STEAM – Unit 2 (COMPUTER PROGRAMMING)

Content Area: **Computer Programming (Grade 3rd)**
Course(s):
Time Period: **Ongoing**
Length: **Ongoing**
Status: **Published**

Big Idea

Learning computer science encourages critical thinking, logic, persistence, and creativity. It can help students excel at problem-solving in all subject areas, no matter what their age. At the root of all computer science is something called an algorithm. The word "algorithm" may sound like something complicated, but really it's just a list of instructions that someone can follow to achieve a result. To provide a solid base for computer science education, students should build a secure relationship with algorithms. (CODE.ORG, 2017)

Enduring Understanding

SWBAT write algorithms to control a digital character's motion, sound, color, and response to stimuli. SWBAT identify patterns in code.

Skills

- Using digital block coding applications, students write algorithms to control a digital character and it's surroundings. Students write algorithms to control the digital character's motion, sound, color, and response to stimuli (cues).
- Solve problems using sequential algorithms, debugging algorithms, creating loops in algorithms, and creating conditional algorithms.
- Practice problem solving and perseverance techniques.

Standards

8.2.5.E.1 Identify how computer programming impacts our everyday lives.
8.2.5.E.2 Demonstrate an understanding of how a computer takes input of data, processes and stores the data through a series of commands, and outputs information.
8.2.5.E.3 Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output.
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8.2.5.E.4 Use appropriate terms in conversation (e.g., algorithm, program, debug, loop, events, procedures, memory, storage, processing, software, coding, procedure, data).

Assessments

- Tracking of student achievement in Code.ORG's (or other online coding application's) lessons.
- Teacher observation

Resources/Instructional Materials

CODE.ORG Course D. https://studio.code.org/s/coursed?section_id=1059595.

Learn new coding concepts including algorithms, nested loops, while loops, conditionals, and events. Create your own game or story that you can share.

Lesson 2: Introduction to Online Puzzles

In this set of puzzles, students will begin with an introduction (or review depending on the experience of your class) of Code.org's online workspace. There will be videos pointing out the basic functionality of the workspace including the Run, Reset, and Step buttons. Also discussed in these videos: dragging Blockly blocks, deleting Blockly blocks, and connecting Blockly blocks. Next, students will practice their sequencing and debugging skills in maze. From there, students will see new types of puzzles like Collector, Artist, and Harvester when they learn the very basics of loops.

Lesson 3: Events in Bounce

In this online activity, students will learn what events are, and how computers use them in programs like video games. Students will work through puzzles making the program react to events (like arrow buttons being pressed.) At the end of the puzzle, students will have the opportunity to customize their game with different speeds and sounds.

Lesson 4: Nested Loops

In this online activity, students will have the opportunity to push their understanding of loops (patterns and repetitions in code) to a whole new level. Playing with the Bee and Plants vs Zombies, students will learn how to program a loop to be inside of another loop. They will also be encouraged to figure out how little changes in either loop will affect their program when they click Run.

Lesson 5: Nested Loops in Artist

Now that students know how to layer their loops, they can create so many beautiful things. This lesson will take students through a series of exercises to help them create their own portfolio-ready images.

Lesson 6: Nested Loops in Frozen

Students will create intricate designs using Artist in today's set of puzzles. By continuing to practice nested loops with new goals, students will see more uses of loops in general. This set of puzzles also offers a lot more potential for creativity with an opportunity for students to create their own design at the end of the stage.

Lesson 8: Debugging in Collector

In this online activity, students will practice debugging in the "collector" environment. Students will get to practice reading and editing code to fix puzzles with simple algorithms, loops and nested loops.

Lesson 9: While Loops in Farmer

By the time students reach this lesson, they should already have plenty of practice using repeat loops, so now it's time to mix things up. While loops are loops that continue to repeat commands while a condition is met. While loops are used when the programmer doesn't know the exact number of times commands need to be repeated, but does know what condition needs to be true in order for the loop to continue repeating. For example, students will be working to fill holes and dig dirt in Farmer. They will not know the size of the holes or the height of the mountains of dirt, but the students will know they need to keep filling the holes and digging the dirt as long as the ground is not flat.

Lesson 11: Conditionals in Bee

Up until this point students have been writing code that executes exactly the same way each time it is run - reliable, but not very flexible. In this lesson, your class will begin to code with conditionals, allowing them to

write code that functions differently depending on the specific conditions the program encounters.

Lesson 12: Conditionals & Loops in Maze
In this lesson, students will be pairing together two key concepts: loops and conditionals. This set of puzzles bridges the gaps in understanding that occur when working on puzzles that use multiple kinds of blocks. By bringing two ideas together, students will create more complex code that shows both impressive creativity and critical thinking!

Lesson 13: Conditionals & Loops in Harvester
Students will practice while loops, until loops, and if / else statements. All of these blocks use conditionals. By practicing all three, students will learn to write complex and flexible code.

Lesson 15: Build a Play Lab Game
In this online activity, students will have the opportunity to learn how to use events in Play Lab and to apply all of the coding skills they've learned to create an animated game. It's time to get creative and make a game in Play Lab!

CODE. ORG ANA AND ELSA This lesson features the Disney film Frozen. Students apply mathematical concepts to solve puzzles. They use knowledge of pixels, angles, acute angles, obtuse angles, sequencing, and patterns to solve problems.

WEB SITES

- Code.org lesson plans
- Scratch lesson plans
- Tynker lesson plans

Modifications

Individual accommodations

• Additional support

• Adapting lessons to meet various learning styles

Integration of 21st Century Skills

Focus on the development of 21st Century Content Skills:

- Global awareness
- Civic literacy

- Health and wellness awareness
- Environmental literacy

Focus on the Development of Learning and Thinking Skills:

- Critical Thinking and Problem Solving Skills
- Communication Skills
- Creativity and Innovation Skills
- Collaboration Skills
- Information and Media Literacy Skills
- Contextual Learning Skills

Focus on the Development of Life Skills:

- Leadership
- Ethics
- Accountability
- Adaptability
- Personal Productivity
- Personal Responsibility
- People Skills
- Self Direction
- Social Responsibility

Interdisciplinary Connections

- Academic and Technical Rigor - Projects are designed to address key learning standards identified by the school or district.
- Authenticity - Projects use a real world context (e.g., community problems) and address issues that matter to the students.
- Applied Learning - Projects engage students in solving problems calling for competencies expected in high-performance work organizations (e.g.,teamwork, problem-solving, communication, etc.).

- Active Exploration - Projects extend beyond the classroom by connecting to community explorations.
- Adult Connections - Projects connect students with the wider community.
- Assessment Practices - Projects involve students in regular, performance-based exhibitions and assessments of their work; evaluation criteria reflect personal, school, and real-world standards of performance.