New Ways to Teach Young Children to Code

Even parents who don’t know programming are using games, apps to teach basic skills

Many parents want their children to learn to code. Tech leaders and educators are pushing schools to add more computer-science classes, and families often see programming as an essential skill for the future.
But unlike reading to your children or teaching them to count, preparing children to code can feel daunting and unnatural. Many parents think they can’t help because they don’t know math or programming themselves.

Increasingly, though, parents who have never written a line of code are finding ways to teach their children basic programming skills. Some tap websites, gaming apps or online puzzles using visual programming languages designed for children. Others focus on teaching the kind of thinking that coding requires. For instance, even young children can learn how to break tasks into steps and perform them in order—a programming concept called sequencing—or to repeat a series of steps until a task is complete, a concept called loops.

Laura Reidy says she’s scared of computers. “I tell my kids all the time: I don’t want them to be like me,” says Ms. Reidy, of White Plains, N.Y. She introduced each of her three children to programming by age 6. She and her husband, Sean, sat at the kitchen table with their son Sean Thomas, who is now 10, while he made mazes, animations and birthday cards using Scratch, a visual programming language developed at the Massachusetts Institute of Technology.

Sean’s younger brother, Jack, 8, makes animations and games on the Scratch website and Code.org, a site offered by a nonprofit organization that promotes coding education. Mrs. Reidy’s youngest child, Isabella, started using Scratch at age 4. Ms. Reidy was surprised recently to see that Isabella, now 6, is creating birthday cards and other projects on her own. “It happened so naturally and quickly that I didn’t even notice her learning,” Ms. Reidy says.

Visual-programming languages such as Scratch, for children 8 and up, and Scratch Jr. for children ages 5 through 7, use tiles or blocks rather than text. Children snap blocks together into a series of steps to direct animations or games—teaching sequencing. They learn to repeat steps by nesting sets of blocks inside a command calling for a specified number of repetitions. Children also learn another programming concept, using conditionals, through the game. For example, they might instruct an animated figure, “If the next space is open, move forward; if not, turn right.”

Learning programming concepts doesn’t always require screen time, something many parents work hard to limit. Kati Iceva and her husband began playing Robot Turtles, a board game that teaches basic programming skills, with their two children as early as age 3. Players instruct their turtles to move toward capturing a gem on the board by putting code cards into a logical sequence. Children use “bug” cards to reverse mistakes.
“We wanted to inspire them and provide opportunities to start exploring,” says Ms. Iceva, of Kirkland, Wash., a senior software engineering manager at Microsoft. Her daughter, Mia, now 6, gained confidence as she learned to program the turtle without any mistakes, Ms. Iceva says. Her son, Filip, now 10, has taken several programming classes.

Parents also can turn everyday tasks into playful logic puzzles to help children learn to break down tasks into steps, says Alice Steinglass, a vice president at Code.org, Seattle, a nonprofit that promotes computer-science education. For example, one parent might leave the room while the other builds a simple Lego toy and the child writes down instructions for doing it, she says. Then, the other parent returns to the room and tries to follow the child’s instructions. The inevitable gaffes may be funny, but they also help a child practice precise, step-by-step thinking.

Kieran Snyder recently turned taking down the family’s Christmas tree into a programming puzzle for her 6-year-old daughter, River. They planned and wrote down step-by-step commands and if-then instructions for River and her two stepsisters, ages 7 and 4½, to follow.

For example: “If all the red ornaments are off the tree, then begin with the blue ornaments and start the process over,” says Ms. Snyder, co-founder of Textio, a Seattle provider of online text analysis. River had to “debug” the program when she realized she had forgotten to include a “take down the tree” command.

Ms. Snyder holds River’s screen time to a few hours a week. During that time, she often helps her learn Hopscotch, using a visual-programming language to create designs and games.

It is usually best for children younger than 8 to sit with a parent while doing coding games, says Bryson Payne, author of “Teach Your Kids to Code,” who held his two sons in his lap starting at age 2, showing them how to tinker with programming designs and graphics. “Part of the fun is doing it with the parent. It’s just like reading with a child,” Mr. Payne says.

Some parents push their young children right away to learn a text-based language such as Python, but this often leads to confusion and frustration, says Rob Kissner, president of Digital Arts Experience, a White Plains, N.Y. provider of K-12 computer-technology classes. “There’s no rush,” he says. Most children do better using visual-programming languages such as Scratch or Blockly to learn basic concepts at least until age 9, then moving on to learn Python or other text-based languages.
And some children just aren’t that into it. Bon Crowder, owner of MathFour, in Houston, a math-teaching website for parents and teachers, says she tried to interest her 6-year-old daughter, Kate, in programming. But online games and puzzles failed to hold the girl’s interest, so Ms. Crowder has let it go. “If you try to force them to sit down with it, you’ll drive them away,” she says.

A lack of interest early “doesn’t mean your kid isn’t going to be able to code,” Ms. Crowder says. She recommends parents acquaint students with basic programming principles a couple of years before they enroll in computer-science classes in school, “so when they hit the classroom, they don’t say, ‘I don’t know what this is all about,’ ” she says.

Most children are drawn to programming by imagining what they can accomplish, says Manuel Cerqueiro, founder of codingKIDZ.com, an after-school computer-science program in New York. “The focus is on the creativity. You want to tell a story, create an e-card for somebody’s birthday, create a song or a drawing. And you need to know a couple of commands and use a computer to do that,” he says.

Melanie Pinola sparked her 4-year-old daughter’s interest by showing her how to make characters on Hopscotch do funny things, saying, “Hey Elise, look at this. By changing this block, I can make the dog meow like a cat,” says Ms. Pinola, a freelance writer and author in Floral Park, N.Y. If Elise, now 7, comes up with an idea for a story, she says, “Hey, wouldn’t it be cool if you could animate it, or turn it into a game?” says Ms. Pinola.

Helping for parents can be “as simple as being an audience for their kids or asking questions about their projects,” says Ricarose Roque, an MIT doctoral student who designs coding workshops for parents and children. She encourages parents to take a “curious and playful” approach.

Many of the websites for children make coding easy enough for anyone. Although I’ve never written a line of code, I recently took a free “Hour of Code” tutorial on Code.org and found the concepts easy to grasp. When I asked a video-game-loving family friend, 11-year-old Sebastian Richardson, to try it, he raced through the Hour of Code in 35 minutes. Within a few minutes of finishing the lesson, he was having fun programming his own basic games.
Coding games and puzzles helps children go beyond a passive role with technology, using it only to receive information or entertainment, to seeing it as a tool for creating things, expressing their ideas and sharing them with others, says Mitchel Resnick, director of the Lifelong Kindergarten Group at MIT’s Media Lab, where Scratch was created. It also instills design and problem-solving skills, enabling children to continually adapt and improve strategies, Dr. Resnick says. Many learn basic math too, such as working with coordinates to place figures or lines at a specific place on the screen.

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