Professional Development Situation: Training
Skill Focus: Modeling Engineering Practices
Time Required: 155 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 and Introduction – 5 minutes
Is it computer science? – 15 minutes
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 – 60 minutes
Debrief – 15 minutes
How to organize a computer science activity – 15 minutes
Action plan – 25 minutes
Conclusion – 5 minutes

Materials

- Computer with internet connection
- Projector and speakers
- Paper and pens/pencils (for taking notes)
- Name tents
- Materials for Animate a Name: headphones (recommended), optional completion certificates
- Flip chart paper and markers

- Handouts:
    - Computer Science Organizer (1 per participant)
    - STEM Planning Template (1 per participant)

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 training. If you are not providing computers, remind them to bring their own. Determine if any participants require accommodations (sight; hearing; etc.).
    - *The next professional development opportunity to enhance our STEM skills will be on DATE at TIME at LOCATION. Our focus for this session will be "Computer Science; It's Easier than You Think". 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 needed for the training.
- Develop a list of possible questions participants might have during the training and your responses to those questions. Review any key terms or ideas that may be unclear.
- Prepare one piece of flip chart paper or a white board with the label, "Problem-Solving Strategies" and one with "Using Computer Science."
- It is recommended to preprint name tents.
- On the day of the training, test the audio and video equipment.

Training Outline

Welcome and Introduction (5 min)

- Greet participants as they arrive. Make sure everyone feels welcome and comfortable.
- Introduce yourself and the focus of the session: "Computer Science: It's Easier Than You Think".
- Ensure participants are aware of the locations of restrooms facilities, refreshments, etc.
- If you preprinted name tents, have participants pick them up as they come in and sit down. If you did not, have them write their name and program on a name tent.

- If you have 12 or more participants, divide them into groups and have each person introduce themselves to their group. If you have less than 12, have people introduce themselves to the whole group.

Is it Computer Science? (15 min)

- Explore computer science through an ice breaker where participants line up from shortest to tallest without talking.
    - *Now that we know a little more about each other let's do an activity that gets us moving. Without talking line up on one side of the room from shortest to tallest. You may begin. Remember you may not speak during this activity.*
- Once participants have stopped moving and lined up from shortest to tallest have them stand in their places and process the experience. Allow participants to have a discussion about the questions you ask, but guide them towards figuring out if they were doing computer science. The answers to the questions are listed below each question.
    - *You may talk again, but please remain in your places. First, did you line up from shortest to tallest? How do you know if you did that?*
        - Answer: Answers will vary.
- If they did get lined up, ask*:*
    - *Should the shortest person be on the left as I face the line, or should that person be on the right?*
        - Answer: There isn't really a wrong answer to this question. What is important is what logic they used to line up.
- If they didn't get lined up, ask:
    - *Do you think part of the reason you didn't get lined up was that some people wanted the shortest to be on the left and some wanted them to be on the right?*
        - Answer: There isn't really a wrong answer to this question. What is important is what logic they used to line up.
- If everyone was in the correct place, ask:
    - *Does it matter whether the shortest person was on the left or the right end of the line?*
        - Answer: No unless the instructor specified that the shortest person is on a certain end of the line. The task was to line up shortest to tallest, whether the shortest is at the right or left side of the line doesn't matter because the instructor didn't specify.
    - *How did you know where to stand?*

        - Answer: There could be several answers from watching where others lined up to just standing in a spot on one side of the room and waiting until everyone else lined up around him/her.
    - *Do you think you were using skills that a computer scientist would use during this activity? Why or why not?*

What is Computer Science? (10 min)

- Have everyone return to their seats and transition to the next activity.
    - *Now that everyone is back in their seats let's define computer science for our programs. Who will share their definition of computer science?* (after a short discussion, share this definition from the *4-H Computer Science Playbook,* pg. 6).
    - *The 4-H Computer Science Playbook 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. Computer scientists deal mostly with software and software systems; this includes their theory, design, development and application and the social impact of computing on individuals and society. Principal areas of study within CS include; artificial intelligence/machine learning, computer systems, and networks, security, database systems, human-computer interaction, vision and graphics, numerical analysis, programming languages, software engineering, bioinformatics and theory of computing."
    - *Programs are instructions that can be understood and followed by a machine.*
    - *Coding refers to creating instructions for a machine to follow. Programming involves planning, testing and debugging your code (or written instructions) for the machine to follow.*
    - *With this definition in mind, what parts of computer science were used as the group was trying to solve the problem of lining up from shortest to tallest? How would a computer scientist use these skills?*
- Use the flip chart paper or a whiteboard labeled "Problem-Solving Strategies" to write participant's responses to the questions below.
    - *How did the group solve the problem I gave you?*

    - *Do any of these strategies help you connect computer science with other fields of study?*
- Using the flipchart paper labeled "Using Computer Science," have participants generate a list of fields that need computer science. (Examples would be computational thinking can be used when playing a sport, a recipe is an algorithm, computer science is the field that produces apps, computer programs that are designed to make work in other fields easier; drafting software for architects, programs for engineers, charting programs for the medical profession.)
    - *This discussion helps us think about computer science in a way that can help us build our understanding of the skills required in computer science like computational thinking, abstraction, decomposition, and algorithms which we'll talk about more in our next training.*

See the Skill in Action (15 min)

- Introduce Computer Science: It's Easier than you Think video-based learning module.
    - *Throughout the video, students are programming using Scratch during an Hour of Code event. Scratch is one of the most widely used introductory coding programs. Shortly you will use Scratch. In the Hour of Code activity, youth could create anything they wanted to such as telling a story or making a game. Once they had their idea, they figured out how to program it by watching short videos and getting help from the facilitators. The first video will explain the activity. The second video will show the skill.*
    - *As you watch the video, think about the following questions:*
        - *What did the facilitators do to make this activity successful?*
        - *Why is computer science important?*
        - *What are some of the problems youth were trying to solve as they worked on their programs?*
- Watch the activity video first, then the skill video.
- As a group, discuss the questions above; watch the video(s) again if needed.

Hands on Learning (60 min)

- Introduce the Animate a Name activity with the following script:
    - *With a show of hands, how many of you have used Scratch before?*

- *This activity is part of the 2018 4-H National Youth Science Day Challenge developed by Google and the National 4-H Council. It 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.*
- *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 this curriculum. We will be using the online version so please follow the instructions in that version.*

- If any of the participants are unfamiliar with Scratch, show them how to sign into Scratch to save their work. If they are familiar with Scratch they can follow the instructions on their own. It's beneficial to let adults spend some time trying to figure things out.
- Give participants 45-50 minutes to work on their animations. If someone finishes early, ask what they would do with students that finish early? Suggest they add more to their animation or they might want to start a new animation if they have time.
- 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.

Process the Experience (15 min)

- Refer back to the chart, "Problem-Solving Strategies" and ask the entire group what problem-solving strategies they used in this activity. Add new ideas to the list.
  - *Now you are going to work in small groups to brainstorm skills or strategies for teaching 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 have one piece of flip chart paper you can use to share your ideas with the whole group.*
- Divide into small groups for brainstorming (5-10 min). Give each group one piece of chart paper and markers to create a chart they will share with the large group.

Organize Your Computer Science Activity (15 min)

- *One of the challenges of leading computer science activities or developing a computer science curriculum within your 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. I'm going to give you another piece of paper to brainstorm equipment you might need or want to do computer science activities. For this activity focus on learning experiences that use computers because unplugged (which means no electronic devices are needed) activities are more similar to managing supplies for other types of STEM experiences. Think of this as a wish list, not just the essentials. What would be the perfect space, equipment, internet connection to have?

- Participants may come up with tablets, computers, laptops, headphones, USB drives, etc.
- After 2-5 minutes, when ideas slow down, encourage them to think about what they can do in advance to make an activity run smoothly. How would they prepare instructions or handouts?
    - *Now I'm going to challenge you individually to start thinking about what will be needed to manage the equipment for your program. Use paper to take notes.*
- Use some of the questions below to facilitate a discussion that will help staff prepare themselves to lead computer science activities. For each question, encourage one person to 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 will be doing your computer science activities?*
    - *How many computers will you need to accommodate that size group?*
    - *What will you need besides computers?*
    - *Would your program own the equipment or are some being borrowed from others?*
    - *How would you keep track of the equipment and make sure you have it all at the end?*
    - *Where would you store your equipment?*
    - *How are you going to manage your equipment like headphones? Are you going to hand out earbuds: If they lose them they have to pay for another pair, turn their volume to zero, or can they use speakers if their device has them?*
    - *What accommodations might your students need? (Sight, mobility, hearing, ADHD, autism, etc. What else could you do to be inclusive?*
- Have each person briefly share one idea that they are excited to take back to their program. For more ideas and suggestions about developing a computer science program they can refer to the 4-H Computer Science Playbook.

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 to do this activity with students. Your equipment list provides a list of all the equipment you would like to have when doing any CS activity, but you will probably not use all this equipment for every activity. Therefore, we want to decide what equipment we will use for one activity and develop an action plan for how we want to do that activity with youth.*
- *Using Animate a Name activity or another computer science activity that you will be using, develop a plan of how you will implement that activity. I have handouts of our STEM Planning Template and a Computer Science Organizer that may help you with your plan. You also have your list of equipment and how you are going to track it and store it to help you figure out how you are going to take care of your equipment needed for this activity.*

- Allow 10-12 minutes for planning. Encourage staff from the same location to plan together. Walk around to answer questions as needed.

Conclusion (5 min)

- *Thank you for coming to the session today. 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 the charts we created today. You can also take the Animate a Name activity with you to use in your programs.*

- Answer any final questions participants may have.

After the Session

- From the pieces of chart paper, compile a list of problem-solving strategies and ideas for using computer science.
- Within 2-3 weeks of the training, email participants and include the lists from the workshop.
  - *Thank you for your participation in the recent Click2Science training on "Computer Science: It's Easier than you Think". If you would like more information on how to set up a computer science program, I have included the link to the 4-H Computer Science Playbook. Consider meeting with a co-worker, supervisor, or friend to share what you learned. 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

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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	
STEM Practices After this activity, youth will know <u>how to</u>:	*STEM Concepts* 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: