Unit 3: Coding for Fifth Graders

Content Area: **English Language Arts**
Course(s):
Time Period: **Trimester 2**
Length: **8-10 sessions**
Status: **Published**

Brief Summary of Unit

Students will be introduced to coding and computational thinking through age appropriate websites/manipulatives. Computational thinking is problem solving in an efficient way. It can include knowing how and when to use computing tools, knowing what steps you need to take to solve a problem, and logically organizing and analyzing data. In addition, students apply the knowledge they have learned in this unit through the programming of various coding robots such Ozobots, Cubelets, and Spheros. Additional enrichment and continued coding skills are always offered activities through monthly and seasonal choice boards.

This unit is designed to be part of a developmental progression across grade levels and make interdisciplinary connections across content areas including physical and social sciences, technology, career readiness, cultural awareness, and global citizenship. During this course, students are provided with opportunities to develop skills that pertain to a variety of careers.

Revision Date: July 2023

Standards

This unit challenges students to locate, evaluate, and use information effectively. Information literacy includes, but is not limited to, digital, visual, media, textual, and technological literacy. Lessons may include critical thinking and using information resources as well as the social and ethical issues surrounding the use of information.

The identified standards reflect a developmental progression across grades/ levels and make interdisciplinary connections across content areas including social sciences, technology, career readiness, cultural awareness and global citizenship. The standards that follow are relevant to this course in addition to the associated content-based standards listed below.

9.4.5.TL.2	Sort and filter data in a spreadsheet to analyze findings.
9.4.5.TL.4	Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).
LA.SL.5.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
LA.SL.5.1.D	Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

LA.SL.5.2	Summarize a written text read aloud or information presented in diverse media and formats (e.g., visually, quantitatively, and orally).
LA.SL.5.3	Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
I	Inquire: Build new knowledge by inquiring, thinking critically, identifying problems, and developing strategies for solving problems.
I.A.1	Formulating questions about a personal interest or a curricular topic.
I.A.2	Recalling prior and background knowledge as context for new meaning.
I.C	Learners adapt, communicate, and exchange learning products with others in a cycle that includes:
I.C.1	Interacting with content presented by others.
I.C.2	Providing constructive feedback.
I.C.3	Acting on feedback to improve.
I.D	Learners participate in an ongoing inquiry-based process by:
I.D.1	Continually seeking knowledge.
I.D.2	Engaging in sustained inquiry.
I.D.3	Enacting new understanding through real-world connections.
I.D.4	Using reflection to guide informed decisions.
V	Explore: Discover and innovate in a growth mindset developed through experience and reflection.
V.A.2	Reflecting and questioning assumptions and possible misconceptions
V.B	Learners construct new knowledge by:
V.B.2	Persisting through self-directed pursuits by tinkering and making.
V.C	Learners engage with the learning community by:
V.C.1	Expressing curiosity about a topic of personal interest or curricular relevance
V.C.3	Collaboratively identifying innovative solutions to a challenge or problem
TECH.8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.
TECH.8.1.5	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.5.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.2.5	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Essential Questions/Enduring Understandings

- How can I use computational thinking to solve simple problems?
- What is computational thinking?
- What vocabulary words are used in computer programming?
- Why is it important to use coding vocabulary appropriately?

- ● How can I program a coding robot to perform a simple task?
- ● How does computational thinking allow me to solve simple problems?

Students Will Know/Students Will Be Skilled At

- ● Programming a coding robot to successfully perform a variety of simple tasks.
- ● Programming various lessons through a coding course on code.org.
- ● Simple problems may be solved with computational thinking
- ● To apply existing knowledge to generate new ideas
- ● Utilizing age appropriate coding activities to build an understanding of the basics of programming.
- ● Utilizing coding terms appropriately and regularly during class discussions and group work.

Evidence/Performance Tasks

Students demonstrate differentiated proficiency through both formative and summative assessments in the classroom. Based on individual student readiness and performance, assessments can be implemented as formative and/or summative.

Developmental progression across years in media is evidenced through benchmark assessments as part of the media specialist's Student Growth Objective (SGO). Follow up diagnostic assessments are used to target skill remediation. Student proficiency allows for additional or alternative assessment based on demonstration or absence of skill.

The performance tasks listed below are examples of the types of assessments teachers may use in the classroom and the data collected by the district to track student progress.

- ● Benchmark: Students demonstrate proficient and appropriate use of coding vocabulary terms through an SGO assessment in the form of a Google Form Quiz.
- ● Formative: Students independently utilize introductory games/tools that teach the elements of basic coding.
- ● Formative: Students independently code various lessons utilizing code.org.
- ● Summative: Students work collaboratively in groups to navigate coding robots through an obstacle course/maze.

Learning Plan

Media Specialists may personalize instruction during this unit and address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students.

Students are exposed to STEM-related activities during this unit allowing them to experience varied disciplines including science and mathematics.

Media Specialists at the elementary level design their own unique lesson plans in order to incorporate the essential questions provided in this unit. The order in which this information is presented is dependent upon the variables specific to each elementary school community. For example, students may be called to the carpet for a lesson followed by guided practice, then independent practice. After the lesson, students will check out books. Library Media time ends with an electronic story or students going to a makerspace station.

Third grade students will review and continue to build coding and computational thinking through age appropriate websites/manipulatives. Computational thinking is problem solving in an efficient way. It can include knowing how and when to use computing tools, knowing what steps you need to take to solve a problem, and logically organizing and analyzing data. This unit incorporates code.org curriculum for second grade and various coding robots appropriate for grade level.

Code.org coding lessons should be completed in order following the progresson of Course A to Course F. Code.org periodically updates their coding course each school year to make improvements. Grade 3 should ideally focus on the lessons in Course E or F (advanced coders only).

Course E Lesson Plans can be found at the following link: https://studio.code.org/s/coursee-2023?section_id=4625822&viewAs=Instructor . During this unit, students usually do lessons 2-7 in Code.org. See below for description and lesson plans.

Course E (2023) Overview:

We created Course E for students in fourth grade. The course begins with an introduction to the Sprite Lab programming tool. Students will learn to make fun, interactive projects that reinforce what they'll learn about online safety. Following these lessons, students will engage in more complex coding. Students will learn about nested loops, functions, and conditionals. By the end of the course, students will combine these concepts to solve challenging puzzles. The course ends with an open-ended project where students create a game or drawing.

Lesson 1 : A Super Digital Citizen - Online tools are empowering for kids, and they also come with big responsibilities. But do kids always know what to do when they encounter cyber bullying? Show your students appropriate ways to take action and resolve conflicts, from being up-standers to helping others in need. Common Sense's Digital Citizenship Curriculum addresses six core topics, based on the latest research on children, media, and technology. This lesson focuses on Cyber-bullying, Digital Drama & Hate Speech. Students take on these tough topics and play the active role of up-standers to build positive, supportive online communities and combat online cruelty.

Lesson 2 : Private and Personal Information -

It's in our students' nature to share and connect with others. But sharing online comes with some risks. How can we help kids build strong, positive, and safe relationships online? Help your students learn the difference between what's personal and what's best left private. Common Sense's Digital Citizenship Curriculum addresses six core topics, based on the latest research on children, media, and technology. This lesson focuses on Privacy and Security. Students learn how to protect personal information and gain a deeper understanding of their data privacy rights so they can advocate for themselves and others.

Lesson 3 : Swimming Fish with Sprite - Students will program a simple animated underwater scene in this skill-building lesson. This lesson is designed to introduce students to the core vocabulary of Sprite Lab, and allow them to apply concepts they learned in other environments to this tool. By creating a fish tank, students will begin to form an understanding of the programming model of this tool, and explore ways they can use it to express themselves.

Lesson 4 : Hello World - In this skill-building lesson, students will learn to create and animate sprites and make them interactive using events. This lesson is intended to prepare students to create simple programming projects in Sprite Lab. Students will learn how to make sprites say things, which is a skill they will use in the following About Me lesson.

Lesson 5 : Mini Project: About Me - Students will apply their understanding of sharing personal and private information on the web by creating an interactive poster in this mini-project. This lesson is meant to make the previous lesson on personal and private information personally relevant for students. With SAFE (personal) and UNSAFE (private) examples in mind, students practice safe self-expression on the web, using Sprite Lab to fashion their own sprite costumes and generate text.

Lesson 6 : Drawing with Loops - This context-setting lesson shifts the focus from Sprite Lab to the Artist, a new tool that students will explore throughout the remainder of the course. Students will practice using loops, a concept that will be revisited throughout upcoming lessons.

Lesson 7 : Fancy Shapes Using Nested Loops - In this skill-building lesson, students will create intricate designs using the Artist. The lesson ends with an opportunity for students to create their own designs. In this online activity, students will create designs in Artist that they can proudly share with their loved ones. The purpose of this activity is to utilize nested loops as a way to inspire students with artistic minds to see coding as another creative outlet. This set of puzzles was built to develop critical thinking skills, an understanding of elementary geometry, and creativity -- all within the scope of nested loops!

Lesson 8 : Mini Project: Design a Snowflake - This mini-project lesson takes students through a series of exercises to create snowflake images using characters from the Frozen movies. In this lesson, students will get apply their skills with nested loops to create images that they will be excited to share.

Lesson 9 : Songwriting - This context-setting lesson will help students understand why combining chunks of code into functions can be a helpful practice. The use of functions helps simplify code and develop the student's ability to organize their program. Students will quickly recognize that writing functions can make their long programs easier to read and easier to debug if something goes wrong.

Lesson 10 : Functions in Minecraft - In this skill-building lesson, students will begin to understand how functions can be helpful! Students will discover the versatility of programming by practicing functions in different environments. Here, students will recognize reusable patterns and be able to incorporate named blocks to call pre-defined functions.

Additional lessons can be found here if time allows.

- Demonstrate how to access age appropriate pre-selected online resources
- Demonstrate Sphero robots prior to use
- Mini lessons may include: Demonstration/modeling of how to safely use tools such as coding robots, tablets, chromebooks, etc., how to access appropriate online sites/applications, and guided practice of online coding tutorials
- Preview the essential questions and connect to learning throughout the unit.
- Refer to visual aids displayed in library media center
- Review Botley robots prior to use
- Review Dash and Dot robots prior to use
- Review Ozobot robots prior to use
- Utilize age appropriate coding tutorials
- Vocabulary to introduce: program, algorithm, looping, functions,
- Within the library media center have materials available for inquiry/ creative activities

Materials

The materials used in this course allow for integration of a variety of instructional, enrichment, and intervention materials that support student learners at all levels in the school and home environments. Associated web content and media sources are infused into the unit as applicable and available.

Code.org and specific robots earmarked for each grade are core materials used by all library media specialists across district.

Suggested Supplemental Resources:

- https://hourofcode.com/us/learn (Hour of Code website)
- https://code.org/educate/curriculum/elementary-school (lesson plans)
- https://www.scratchjr.org (Scratch Jr application)
- Coding Choice Board for 3-6

- https://www.makewonder.com/ (Dash and Dot)
- Introduction to Dot (Google Slides)
- Introduction to Dash (Google Slides)
- Debugging (Google Slides)
- Coding Robots (Google Slides)
- Ozobots
- Dot Robots
- Dash Robots
- Botley Robots
- Cubelets
- Spheros
- Samsung Tablets to program the robots
- SmartPanel

- Age appropriate online websites
- Age appropriate websites/applications
- Botley Coding Robot
- Computer technology (Ipads/Laptops)
- Cubelet Robots
- Dot and Dash Robots
- Edison Robots
- Interactive board technology
- Presentation software
- Sphero Robots
- Visual aids

Strategies for Accommodation and Modification

Content specific accomodations and modifications as well as Career Ready Practices are listed here for all students, including: Special Education, English Language Learners, At Risk of School Failure, Gifted and Talented, Students with 504.