

Professional Development Situation: Virtual Training**Skill Focus: Modeling Engineering Practices****Time Required: 150 minutes**

COMPUTER SCIENCE: IT'S EASIER THAN YOU THINK

Participants will explore what computer science is, why it is important for youth in their program, and how they can successfully teach computer science.

Agenda

Welcome, introductions, and explanation of Zoom – 10 minutes

Is it computer science? – 10 minutes

- [Palindrome activity](#)

What is computer science? – 10 minutes

See the skill in action – 15 minutes

- [Computer Science: It's Easier Than You Think](#) video-based learning module

Hands-on-learning with Scratch – 40 minutes

Process the experience – 20 minutes

Organize your computer science activity – 20 minutes

Create an action plan – 15 minutes

Conclusion – 10 minutes

Materials

- Computer with internet connection, camera and speakers
- Crayons or colored pencils (6 colors)
- Paper and pens/pencils (for taking notes)
- Headphones are recommended
- 3 Handouts (send in pre-session email and download on your computer for screen sharing):
 - [Palindrome activity](#)
 - [Computer Science Organizer](#)

- [STEM Planning Templates](#)
- [4-H Computer Science Playbook pdf](#)

Before the Session

- **Read this training guide** to familiarize yourself with the content and to personalize the activities to best suit your style. Watch all videos and read informational materials.
 - *Italics indicate text that can be read aloud or emailed to participants.*
- Send a reminder email about the meeting. Determine if any participants require accommodations (sight; hearing; etc.). You can set up a meeting and send an email about the meeting through Zoom. The following should be included with the Zoom invite you send.
 - *The next professional development opportunity to enhance our STEM skills will be on DATE at TIME. Our focus for this session will be "Computer Science; It's Easier than You Think". This is a virtual training, so before we begin the session, gather the materials and print the attached handouts.*

You will need a computer with an internet connection, a camera and speakers or headphones. Please try to avoid calling in on a phone. You will not be able to participate fully in the training with a phone.

We will be using Zoom (or another video conferencing tool) for this training. Be sure you have Zoom installed on your computer before the session. The Zoom [help center](#) has instructions for joining a meeting and using Zoom.

Please have paper and a pen or pencil for taking notes and at least six different colors of crayons or colored pencils.

There are three attachments to print. You should not fill them out before the session—we will do that during the training.

- [Palindrome activity](#)
- [Computer Science Organizer](#)
- [STEM Planning Template](#)

Let me know if you require any accommodations to participate in the training. I am happy to answer any questions you have and look forward to seeing you at the workshop. I can be reached at CONTACT INFO.

- Gather all materials and download handouts before the session to use as visual aids if necessary.
- Test the audio and video equipment.

Preparing for Virtual Trainings

- This training is written for Zoom, but you can use any virtual meeting platform you have access to and are familiar with. Practice using the virtual meeting software before the meeting and be sure you know how to use all the features that will be used in this training.
- Participants can download, install, and use the free version of Zoom. They will be able to use the whiteboard feature and breakout rooms as long as the host has the Pro version. As host, you need the Pro version to schedule a session that is longer than 40 minutes. The Pro version does have to be purchased. You can purchase a basic plan or contact Zoom to customize a plan for your circumstances.
 - Zoom plans and pricing <https://zoom.us/pricing>
 - Zoom for Education <https://zoom.us/education>
- If your organization has Zoom, they might have a URL that you should use to sign up for Zoom. If you are using a different platform, provide participants with the URL they need to download the platform. Set up Zoom (or whatever system you are using) before sending the email reminder because there is a calendar feature in Zoom so you can add your training session to participants' calendars.
- We recommend at least two facilitators for a virtual CSPD training. A co-facilitator will help you manage participants and answer questions in the chat box, but they will not have all the abilities in Zoom that a host has.
- Zoom allows up to 50 people to use video in a meeting with the Pro version. You can schedule two sessions if you have over 50 people. When participants join the meeting, their name should appear which is handy for calling on someone.
- We recommend all facilitators have dual monitors so you can share one screen and have the participants and breakout rooms on the other screen. It will make it easier for you to manage everything.
- For this training, you will need to know how to use the chat, breakout rooms, whiteboard and share your screen. You may also want to record your meeting. You must enable breakout rooms before the session begins.

- Learn how to use the chat feature. Be sure you know how to save the chat. You must do this before you end the meeting.
- Learn how to use breakout rooms. There are tutorials on how to set up and manage breakout rooms. We recommend assigning participants automatically unless you have groups within your training that you want to collaborate together. Be sure you know how to set up breakout rooms, assign participants, manage the rooms and broadcast a message to all rooms.
- Learn how to use the whiteboard feature. Be sure you know how to insert text, draw on, save and clear your whiteboard.
- Learn best practices for meetings and webinars that explain how to engage participants and follow up after the session.

Training Outline

Welcome, Introduction, and Explanation of Zoom (10 min)

- Greet participants as they join the meeting and ask them to introduce themselves in the chat by sharing their name and where they are from. Encourage everyone to turn on their video. You may want to record the training, especially if someone is absent.
- Introduce yourself and the topic for this training: “Computer Science: It’s easier than you think”.
 - *Today, we may be using Zoom (or another platform you’ve selected) in ways you haven’t experienced before. We are going to [what you say will depend on the size of your session, options listed below]*
- If you have less than 12 participants, have each person introduce themselves and share one expectation or hope for today’s workshop as you say their name. This will assist people in knowing when it their turn to speak.
- If you have 12 or more participants, explain how breakout rooms work. Explain that everyone will introduce themselves and share one expectation or hope for today’s workshop in their breakout room. Tell them you will bring them back from their breakout room in 8 minutes.
- After 6 minutes, use the “Broadcast a message to all” button and tell the participants they have 2 minutes left to finish introductions.
- After 7 minutes, click the “Close All Rooms” button. This will give each breakout room a 60-second countdown, and will automatically end the breakout session and return them to the main room when the timer ends.

- Direct participants to <https://support.zoom.us/hc/en-us/articles/115005769646-Participating-in-Breakout-Rooms> if they need help with the breakout rooms.

Is it Computer Science? (10 min)

- *We're going to start with an activity that lets you play and explore numbers. For the activity, you'll need six colored pencils and a Palindrome chart in front of you. Does everyone have what you need for the activity?*
- *A palindrome is a number that reads the same forward and backward, such as 939 or 8102018. Look at your chart for some palindromes. Select your favorite color and color in all the palindromes on the chart. Show me your chart when you are done, so I know when we're ready to move on.*
- *It is possible to transform some numbers into a palindrome by adding the number and its reverse. Here is an example starting with 423. We call this a 1 step palindrome because you can transform it into a palindrome in one step by adding the number and its reverse. 423 plus 324 is 646, which is a palindrome. On your chart, 12 is a 1 step palindrome. What other numbers would be 1 step palindromes? Select a different color that you like a lot, and use it to color in all the 1 step palindromes. Show me your chart when you are done.*
- *As you might guess, there are also 2 step palindromes, like 46. 46 plus 64 is 110 and 110 plus 011 is 121, which is a palindrome. I'll give you a few minutes to find the 2 step palindromes and color them a third different color. Then look at your chart and see what patterns emerge. Share in the chat what patterns you notice in this activity. Raise your hand if you'd like to show your chart and describe a pattern you noticed.*
- *I have always loved looking at charts like this. Looking for structures and patterns like this in numbers and number relationships is an important mathematical thinking skill. I think activities like this are a fun way to help learners' practice mathematical thinking, but now we should get back to our topic of Experiential Learning.*

What is Computer Science? (10 min)

- *Thanks for playing along with me. Now let's figure out how palindromes might relate to computer science. How would you describe computer science? Share your thoughts in the chat box. (Pause so participants can type.)*
- *What about coding or programming? Are they the same thing? (Pause so participants can type.)*

- *Here is another way of thinking about computer science, coding and programming.*
This comes from the 4-H Computer Science Playbook which says:
 - *Computer science is the study of how computers are designed and how to write step-by-step instructions to get them to do what you want them to do. This often includes computer programming or coding as a tool to create things like software, apps, games, websites and electronics and managing large databases of information.*
 - *Coding involves creating instructions that can be understood and followed by a machine.*
 - *Programming involves more than just coding. It also includes planning, testing and debugging your code.*
- *With this definition in mind, what parts of computer science did we use in our challenge? Share your thoughts in the chat box. (Pause so participants can type.)*
- *How would a computer scientist use these skills? (Pause so participants can type.)*
- *Let's brainstorm computer science problem solving strategies in the chat box. I want everyone to get involved in this discussion. Share at least one idea in the chat box about how computer science can be used to solve problems. (Pause so participants can type.)*
- If your group is not too large, take a moment to invite participation, “[Name], how do you think computer science can be used to solve problems?”
- Comment on ideas shared if there is time.
 - *Thanks for sharing your expertise. This discussion helps us understand why computer science is important and some of the skills used to solve problems, like abstraction, decomposition, and algorithms which are aspects of computational thinking.*

See the Skill in Action (15 min)

- Cue up the [Computer Science: It's Easier Than You Think](#) video-based learning module.
- Introduce the activity overview video.
 - *I am going to share a video of a computer science event led for a group of 4-Hers by some mentors from Google. In the video, the participants are learning about computer science as they use Scratch to create an interactive story or game. You will get to try out Scratch yourself in a few minutes.*
- Watch the activity overview video.
 - *What did you notice in the video? Share your observations in the chat box. (Pause so participants can type.)*

- Now let's watch a second video that focuses on how the mentors are talking about computer science. As you watch the video, notice what the facilitators do to make the activity successful. Pay attention to how they talk about computer science. And note what problems youth are trying to solve as they work on their program.
- Watch the skill video.
- Use these questions to facilitate a discussion in the chat box about the videos.
 - How do the mentors describe computer science?
 - What did the facilitators do to make this activity successful?
 - What problems are youth trying to solve as they work on their programs?
 - We can choose to portray computer science as a future job, as a challenging task, or as a way of solving problems. All of these things are true of computer science. But when we focus on solving problems, it helps young people develop perseverance and grit – and makes it easier for young people to see how they apply the practices of computer science to other real-world problems.

Hands-on-Learning with Scratch (40 min)

- Now it is our turn to use Scratch. Scratch is a visual programming language (like Visual Basic) rather than a text-based language (like Python or Java). Animate a Name is designed to help users become more comfortable with coding. By the end of this activity, you will know more about Scratch by creating animation and using some computer science concepts. There is an online and offline version of Scratch. We will be using the online version so please follow the instructions in that version.
- Animate a Name is one of the activities from the 2018 4-H National Youth Science Day Challenge developed by Google and the National 4-H Council. The activity has a lot of support for students embedded into the activities so this is a good activity to try if you are not familiar with computer science.
- Watch the Code Your World introduction video Animate a Name at <https://csfirst.withgoogle.com/c/cs-first/en/animate-a-name/animate-a-name.html>
 - What do you think? Are you ready to do some coding? (Pause to see how participants react. Respond to questions or concerns if they exist.) Follow the link I put in the chat box and then use the link on the right to open a starter project.

- Share URL in the chat box so that everyone gets to the right activity and open it in a browser on your computer as you explain the steps <https://csfirst.withgoogle.com/c/cs-first/en/animate-a-name/animate-a-name/animate-a-name.html>
 - *We watched the video together, but if you want to go back to the instructions they start at 1:20 in the video. You start out by opening a starter project. (Demonstrate.)*
 - *But you can come back to this page to get instructions. You may even want to keep both windows open at once. (Demonstrate.) If you want to save the project you create, you'll need to set up an account. (Demonstrate selecting Join Scratch link in upper right corner.)*
 - *I'll give you half an hour to work, then we will touch base again. Let me know if you have any questions. (It's beneficial to let adults spend some time trying to figure things out, but important to give support when they ask for it.)*
- At the end of the time, ask if anyone would like to share their animations with the group and explain why they chose to animate their name the way they did.
 - *In the Animate a Name activity, you were learning to code with Scratch. And I suspect, along the way you were faced with some problems. What did you do when you had a problem? What computer science problem-solving strategies did you use? I want everyone to share at least one strategy in the chat box. (Pause so participants can type.)*
- Comment on ideas shared as appropriate and if time allows.

Process the Experience (20 min)

- *Now we are going to use breakout rooms to get into small groups and brainstorm how we can apply what we're learning about computer science. Think about what worked, or didn't work in the Animate a Name activity and any tips you have based on your own experience. You will brainstorm strategies for teaching computer science in your programs.*
- *I'm going to give you 10 minutes to brainstorm in your breakout rooms. I will send a reminder before it is time to come back together, but if you finish early, please return to the main session. That will help me know that you are ready to move on. If your group needs help just click the "Ask for Help" button in the meeting controls and "invite host".*
- *Before you begin brainstorming, choose one person in your group who will report back verbally in the main session about your discussion. It would be nice if your*

reporter has their video on. Towards the end of your time, I'll remind you to choose two strategies for your reporter to share.

- Send participants to their breakout rooms.
- Use the “Broadcast a message to all” button and share the topic – Strategies for teaching computer science in your program
- After 8 minutes, use the “Broadcast a message to all” button to send a reminder – You have two minutes left to choose two strategies to share in the main session.
- When you have one minute of time left, click the “Close All Rooms” button. This will give each breakout room a 60-second countdown, and will automatically end the breakout session and return them to the main room.
 - *I am looking forward to hearing the strategies you think will be useful in teaching computer science.*
- Call on breakout groups one at a time to share. Encourage the reporter to use their video if they are not already doing so.
- You may want to make notes as groups share so you can include these strategies in your follow-up email. If you are recording the meeting, you can come back later and make notes.

Organize Your Computer Science Activity (20 min)

- *One of the challenges of leading computer science activities or developing a computer science program is the organization and management of equipment. When thinking about what equipment you ideally would like to have if starting a computer science curriculum and the equipment you already have, there are several logistical issues to consider. We're going to be using the [Computer Science Organizer handout](#) and [4-H Computer Science Playbook](#) to brainstorm equipment you might need or want to do computer science activities. For this activity focus on all the equipment you would want to have for learning experiences that use computers, tablets or other devices.*
- *Get out [the Computer Science Organizer handout](#) and something to write with. I'll give you 12 minutes to organize a plan. Think of this as a wish list, not just the essentials. What would be the perfect space, equipment, internet connection to have? We will come back together at _____ (time in 12 minutes).*
- Watch the group as they work and be ready to give suggestions. If it becomes clear that there are a lot of people done writing before your set time, give a one-minute warning, then bring the group back together.

- Be prepared to clarify, this is a broad wish list, in the next activity we will focus on what is actually required for a specific activity.
- After 11 minutes, give a one-minute warning, then bring the group back together.
- Use the questions below to facilitate a discussion that will help participants prepare themselves to lead computer science activities – you probably won’t have time for all the questions. For each question, ask a specific person to unmute their mic and share their response. Then ask for someone else to share a different response (this reminds everyone that there are multiple ways to make computer science activities work).
 - *How many students do you hope to engage in your computer science program?*
 - *How many computers will you need to accommodate that size group?*
 - *What will you need besides computers?*
 - Example answer: Facilitators might need tablets, laptops, headphones, USB drives, etc.
 - *Which equipment does your program own? or Which equipment could be borrowed from others? Who has equipment that could be borrowed?*
 - Example answers:
 - Local school, libraries or universities might have equipment that could be borrowed.
 - Local businesses such as banks or tech firms might be willing to donate used equipment.
 - *How would you keep track of the equipment and make sure you have it all at the end?*
 - *Where could you store your equipment?*
 - Example answers:
 - Facilitators might have cabinets on site for storage, or nearby.
 - They might store items in a van or trailer that travels between sites.
 - They might store items in their office and carry them to each program.
 - *How are you going to manage your equipment like headphones?*
 - Example answers:
 - Facilitators might give everyone a set of earbuds and if they lose them they have to pay for another pair.
 - They might have everyone turn their volume to zero
 - They might have everyone provide their own earbuds.

- They might have headsets that are retuned after each session. Will the headsets need to be cleaned?

Create an Action Plan (15 min)

- Now we are going to take our ideas on how to manage our equipment and our experiences with Animate a Name and put them together into an action plan for a specific activity. We will use the [STEM Planning Template](#) handout for this activity.
- Your computer science organizer list includes all the equipment you would like to have for your CS program, but you will probably not use all your equipment for every activity. Therefore, we'll start by deciding what equipment is needed for Animate a Name (or a different activity you want to plan). Then you will use the template to plan that activity.
- I'll give you 12 minutes to work on your activity. Start with the end in mind and identify what youth will know and be able to do after experiencing Animate a Name. Then focus on how you will engage them in the activity, how much time you will need, supplies, etc. We will come back together at _____ (time in 12 minutes).
- Watch the breakout rooms as participants work and be ready to give suggestions. If it becomes clear that there are a lot of people done writing before your set time, give a one-minute warning, then bring the group back together.
- Be prepared to encourage thinking about materials needed, time for each part of the activity, and planning specific questions or strategies for reflecting and processing.
- Ask, what accommodations might your students need? (Sight, mobility, hearing, ADHD, autism, etc. What else could you do to be inclusive?)
- After 11 minutes, give a one-minute warning, then bring the group back together.

Conclusion (10 min)

- Now, think about how you can apply what we've learned today. Do you feel like you understand what computer science is now? As I ask a question, please use the chat box to share your ideas so we can learn from each other. I will pause after each question to give you some time to think and type.
 - How could computer science help the young people in your program prepare them for their future? (Pause so participants can type.)
 - How would integrating computer science into your program support other program goals? (Pause so participants can type.)

- Share at least one strategy you can use to include more computer science in your program. (Pause so participants can type.)
- Now take some time to scroll through the chat, read each other's responses and comment on them. You can make your chat window larger so that it is easier to read. (Pause so participants can read and type.)
- Comment on ideas shared as appropriate and as time allows.
 - Thank you for being active participants in today's virtual training. We learned what computer science is, why it is important and how you can be successful in teaching computer science. Following the session, I will share the notes from our brainstorming and discussions today. Please stay online for a few minutes if you have any questions for me.
- Answer any final questions participants may have.
- Remember to save the chat before you close the meeting.

After the Session

- Compile ideas from the chat boxes on three topics: (1) What is computer science? (2) CS problem-solving strategies, and (3) Strategies for teaching CS in your program.
- Within three weeks of the training, send an email to participants with the message below and the lists they generated in the workshop.
 - Thank you for your participation in the recent Click2Science training on "Computer Science: It's Easier than you Think". I hope you found it useful. Consider meeting with a co-worker, supervisor, or friend to share what you learned.

Here are some notes from our discussions that you may find helpful.

1. *What is computer science?*
2. *CS problem-solving strategies,*
3. *Strategies for teaching CS in your program*

I look forward to continuing our learning at the next session on SKILL/FOCUS on DATE at TIME at LOCATION. Please let me know if you have any questions. I can be reached at CONTACT INFO.

Want to Earn Credit? Click2Science has teamed up with Better Kid Care to provide continuing education units. Check it out at: <http://www.click2sciencepd.org/web-lessons/about>

This material is based upon work supported by the National Science Foundation under Grant No. 1840947

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Computer Science Organizer

Type of Equipment # needed	Does Program Own If no, who owns it?	Equipment Storage Plan	Equipment Tracking Plan

Location for the activity:

Additional supplies needed:

Software needed:

Do you need to download programs onto devices before doing the activity? If so, who is going to do this?

Additional adults to help with the activity? If so, how many? Who will you ask to assist you?

STEM Planning Template

Date:	# of Youth:
Activity Name:	Age of Youth:
Learning Outcomes	
<i>STEM Practices</i> After this activity, youth will know <u>how to</u> :	<i>STEM Concepts</i> After this activity, youth will know <u>that</u> :
Lesson Design	
Introduction (Hook) _____ minutes	
	Materials needed for this step:
Activity _____ minutes	
	Materials:
Reflection or Assessment _____ minutes	
	Materials: