Introduce Students to Computer Science in an Engaging Way

Objective
The intention of this lesson is to introduce students to computer science in such a way that they are motivated to seek opportunities to participate through course selection, computing experiences, and plans beyond high school.

Preparation — For you, and for the host teacher
This lesson assumes you will be the guest teacher in a math, science, or technology class. You may wish to present the lesson with a computer science teacher as your partner. Be sure to involve the host teacher. He or she can help make connections between concepts students learn in class and those presented in the special lesson.

Plan ahead so you are able to describe course offerings and other opportunities for students to learn computing outside of school. These might include camps, clubs, competitions or junior college. The computer science teacher at your school can help you prepare.

Practice the lesson and familiarize yourself with the videos and activities students will engage in. (The URLs for these activities can be found on the next page.)

- Watch the 5-minute Code.org video that students will see in advance of your visit.
- Watch the Khan Academy Welcome to Computer Science video that you will show and become familiar with the associated activity.
- View the Career Cruising and Takeaway Tech pages.

Ask the host teacher to prepare students for your visit a day or two in advance and show a short introductory video. He or she might say:

Mr./Ms. ____ is coming in tomorrow to teach a lesson about computer science. He/she wants you to know what computer science is, and what kinds of education and career opportunities are available to you. Right now, this is a growth area, where there are more jobs than there are people to fill them. It’s creative, and well-paying work, too, and he/she wants to make sure everyone knows about the opportunities open to them.

Ask that the host teacher show the 5-minute introductory video from Code.org (See: www.code.org, available in different formats.) Afterward, he or she can have students discuss what they know about computing and what they are curious to learn.
Materials
1. Slide presentation. Download C4C Counselor Lesson Plan Presentation at www.ncwit.org/c4c
2. Computer–projector setup with audio
3. White- or chalkboard
4. Computers — One to each two students
5. Web access to these pages:
   - Code.org 5-minute video (if students haven’t seen it): www.code.org → Teach → 5-minute video
   - Khan Academy Welcome to Computer Science http://www.khanacademy.org/cs/welcome-to-computer-science/882454257
   - Career Cruising: http://goo.gl/MlnCU
   - Takeaway Tech: www.ncwit.org/takeaway

Outline
This lesson has 5 or 6 parts and takes 50–60 minutes. (Part 6 is optional)

Contents

Part 1: Introduction — Learn a bit about computer science (Lecture) 10 m Slides 1–7
Part 2: See programming in action (Video) — Give it a try (Activity) 15 m Slides 8–9
Part 3: Computing is at the heart of everything (Lecture) 5 m Slides 10–18
Part 4: Paths to Careers — How people get started in CS (Lecture) 5 m Slides 19–24
Part 5: Paths to Careers (Activity) 15 m Slide 25
Part 6: Takeaway Tech Optional — send as home task (Activity) 10 m Slide 26
Part 1: Introduction — Learn a bit about computer science  
Slides 1–7 (Lecture)

Slide 1: Intro

Introduce yourself and thank your host teacher for inviting you.

Tell the class you are excited to have the chance to share information about an area of life and work that people don’t know a lot about, but is really powerful and exciting — Computing and Computer Science.

You might ask them about this first slide — What seems “computery” about it?

They may say things like, It looks futuristic, 0’s and 1’s are binary code, or the image of the woman might be the basis for CGI (computer—generated imagery) for a movie. Don’t go into detail, just acknowledge their statements and encourage them to keep wondering aloud about what they hear and see in the presentation.

Say: The subtitle, Invent the Future, gets across the idea that computing is the backbone of innovation. There are very few, if any, new inventions that happen without computer science. Anyone with a creative idea, anyone who wants to make a difference, should know something about computer science. As we proceed today, think about what mark you want to make on the world, and how computing might be a part of it.

Slide 2–3: Agenda

Say: Here is an agenda for our hour together. [Expand on each a bit.]

Say: Let’s dig in!

Slide 3: Code.org

Say: You saw this video the other day. Who’s this guy? [Right bottom corner, basketball player and coder Chris Bosh.] What do you remember about the Code.org video? What stuck with you? Turn to a neighbor and talk for a minute then we’ll discuss as a group.

Wait for one minute then reconvene. Let kids riff for a minute, comment as appropriate. Ask: Are any of you already doing some programming? Invite kids to elaborate.
Slide 4: Leo Cherne Quote

Say: Consider this quote from Leo Cherne. [Pause for students to read.]

Say: What does Cherne mean? Do you believe you are smarter than a computer? All it takes is learning how to code.

Slide 5: Why CS

Say: Remember this Steve Jobs quote from the Code.org video? Can you imagine how programming a computer teaches you to think? [Kids respond.]

Slide 6: CS Defined — 1

Say: In a nutshell, here’s a definition of CS we’ll operate from today. [Read the slide.]

Slide 7: CS Defined — 2

Say: All that work goes into making technology that works for us. Read slide, “CS is designing…”

Then say: Think about cell phones. They are just tiny computers. Any time you change the ring tone or screen background you are running a computer program. A layer of software a programmer wrote interprets your keystrokes so the computer changes how it operates.

Ask: Have any of you ever wanted to make a phone work better or differently? [Pause.] A lot of computer science is about improving technology — making it faster, smaller or able to do new things. It’s powerful!
Part 2: See programming in action (web video) — Give it a try
Slides 8–9 (Activity)

Slide 8: Khan Academy — Welcome to CS

Say: There are lots of ways to get started with CS. We’ll look at more of them later, but here’s a quick look at one. Khan Academy is a website with many free, online courses you can take, including computer science. Let’s watch an introductory “teaser” video for their Computer Science course.

Note: This slide is linked to the online video http://www.khanacademy.org/cs/1-welcome-to-codecanvas/882454257. Click the image and the video will start.

After the video plays encourage comments.

Slide 9: Give Programming A Try

Say: The video showed a basic computer program — a few lines of code that made the spiral and its color and controlled the animation. Do any of you play the game Rome 2? Guess how many lines of code goes into it? [Let students guess.] 3 MILLION! Enough lines stacked to reach five times higher than Mt. Everest! Huge teams worked on that game, and lots of the coding is automated, but still, that’s a lot of code!

Now it is your turn to see what code does by manipulating an existing program. You’re going to team up and pick any of these designs that other people programmed [Indicate bottom of screen — first URL: http://goo.gl/JRySP or go to the spinning galaxy that was shown in the video. [Indicate second URL: http://goo.gl/tVCwa] You can hit reset to return to the original. You have five minutes to fool with these programs and also browse the Khan CS course a bit if you want.

Note: In the middle of the 5 minutes remind kids they can browse around the CS course a bit, look at the different lessons.

After 5 minutes ask kids to close the lids on the computers. Ask: Was that fun? Doable? What did you think? Might you come back to it? Ask: Did anyone browse the course?
Part 3: Computing is at the heart of everything
Slides 10-18 (Lecture)

Slide 10: Unlock Your Future
Say: Let’s talk about WHERE Computer Science shows up in the world.
Poll the class. Say: Some of you might have an idea of what you want to do after school. Anyone care to share?
Say: If you’re interested in topics like these (orange topics on screen) there are a lot of ways to get involved in computing. Let’s dig in to just a few areas.

Slide 11: Computing Connects
Say: You might be surprised to know only half of computing jobs are in high tech companies! You could mash up your interests in other careers with technology and work anywhere.
Ask: Do you see a field here that interests you? Could you imagine how technology might be important to it? [Let students reply.]

Slide 12: Computing Connects — Health Fields
Say: Since computing can be an applied science, it underpins innovations across whole fields. If you were interested in medicine for example, you could be part of a new innovation in health care. [Read slide.]
Note: The next series of slides 13–18 are very quick snapshots.

Slide 13: Information Systems
Say: Computing connects people to businesses and to information and to each other! [Give students a chance to read and comment on each slide.]
Slide 14: Computer Engineering
Say: Computing is part of designing new products, not just technical ones. But here’s Google Glass, the first wearable computer.

Slide 15: Visualization and Graphics
Say: Computing is a big part of visualization and imagery. You’ve seen computer-generated graphics in movies and video games. It’s useful in science, too, to picture a problem or process.

Slide 16: Infrastructure and Networks
Say: Computing is also the connections between computers.

Slide 17: Computer Forensics and Cyber Security
Say: Lots of people work to keep computers safe from hackers. People also use computers to solve crimes.

Slide 18: Design and Modeling
Say: People in the arts and architecture rely on design software all the time.
Say: Now let’s talk about how people get into computing.
Part 4: Paths to Careers — How people get started
Slides 19–24 (Lecture)

Slide 19: Kids Get Started
Say: Let’s talk about how people get started. It varies a lot. Do some of you have programming experience now? Some kids teach themselves, others get started with camps, clubs, classes and competitions. These girls got started in different ways and all met when they got awards for their work in computing.

Slide 20: CS might be right for you...
Point to the list of skills and say: This is the skill set of people who accomplish a lot through computer science. These skills are essential to working on technical teams and to invent new ways of doing things with computers.
Say: Could you see yourself in computing?

Slide 21: First Courses
Note: Learn in advance what computer science offerings are available and add additional slides following this one.

Encourage students to continue taking math and science, and to try computer science in or out of school. Say: Keep up your good work in math and science, and give CS a try. In an intro course being offered around the country, this is what students study.
Say: Sound interesting? What do you think?

Slide 22: Study Online
Say: You don’t have to wait. You might study on your own or with buddies. You could take an online course like the Khan Academy one we saw, or take this free, online game design course that MIT offers…
Slide 23: Sample Courses — 1
Explain to students that courses in the CS major vary from school to school but here are first year courses at three universities. First year community college courses might be similar.

Slide 24: Sample Courses — 2
Here are additional courses. Notice there are CSI and forensics ones, software design, and artificial intelligence…

Part 5: Paths to Careers — Slide 25 (Activity)

Note: This Slide Supports Two Activities:
1. Examining the pathways card
2. Career cruising from URL shown.

Get ready to have kids do career cruising. Say: With a partner you are going to examine three “Pathway” cards. They show routes to computing by getting a 4-year university degree, military experience, or a 2-year or community college degree. Obviously some paths overlap. For instance, someone might get some computing experience in the military and then go on to get a degree.

If the Merging Pathways poster is in the room, say: This poster shows how the different ways connect. You might want to look at it closer later.

Say: You and your partner are going to examine these cards, front and back, for two or three minutes and talk them over. When you’re ready, grab a laptop [tablet, computer] and CAREFULLY TYPE this web address. [On slide: http://goo.gl/MlnCU.] It takes you to a more in-depth view of computing college majors and careers. Your job is to find one or more that interests you and that you think your classmates should know about. Be ready to report out in 10 minutes.

Reconvene after 10 minutes or so and ask: What did you find? What do you notice? After kids report, say: Do you see any patterns or trends to what you’re hearing? Would you be inclined to learn more?
Slide 26: Takeaway Tech

Say: You have options to explore, from experiences you can do right now like the programming activity we did, to camps, clubs, online courses and more. Check out this URL (click though link if time allows) for a “Takeaway Tech” page: www.ncwit.org/takeaway and have fun!

Slide 27: End

Say: Thank you for your time. There’s a big world of computing out there and it would be great if you were part of it. Who knows? You could work like these Google employees in Australia! Have fun and see where your interests take you!