The "Science" of Computing: Inclusive Computing Pathways in Iowa City Community School District

Iowa City Community School District (ICCSD)

Urbanity	Number of schools	Student enrollment	Student demographics
Urban	<u>28 Schools</u> 21 elementary, 3 junior high, 4 high schools	14,500	• 12% Latinx • 19% Black • 37% low-income

Equity Goal

Greater inclusion of students who identify as Black and Latinx and students who have been identified as English language learners

Iowa City Community School District (ICCSD) is a college-town district serving 14,500 students and is rapidly becoming more urban and diverse in its population and a growing tech hub in its own right within the state. ICCSD applied to participate in the National Science Foundation-funded *Developing Inclusive K-12 Computing Pathways for the League of Innovative Schools* (Inclusive CT Pathways) project to focus on developing a K-12 pathway that aligned computing courses already available within the district through the Project Lead the Way (PLTW) curricula as well through their K-8 science courses, which were recently aligned to Next Generation Science Standards (NGSS) entailing computational models of natural phenomena. Though Iowa City had robust, if limited, high school offerings in computer science (CS), these classes simply were not attracting a student demographic representative of the wider district.

November 2018

- Notice the importance of inclusive CT work and inequity in district

- Review CT-related groundwork

- Identify leadership team

- Develop shared understanding of CT

ICCSD started with the data, pulling the then (2017) district's latest enrollment numbers in its high school CS course offerings and examining enrollment in light of the wider district demographics. It quickly became clear some students (and some schools) were less representative than others.

During the first two years of the project (2018-20), a small group of teachers and administrators at ICCSD designed their Inclusive CT Pathways specifically around K-8 offerings, leveraging the PLTW model of hands-on computing aligned with NGSS Standards specific to computation.

Plan
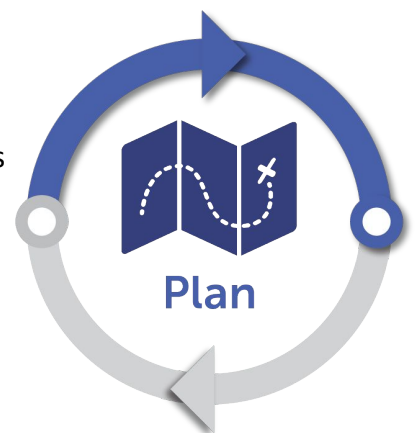
April 2019

- Identify competencies

- Customize competency map template

- Map to Iowa CS standards and Iowa CORE standards

- Gather feedback and make adjustments

September 2019

- Alignment of competencies

September 2020

- Form Inclusive CT Committee

- Review pathways document

- Begin developing ICCSD Computer Science Standards Progression

A small team at ICCSD developed an initial draft of the Inclusive CT Pathways competency map. Competencies were identified by the District Development Team of four teachers, one part-time instructional design specialist, and a district level instructional design coach. They identified five key competencies: **Algorithms**, **Computational Models**, **Systems**, **Data**, and the **Impact of Computing**.

Build
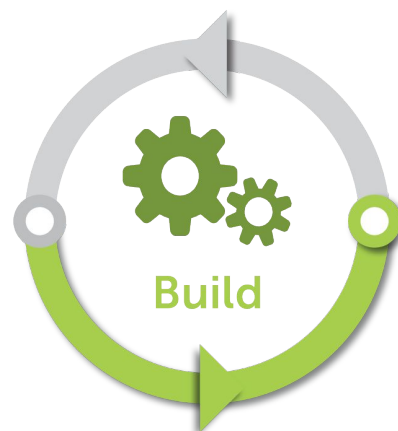
The ICCSD Inclusive CT Pathways document was developed with the Iowa Computer Science Standards aligned with the Computer Science Teachers Association Standards (CSTA) and Iowa CORE Standards in mind. While ICCSD prioritized K-8 science integration, in Years 2 and 3, additional lessons developed in parallel by librarians were aligned to the School Library Standards (more below). At the end of Year 1 (Spring 2020), the Pathways document was presented to a group of K-12 teachers for feedback. The focus group provided positive reactions to the map as a "single blueprint" pointing to the various grade-level integration points.

By the end of Year 1, the blueprint offered ICCSD a framework to ensure consistency and cumulativity in computational thinking (CT) integration from subject to subject across grade levels. Professional development opportunities for ICCSD teachers were specifically supported by PLTW trainings and district-level CT integration were funded through the state department of education incentive fund.
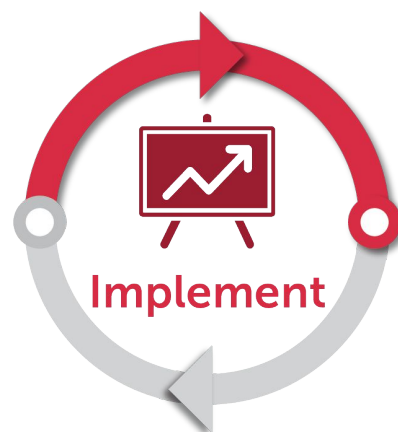
Implement

ICCSD offered PLTW at two elementary schools and two middle schools over the 2019-20 academic year. During the 2020-21 academic year, five schools in the district were selected to implement PLTW at a variety of grade levels, and the district specifically recruited a district-wide CS Specialist to support teacher PD and integration. Teachers reported implementing individual PLTW units, though challenges with COVID-19 in Years 2 and 3 slowed progress. Accordingly, in late Year 2 (Fall 2020), select ICCSD librarians worked in parallel to create a library of CS/CT lessons for students in grades K-6.

Reflection

*What are some of the key takeaways for the district?*

- As the district and wider community struggled with the ongoing challenges of COVID-19 in the second and third years of the grant, ICCSD made two key decisions:
  - First, to support teachers by distributing leadership and leveraging school-based librarians to create a database of [CS/CT lessons for students in grades K-6](#).
  - Second, to center leadership (and prioritize CS and CT as a curricula offering) by appointing a district-level leadership position in CS/ CT in Year 2.
- ICCSD well-leveraged Next Generation Science Standards (NGSS) to begin integrating CT into district science coursework but developing modeling activities for students was a substantial lift and assessing them (via rubrics and checklists) was likewise took time; PLTW offered the districts established curricular content but the coursework prioritizes coding more than integrative CT.
  - Science and NGSS represented a starting point for curricular integration on the K-8 level, but the district is now working to expand to math, English language arts, and social studies.
- Through the adoption of the the Digital Promise co-designed [student empathy interview protocol](#), the formation of a district inclusive computing committee, and collaboration in the "[Equity in the Driver's Seat](#)" Initiative, ICCSD took deliberate and pragmatic steps oriented towards changing classroom practice.

Opportunities

Following their three years of work developing an Inclusive CT Pathway, ICCSD will next focus on:

- Increasing shared leadership capacity with library media specialists who have capacity to coach teachers.
- Aim for a clear articulation of where PLTW is being offered at the district level and what the implementation plan looks like moving forward.
- Create teacher-friendly and usable guides to the ICCSD Computer Science Standards Progression document and a 1-page overview document that can help teachers have a better understanding of the "Why?"

District Leads:
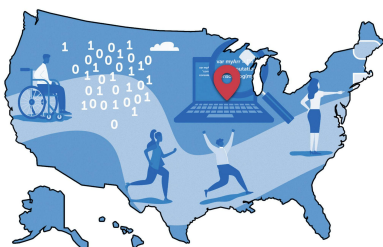
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Digital Promise®

Is your district interested in developing an Inclusive Computing Pathway?
Visit the toolkit at: https://bit.ly/CTPathwaysToolkit
Email Quinn Burke at: qburke@digitalpromise.org