**Girls In Technology 2017**

**Coding/ Decoding Using Binary Bracelets**



**Objective:**

Students will be able to code letters into binary, decode binary back to letters and relate to the process of coding/decoding data in a computer using beads to make bracelets.

**Materials: (will be provided to us)**

* Binary Decoder Key (200 copies)

<https://code.org/curriculum/course2/14/Activity14-BinaryBracelets.pdf>

* Black and white beads
* Separators (different color beads)
* Thread (pre-cut into 10 inches each)
* Pencils

**Procedure:**

1. **Introduce Binary (3 mins)**

* Ask students if anyone knows what binary means.
* Ask students if they have ever seen what is inside a computer. Explain to students how wires inside a computer carry information in the form of electricity. Tell students that there are two options that computers use with respect to electrical information which is “off” and “on”.
* Give students definition of binary as a way of representing information using only two options such as “on” and “off”, “1” and “0”, “True” and “False”.
* Watch this video <https://studio.code.org/s/course2/stage/14/puzzle/1>

(we will not be able to show the video to students)

* Share with students that the word “bit” is short for “binary digit”.
* Ask if any student knows that grouping of eight bits is called a “Byte” and a grouping of four bits is called a “nibble”.

1. **Making the Binary Bracelets (19 mins)**

* Transition to making the binary bracelets by explaining that the theme of two options will be used to make the bracelets.
* Explain that we will be using black and white beads where a black bead (no light) will represent “0” and a white bead (there is light) is “1”.
* The following binary decoder key will be used to make the bracelets:

<https://code.org/curriculum/course2/14/Activity14-BinaryBracelets.pdf>

* Ask students to find the initials of their first and last name on the binary decoder sheet
* Fill in the squares on the provided binary decoder using black and white beads to code the first letter of their first name.
* Students will use a different color bead as a separator between the two letters.
* Fill in the squares on the provide binary decoder using black and white beads to code the first letter of their last name.
* Use the provided thread to make the bracelets.
* Once the bracelets are made, tell students that they just learned how to code using binary code and now it is time to learn to decode.
* A secret word will be provided in a form of a binary bracelet/chain to each group (Fahima will make the bracelets/ chain).
* Students will be asked to decode the secret word. The group that decodes it first will win the competition for that session (make sure to write the school name).

**3. Wrap up (3 mins)**

* Ask students to tell you what they learned from this activity.
* Ask students to think about how else they might use binary code to design or represent something else.
* Ask what was their favorite part of this activity.
* Tell students that they get to keep and wear their bracelets.

**Standards**

### **ISTE Standards**

* 1.a - Apply existing knowledge to generate new ideas, products, or processes.
* 1.c - Use models and simulation to explore complex systems and issues.
* 2.d - Contribute to project teams to solve problems.
* 4.b - Plan and manage activities to develop a solution or complete a project.
* 6.a - Understand and use technology systems.
* 6.d - Transfer current knowledge to learning of new technologies.

### **CSTA K-12 Computer Science Standards**

* CT.L1:3-03. Understand how to arrange information into useful order without using a computer.
* CT.L1:6-03. Demonstrate how a string of bits can be used to represent alphanumeric information.
* CT.L1:3-05. Demonstrate how 0s and 1s can be used to represent information.
* CT.L2-07. Represent data in a variety of ways: text, sounds, pictures, numbers.
* CT.L2-08. Use visual representations of problem states, structures, and data.

### **NGSS Science and Engineering Practices**

* K-2-PS3-2. Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem.
* K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

### **Common Core Mathematical Practices**

* 1. Make sense of problems and persevere in solving them.
* 2. Reason abstractly and quantitatively.
* 4. Model with mathematics.
* 6. Attend to precision.
* 7. Look for and make use of structure.
* 8. Look for and express regularity in repeated reasoning.

### **Common Core Language Arts Standards**

* SL.1.1 - Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups
* SL.1.2 - Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
* L.1.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships.
* SL.2.1 - Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
* SL.2.2 - Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
* L.2.6 - Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe.
* SL.3.1 - Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
* SL.3.3 - Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
* L.3.6 - Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships.