Learning Experience 10

Introduction to Scratch & Computer Scientist Team Roles

DAILY MESSAGE/DO NOW
Do you know anyone who is a computer scientist? A programmer? What kinds of jobs can you have as a computer scientist?

HOOK
Today we are going to learn about the four different Computer Scientist Roles. Knowing the strengths of different members of your team, decide who will be doing which Computer Scientist Role to contribute towards your final project.

Teacher Prep/Materials

- Laptop cart/computers
- Experience 10 Presentation & Do Now
- Signed Scratch Permissions Slips (for online)
- Scratch Online/Scratch Offline Editor
- MakeyMakey Kits
- Circuit Scribe Pens
- Copper Tape
- Experience 10 - 10 Block Challenges
- Experience 10 - Broadcast Specialist Sample Code
- Experience 10 - Cloning Specialist Sample Code
- Experience 10 - Cloning Specialist Scratch Card
- Experience 10 - Image Import Specialist Directions
- Experience 10 - MakeyMakey Planning Sheet
- Experience 10 - MakeyMakey Setup Directions
- Scratch Interactive Ecosystems 10 Block Challenge Studio - https://goo.gl/fCDa9T

Summary
Similar to the scientist roles, each student will take on a second role as a computer scientist for work on their final project: Image Specialist, MakeyMakey Specialist, Cloning Specialist, or Broadcast Specialist. Once students have taken on their computer science role, the Library Technology Specialist/Instructional Technology Specialist will work with the classroom teacher to introduce the Scratch programming application (either online or offline editor) to students through a guided free-play period using the 10 Blocks Challenges.

In the second class period, students will learn more about how their individual roles can contribute to the success of their team project through a jigsaw activity. The LTS/ITS leads these short activities with each of the four computer scientist roles.

Understanding and Performance Goals

- Understand how the individual computer scientist roles contribute to the completed team project.
- Learn how use Scratch in the context of the specific roles.
- Exposure to and experience with Computational Thinking Practices as

Time
100 minutes (approximately 2 class periods)

Key Vocabulary
Scratch
Computer Scientist
Programmer
Image Specialist
MakeyMakey Specialist

Cloning Specialist
Broadcast Specialist

found on the “Computational Thinking with Scratch” website (http://scratched.gse.harvard.edu/ct/defining.html) such as:

- **experimenting and iterating:**developing a little bit, then trying it out, then developing more
- **testing and debugging:** making sure things work — and finding and solving problems when they arise
- **reusing and remixing:** making something by building on existing projects or ideas
- **abstracting and modularizing:**exploring connections between the whole and the parts

DAY 1

Analyze (5 min.)

Lead a discussion around the types of jobs computer scientists could possibly have. Ask for student connections (friends, family members, etc.), mentioning opportunities in the community, online, as well as in school/at the high school to continue learning about computer science.

Highlight that working a computer scientist or at a technology-based company does not necessarily mean only working with code. For example, popular games and apps need graphic designers, artists, managers and other types of jobs to help the company run smoothly and contribute towards the projects.

Expand (15-20 min.)

1. If using online Scratch accounts and students have returned signed permission slips, start with creating accounts. Follow the directions in the Experience 10 Presentation Slides. *Note: students will need to login to their school email account to verify their email address. Speak with your LTS/ITS for login information.*
2. Review the four computer scientist roles.
    - **Image Import Specialist**: gather all the digital images of the team’s artwork and import them into a Scratch project. Once the images are in Scratch, crop out any extra white areas and give the sprites accurate, descriptive labels to assist with coding done by other team members.
    - **MakeyMakey Specialist:** in charge of taking out and putting away the MakeyMakey, hooking it up to the team watercolor food web, and making sure the programming is correct in Scratch.
    - **Cloning Specialist:** in charge of cloning organisms in your Scratch project. This role makes sure the correct number of organisms are being cloned and that they are being “deleted” when interacting with the right predators.
    - **Broadcast Specialist:** Broadcasting is a way to send messages to all the sprites (the organisms) in Scratch. You will be in charge of making sure all the organisms react the right way when there is a change in the ecosystem.
3. After reviewing the roles, ask students to consider their own strengths and weaknesses. Have the teams discuss which computer scientist role each team members should take on, thinking about how to capitalize on the strengths of each person to create a successful final project.

For differentiation, the roles are listed in order of complexity in regards to required programming skills. The Image Specialist has the least amount of coding while the Broadcast Specialist has the most complex.

Explore (20 min.)

1. Once computer scientist roles have been decided, have students sit with other students who share the same role.
2. Introduce the 10 Block Challenges. Each role has as starter project here: https://scratch.mit.edu/studios/1337256/ as well as a handout in the **Experience 10 - 10 Block Challenges** document. The goal is to spend time exploring both the Scratch Interface and specific Scratch programming blocks that will aid the students in being successful in their roles.
3. Some helpful tips to show students to make the most of their time exploring in Scratch include:
    a. On the project page, each challenge has directions in the "**instructions**" section on the right of the image as well as yellow comments inside the project.
    b. Pointing out the blue "**see inside**" button on the project page.
    c. **Right-click** on any block to see a pop-up menu of options including duplicate, delete, and help. The help is particularly useful as it brings up an explanation and example of what the block does.
4. If students are stuck while working on their 10 Block Challenges, direct them to the bottom of their 10 Block Challenge handout as well as the "Feeling Stuck" slide in the Experience 10 - Presentation file. Review the strategies, or computational practices, with the students and leave visible for students to reference while working on their challenges.

Review, Extend, Apply (5 min.)

Ask student to reflect in their role groups on what it was like to be a computer scientist.

- How were you successful?
- What was challenging?
- How did you persevere?

DAY 2

Analyze (5 min.)

While sitting in their teams, students should answer and discuss the following questions, gathering answers to their questions from other team members.

- Did you finish your 10 Block Challenge?
- What questions do you still have about using Scratch?

Expand (10 min.)

1. Share with students the goals for the day, which include learning more about their individual computer scientist roles, as well as moving forward with various parts of the team final project. See the Day 2 section of Experience 10 - Presentation.
2. Review options for what each student can be working on during the jigsaw activity pull out times including:
    - Finishing 10 Block Challenge
    - Starting/continue working on team Google Slides presentation
    - Finishing team watercolor food web
3. Through a jigsaw activity with either the LTS or ITS, each group will be pulled out in the order listed below for a brief 10 minute overview of key

components of their computer scientist role as well as learn about resources specific to their role.

- **Image Import Specialist**: The Image Specialists need to complete their job first of setting up the Scratch project before other team members can complete their roles. Use the Experience 10 - Image Import Specialist Directions as well as the Image Import Specialist 10 Block Challenge to walk students through the steps of downloading the digital images from Google Drive and importing them into Scratch. Highlight the following points:
    - Can import more than one image at a time by holding down the “shift” key
    - Use the eraser on the largest setting first to erase a lot quickly, then use a smaller eraser.
    - Don’t go overboard with having perfectly cropped images, just enough cropping to focus on the organism and not extra whiteness.
    - Show the “undo” button in the image editor to undo the last erase to help with any mistakes.
    - Import the watercolor drawing, without the food web lines, onto the Stage, not as a Sprite.
- **MakeyMakey Specialist:** This role can get started on the Experience 10 - MakeyMakey Planning Sheet without having to wait for the Image Specialist. This role should check in with team members as to which main five organisms are going to be animated in the Scratch project and why. The Experience 10 - MakeyMakey Setup Directions document as well as the MakeyMakey Specialist 10 Block Challenge can show students through the steps of setting up the hardware of the MakeyMakey and the Scratch programming blocks. Highlight the following points:
    - On the final watercolor food web, the claim and the solution should be hooked up to the MakeyMakey.
    - Complete the Planning Sheet before setting up the MakeyMakey or doing any coding.
    - Each kit has 7 alligator clip cables of different colors as well as the MakeyMakey. Students are responsible for returning the kit in an organized manner for the next class.
    - Have students practice using the alligator clips to put through the two holes for each key on the MakeyMakey.
    - One one organism per key
    - On the final watercolor food web, remind students they need to draw an “earth button” in a corner to hook up the earth alligator clip to complete the circuit.
    - Demonstrate using the Copper tape and Circuit Scribe pen, reinforcing the tape is sharp on the edges and that the Circuit Scribe pen has bits of metal in it to make it conductive ink.
- **Cloning Specialist:** The Cloning Specialists can begin work as soon as the Image Specialists are done. This role should collaborate with the MakeyMakey Specialists to make sure the

Important Technology Note
Images should be reduced in file size before importing into Scratch. Large image files will cause Scratch to have significant pauses/delays when working with the image. The images do not need to be any larger than approximately 800-1,000 pixels. Automator on a Mac OSX computer can be used to reduce picture file size very quickly. Click here to learn how.

correct keys are “triggering” the correct organisms. Use the Experience 10 - Cloning Specialist Sample Code and Experience 10 - Cloning Specialist Scratch Card documents as well as the Cloning Specialist 10 Block Challenge to walk students through the steps of using cloning in the team Scratch project. Highlight the following points:

- Cloning is like duplicating only another sprite isn’t created, just a copy of the sprite on the stage.
- Cloning can be used to introduce a certain number of organisms into the forest environment, or have them “show” when triggered by the MakeyMakey.
- To do cloning correctly, all three blocks “create a clone,” “when I start as a clone,” and “delete a clone” must be used. “Create a clone” tells Scratch when to make a clone. “When I start as a clone” tells the clones what to do, like where to move, when they are created. “Delete a clone” tells Scratch when a clone should be deleted or removed from the stage.
- Use the “if” block and “touching” to tell the clones when to delete depending on predator/prey relationships.

- **Broadcast Specialist:** This role should collaborate with the Cloning Specialists to coordinate when changes in the ecosystem should happen depending on when clones are added or deleted. For example, when small mammals increase there should be an increase in ticks. When small mammals decrease when “eaten” by their prey, the ticks should also decrease. Broadcasting can be used on the ticks and small mammals to demonstrate the dependent relationships. Use the Experience 10 - Broadcast Specialist Sample Code document as well as the Broadcast Specialist 10 Block Challenge to walk students through the steps of using broadcast in the team Scratch project. Highlight the following points:
  - To be successful with broadcasting, you must use the “broadcast” and “when I receive” blocks.
  - Be descriptive in the message descriptions such as “add ticks” or “remove ticks.”
  - Broadcasting in Scratch is a much like sending a text message to all of your friends. You can send the message, but you have to have a phone/device to receive the message. The same is true for Scratch. Use the “broadcast” block to say when to send the message, but be sure to use the “When I receive” block on another sprite to tell the sprite what actions to take when receiving the message.

Explore (35 min.)

1. As students learn more about their computer scientist roles, other team members can continue to work on other aspects of the project, including taking screenshots/using the Snipping Tool of evidence from the EcoMUVE graphs, completing the watercolor food web, completing the 10 Block Challenge, or working on the team Google Slides presentation.