Exploring Computer Science

PROFESSIONAL DEVELOPMENT MAP

SUMMER 1

Prior to implementation, this week-long summer institute introduces the instructional philosophy and content from the early units.

THE INSTRUCTIONAL PHILOSOPHY

THE THREE STRANDS

EARLY UNITS

UNIT 1: HUMAN COMPUTER INTERACTION

Students are introduced to the concepts of computer and computing while investigating the major components of computers and the suitability of these components for particular applications. Connections among social, economical and cultural contexts are discussed.

UNIT 2: PROBLEM SOLVING

Students will have opportunities to become "computational thinkers" by applying problem-solving techniques. The range of contexts motivates the need for students to think abstractly and apply known algorithms and create new ones.

QUARTERLY PDs

During the school year, quarterly PDs focus on remaining units and the three pillars.

QUARTER 1

UNIT 3: WEB DESIGN

Students prepare to take the role of a developer by expanding their knowledge of algorithms, abstraction, and web page design and applying it to the creation of web pages and documentation for users and equipment. They will also explore issues of social responsibility in web use.

QUARTER 2

UNIT 4: PROGRAMMING

Students design algorithms and create programming solutions to a variety of computational problems using an iterative development process in Scratch. Programming problems include mathematical and logical concepts and a variety of programming constructs.

QUARTER 3

UNIT 5: COMPUTING AND DATA ANALYSIS

Students explore how computing has facilitated new methods of managing and interpreting data, finding patterns using a variety of large data sets. Students will collect and generate their own data related to local community issues and discuss appropriate methods to support facilitating a discovery.

QUARTER 4

UNIT 6: ROBOTICS

This unit introduces robotics as an advanced application of CS that can be used to solve problems in various fields and how robotics enables innovation by automating processes that may be problematic for humans. Students explore how to integrate hardware and software in order to solve problems.

SUMMER 2

GROW & REFLECT

The summer after a year of teaching ECS, teachers attend our week-long summer institute again, but with a focus on deepening their understanding of content and pedagogy. In the second summer, teachers learn, observe, and share.

LEARN

They are more able to focus on student learning: how to improve it, assess it, and learn from it.

OBSERVE

They can listen and relate to others' classroom teaching experiences and learn from their peers.

SHARE

They reflect on and offer their experiences to first-year ECS teachers and help build a learning community.

Exploring Computer Science

PROFESSIONAL DEVELOPMENT

FOUNDATION

CULTURE + PROCESS

We firmly believe that ECS teachers and students are part of a community where all learners have a voice and can make valuable contributions to the learning of the whole group. Our three strands don't just apply to the curriculum: they are woven throughout all of the support provided to our teacher community.

CS CONCEPTS

We seek to develop teachers' confidence in the course materials and help them feel able to offer their students an in-depth understanding of what makes Computer Science a meaningful field of study.

INQUIRY

Teacher learning involves many opportunities for collaboration and small group learning and presentations to model the types of experiences that we hope students will experience as ECS is implemented at school sites.

EQUITY

We seek to provide professional development opportunities that are accessible to teachers who don't typically have access or who teach students who typically encounter barriers to quality computer science education.

REINFORCE

As we have seen in ongoing research, effective teacher learning requires multiple professional development sessions over an extended period of time. This allows for more time for reinforcing concepts during each session and provides time for practice and reflection between sessions.

APPLY

Our professional development sessions are very hands-on! Computer science instruction is modeled through role playing, jigsawing activities, pair and small-group collaboration, structured tinkering, multiple solutions, utilizing manipulatives, and simulations.

GROW + REFLECT

An important part of our professional development experience is the ongoing encouragement and opportunity to grow and reflect as a computer science teacher. We believe this focus helps develop educators who are aware of how their classroom can influence the direction of the fields of both computer science and education, and who are empowered to change these fields for the better.