TECH TALES

MAKE. LEARN. SHARE.

DAY 2: STORYTELLING WITH ELECTRONICS

Technology

In this session, families are using what they have been learning since Session 1 to sink in and start doing detailed work on their design project—from doing brainstorming and planning on paper to then implementing it with physical materials and electronic tools. Along the way, families continue to learn about important ideas related to electonics (input sensors) and coding (how algorithms work).

badges

materials

- Light meal, disposable cutlery, drinks with lids
- Computers with Birdbrain Robot Server and Scratch 2.0 installed
- Hummingbird boards, USB cords, and single-color LEDs
- Slides and/or projected screen
- Troubleshooting Guide
- Laminated family discussion questions
- Backpack play page in workbook
- Backpack play cameras

workshop day 2

1. WELCOME & SHARING

Overview the arc of the program.
Introduce the theme of the day.

2. STORYTELLING

Share a book or traditional story.
Demonstrate how to fill out the storyboarding worksheet.

3. EXPLORING

Develop Your Story Together
Introduction to Hummingbird & Scratch
Family Discussion

4. ACKNOWLEDGING

Reflection on the day
Award badges from the day
Prepare for next week

EATING & SET-UP

20 minutes

Welcome families as they arrive.

As they are eating, encourage families to turn to page 7 of their family guide. Instruct each family member ask at least one of the five questions. They will discuss these answers within their own families.

- **Question 1**: What kinds of things do people in our family make or build in our jobs or family life?
  Examples: clothes, art, bikes, jewelry, or others! Think about extended family too!
  Do we think that the things our family makes is connected to robotics and computer science?
- *Engineers and computer scientists work in teams. Please think about how your family works as a team by talking about the rest of the questions.*
- **Question 2:** How do we work together as a family?
- **Question 3:** How do we help each other learn?
- **Question 4:** How do we make decisions as a family?
- **Question 5:** How do we make sure we listen to everyone's ideas?

From here on out, families will be working together on a collaborative project. This is a good time to stop and recognize strengths, and agree about how they would like to work together.

materials

Light meal
Disposable cutlery, drinks with lids
slides
projector
family guides

background info

In this workshop, highlight examples of technological advances from the community's culture, other non-dominant cultures, and from other times.

Ideas: calendars, building techniques and materials, alphabets, storytelling

set up

Set up food and paper goods on a table.

Arrange any books or supplemental items on a table.

Post a schedule of the day prominently in the room, on a white board, paper, or projected on the wall.

Today will be the first day using electronics at the family tables. To reduce spills, designate an area for liquids, or ensure that all drinks have lids. Be prepared to clean up any spills right away.

STORY PAIR SHARE

5 minutes

Pair up families. While in pairs, families will share their ideas for their stories. Ask families to share the following two things:

1. **Share the idea for your story.** What prompt are you using? What is your idea for your story? Why is this story important to you?
2. **Share one thing that you think you want to happen in your story.** Have families share one thing that they think will happen in their dioramas once they are built. Some examples can be: the sun rising, lights twinkle on and off, a cloud moves across the scene.

background info

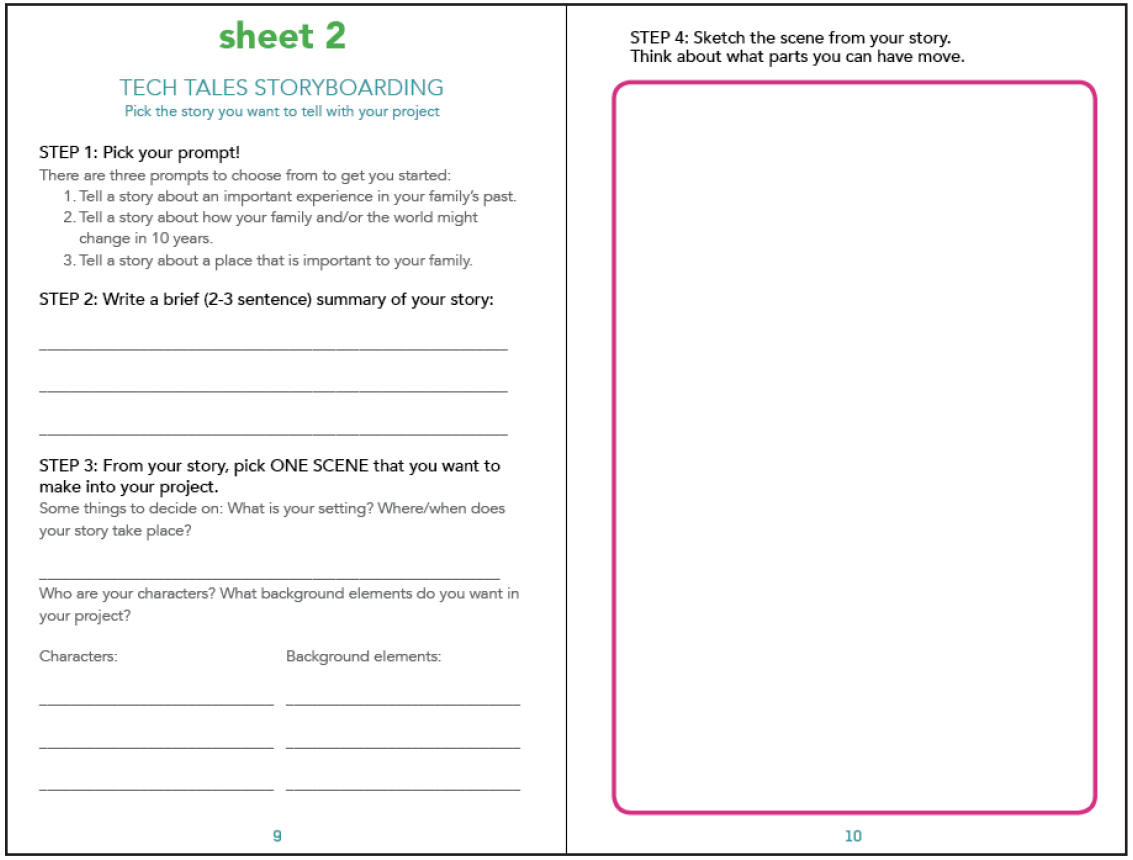
Individuals practice diverse skills ("craft" and "science") that may initially seem unrelated. It is useful for people to see that a range of knowledge and practices are needed to engage in project work of this kind.
During this time, facilitators can be listening for overlap between participants' areas of expertise and robotics/ design/art.

SHARE A STORY

15 minutes

Families gather together. Facilitator shares a book or traditional story.
After the story has been shared, refer to the storytelling worksheet and discuss how you would fill it out from the story you heard.

Call out specific parts of the story and fill out a worksheet together.
Who are the characters?
What are they doing?
Where are they (setting)?



sheet 2

TECH TALES STORYBOARDING

Pick the story you want to tell with your project

STEP 1: Pick your prompt!

There are three prompts to choose from to get you started:

1. Tell a story about an important experience in your family's past.
2. Tell a story about how your family and/or the world might change in 10 years.
3. Tell a story about a place that is important to your family.

STEP 2: Write a brief (2-3 sentence) summary of your story:

_____

_____

_____

STEP 3: From your story, pick ONE SCENE that you want to make into your project.

Some things to decide on: What is your setting? Where/when does your story take place?

_____

Who are your characters? What background elements do you want in your project?

Characters: Background elements:

_____ _____

_____ _____

_____ _____

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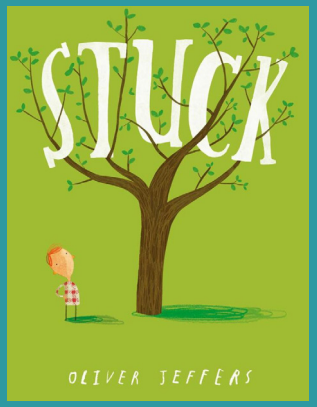
STEP 4: Sketch the scene from your story.
Think about what parts you can have move.

10

materials

Book, visiting storyteller. Suggested book: *Stuck*, Oliver Jeffers

Storytelling worksheet



DAILY THEME

5 minutes/family, or 10 minutes all together

SHORT DISCUSSION ON THE THEME OF THE DAY

Today's theme is Technology.

ASK

What is Technology?
What do you think of when you hear that word?
Possible answers include computers, phones, wheels, etc.

EXPLAIN

We hope to expand our ideas about technology and what it means to us today. We offer a very technical definition of the multiple meanings of the word "technology."

DISCUSS

Discuss other technologies: Wheel, canoe, navigation, weaving, medicine, art techniques, storytelling, writing…

All technology is brand new at some point, even the wheel.

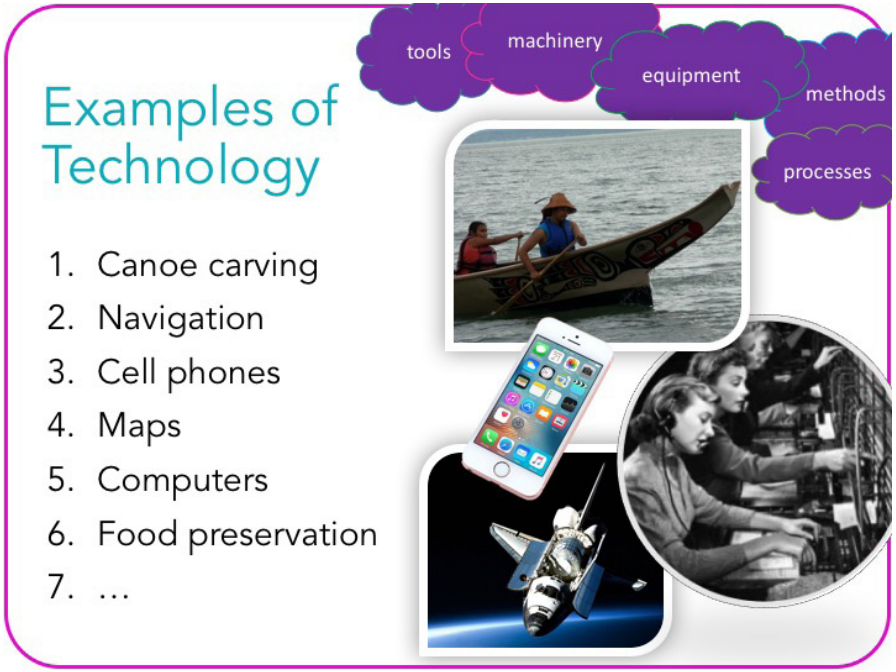
Engineers use technologies to solve problems in life. Artists use technologies to express ideas. Scientists use technologies to find out more about the world. Sometimes the same technology can be used in many different ways.

background info

What is Technology?
Scientific Definition:
The application of scientific knowledge to develop:
- machinery and equipment
- a process or method that serves a practical end

The branch of knowledge dealing with engineering, applied sciences, and the industrial arts

Find out about technologies that were developed within your community and share these as examples.



Day 2 slide

DEVELOP YOUR STORY TOGETHER

30 minutes

At this point we are introducing the theme for the work families will be doing together.

Each family may choose a story based on these prompts:

1. Tell a story about an important experience in your family's past
2. Tell a story about how your family and/or the world might change in 10 years
3. Tell a story about a place that is important to your family

Families brainstorm and briefly describe their story using the handout that you went over together.

They identify the setting, characters, and major actions and develop a drawing of these elements.

Encourage sketching and writing in their preferred language. This doesn't have to be the final version of your story or a realistic diagram, so don't worry about making it perfect. Just get ideas on paper.

Thoughts for story development:
A story can be interesting or meaningful when interactions happen, when something changes. Characters can interact to cause a feeling, or a reaction. How does that happen in your story? Why is this story important to you?

materials

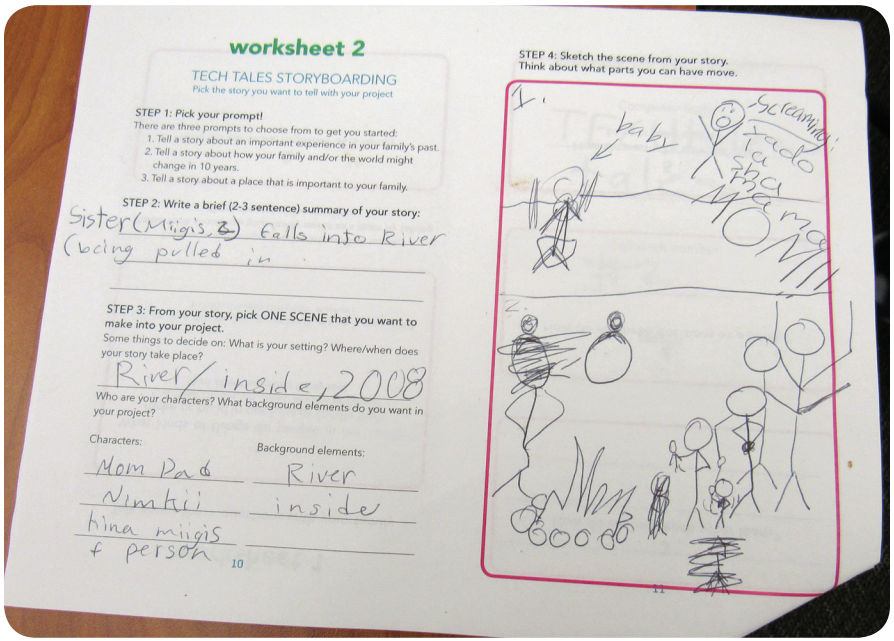
Storyboarding worksheet per family (pg 10-11 in family guide)

Pencils, markers, crayons
Optional: Large sketch paper

background info

The storytelling prompts will allow families to tell personally relevant stories prompting discussions and draft writing which demonstrates an understanding of diverse cultural perspectives.

The goal is to have each family jointly decide the story they want to focus their project on. The session ends with a sharing of ideas with constructive feedback from everyone.


worksheet 2

TECH TALES STORYBOARDING

Pick the story you want to tell with your project

STEP 1: Pick your prompt!
There are three prompts to choose from to get you started:
1. Tell a story about an important experience in your family's past.
2. Tell a story about how your family and/or the world might change in 10 years.
3. Tell a story about a place that is important to your family.

STEP 2: Write a brief (2-3 sentence) summary of your story:
Sister (Miigis, 2) falls into River (voicing pulled in

STEP 3: From your story, pick ONE SCENE that you want to make into your project.
Some things to decide on: What is your setting? Where/when does your story take place?
River / inside, 2008

Who are your characters? What background elements do you want in your project?

Characters: Mom Dad Nimkii Nina miigis + person

Background elements: River inside

10

STEP 4: Sketch the scene from your story. Think about what parts you can have move.

11

INTRODUCTION TO SCRATCH + HUMMINGBIRD

40 minutes

Each family will have their own computer out, and the facilitator will demonstrate on a projected screen.

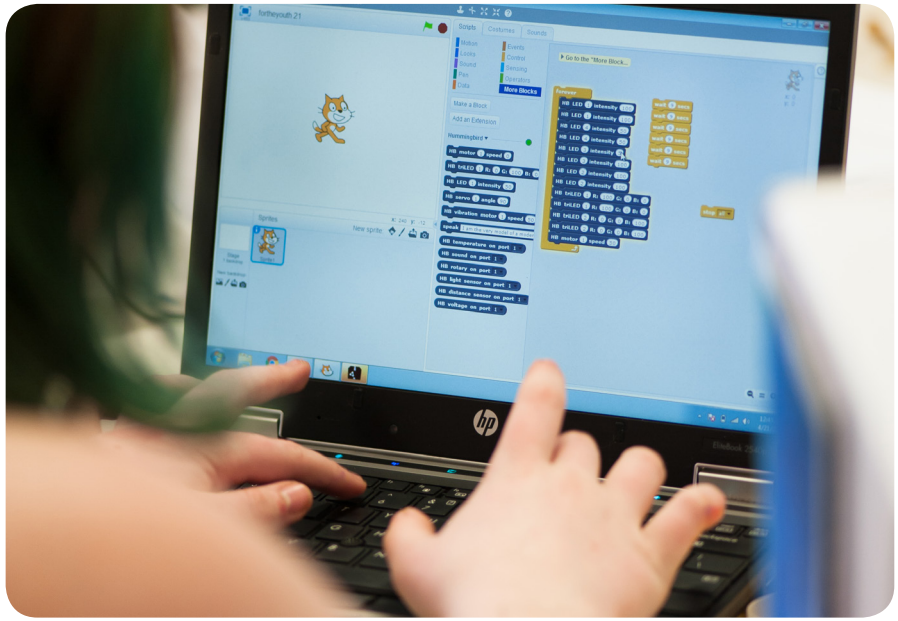
materials

Computers with Birdbrain Robot Server and Scratch 2.0 installed, OR netbook with Scratch Hummingbird Connection app installed

Hummingbird boards, USB cords, and single-color LEDs

Slides or live computer screen and projector

Troubleshooting Guide



EXPLAIN

We're going to learn how to tell these robotic parts what we want them to do.

INTRODUCE

Introduce each electronic component:

- Hummingbird board (brain),
- LED (output),
- USB cable (communication),
- computer (instructions).

What is the Hummingbird?

Hummingbird is the name of the device (a microcontroller) you'll be using to control your diorama. It's basically a little computer that controls robotics parts like motors, lights, and sensors. It has a little brain that understands what you tell it to do and talks to those parts. *(point out microcontroller chip on the Arduino board)* This is a microcontroller.

We will call the motors, lights, or sensors robotic "**components**."

There are lots of different parts that can connect to the Hummingbird board, so the general term "component" is used to refer to all of them. The designers of the Hummingbird kit color coded each component so they are easy to find.

EXPLORING

How do you talk to it?

In order to communicate with the components, we type out instructions that the Hummingbird understands on our personal computers and send those to the Hummingbird. Let's look at how those instructions are written.

INTRODUCE SCRATCH

Practice:

- Turning on and logging into the computer
- Launching **Birdbrain Robot Server** , then **Scratch 2.0**
- Connecting a **component** (referencing polarity) to the **microcontroller**
- Sending a **command** to the component
- **Events:** Telling it WHEN to react (on space bar, flag click)
- Adding **Logic** with **conditions**
  - What are other conditions in life? E.g., **if/when** you finish dinner, you can have dessert
- Saving files

STEP BY STEP

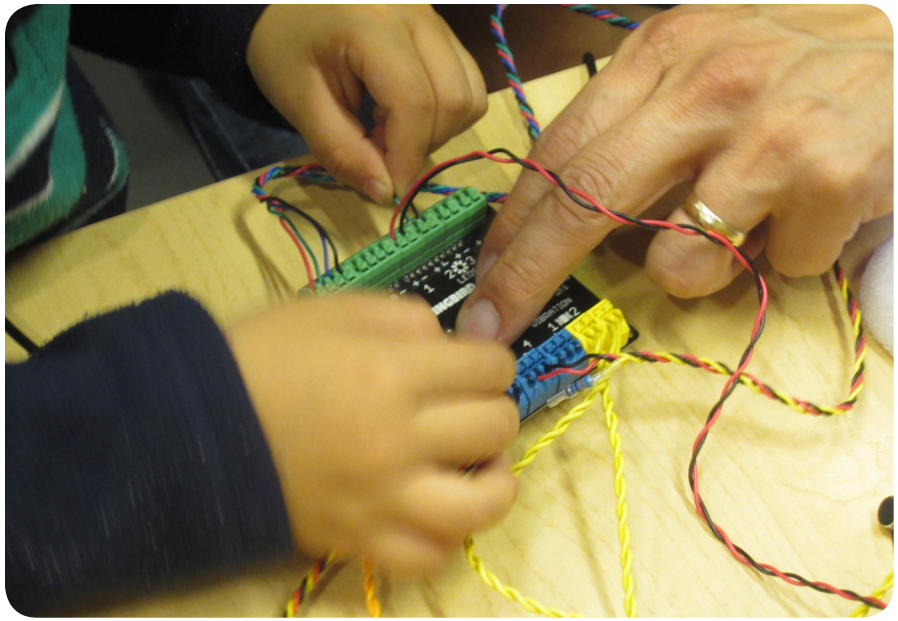
Follow through the step-by-step instructions using the included slides, or do a live demonstration of programming Scratch projected to all. Families will walk through programming a single LED to blink on and off forever. Encourage trying out the tri-color LEDs on their own.

background info

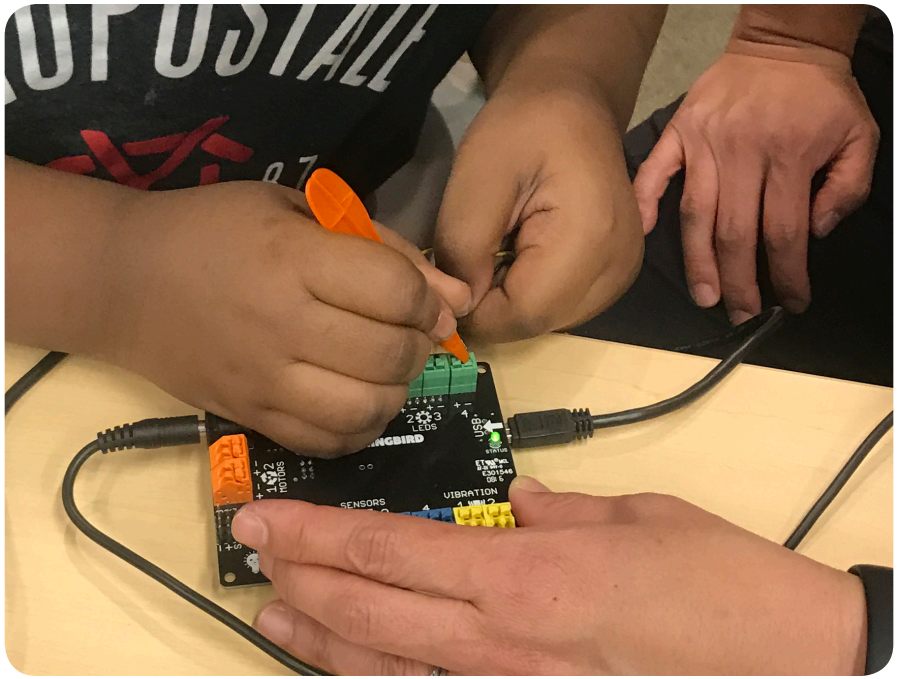
The Hummingbird is called a microcontroller because it controls components like lights, motors, and sensors. It's small, too, which is the micro part. It has a little computer "brain" for sending and receiving instructions, and ports to plug lights, motors, and sensors into it.

There may be a wide range of familiarity around using a computer. Be sure to go slowly, particularly at first, and make sure everyone is caught up. Using a trackpad or a mouse may not be familiar to all.

Encourage patience and helping each other as they all become familiar with the equipment. Avoid letting some get too far ahead of or behind the group. It helps to have at least one assistant for technical help.



Bracing the board with fingers can help stabilize the board when inserting wires. Use the Hummingbird tool or a small flathead screwdriver to push down the buttons that open the ports.



If there is time, introduce motors in increasing complexity, starting with the vibration motor. By the time they have programmed the LEDs, they may be confident enough to experiment with the new components. Check in from time to time to see if they are ready to move on or could use more instruction.

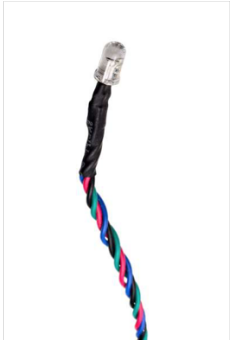
Añadiendo Controles: Demora
Adding Controls: Delay

¿Por cuánto tiempo quieren que la luz esté prendida?
How long do you want the light on?

Prender/ *Turn on*
Durar por 1 segundo
Stay on for 1 second
Apagar/ *Turn off*

Spanish language slide day 2. Scratch is available in many languages!

Tri-Color LED



Single Color LEDs

REFLECTION

5 minutes

DISCUSSION

All the things we explored use **energy** (electricity, in this case). A set of instructions is an **algorithm** (toothbrush robot, adult robot). The computer program you wrote is an algorithm.

What **technologies** did we explore today? (possible answers include sensors, LEDs, computers, pulleys, writing, pencils, etc)

What are some **technologies** that are important to you and your communities?

background info

Individuals and families will be able to track their progress and areas of specialization with badges. Badges are awarded for individual work and collaborative family work. The primary learning goal of the badge systems is to make visible to participants potential learning opportunities. In addition, badges allow participants to see each others' developing areas of expertise and may foster collaboration across skill sets.

BADGES

5 minutes/family or 10 minutes all together

Technology doesn't just do things for us but it can also be a way in which we express ourselves. Storytelling and coding are very, just different languages. Like computer scientists and storytellers, today you've begun to use robotics and programming to tell your family story.

BADGES

facilitator background

LOCKING IN ON STRENGTHS

- The purpose of badges in week 2 is to identify the areas in which participants have demonstrated their strengths. For some, this may be the inclusion of skills they are known to have mastered.
- Participants who are drawn to areas of expertise that they identify with start building confidence through these practices.
- With badges we can bridge their existing strengths to new roles by demonstrating crossover skills and practices. For example, in week two a participant may take to drawing the storyboard. The meticulousness of their storyboard is very similar to the precision of the computer scientist - they have to make sure everything is in the proper sequence. Only through retelling and revisiting the story are they able to ensure they've captured the right sequencing and detailing - a form of debugging.

MORE RESOURCES

Hummingbird kit videos
https://www.hummingbirdkit.com/
https://www.hummingbirdkit.com/learning/tutorials/connecting-electronics
Search for "Birdbrain Technologies" on YouTube

Technology Definition
http://www.dictionary.com/browse/technology

Highlighting diverse technologies:
Teaching STEM In Ways that Respect and Build Upon Indigenous Peoples' Rights
http://stemteachingtools.org/brief/10
How to avoid known pitfalls associated with culturally responsive instruction
http://stemteachingtools.org/brief/53