teacher cohort model with Cohort 1, Cohort 2, and Cohort 3, showing numbers of teachers in each cohort for the years 2014–15, 2015–16, and 2016–17.]
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

THE MOTIVATIONAL APP!

Languages4u

Spain
South Korea

U.S.A.
China

CHEESE TRANSLATOR

Spanish
Italian
French

German
Polish
Chinese

Portuguese
Czech
Indian

Russian
Dutch
Bulgarian

Press a Green Button Above!
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

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