**Lesson Three -- Scratch: 10 Block Challenge Lesson**

**Problem statement:** Your team must design a new game and present your product to the leadership team of Games R Us, your goal is to get approval from the Games R Us executives to produce your game.

This lesson will teach students the basics of how to make a ball bounce using Scratch.

**Learning objectives:** By completing this activity, students will create a project with the constraint of being able to use 10 blocks of computer code.

**Lesson standards (NGSS, CCSS, CTE):**

**Washington State Computer Science Learning Standards (3-5)**

1B-A-5-4

Construct programs, in order to solve a problem or for creative expression, that include sequencing, events, loops, conditionals, parallelism, and variables, using a block-based visual programming language or text-based language, both independently and collaboratively (e.g., pair programming).

1B-A-5-5

Use mathematical operations to change a value stored in a variable.

1B-A-3-7

Construct and execute an algorithm (set of step-by-step instructions) that includes sequencing, loops, and conditionals to accomplish a task, both independently and collaboratively, with or without a computing device.

1B-A-6-8

Analyze and debug (fix) an algorithm that includes sequencing, events, loops, conditionals, parallelism, and variables.

**Next Generation Science Standards (NGSS)**

3-5 ETS1-2

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

**Common Core State Standards (CCSS) Mathematical Practices**

1. Make sense of problems and persevere in solving them.

6) Attend to precision.

7) Look for and make use of structure.

**Soft Skills:**

**Partnership for 21st Century Learning (P21)**

* Think creatively
* Solve Problems
* Create media products
* Apply technology effectively
* Manage goals and time
* Work independently
* Be self-directed learners
* Produce results

**Connections to career and educational pathways:**

* Software applications developer
* Computer systems analyst
* Computer systems engineer
* Web developer
* Computer programmer

**Materials:**

* Computers
* Student accounts for Scratch (this allows for students to save the projects that they create)
* Student worksheet -- “Scratch: 10 Block Challenge”
* Internet access -- <https://scratch.mit.edu/projects/141280894/#editor>
* Post-it notes

**Lesson preparation:**

**Time required:** 30-40 minutes

**Grouping of students for instruction:**

Grouping of students is dependent on computer access.

* If computers are available, students will be working independently on this assignment.
* If computers are not available, have students use pair programming. Student A will be the “driver,” inputting information into the computer. Student B will act as the “navigator,” directing the driver and what to input. Use the following video to instruct the students in how to pair program -- <https://www.youtube.com/watch?v=vgkahOzFH2Q> . Be sure that partners switch the roles often.

**Lesson:**

1. The teacher will make sure that each student has a computer, a Scratch login, and a copy of the worksheet “Scratch: 10 Block Challenge.”
2. If students are sharing a computer, begin the class by showing the video for partner programming (<https://www.youtube.com/watch?v=vgkahOzFH2Q>).
3. The teacher will introduce the challenge: “What can you create using 10 Scratch blocks? Use them once, twice, or multiple times, but use each block at least once!” (The blocks of code are also referred to as “script.”
4. If students add a sprite to their 10 block challenge program and they click on their new sprite they don’t have the 10 blocks available. The easiest way for students to add a sprite and keep their 10 blocks is click on the cat sprite and then click on the Costume tab next to the stop sign. Just below the tab click on the sprite icon and pick a new sprite from the gallery. This new sprite will replace the cat sprite.
5. The teacher will facilitate students as they begin to work on the challenge. Instruct students that if they have a question, use a post-it note as a flag on their monitor. This will create a visual for the teacher to see what students need assistance.
6. Students will explore, create, and problem solve using the 10 supplied blocks. Students may also collaborate with other students in the classroom as they discover the purpose of each block. If students don’t know what one of the blocks do have them click on the single block. If nothing happens have them move the sprite to a different part of the room and click on the block again. Like for example moving the sprite and clicking on the glide block will show the sprite gliding across the room back to the middle.
7. After students have created a project using the 10 codes, have students save their project by clicking on “share.” If students used the Scratch project called 10 Block Challenge they will need to change the project name to their own (located to the left of the green flag). Next click on Remix to save it in their own projects (My Stuff). If students joined your Studio they can now share it within your studio. Along the gray strip in the middle of the screen is a button called Studio, click on it, below is a list of studios. Click on the studio that you want to share the project to. It is shared when you see a green check. At this point you have access to students projects and you can show it to the class.
8. After saving their project, have students reflect on the back of their worksheet. They are asked to explain what they have created and what they have learned from completing the challenge.
9. Provide time for students to take a “gallery walk.” During this time, students are able to share what they have created with their peers. Allow for students to leave feedback on at least three different projects on the bottom half of the student worksheet.

**Accommodations:**

* For students that are visually impaired: Partner with another student. The visually impaired student can describe what action they would like their sprite to do and partner can assist with the inputting of the code. In addition, have a tactile copy of the code blocks with the braille code. The student can manipulate the “unplugged” code and their partner can tell them the effect the code had on the sprite.
* For students that are ELL:Partner with another student.

**Extensions:**  If there is additional time, have the students add other features to their code.

**Assessment:**

Formative Assessment in the Lessons -- As students are working you can collect informal information of their understanding. In addition, students will be providing peer feedback on the student worksheet.

**References/Resources:**

Instructional plan adapted from:

* Speakvisually (<https://scratch.mit.edu/projects/26203022/>)
* Creative Computing (activity pages 30-31) (http://scratched.gse.harvard.edu/guide/files/CreativeComputing20140806.pdf)