

Tiny Tech 2 Lesson Plan

Class 1

BINARY

Introductions: Share names

Discussion: What is your name made up of? Letters. Our language is based on the alphabet. How many different letters in our alphabet? 26. We use those 26 different letters in different combinations to make words that mean different things to us. A computer reads and stores information differently. A computer only uses TWO options to store information—0 and 1 which can also represent OFF and ON. When computers represent information using only two options, it's called BINARY.

Story: Alex and Lulu Two of a Kind by Lorena Siminovich

Discussion: Alex and Lulu are two very different animals that work well together to create all kinds of fun. With binary numbers, we only use two different numbers – 0 and 1. When you put them together in a bunch of combinations, they work together to create a lot of information for your computer.

Action: Give kids set of binary cards; have them place them in front of them in order. Demonstrate how to turn cards over and add dots to create different numbers. Show on the whiteboard how those numbers are represented in 0s and 1s. Work through a few numbers in order (like 5,6,7,8). Have all children work through the numbers with their own set of cards and instructor writes binary representation when all students have it. Can also work backwards where instructor writes a binary number and students turn over cards to match and decide what number it represents. (kids did well with this)

Discussion: Explain that there are binary numbers set to represent letters of the alphabet.

Action: Decode binary message on worksheet. (this age found this to be hard; maybe go back to binary bracelet which only decodes first letter of name)

Action: Pass out iPads now, start Scratch Jr. and let kids create characters and backgrounds. Record who used which iPad, so they can return to those saved creations when we revisit Scratch Jr. later.

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Class 2

CONDITIONS

Story: If You Give a Pig a Pancake by Laura Numeroff (emphasize IF...THEN)

Discussion: Condition – what needs to happen before something else is allowed to happen.

If...then. Have any of you ever heard your parent say, “IF you eat all your dinner, THEN you can have dessert?” or “IF you clean up your room, THEN we can go play?” Those are conditions. You have to do one thing first before you can do something else. One thing must be true before some other thing happens.

When your parents reward you like that, what is the condition of the reward? Just like your parents will check on your room to see if you cleaned it, a computer will also check on a statement to see if it is true to decide which action to take.

Can you think of some other conditional statements? (examples: If it’s raining out, then we will have recess inside. If it’s a holiday, then we have a day off from school. If I don’t eat my lunch, then I will be hungry) *May have to prompt by offering the IF part of the statement, and let them fill in the THEN part.*

A computer example would be IF you enter the correct passcode, THEN you can buy an app or get into the program.

Game: Rock-Paper-Scissors: Model hand motions for rock, paper, and scissors. Go over rules for game. Pair off students to play together.

“The game works in conditional statements: **If** one player shows rock, and the other player shows paper, **then** paper wins (paper covers rock). **If** paper and scissors are chosen, **then** scissors win (scissors cut paper). **If** rock and scissors are selected, **then** rock wins (rock smashes scissors). **If** the players show the same object, **then** the game is a tie.”

“Your job during the game is to think like a programmer while you play. After each round, meaning each time you and your partner show your object, you must turn the round into a conditional statement.”

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REVIEW: Just like last week, our computer is dealing with just two values – TRUE or FALSE. Just like 0 or 1, Off or On. Who remembers what that two-value system is called? Binary.

Discussion: Now sometimes in a computer program there can be several ways to do things (example: in a game, if you press A, then your guy will jump; if you press B, then your guy will duck); there are different conditions to tell your computer about. With our fuzzballs, there may be more than one way to go, and we have to give him directions for the best way to go. Sometimes there are conditions in our fuzzball maze.

Action: Continue Conditions Levels in Kodable. Students will be at different levels, so try to pair up students who are on similar levels to work together.

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Class 3

LOOPS

Discussion: Repetition – doing or saying something over and over. What phrases repeat in this story? Listen for repetition in the next story.

Story: Giraffe and a Half by Shel Silverstein

Discussion: If you took out all the repeated phrases in this story, there would be a lot less story, a lot less words. That might not make for a great story, but in a computer program, using less code/less words is important. Using less code saves time for the programmer and saves time for the computer (and we all like our computers to work quickly, right?).

Activity: Peanut Butter and Jelly – ask for steps in making a peanut butter and jelly, condense down to Bread-PB-Jelly-Bread. Write steps on whiteboard. Show how if we need more than one sandwich (like packing for a picnic), we would repeat the same steps over and over (draw loop arrows around the steps). Tell students we are going to make 8 sandwiches today (or however many students are present). Offer cutout ingredients to first student, he/she assembles sandwich, tally the number of total sandwiches, if not at 8, have another student perform the next loop of steps with cutout ingredients.

Discussion: Today, we are going to look for directions that repeat and LOOP those directions, so our program is a lot shorter and easier to read. Sometimes you'll need to tell your guy how to move today using two directions (like up, right, up, right). Look for patterns in movement and LOOP them together. Instructor demonstrates on whiteboard how to complete a maze using all the commands listed out, then shows how to condense the patterns into a loop function to see how much shorter the code is.

Action: Pass out iPads starting each student on the Kodable level they left off in Loops from the first session (if applicable) and continue at own pace. Try to pair up students who are on similar levels to work together.

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Class 4

FUNCTION

Discussion: Review of words learned in previous weeks

Binary – computer language using two input variables

Condition – what needs to happen before something else is allowed to happen (If...then)

Repetition – doing or saying something over and over = Loops

Story: Old McDonald Had A Farm (traditional)

Discussion: Again, this story/song has a lot of repeated words. If you took out all the repeated phrases, there would be a lot less story, a lot less words. That might not make for a great story, but in a computer program, using less code/less words is important. Using less code saves time for the programmer and saves time for the computer. Last time we used our repeated directions in a loop that repeated so many times in a row. This time we are using our repeated directions a few times in one program but maybe not right in a row. We might use the same set of directions at the beginning of the program and then maybe near the end of the program. That set of directions, that piece of code, we can use over and over again is called a FUNCTION.

Activity: Head Shoulders Knees and Toes

The class sings and acts out Head Shoulders Knees and Toes together. Then try to write a Program using the instructions for the song. BUT we only have 4 places in our program! All those instructions won't fit! Look for sets of instructions/commands. Group them into FUNCTIONS, then re-write the Program using the Functions. Much shorter!

Action: Pass out iPads now, start Kodable at Functions levels. Encourage to work together as this is a difficult concept at this age.

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Class 5

IMAGINE and CREATE

Story: Harold and the Purple Crayon by Crockett Johnson

Discussion: IMAGINE – to think and dream whatever your mind can come up with

Programmers must use imagination to have the computer solve problems and to make fun games for us to play – a computer can open the door to different worlds and different languages and different ways of thinking about things

Story: Instructor creates a story on Scratch Jr. and plays it for students

Discussion: CREATE – to make something

Programmers create all kinds of games and useful applications for our devices using their coding skills and their imaginations. Today we are going to create our own stories.

Review: Go over key concepts from previous weeks

Binary – computer language using two input variables

Condition – what needs to happen before something else is allowed to happen (If...then)

Repetition – doing or saying something over and over = Loops

Function – a set of directions/piece of code that can be used over and over but not necessarily in a row like a loop – placed in curly brackets

Action: Create a story in Scratch Jr. using at least one condition and one loop. Students will work individually with assistance as needed. Instructor will use keywords when assisting students to help review programming concepts.

To close: Children can create as many projects/stories as they would like in Scratch Jr. If some children tire of or become frustrated with Scratch Jr., they can keep progressing in Kodable levels.