Equity and Innovation: Computer Science Pathways for Grades 7-12

Learning Lessons in the Sweetwater Union High School District
Welcome and Introductions

- Katrine Czajkowski: Math Curriculum Specialist
- Roman Del Rosario: Director, Curriculum & Instruction
- Art Lopez: Classroom Teacher and CS Curriculum Specialist
- Joe Pistone: Classroom Teacher and San Diego CSTA President
- Tara Taylor: Classroom Teacher and Cybersecurity Team Coach
- Susan Yonezawa: Associate Director, Center for Research for Educational Equity and Teaching Excellence (CREATE) at UCSD
Who’s in the Room?
Presentation Overview

Brief summary of information followed by panel discussion

Three key questions:

1. How has the SUHSD expanded student access to computational thinking in the past four years?

2. How has the SUHSD gathered resources to expand its "critical mass" of CS advocates?

3. What challenges have we encountered and how do we plan to overcome them?

Questions & answers
Our Focus: Computational Thinking

What is it?
Computational Thinking

Computational thinking (CT) is a problem-solving process that includes (but is not limited to) the following characteristics:

- Formulating problems in a way that enables us to use a computer and other tools to help solve them.
- Logically organizing and analyzing data
- Representing data through abstractions such as models and simulations
- Automating solutions through algorithmic thinking (a series of ordered steps)
- Identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- Generalizing and transferring this problem solving process to a wide variety of problems

(CSTA.org)
Computational Thinking

These skills are supported and enhanced by a number of dispositions or attitudes that are essential dimensions of CT. These dispositions or attitudes include:

- Confidence in dealing with complexity
- Persistence in working with difficult problems
- Tolerance for ambiguity
- The ability to deal with open ended problems
- The ability to communicate and work with others to achieve a common goal or solution
Computational Thinking (and Computer Science) 

Teaches Skills Required for Common Core State Standards and 

Next Generation Science Standards 

- Analysis 
- Problem-Solving 
- Communications 
- Collaboration 
- Creative 
- Organizational
Computational Thinking
(and Computer Science)

Teaches You How to Think!
First Question

How has the SUHSD expanded student access to computational thinking in the past four years?
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**Computer Science Principles** at Sweetwater High School and elsewhere in the SUHSD

- Art Lopez
- Roman Del Rosario
How has the SUHSD expanded student access to computational thinking in the past four years?

Integrating Computer Science within Mathematics

- Joe Pistone
- Katrine Czajkowski
"If you continue to do what you're doing, you will continue to get what you're getting."
How has the SUHSD expanded student access to computational thinking in the past four years?

Finite Math: Raspberry Pi2 and Mathematica
Raspberry Pi 2 SoC
Mathematica
Manipulate[Plot[a function - b, {x, 4, -4}, PlotRange -> 4],
{a, 2, -2, Appearance -> "Labeled"}, {b, 3, -3, Appearance -> "Labeled"},
{function, {x^2, x^3, Sqrt[x], x, 1/x, Abs[x]}}]
Manipulate[
  Plot[
    amplitude*function[x + phase],
    {x, 0, 2\[Pi]},
    PlotLabel -> "Sweetwater High School
    Trigonometric Parameters",
    PlotRange -> 3],
    {frequency, 1, 5, Appearance -> "Labeled"},
    {phase, 0, 2\[Pi], Appearance -> "Labeled"},
    {amplitude, 3, -3, Appearance -> "Labeled"},
    {function, {Sin, Cos, Tan}}]
“Computers liberated real-world maths from hand-calculating to go far further and faster than anyone could have imagined. Now it’s vital that educational maths stands on this automation too.”

-- Conrad Wolfram [founder, computerbasedmath.org]

"Mathematica will revolutionize the teaching and learning of math by focusing on the prose of mathematics without getting lost in the grammar."

— Steve Jobs
DOING MATH WITH PYTHON

USE PROGRAMMING TO EXPLORE ALGEBRA, STATISTICS, CALCULUS, AND MORE!

AMIT SAHA
How has the SUHSD expanded student access to computational thinking in the past four years?

C-STEM: Integrated Math I with Computing/Robotics
## California Credential Requirements

Educators who teach C-STEM A-G courses in California should have one of the following credentials.

### Credential Requirements for ‘C Credit’ Math Courses

- Algebra 1 with Computing
- Algebra 1 with Computing and Robotics
- Integrated Mathematics 1 with Computing
- Integrated Mathematics 1 with Computing and Robotics

1. Single Subject Teaching Credential in Mathematics

2. Single Subject Teaching Credential in Foundational-Level Mathematics (FLM)

3. Single or Multiple Subject Teaching Credential in any content area with a Subject Matter Authorization. Subject Matter Authorizations are added to Single or Multiple Subject teaching credentials based on 32 with specified content. These authorizations meet the HQT requirements for NCLB. The Subject Matter
UC Davis C-STEM Curricula

COURSES FOR ADOPTION IN 2015-2016

- Algebra 2 with Computing
- Algebra 2 with Computing and Robotics
- Integrated Mathematics 2 with Computing
- Integrated Mathematics 2 with Computing and Robotics

COURSES FOR ADOPTION IN 2016-2017

- AP Computer Science Principles
- Integrated Mathematics 3 with Computing
- Integrated Mathematics 3 with Computing and Robotics
How has the SUHSD expanded student access to computational thinking in the past four years?

Engaging Students in Computational Thinking beyond the School Day through Cybersecurity and Robotics

• Tara Taylor
• Katrine Czajkowski
How has the SUHSD expanded student access to computational thinking in the past four years?

Cybersecurity

Windows
- How to Change a Password in Windows
- How to Upgrade a System in Windows
- How to Turn on a Firewall in Windows
- How to List/View Currently Running Programs to Determine Programs That Shouldn't Be Running in Windows

To kill processes in Windows is a bit different:
- Download and Run This
- Download and Use This to Kill the Process... Use the Process ID to Kill the Process
- How to View Users and Disable Those That Are Suspicious in Windows

In Windows, for setting an SSH Password and Changing the Default Port: No straight answer as we have to know what SSH server is running. However, it should be as simple as searching for the program in the start menu and then searching the GUI for a settings tab and making the changes there.

Cyber Forensics
- Digital Forensics: An Introduction
- Decrypt and Decode Data
- SDMCC Forensic Tips and Tricks
- Link to Online Cipher Decoder
- Link to Online Decoder Translator
- Link to Steganography Tools
- Link to Ancient Languages Images
- Link to Open Source Cryptanalysis
How has the SUHSD expanded student access to computational thinking in the past four years?

Robotics
Second Question

How has the SUHSD gathered resources to expand its "critical mass" of CS advocates?
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Partnership between UCSD CREATE (STEM Success Initiative) and the SUHSD

- Susan Yonezawa
- Roman Del Rosario
- Katrine Czajkowski
How has the SUHSD gathered resources to expand its "critical mass" of CS advocates?

Building a Critical Mass of Computer Science Advocates through Internally-led Workshops

- Art Lopez
- Katrine Czajkowski
How has the SUHSD gathered resources to expand its "critical mass" of CS advocates?

Supporting Teachers through the Work

- Tara Taylor
- Art Lopez
Third Question

What challenges have we encountered and how do we plan to overcome them?
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**Master Schedule Limitations**

- Roman Del Rosario
- Katrine Czajkowski
What challenges have we encountered and how do we plan to overcome them?

Recruiting the “Right” (Diverse) Students

• Art Lopez
• Tara Taylor
What challenges have we encountered and how do we plan to overcome them?

Recruiting the “Right” (Diverse) Students: Middle School
What challenges have we encountered and how do we plan to overcome them?

Maintaining Forward Momentum

- Susan Yonezawa
- Joe Pistone
http://sandiegocsta.org

San Diego CSTA
In partnership with UCSD San Diego Supercomputer Center and San Diego State University
SAN DIEGO, CALIFORNIA
JULY 10-12, 2016
TOWN & COUNTRY RESORT AND CONVENTION CENTER

CSTACONFERENCE.ORG
Questions & Answers
Thank You!

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