Computer Programming in the Elementary School

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Welcome and Introductions

For today:

- Don’t be shy
- Be open-minded
- Just try it
- Share your progress
- Help each other
- Share best practices
- Take a risk
- Ask questions!
- Have fun

Goal: learn about CS in the Elementary Classroom. Ways to incorporate and free resources to use.

Computer Science is Changing Everything: https://www.youtube.com/watch?v=1x54GqfL3UY

Code.org K-5 Courses Overview

Code.org- K-5 Courses Overview (Course 1, Course 2, Course 3, Course 4):
https://studio.code.org/users/sign_in

Elementary School Hour of Code Lessons


Unplugged activities and Curriculum Book
https://code.org/curriculum/unplugged
Coming soon from Code.org

Code.org is getting ready to release exciting new updates to Computer Science Fundamentals Courses 1-4 for the '17-'18 school year.

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Introducing Courses A - F

The biggest update to CS Fundamentals is that content will move from four courses (Courses 1-4) to six courses aligned to each K-5 grade level.
Tynker

Programming 100 - Introductory 6-lesson Programming Course Grades 3-8
Introduce your class to visual programming. In this course, students get introduced to basic programming as they create interactive stories, design animations, and make mini-games in Tynker's game-like interface. Each lesson is designed for a class period of 45-60 minutes. During this period, students learn by themselves as they progress through interactive tutorials, solve coding puzzles, follow along to build their own project, and take a quiz. All student work is automatically tracked and assessed, and with access to the premium offerings, you'll be able to monitor their individual progress and mastery charts.

Topics Covered: Sequencing, repetition, events, conditional logic, animation, storytelling, problem solving and debugging, pen drawing, drawing shapes and patterns.

Sign in as either a Teacher with your School email

Student with Person account - Class Code: 58157026
Kodable

https://game.kodable.com/  Kodable is an App and a web based program - The focus is to build computer science comprehension in elementary school. Kodable provides a structured transition from symbols into written code focused on student outcomes. 9 out of 10 Teachers using the Kodable Curriculum reported improvements in other subject areas. (math, ela, and 4c's)

K ages 4-6 - Sequence and Algorithms. Learn to write commands in order and solve problems using algorithms.
1st ages 5-7 - Conditional Expressions Learn to write logical “if, then” statements and learn to debug code.
2nd ages 6-8 - Loops and Patterns Learn what a loop is, when to use it and how to write concise code.
3rd ages 7-9 - Functions and Variables Learn to use functions with all other concepts, assign value to variables and learn to identify syntax.
4th ages 8-10 - Object-Oriented Programming Basics Learn about classes, instantiate objects and modify properties.
5th ages 9-11 - Advanced Object-Oriented Programming Learn to create sub-classes, write methods and implement code changes in JavaScript.

Class Link for Today:
https://game.kodable.com/class/iste2017

Resources:
https://www.kodable.com/resources
5 Reasons to teach kids to code:
http://resources.kodable.com/public/5_reasons_to Teach_kids_to_code_poster.pdf
Ozobots & Dash and Dots

Ozobot (robot)  [http://ozobot.com/](http://ozobot.com/)  - Ozobots are small, smart toy robots that empower gamers and learners to code, play, create and connect the physical and digital worlds. These run about $50 and can be purchased on Amazon or at Barnes and Noble. Ozobot also has apps and Classroom kits sets Lesson plans and Activities can be found here: [http://portal.ozobot.com/lessons](http://portal.ozobot.com/lessons)

Dash & Dot (robots)  [https://www.makewonder.com/](https://www.makewonder.com/)
Unplugged Activities

**Hour of Code** unplugged lessons [https://code.org/curriculum/unplugged](https://code.org/curriculum/unplugged)

**Computer Science-in-a-Box:** Unplug Your Curriculum introduces fundamental building blocks of computer science -- without using computers. Use it with students ages 9 to 14 to teach lessons about how computers work, while addressing critical mathematics and science concepts such as number systems, algorithms, and manipulating variables and logic. [https://www.ncwit.org/sites/default/files/resources/computerscience-in-a-box.pdf](https://www.ncwit.org/sites/default/files/resources/computerscience-in-a-box.pdf)

**CS Unplugged** [http://csunplugged.org/](http://csunplugged.org/) CS Unplugged is a collection of free learning activities that teach Computer Science through engaging games and puzzles that use cards, string, crayons and lots of running around.
Board Games for Coding
Robot Mouse

The race is on to build hands-on coding skills! Build your maze, and then use the coding cards to create a step-by-step path for Colby, the Programmable Robot Mouse. Program the sequence of steps, and then watch Colby race to find the cheese! This deluxe set includes 30 double-sided coding cards, 10 double-sided activity cards, cheese wedge, and Activity Guide to provide the perfect hands-on introduction to coding concepts. Create your path with 16 maze grids to create a 20" x 20" maze board, 22 maze walls, and 3 tunnels for endless possibilities. Colby lights-up, makes sounds, and features 2 speeds along with colorful buttons to match coding cards for easy programming and sequencing.
Robot Turtle


Robot Turtles is a board game for kids inspired by the Logo programming language. Players dictate the movements of their Robot Turtle tokens on a game board by playing Code Cards: Forward, Left and Right. When a player's Robot Turtle reaches a jewel they win! If they make a mistake, they can use a Bug Card to undo a move. The game has many levels so, as the players advance, they will encounter obstacles like Ice Walls and use more complex Code Cards (like lasers to melt the walls). Play continues until all players collect a jewel, so everyone wins. Beginner to Advanced levels will make it a family favorite for many years. It includes a large Game Board, 40 Tiles, 4 Robot Turtle Tiles, 4 Jewel Tiles, 4 Code Card Decks (45 cards in each deck) and instructions. 2-5 players can play at once and everyone who gets the Robot Jewel wins.
Code Master

In Code Master, kids use programming logic to navigate their Avatar through the game world. In each of the 60 levels, they must collect crystals and land at the portal. There’s only one specific sequence that leads to the end of each level, so this game activates the portion of your child’s brain opposite the one that compels them to answer everything you say with, “Why?”

Code Master Board Games ($27)
Ages: 8+

Code Island Monkey

Code Monkey Island also uses cards to teach kids the programming skills like strategic problem solving, adaptability, looping, assignment operations, and Boolean operators. The cards dictate how each player’s team of monkeys moves towards their goal of reaching the banana patch.

Code Monkey Island ($35)

Ages: 8+

Code Monkey-

http://codemonkeyplanet.com
IPad Apps
Move the Turtle

Platform: iOS (iPad and iPod) Cost: $2.99

We love Move the Turtle, a gamified way to learn programming procedures. The main character reminds us of the old Logo turtle used to teach kids computer programming during the reign of the Apple IIe. Each new level of achievement increases in difficulty and teaches a new command that directs the turtle to reach a star, make a sound, draw a line, etc. A free play "compose" mode lets students move the turtle however they want.
Scratch Jr.

GRADES K-2 Platform: Android, iPad
Price: Free *also Available in Spanish*

Scratch Jr is an introductory programming language that enables young children (ages 5-7) to create their own interactive stories and games. Children snap together graphical programming blocks to make characters move, jump, dance, and sing. Children can modify characters in the paint editor, add their own voices and sounds, even insert photos of themselves -- then use the programming blocks to make their characters come to life.
Scratch

Platform: Web Cost: Free!
Designed by MIT students and staff in 2003, Scratch is one of the first programming languages we've seen that is created specifically for 8-to-16-year-olds. Originally a multi-platform download, Scratch is now web-based and more accessible. Students use a visual programming language made up of bricks that they drag to the workspace to animate sprites. Various types of bricks trigger loops, create variables, initiate interactivity, play sounds, and more. Teaching guides, communities and other resources available on the website will help instructors get started. You don't have to be a programming expert to introduce Scratch -- we learned right along with the students!
Hopscotch

Platform: iPad Cost: Free!

Hopscotch looks a lot like Scratch and Tynker and uses similar controls to drag blocks into a workspace, but it only runs on the iPad. The controls and characters are not as extensive as Scratch and Tynker, but Hopscotch is a great tool to begin helping students without coding experience learn the basics of programming, logical thinking and problem solving.
Daisy the Dinosaur

Platform: iPad  Cost: Free!
From the makers of Hopscotch, Daisy targets the youngest coders. The interface is similar to Hopscotch but much simpler. There is only a dinosaur to move and only basic functions to use, but for your younger students, this is an excellent introduction to programming.
Cargo-Bot

Platform: iPad  Cost: Free!
Cargo-Bot is another game that teaches coding skills. On each level, the objective is to move colored crates from one place to another by programming a claw crane to move left or right, and drop or pick up. The game was actually programmed on an iPad, using a touch-based coding app called Codea, which is based on the programming language Lua. Elementary students will learn the logical thinking required to eventually do "real" text-based programming using Lua -- but Lua is not for young learners. For elementary students, stick with Cargo-Bot
LightBot

Platform: Ipad, Android, Kindle

Lightbot: Code Hour is a programming puzzle game - a game whose game mechanics require using programming logic to solve levels. This short teaser is meant to introduce players to programming who may have little to no experience. Anyone, anywhere, from grades K-12 can play, have fun and learn real programming logic!

Simply guiding a robot to light up tiles and solve levels using commands, Lightbot cultivates a real understanding of procedures, loops, and conditionals.

Lightbot: Code Hour features 20 levels. The follow-on Lightbot: Programming Puzzles features 50 levels and 20 challenge stars to collect for when you want more of a challenge!
Classroom Strategies

Ditch the One Size fits all:
Have students complete other challenges in the Code Studio (HOC, etc.)
Students will travel at their own pace throughout the courses (differentiation)
Have students code in their home languages
Provide learning centers with various task cards at different skill levels
Try SCRATCH or Khan Academy (JavaScript, HTML)

Frequent Breaks:
Model for students how to take a break when they need to (a special spot in the room, take a walk, etc.) to help them self-regulate
Allow the students to have down time through conversations that help their neighbors through assortment of projects

Collaborate:
Pair programming
Building in time for sharing with one another
Projecting the code of a student on the board for all to see.

Students as Teachers:
Respect all contributors
Ask for peers to answer each other’s questions first
Use older students as teachers for the younger students
Ask 3 before me.
Integration with Commitment

How are you going to use what you have learned in this workshop in your classroom?

Solutions: advocate, integrate with other things in the classroom, such as write a story for a character to accomplish and then implement that story in code
Buy in at my School?

Buy in at my school? (Do a workshop for teachers) Have the teachers explore coding and programming, do some of the same lessons that the students will.

What if our district doesn’t have the funds? Fundraising Options? Technology not working in the classroom?

Solutions: try to fundraise at donorschoose.org, GOFundMe, Target, businesses in town, grants.
Other Resources

Turtle Blocks: https://turtle.sugarlabs.org/ - Website like the old Turtle programs from the early 90's

Made with Code: https://www.madewithcode.com/projects/

Blockly Games - Blockly Games is a series of educational games that teach programming. It is designed for children who have not had prior experience with computer programming. By the end of these games, players are ready to use conventional text-based languages.

Khan Academy - Computer Programming - https://www.khanacademy.org/computing/computer-programming/programmin
Other Resources

Google CS First-https://www.cs-first.com/
Over 4,600 schools have used CS First clubs to introduce computer science to students. The CS First curriculum is free and easy to use.

Books--A Programming Project: Learning to Code With Google Sheets & Docs $12.00 Amazon https://www.amazon.com/gp/product/1511888342/ref=oh_aui_detailpage_o02_s00?ie=UTF8&psc=1

Shake up Learning- Coding Resource http://www.shakeuplearning.com/coding-resources/

BrainPop Videos for CS-Coding,Binary, 3D printing https://www.brainpop.com/technology/computerscience/

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