Computational Thinking: Unplugged

Presenters: Claire Ratcliffe, Brooks Mitchell, Tai Hutchinson

The webinar will begin at 2:00 p.m. (MT) and will be recorded.

While you’re waiting:
1) Find the toolbar – it will either be on the bottom or top of your Zoom window
2) Introduce yourself in the chat box (please select “Share with All” not “Share with Panelists”)
3) Click audio “Join by Computer” – you won’t have microphone access

Tip for viewing: You can resize and move the location of the video and slide screens by clicking and dragging them
Facilitator Introduction

Claire Ratcliffe (Space Science Institute)
Brooks Mitchell (Space Science Institute)
Beatrice Chavez (Space Science Institute)
Tai Hutchinson (Girls Who Code)
Today’s Agenda

Welcome
Clearinghouse Navigation
Discussion: What is Computational Thinking?
Hands-on Activities: *Binary Bead Craft* and *Passion for Pixels*
Hands-on Activity: *Something is Different About You*
Hands-on Activities: *Robot Mouse* and *Mars Rover*
Girls Who Code “Unplugged” Resources
Q&A
Like an activity and think other library staff should know how great it is? Didn’t like an activity or have modifications to make it better? **Make sure to leave a review!**
Poll Question

Have you facilitated “computational thinking” activities in your library programs?

a. Yes
b. No
c. I have no idea what “computational thinking” is
Poll Question

What answer *best* defines “Computational Thinking?”

a. Designing and building a computer
b. Thinking only in “binary code”
c. Thought processes used to evaluate complex problems and their solutions
d. Coding computer programs
What is Computational Thinking?

“Computer Science is no more about computers than astronomy is about telescopes.”

-E.W. Dijkstra

Image credit: Pixabay
Libraries Ready to Code

Computational thinking (CT) refers to the thought processes used to formulate problems and their solutions (Wing, 2006). These include breaking down problems into smaller parts, looking for patterns, identifying principles that generate these patterns, and developing instructions that the computers, machines and people, can understand. It is an approach to critical thinking that can be used to solve problems across all disciplines (Google’s Exploring Computational Thinking, n.d.).
So.....what?

• Decomposing a problem into smaller pieces to solve: Divide and Conquer!
• Looking for patterns and identifying causes and effects
• Using “Algorithmic Thinking” (creating a series of instructions) to solve problems

Make explicit things humans do implicitly without realizing

Weintrop et al., 2015
Wing, 2006
How do CT Skills Help our Patrons?

- Confidence in dealing with complexity
- Persistence in working with difficult problems
- Ability to deal with open-ended problems
- Ability to communicate and work with others to achieve a common goal or solution
- Enables kids to be creators, rather than just consumers, of technology
Discussion Question

Please answer in the chat box:

How can libraries help their patrons develop CT skills?
CS Ed Week

• December 9-15
• Week dedicated to inspiring K-12 students to take interest in computer science
• Held in recognition of the birthday of Admiral Grace Murray Hopper (December 9, 1906)

Image credit: Wikipedia Commons

www.csedweek.org

Image credit: csedweek.org
Hands-On Activities: Binary Bead Craft, Passion for Pixels
Binary Bead Bracelet

A  ■■■■■■■■■■
B  ■■■■■■■■■■
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Y  ■■■■■■■■■■
Z  ■■■■■■■■■■

■ purple
□ blue
Passion for Pixels

Challenge: “Transmit” an image digitally to a partner using a code of zeros and ones

• The “sender” draws on a grid then reads the picture to the “receiver” square by square
• 0 for a blank square, 1 for a filled square
Hands-On Activities: Something is Different About You

Anomaly Detection

January 23, 1930

January 29, 1930

Anomaly Detection
Hands-On Activity: Mars Rover

After setting up the pretend Mars landscape, *Mission Control* walks through and uses the program board to create a set of instructions for the *Rover* to follow.

Next, *Mission Control* reads the commands to the *Rover*, who must follow them exactly (blindfold optional)

After going through the landscape, talk about what was hard or easy. What would you do differently next time?

Images source: Lunar Planetary Institute
Tai Hutchinson
Manager, Community Partnerships & Outreach
GIRLS WHO CODE  UNPLUGGED

2019-2020
AGENDA

➔ Why Gender Equity?

➔ Unplugged Club Curriculum Deep Dive

➔ What’s Next?
WHY GENDER EQUITY?
WHY GENDER EQUITY?

The tech industry is booming! By 2026, there is expected to be more than half a million jobs available, making computing the most sought-after in the US job market, with demand growing **3X** the national average.

However, **only 19%** of students who receive **degrees in computing are women**, and **only 2%** of students who receive degrees in computing are women of color.

We can’t leave behind the **ideas and innovations** of half the population, nor can we shut girls out of the economic opportunity represented by the tech sector—on average, **tech jobs pay over $100K/year**!

We need to make a change!
Clubs are FREE after-school programs for 3-12th grade girls to join our sisterhood of supportive peers and role models and use computer science to change the world.

Clubs are led by Facilitators, who can be teachers, librarians, parents, or volunteers from any background or field.

Many Facilitators have no computer science experience and learn to code alongside their Club members with our comprehensive resources and support.
UNPLUGGED CURRICULUM DEEP DIVE
**PROGRAM LOGISTICS BY AGE GROUP**

Our Club programs differentiated by age group features the following:

### 3-5TH GRADE CLUBS UNPLUGGED

**Time & Logistics:**
- 5+ sessions
- ~45-60 min per session
- $300 per club!

**Skill Level:**
- Beginner

**Curriculum Features:**
- Book Club Model
- Chapter Guides for non-fiction and fiction books
- Online or Unplugged Options

### 6-12TH GRADE CLUBS CS PLUGGED

**Time & Logistics:**
- 10+ sessions
- ~1-2 hours per session
- $300 per club!

**Skill Level:**
- Beginner, Intermediate, Advanced

**Curriculum Features:**
- Girls Who Code Project Focus
- Project-based learning
- 120+ hours of Curricula
- Beginner to Advanced Self-Guided Tutorials
- Plug and Play Model - FLEXIBLE!
3-5TH GRADE CLUB CURRICULUM FOCUS

GIRLS WHO CODE BOOKS

BRAVERY & RESILIENCE

Teaching girls to be brave and resilient early in their lives has the potential for enormous impact on how they approach challenges—and whether they stick with coding in the years to come.

COMPUTER SCIENCE

3rd–5th Grade Clubs introduce computer science to girls in a fun and creative way, at the exact moment when their interest is high.
3-5TH GRADE CLUB LESSON PLANS

IF YOU HAVE 45 MINUTES...
1. **Build Sisterhood (5 minutes)**
   - Make time for a quick activity that breaks the ice at the beginning of a meeting.
   - Take a peek at the Sisterhood Activity Section for ideas.
2. **Read & Reflect (15 minutes)**
   - Read a suggested passage from the book, and discuss the related questions. Check out our Discussion Tips to guide you.
3. **GWC Challenge (20 minutes)**
   - Complete one of the suggested activities that connects to the passage you read.
   - Challenge your girls to be brave, bold, and creative! If you’re trying an online challenge or using HQ with your students, read the Logistics section for more information.
4. **Close-Out (5 minutes)**

IF YOU HAVE AN HOUR OR MORE...
1. **Build Sisterhood (10 minutes)**
   - Make time for a quick activity that breaks the ice at the beginning of a meeting.
   - Take a peek at the Sisterhood Activity Section for ideas.
2. **Read & Reflect (15+ minutes)**
   - Read a suggested passage from the book, and discuss the related questions. Check out our Discussion Tips to guide you.
   - If time allows, consider reading another passage together!
3. **GWC Challenge (20+ minutes)**
   - Complete one of the suggested activities that connects to the passage you read.
   - Challenge your girls to be brave, bold, and creative! If you’re trying an online challenge or using HQ with your students, read the Logistics section for more information.
4. **Close-Out (5 Minutes)**
Facilitator Toolkit

Launch Your Club Webinar

Sign up for a live Launch your Club facilitator training or watch our pre-recorded training webinar.

Plan Your Club Checklist

Get everything ready for your Club by following these simple steps.

Resources

Sisterhood Activities

Break the ice and build sisterhood in your Club with these quick icebreakers.
OUR IMPACT
The National Pipeline

3rd-5th Grade Clubs
6th-12th Grade Clubs
College Loops
Alumni

6,500+
2018-19 CLUBS

185,000 GIRLS SERVED TO DATE

50% are from historically underrepresented groups.

Majoring in CS-related fields:
15-16X the national rate.
Our organization relies on collaboration with Community Partners to drive our work and reach even more girls in your community. We create partnerships with state and local leaders, school districts, community organizations, library networks and colleges/universities to launch multiple Girls Who Code Clubs.

→ Access to the Community Partner Fund: $100 in grants in addition to the Clubs Fund $300 to be used for snacks, books, school supplies, field trips, and more (for partners with 5+ Clubs with 3+ students enrolled)
Affiliate yourself with an existing partner to get access to partnership benefits & support when you apply at girlswhocode.com/clubsapply!

When you reach the below question on the last page of the Clubs Application, please list “Name of Organization” as your partner affiliation for the following question:

Is your Club affiliated with a Girls Who Code Community Partner (school districts, library systems, nonprofit organization, afterschool networks etc.)? Search for your affiliation here. If your Club is not affiliated, or your search returns no results, simply type "None". *

Note: this may take a second to load.

Acero Schools
Achievement First
After School Matters
"There is no perfect time to do something - just take a leap, be brave, and try it!"

"It was totally well-received because in just 3 weeks after we started the Club, we grew from 2 members to 25."

"The curriculum that GWC provides.. sets you up with literally everything you need.. I didn’t have to worry about curriculum, and I could focus on building relationships with the girls and helping to develop their skills.”

"Coding is more accessible to learn than it seems”

"The payoff of struggling and persevering is really worth it."

"Working together always builds stronger results."
WHAT'S NEXT?
What You Need

- SPACE
- BOOK PASSAGES (3rd-5th grade)
- TECHNOLOGY IS OPTIONAL
- OR
- FACILITATOR & DECISION MAKER
What GWC Provides

LOGISTICS SUPPORT
→ Customizable Club Plans
→ Student Recruitment Resources
→ Clubs Fund, mini-grant $$

CS SKILLS
→ Custom Online Training
→ Girls Who Code HQ Platform
→ 120+ Hours of Curriculum
→ Extended CS PD Resources

COMMUNITY
→ Clubs Success Specialist
→ In-person and virtual events
→ Alumni programming and networking post-Club
How to Get Started

5 min
Create an HQ account

15 min
Fill out the Clubs Application

5-10 days
Get your Approval Email

Prior to Launch
Review resources & meet your CSS

Ready?
Launch Your Club!

Create a Girls Who Code HQ login to access the application

Fill out the 15 min Clubs Application

*Complete the background check only if you are a Facilitator who is NOT employed by the host site

Receive our Welcome Email with access to your Club Code for our curriculum! (i.e. HI123)

Log into HQ to access:
- Training webinar (15 min)
- Recruitment materials
- 120+ hr curricula
- And more!

Recruit students and help them enroll on HQ.

Enrolled students receive access to our curriculum. 3+ enrolled students gives you access to Clubs Fund!
GET STARTED TODAY!

Launch an individual Club at [girlswhocode.com/clubsapply](https://girlswhocode.com/clubsapply).
Interested in exploring a Community Partnership? Contact the respective staff member or complete the [Community Partnership Confirmation Form](https://girlswhocode.com/clubsapply)!

<table>
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<th>Girls Who Code Staff</th>
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</tbody>
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Thank you for joining!

Have questions? Email Tai Hutchinson at tai@girlswhocode.com
Thank you!

Any Questions?