

Elementary Computer Science

6 wk lesson plan

1/12/2017 Day 1

❑ Objectives:

- ❑ Intro/goals
- ❑ iPad etiquette
- ❑ Early Computers
- ❑ Hardware vs. Software
- ❑ I/O devices
- ❑ Computer Program
- ❑ Lightbot

- 2:15 - 2:20: Introductions & Objectives
 - Share names and grades
 - Goals for the class
 - Discuss guidelines for iPads
- 2:20 - 2:25 What is a computer?
 - Ask the class what they think a computer is
 - In order to be a computer, does it need to have a battery?
 - Is your parent's car a computer?
- 2:25 - 2:35 Early Computers
 - Early computers were tools (mechanical devices) to help people do math
 - To help gain an appreciation for where computers are today, walk through slides from Tally Sticks to Babbage machine and Ada.
 - Get input from class and discuss how some of these early computers might work
- 2:35 - 2:45 Draw a Computer
 - Have class draw what they think is a computer, try to label parts of their drawing
 - Ask what is software? What is hardware?
 - Hardware: the physical stuff; the 'hard' things
 - Software: programs; instructions to tell a computer what to do
 - Ask if they see hardware in their drawings (should be all of it)
 - Discuss Input/Output devices
- 2:45 - 2:55 Simon Says/Efficient
 - Do a simple demonstration of efficiency using the Simon Says game
 - Quickly explain the Simon Says game (they should all know it already? Too old now?)
 - Pick two students
 - Give them instructions to go to the same place:
 - "Simon Says, walk five steps; simon says turn right..."
 - but, have one complete it using a lot more unnecessary steps than the other one
 - Ask class which set of instructions was more efficient?

- Explain what it means to be efficient
- Explain that we'll be using the app, Lightbot to learn basics of programming instructions for a computer to carry out
- 2:55 - 3:15 Lightbot
 - Iterate again that to program is to give a computer step-by-step instructions to do something
 - Quickly explain Lightbot; giving a robot instructions to light up the blue squares
 - It cannot do this on its own, you have to 'program' it

Were Objectives met?

1/19/2017 Day 2

❑ Objectives:

- ❑ **Efficiency in terms of hardware advancements**
- ❑ **Transistors/Logic Gates**
- ❑ **Build logic gates on Circuit Coder**
- 2:15 - 2:20: Review
 - Hardware vs. Software
 - Computer program
 - Early computers were mechanical aids/tools to help people perform math
- 2:20 - 2:30 Continue Early Computers
 - Use computer components jar for visuals
 - Focus on, engineers are always searching for building faster, better devices and developing tools to help people use these devices more productively
 - Discuss the hardware advancements that were categorized into generations
 - From vacuum being main component of hardware, to transistor, to circuits (micro chips)
- 2:30 - 2:45 Transistors and Logic Gates
 - "Building blocks" of computers
 - The internal "switching" logic that allows hardware to execute instructions provided by the software
 - Transistors combine to form logic gates
 - The more logic gates in a computer, the more capabilities
 - Computer hardware is a series of on/off switches
 - Touch on Binary
 - Explain a few logic gate symbols and their truth tables on a white board with student input
 - AND, OR, NOT
- 2:45 - 3:00 Circuit Coder app
 - Have students build the switching devices that were explained in the Circuit Coder app
 - Maybe do a demonstration first/walk-through of app
 - Have students create a new "sandbox" file

- 3:00 - 3:15 Lightbot
 - For students that finish, have them continue where they left off with Lightbot
 - Iterate instructions given to a computer/programming
 - If they get to procedures, explain functions

Were Objectives met?

1/26/2017 Day 3

❑ Objectives:

- ❑ Logic gate review
- ❑ binary

- 2:15 - 2:25: Review
 - Go over logic gates, see if students can remember how to make AND, OR, NOT with their truth tables (whiteboard or paper)
 - If class seems up to it: provide an example of combining logic gates with student's input
 - Option to do [transistor](#) exercise with tennis balls
 - Rough [transistor diagram](#)
 - If arduino board logic gate is available, use that to have the class test a simple AND gate to turn on an LED
- 2:25 - 2:40 [Binary Numbers](#)
 - Computer's only understand in binary language
 - Binary number system exercise w/ the binary cards
 - Have the class try and count up to ten in binary on a whiteboard
- 2:40 - 2:55 Hopscotch
 - Another app for learning some fundamentals of programming
 - Explain an Event, a trigger that the computer recognizes and causes it to do something.
 - In Hopscotch, you have to specify a certain event, so the computer knows when to run your program.
 - To quick run-through of the app
 - Create a new project
 - Drag and drop a character
 - Tap the character to 'see code': This is where you give that object a sequence of instructions
 - Have them choose an event to let the computer know to start the program, give their character an instruction (move forward), and test it.
- 2:55 - 3:15 Programming Challenge
 - Have students try and make a program to have a character controlled by buttons to move in at least four directions
 - If students finish early, challenge them to have other object interact with the character when it bumps it -have an event occur when two objects collide

Were Objectives met?

2/2/2017 Day 4

❑ Objectives:

- ❑ Review binary
- ❑ Algorithm activity
- ❑ LED pendant project intro/designs

- 2:15 - 2:20: Review
 - Review binary numbers
 - Have class count to 10 in binary
- 2:20 - 2:40 Algorithm Activity
 - Discuss with the class on steps for pouring a bowl of cereal
 - What if the steps were slightly out of order? For instance, the milk is poured before the bowl is even put out
 - Discuss with class that this is an example of an algorithm; step-by-step instructions to complete a task or solve a problem.
 - Remember, computers (or lightbot) do what they are told, only in the order they were told. This is known as a sequence, an order of events.
 - Just like with pouring a bowl of cereal, with computers, it is important to give instructions in the right order, or else the program won't run as you expected.
 - A Sequence is important in a computer algorithm because the correct order of steps is needed in order to make the algorithm work.
 - computers do what they are told, in the order they were told
 - Have the class conduct the algorithm activity; put together the steps in the correct order to plant a seed
- 2:40 - 2:50 LED pendant project
 - Explain the project
 - Iterating binary numbers; we will program them using binary numbers
- 2:50 - 3:15 Drawing LED designs
 - Pass out the LED pendant drawing
 - Explain how it works (shaded in squares are 1, blank squares are 0)

Were Objectives met?

2/9/2017 Day 5

❑ Objectives:

- ❑ Layers of a computer activity
- ❑ Abstraction

❑ Transfer LED designs

- 2:15 - 2:30 [Layers of a computer activity](#)
 - Discuss the slides on the layers of a computer
 - While talking about each layer, have the students make their model to follow along
- 2:30 - 2:40 Abstraction
 - Explain that they just made an model to show abstraction
 - When we are dealing with a computer on one layer (for example, programming), we don't need to be concerned with the other layers
 - We remove unnecessary details so we can focus on what we need to accomplish at the time
- 2:40 - 3:15 Transferring LED designs
 - Have students transfer their LED designs from paper to the Koder app
 - Quick walk-through of app
 - If students finish early, have them continue on Lightbot or make a 'crossy road' game on Hopscotch
- **Make sure to prep all LED pendants with student's code**

Were Objectives met?

2/9/2017 Day 6

❑ Objectives:

- ❑ Mini quiz
- ❑ Have finished LED pendants
- ❑ Challenges
- 2:15 - 2:25 Review
 - Mini logic gate/binary quiz!
 - After 5min over the quiz as a class
- 2:25 - 2:35 LED Pendants
 - Explain the parts of the LED pendant; how they can recharge the battery
 - Have students test out their LED pendant displays
 - Make changes to the code if they need to on the laptops
- 2:35 - 3:15 Challenges
 - For students that are completely finished with pendants have them complete one or two challenges
 - Lightbot: Work up to Conditions and complete the levels
 - Hopscotch: finish/start "crossy road" game create another fun game

Were Objectives met?
