Coding Resources for Educators and Families

This handout provides different resources that educators or families can use to build their knowledge of computational thinking (CT) and computer science (CS). Please note that this list is not exhaustive. New resources are continually being developed for educators to support young children's learning in CT and CS.

State and National CS Standards, Frameworks, and Organizations

- California K–12 Computer Science Standards
- K–12 Computer Science Framework
- Computer Science for California (CSforCA)
- Seasons of CS
- Computer Science Teachers Association
- CSTA Standards for CS Teachers

Blogs and Articles

- Bers, M. U., Strawhacker, A., & Sullivan, A. (2022). The state of the field of computational thinking in early childhood education. OECD Education Working Papers No. 274.
- Digital Promise. (2020). Computational thinking in preschool: What, why, and how.
- K–12 Computer Science Framework. (n.d.). Computer science in early childhood education.
- Wing, J. (2006). Computational thinking. Communications of the ACM, 49(3), 33–35.

Books

- *Coding as a Playground* by Marina Umaschi Bers
- *Computational Thinking Meets Student Learning: Extending the ISTE Standards* by Kiki Prottsman
- *Computational Thinking and Coding for Every Student: The Teacher's Getting-Started Guide* by Jane Krauss and Kiki Prottsman
- *Lifelong Kindergarten: Cultivating Creativity through Projects, Passion, Peers, and Play* by Mitchel Resnick

- *Mindstorms: Children, Computers, and Powerful Ideas* by Seymour Papert
- *Playful STEAM Learning in the Early Years* by Amanda Sullivan and Amanda Strawhacker
- *Teaching Computational Thinking and Coding to Young Children* by Marina Bers

Lessons and Activities

- Code.org: Code.org is a nonprofit organization that provides free CS and artificial intelligence education for children in K–12 schools and beyond, aiming to make CS instruction accessible to all. It offers a curriculum of free courses and resources for children, educator training programs, and advocacy for CS in schools..
- Coding as Another Language curriculum (ScratchJr and KIBO): Using the ScratchJr app and the KIBO robotics kit, this set of curriculum units for pre-K–2 introduces powerful ideas from CS, in conversation with literacy, in a playful, structured, and developmentally appropriate way through unplugged games, storytelling, movement, singing, and coding.
- CS Unplugged: CS Unplugged is a collection of free teaching materials that teaches CS through engaging games and puzzles that use cards, string, crayons, and lots of running around.
- San Francisco Unified School District Creative Computing K–2 Curriculum: SFUSD's creative computing curriculum introduces CS as a creative, collaborative, and engaging discipline to K–2 children. Across four units and 15–20 lessons, children will learn about algorithms and programming, computing systems, the internet, and the impacts of computing, while developing strong practices and dispositions. Lessons are designed to be implemented in 45- to 60-minute periods approximately once per week.
- UC Davis C-STEM Elementary School Curriculum: TK–6 children learn math, CS, and science through building and coding. Children can quickly build their own robots by snapping Linkbot and accessories together. They can then readily control and program their robots using the user-friendly RoboBlocky platform in drag-and-drop coding.
- CS Cross Content Connections: Developed by partners of the California Mathematics, Science, and Computer Science Partnership (CAL-MSCS), this website offers guidance, lesson ideas, and instructional tools for K–8 educators to connect CS with other content areas such as English, math, science, social studies, and physical education. The site offers custom chatbots to help educators design cross-content lesson ideas that align with content standards, incorporate CS concepts, and integrate universal design for learning principles.

Family and Community Engagement Resources

- CS is Elementary: CS is Elementary is a movement and a nonprofit organization dedicated to bringing CS education to all elementary school children, from kindergarten through fifth grade, as a fundamental part of their learning. It provides resources for schools, such as curriculum materials, strategies for family engagement (like family code nights), and support for building schoolwide CS capacity.
- Family Creative Learning: Family Creative Learning is a workshop series that engages children and their families to learn together—as designers and inventors—through the use of creative technologies. The developers designed the workshops to build on families' relationships and cultural backgrounds and to strengthen their social support and expertise around computing.
- Making the Connection: Computational Thinking and Early Learning for Young Children and Their Families: This article provides an overview of CT concepts and skills, details CT's role in early childhood development and relationships with other early learning domains, and shares examples of how to integrate CT into library programs and services for young children and families.

Children's television shows focused on CT and CS skills

- *Wonderblocks* (ages 3+): *Wonderblocks* is a British animated television series for preschoolers that teaches children about coding, thinking skills, and problem-solving. The main characters are two friends, Go and Stop, who help their animal friends in their everyday life.
- *Work It Out Wombats!* (ages 3–6): *Work It Out Wombats!* is a PBS KIDS animated series for children, starring Malik, Zadie, and Zeke—three energetic and creative marsupial siblings who live with their grandmother in her treehouse apartment complex. The playful trio demonstrates CT for preschoolers—a way of thinking that enables them to solve problems, express themselves, and accomplish tasks using the practices, processes, and ideas at the core of CS.
- *Mia & Codie* (ages 4–7): *Mia & Codie* is an animated series by PBS. Mia, an almost eight-year-old girl, wants to make the world more marvelous through coding, and her robot younger brother is the ideal partner. Together, Mia and Codie solve everyday preschool problems using code blocks, out-of-the box thinking, and gung-ho exuberance.
- *Lyla in the Loop* (ages 4–8): *Lyla in the Loop* is a PBS KIDS animated series that follows Lyla, a creative seven-year-old girl who lives in a big city with her family. Using CT, creative problem-solving, and critical thinking, Lyla and her blue, hyrax-like sidekick, Stu, work with her family and community to tackle everyday challenges, from building carnival games to understanding AI.