Preschool Computational Thinking: An Initiative from Public Media

Family Engagement to Increase Preschool Computational Thinking (CT)

Why Computational Thinking?

- Children need CT to succeed in an increasingly technological world
- There is a worldwide movement underfoot to teach children CT
- This includes efforts in MS and MD

What Existing Research Says

- CT is an important predictor of academic success in both math and literacy (Grover & Pea, 2013; Kazakoff & Bers, 2012; Kazakoff, Sullivan, & Bers, 2014).
- As children develop their CT, they are also developing their executive function (Kazakoff, 2014) and teamwork skills (Bers, Flannery, Kazakoff & Sullivan, 2014).
- CT fosters a flexible, creative approach to problem solving, equipping children with skills essential across many disciplines, such as perseverance, working cooperatively, exploring innovative problem-solving approaches, and applying systematic thinking (Bers et al., 2002; National Research Council, 2010).

What Existing Research Says

- CT further supports literacy skills through the common thread of temporal sequencing, requiring children to think in terms of next, before, and until when ordering problem solving and numeric sequences (Pea & Kurland, 1984).

- To build a solid basis for problem-solving skills later in life, children ages 4 through 5 need early, introductory experiences both to learn and practice the skills necessary for CT (Bers, 2008; Gelman & Brenneman, 2004).

PreK Computational Thinking Is…

- A set of foundational thinking skills that enables children to identify, understand, and creatively solve problems
- Applicable to a wide range of disciplines, including math, science, engineering, and literacy
- A precursor to learning coding and programming
- Something that children can learn at an early age

3 Core CT Core Skills

1. **Sequencing:** Putting Steps in Order to Solve a Problem

2. **Design Process:** Designing Solutions to Problems

3. **Debugging:** Fixing and Improving Solutions

Sequencing: Putting steps in order to solve a problem

- Catchphrase: ***Step it Out***
- Understand that in some situations, order matters; in other situations, it doesn't
- Follow steps in order to solve a problem or achieve a task
- Create your own set of steps for how things could happen or how a task could be completed
- Notice and extend patterns (when steps repeat)

Design Process: Designing solutions to problems

- Catchphrase: ***Create, Test, Improve***
- Understand that you can use a three-step process to make something
- First, *create* something; then, *test* what you created; finally, *improve* what you created
- This process can repeat indefinitely

Debugging: Fixing and improving solutions

- Catchphrase: ***Make It Work***
- When something happens that you didn't expect, you can try to change part of your solution and try again
- You can use trial and error
- You can also use a more systemic process of carefully checking each step, brainstorming and testing different solutions, and keeping track of what you've tried

Project Research: Media

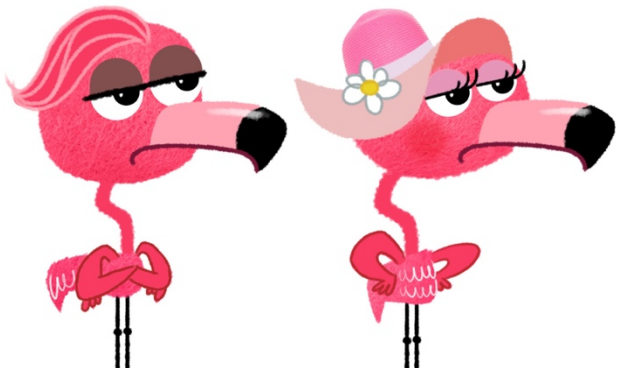
- Characters and stories were appealing to children and parents, and the videos fostered interaction.
- Children exhibited high levels of plot comprehension and varying levels of CT understanding.
- Promising feedback on use of catchphrases like ***Make It Work*** and ***Create, Test, Improve.***
- Parents did not have prior knowledge of CT but saw its value.

Project Assets

Debugging, Sequencing, Design Process

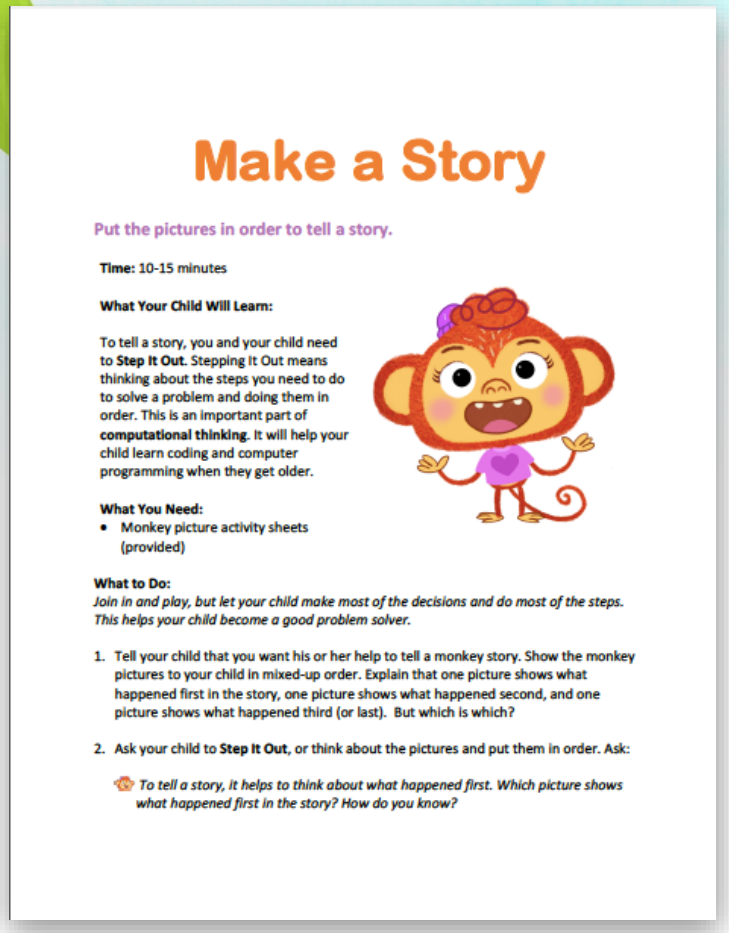
- 9, 7-minute **animated** videos (3 for each CT concept)
- 9 animated **music** videos
- 3 **live-action** videos

18 hands-on activities for families



Make a Story

Hands-On Activity



Make a Story

Put the pictures in order to tell a story.

Time: 10-15 minutes

What Your Child Will Learn:

To tell a story, you and your child need to **Step It Out.** Stepping It Out means thinking about the steps you need to do to solve a problem and doing them in order. This is an important part of **computational thinking**. It will help your child learn coding and computer programming when they get older.

What You Need:

- Monkey picture activity sheets (provided)

What to Do:

Join in and play, but let your child make most of the decisions and do most of the steps. This helps your child become a good problem solver.

1. Tell your child that you want his or her help to tell a monkey story. Show the monkey pictures to your child in mixed-up order. Explain that one picture shows what happened first in the story, one picture shows what happened second, and one picture shows what happened third (or last). But which is which?

2. Ask your child to **Step It Out**, or think about the pictures and put them in order. Ask:

   - *To tell a story, it helps to think about what happened first. Which picture shows what happened first in the story? How do you know?*

Opportunities in Maryland

Leveraging state systems for:

Program implementation in 2019
- Partners
- Venues

Communication and awareness-building
- Press release
- Social media
- Radio and television PSAs