



SPRINGFIELD PUBLIC SCHOOLS
ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Springfield Public Schools
Springfield, New Jersey 07081

Kindergarten Computer Science

Curriculum Guide

2022

This curriculum may be modified through varying materials, techniques, and strategies as per an individual student's IEP.

*Springfield Board of Education
Approved July 25, 2022*



**Springfield Public Schools
Springfield, New Jersey**

**Rachel Goldberg
Superintendent of Schools**

**Erica Scudero
Assistant Superintendent**

Curriculum Developed By:

Michael Plias ~ Principal of Edward V. Walton Early Childhood Center

Gregory Salmon ~ STEM Supervisor

Colleen Funk ~ Elementary School Teacher

Julia Rechner ~ Elementary School Teacher

Springfield Board of Education
PO Box 210
Springfield, New Jersey 07081

"Cultivating compassionate and extraordinary learners"

Rachel Goldberg
Superintendent of Schools
(973) 376-1025

Michelle Calas
School Business Administrator/
Board Secretary
(973) 376-1025

Resolution: School Government
Introduced By: Mr. Miller
Seconded By: Mrs. Gamarekian
Adopted: July 25, 2022

Curriculum Adoption

To adopt the following curriculum and courses for the 2022-2023 school year:

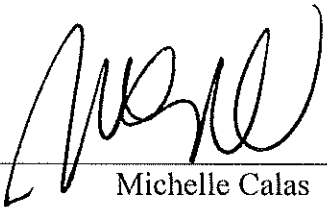
- Revised Elementary Curriculum due to revised state standards.
 - K-5 Social Studies
- Revised Middle School Curriculum due to revised state standards.
 - Grades 6-8 Social Studies
- Revised High School Curriculum due to revised state standards.
 - AP Macroeconomics
 - AP European History
 - AP US Government & Politics
 - AP US History
 - Contemporary Global Studies
 - Diversity Studies
 - Holocaust & Genocide
 - Sociology
 - US History to 1900
 - World History
 - World History Honors
 - 20th Century & Beyond
- Revised Middle School Courses due to new standards in Computer Science
 - PLTW Gateway: Computer Science for Innovators and Makers
 - PLTW Gateway: App Creators
- Revised High School Courses due to new standards in Computer Science
 - Introduction to Java
 - AP Computer Science Principles
 - Advanced Computer Science - Data Structures: Java
- New Elementary Courses
 - Kindergarten Computer Science
 - Grade 1 Computer Science
 - Grade 2 Computer Science
 - Anticipated - moving PLTW Launch down to Grade 3
 - PLTW Launch Grade 4
 - PLTW Launch Grade 5
- New Middle School Elective Course
 - Forensics

- New Elective Courses at FMG
 - Creative Writing
 - Drama/Theater/Playwriting
 - Journalism
 - Mock Trial
 - Model UN
 - Mysteries in History
 - Project Citizen
- New ELA Courses at FMG
 - Accelerated Communication Arts Grade 7
 - Accelerated Communication Arts Grade 8
- New Elective Courses at JDHS:
 - African American Studies

I, Michelle Calas, School Business Administrator/Board Secretary of the Springfield Board of Education, hereby certify that the extract from the minutes of a meeting of the Board of Education duly called and held on July 25, 2022 has been compared by me with the original minute book of said Board of Education, and is a true, complete and exact copy therefor, as far as the same relates to the subject matter referred to said contract.

IN WITNESS THEREOF, I have hereunto set my hand and seal of the Springfield Board of Education, this 26th of July 2022.

SEAL



Michelle Calas
School Business Administrator/Board Secretary



Unit Overview Template

Content Area: Computer Science **Grade Level:** Kindergarten **Unit Title:** Unplugged CS

Unit Summary: This unit will introduce students to computer science through unplugged computer science lessons. Students will explore concepts of computer science such as sequencing through playful and creative activities. All of the activities in this unit are unplugged, and many involve active movement or arts and crafts.

Primary Interdisciplinary Connections:

21st Century Themes **X** Creativity and Innovation **X** Critical Thinking and Problem Solving **X** ICT Literacy
☐ Information Literacy **X** Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy

Unit Rationale: This unit will introduce students to computer science through readings and hands-on activities.

Career Readiness (Standard 9):

- 9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.DC.1: Explain differences between ownership and sharing of information.
- 9.4.2.DC.5: Explain what a digital footprint is and how it is created.
- 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.5: Describe the difference between real and virtual experiences.
- 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

Learning Targets

Standards: 8.1.2; K.MD; R.I.K

Content Statements: Computing Systems; Networks and the Internet; Impacts of Computing; Data & Analysis; Algorithms & Programming; Measurement and Data; Reading Informational Text

CPI#:	Cumulative Progress Indicator (CPI):
8.1.2.CS.2	Explain the functions of common software and hardware components of computing systems.
8.1.2.NI.1	Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.



8.1.2.NI.2	Describe how the Internet enables individuals to connect with others worldwide.
8.1.2.NI.3:	Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others.
8.1.2.NI.4	Explain why access to devices need to be secured.
8.1.2.IC.1	Compare how individuals live and work before and after the implementation of new computing technology.
8.1.2.DA.1	Collect and present data, including climate change data, in various visual formats
8.1.2.DA.3	Identify and describe patterns in data visualizations.
8.1.2.DA.4	Make predictions based on data using charts or graphs.
8.1.2.AP.1	Model daily processes by creating and following algorithms to complete tasks.
8.1.2.AP.4	Break down a task into a sequence of steps.
8.1.2.AP.5	Describe a program's sequence of events, goals, and expected outcomes.
8.1.2.AP.6	Debug errors in an algorithm or program that includes sequences and simple loops.
K.MD.A.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.
RI.K.1.	With prompting and support, ask and answer questions about key details in a text.
SEL.PK-12. 2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12. 4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12. 5.2	Utilize positive communication and social skills to interact effectively with others.

Unit Essential Questions:

- What is a computer?
- How do we design our own computers?
- What do computers do?

Unit Enduring Understandings:

- Computers take inputs, give outputs, store data, and process data.
- Computers are made of different parts that have different purposes.
- Computers connect to each other through networks.
- Computers complete tasks through sequences and algorithms.
- Passwords help protect computers by adding a layer of security.
- New computing technology constantly changes the way we live and work.

Unit Learning Targets:

Students will....enhance their knowledge of computer science through readings and hands-on activities.



Evidence of Learning

Summative Assessment: 6 days

Equipment Needed: Design sheets, arts and crafts supplies, origami paper

Teacher Resources: Laptop

Formative Assessments:

- Computer Design Activity
- Input/Output Activity
- Origami Algorithm Activity



Lesson Plans

Lesson	Time Frame
Lesson 1 What is a computer?	2 hours/2 days
Lesson 2 That could be a computer!	2 hours/2 days
Lesson 3 Secret Handshake Sequencing	2 hours/2 days

Teacher Notes:

These lessons are designed to introduce students to computer science through playful and unplugged lessons. Students will explore using their own creativity to engage in a meaningful way.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

<https://sites.google.com/sfusd.edu/k-2cs/red/unit-1-unplugged-cs>

<https://sites.google.com/sfusd.edu/k-2cs/home>

<https://www.pattan.net/Supports/STEM/computer-science/CS-Teacher-Toolkit/Lesson-Resources>



Lesson Plan 1 Template

Content Area: Computer Science	Lesson Title: What is a computer?	Time Frame: 2 hours/2 days
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Lesson Components

21st Century Themes

- | | |
|---|--|
| ☐ Global Awareness | ☒ Financial, Economic, Business and Entrepreneurial Literacy |
| ☐ Civic Literacy | ☐ Health Literacy |

21st Century Skills

- | | | |
|---|---|--|
| ☒ Creativity and Innovation | ☒ Critical Thinking and Problem Solving | ☐ Information Literacy |
| ☐ Life and Career Skills | ☐ Communication and Collaboration | ☐ Media Literacy |
| | | ☒ ICT Literacy |

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Artifact Placemat (print-out), Magazine pictures, Drawing Materials (crayons, markers, etc.), Craft Materials (optional)

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Use a variety of media to model their current conception of computers. - Explain why they believe something is a computer. - Refine their definition of a computer.	Lesson Sequence: Welcome to your first day of computer science in Kindergarten! Computer science is using the power of computers to solve our problems and express ourselves. I can already tell, you are going to be great at this! Warm-up: Let's think about the word <i>computer</i> today. What is a computer? - Close your eyes and imagine all the computers you know about, all the computers you've seen, and all the	- Observe and record students current understanding of what a computer is - Keep photos of student artifacts as a record of their evolving thought



computers you've touched.

4. (Give think time. Depending on your class's needs and time of year, consider using equity sticks, think-pair-share, etc. to gather students' ideas. Record all responses on an anchor chart: What We Think We Know About Computers. Some ideas may not be accurate, but we are recording students' current thinking; we will revisit this idea again to capture students' evolved thought.)
5. **Main Activity:** What is a computer? Show us your thinking. You can cut pictures out of magazines, build with craft materials or blocks, and draw on or construct with paper. You decide the way you want to show your thinking. (Briefly demonstrate how to draw, build, and collage ideas onto the [artifact placemat](#) or other surface. Leave the majority of the time for children to engage, and for you to carefully observe and record students' current understanding of what a computer is.)
6. **Debrief:** I can see we have lots of ideas about what computers are and



- what they can look like.
Take a moment and pick one of your ideas. We will ask you two questions:
Why do you think it is a computer?
How does it work?
7. Give think time. Again, depending on your class's needs and time of year decide whether all students will present, or a representative sample. Keep photos of each students' artifact as a record of their evolving thought.)

Differentiation:

The teacher can scaffold the level of support based on student readiness level. The students can work in partners or small groups and be given respective tasks within the group. The teacher can also have students dictate what they think a computer is/looks like to them and help them draw it (this would be ideal for students who struggle with fine motor skills).

Resources Provided:

- Artifact Placemat
- [Computational Thinking Star Chart](#)



Lesson Plan 2 Template

Content Area: Computer Science	Lesson Title: That Could Be A Computer!	Time Frame: 2 hours/2 days
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Lesson Components

21st Century Themes

☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☐ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Everyday Objects (Backpack, Box, Ball, Pencil, Book, etc.), Student Objects (can be the same as listed above, or students may bring an object from home), [Cut out icons for input and output](#), [Print icon](#), [Design Sheet](#), [Computational Thinking Star Chart](#)

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Reimagine an everyday object as a computer that addresses a problem - Assign an input and output to their imagined computer.	Lesson Sequence Welcome: Welcome back to computer science in Kindergarten! Computer science is using the power of computers to solve problems and express ourselves. Last time, we showed our thinking by building our own computers and explaining why we thought it was a computer. - We found that computers need a human to tell it what to do. It needs to	- Review student design sheets in order to gauge understanding of input/output - Monitor student dialogue and use of computer language. Keep a record.



receive **input** before it does what we want, before it **outputs** what we want. We're going to build on that learning, and add on that a computer helps us solve one or more problems.

3. **Warm-up:** (Have a few familiar items in the middle of the circle: a box, a backpack, a shirt, stuffed toy, etc. as well as some [large cut-out icons for inputs and outputs](#).)
4. Today, we will do what computer scientists do: computer scientists use their imaginations to help them solve problems and express themselves! Today, we are going to look at everyday things in our classroom and reimagine them to be computers!
5. But why? Why would making something into a computer be helpful? Hmm, let me think. Sometimes I forget to put important things inside of my backpack. Show me a hand of agreement if that happens to you, too. If my backpack was a computer, maybe when I pick it up, it can scan inside all the pockets to check for 1) important papers, like homework; 2) my lunch, and 3) my water bottle! Then it could make a sound: "Warning! You are



missing your water bottle.”

6. When I lift up the backpack, I’m telling the computer inside to start scanning. That’s the **input**. My input was movement detected by the motion detector. (Show the motion detector icon.) I moved something to tell the computer to start its program.
7. What was the **output**? The output was the computer telling me with a voice whether I had all my important items inside. The output is sound coming out of speakers! (Show the speakers icon.)
8. So, now you see how I turned a backpack into a computer!
9. Let’s play a game. It’s called It’s a Computer. Watch and listen to what I say when it’s my turn. (Choose another item from the center of the circle.)
10. **This is not a box, it’s a computer that can make any flavor of ice cream I want!** I use a keyboard to input the flavor. (Hold up the keyboard icon.) Then the computer 3D prints-out real ice cream for me to eat as its output. (Hold up the 3D/print icon.)



11. Do you see what I did? I looked at what I was holding, and I used my imagination to see it as a computer that could do something that I need. Sometimes I go to the store, and they don't have the flavor that I want and it makes me feel sad. If I had a computer that could make any flavor of ice cream, I wouldn't have to feel so sad when the store doesn't have the flavor I prefer.
12. Take a moment and look at the items in our circle. In your mind think, "This is not a _____, it's a computer that...." How do I input, or tell the computer what to do? What does the computer do, or output, as a result? (Give think time.) Let's try it. (Do a think-pair-share, or use equity sticks to choose a few students if you do not have time to do this as a whole class. Have the students repeat the same frame "This is not a box, it's a computer (*that can/will...*)!" If kids start to say the same idea, or say "you stole my idea" reframe it, saying, "You both are thinking alike! That's great. You can choose whether you'd like to work together later!")
13. Thank you for all of your ideas! I would love to see



those computers exist in real life; they would help me and so many other people have a happier and easier life.

14. **Main Activity:**

(Distribute and refer to the [Design Sheet](#).) We know that computers don't always look like a box. I've seen computer watches and computer glasses! In a moment, you are going to use your imagination to choose an object (in the room/in your desk/in your backpack/from this pile in the middle of the circle) and reimagine it as a computer. Quietly and calmly bring it to your desk in 30 seconds or fewer.

15. Take a moment and really look at the object you chose. Look at it from the top, the bottom and the side. What problem does it solve? (Depending on what part of the year it is, have students use appropriate strategies for recording this on their design sheets such as using initial sounds, chunks, and the class word wall.)

16. Now, turn it on! What are you using as input? Who chose a microphone? A keyboard? Great! Let me see you input your directions into the



- computer. Tell it what to do! (Have students circle the input they chose.)
17. Excellent. So now that you told it what to do, what's happening? What is the computer outputting? Whose computer has a screen that changed? Whose computer printed something out? Whose computer outputs a sound? (Have students circle the output they chose.)
18. Wonderful! Share your computer with your table mates. Tell them what problem it solves. Teach them how to input information into the computer! What should they expect your computer to output? (Have students sketch their computer. As they are sketching, rotate around the room to assist them with writing/sounding-out what problem their computer solves.)
19. **Debrief:** Computers solve problems. We tell computers how to solve problems. We tell computers what to do by giving them **input** (hold up the icons, name them individually). The computer takes our input, **processes** and stores it, then generates an **output** (hold up the



	icons, name them individually). 20. (Leave time to highlight a couple student examples that strongly show the computer 1) solving a problem, 2) with a clear input and 3) output.) 21. I've made a special chart to celebrate what we are learning in computer science. Each of you has earned a badge for Impacts of Computing today. That means you understand that humans design computers to solve problems, and that what we design can change people's lives. Congratulations!	
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Differentiation:

Have students bring objects from home so that they are already familiar with the function of the object. Students may work in groups or pairs to complete the design sheet. Provide a model design sheet for students to view while completing theirs

Resources Provided:

- [Design Sheet/Icons](#)
- [Computational Thinking Star Chart](#)



Lesson Plan 3 Template

Content Area: Computer Science Lesson Title: Secret Handshake Sequencing Time Frame: 2 hours/2days

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☐ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Smartboard or Projector, <http://www.viewpure.com/Dv4-YouYngY?start=o&end=o>, [Handshake Icons](#), [Sequencing Sheet](#), [Print out Signs](#), [Computation Star Chart](#)

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Record a sequence with symbols. - Revise a sequence based on criteria. - Compare sequences with classmates. - Choreograph and teach classmates original sequences.	Lesson Sequence Welcome: Welcome back to computer science in Kindergarten! Computer science is using the power of computers to solve our problems and express ourselves. (Reference your class anchor chart, storyboard, or other artifacts.) Last week, we practiced problem solving and created our first algorithm together. At the end of the lesson, you earned a badge! What was it for? Yes, Impacts of Computing!	- Monitor student understanding of vocabulary - Record data on students' progress in each challenge, take note of understanding of creating sequences. - Review students sequencing sheets



Today, you will have a chance to earn a second badge.

2. **Warm-up:** Sometimes when I'm with my friends, I like to say hi to them in a special way. I use a secret handshake. It shows that we're close, because only two of us know it. Well, I'd like to make a secret handshake with you because I like you, and I like learning computer science with you!
3. In a moment, we're going to watch [a quick video](#) about one type of secret handshake. Get ready to work with a partner to practice.
4. What order did they teach us the moves?



5. What order did they do the secret handshake?



6. **Main Activity:** So we learned three moves to make a secret handshake, but as you can see, we don't have to keep them in that order! The order that we put our steps is the *sequence*. (To draw



more attention to vocabulary, consider challenging students to wiggle their fingers silently in the air, or some other signal, each time they hear or use the vocabulary word of the day.)

7. Challenge 1: Make a sequence using the three moves we learned: wave, jellyfish, and ice cream, in whichever order you want, but make sure you use each move only once. (Either pre-cut some [printed-out icons](#) in advance, and have students paste them onto their [sequencing sheet](#), or model how to do a simple line drawing in the boxes, or in journals.)
8. Teach a neighbor your secret handshake. You may show them your sequencing sheet.
9. Sorting Challenge 1: I'm curious to see how people thought about this problem. If you chose to do wave first, could you please stand over here? If you chose to do jellyfish first, please stand here. Finally, if you chose ice cream first, could you please stand here? ([Print-out signs](#) to give visual cues.) Wow, what do we notice?
10. Now, compare your sequence with those people around you. Can



you find someone who put the moves in the exact same order as you? If you find someone, say, “Same sequence!” Keep looking. Maybe you’ll find three or more people with the same sequence!

11. Challenge 2: Here’s our second challenge. It’s a bit challenging, but I know you’ll do great! Instead of doing each move one time, pick two of your favorite moves then choose one of them to do twice. For example, I might do:



Which move did I leave out?

Which move did I do twice?

Record your second sequence on your sequence sheet.

12. Sorting Challenge 2: I’m curious to know how people thought about this problem! If you used wave more than once, stand here. If you used jellyfish more than once, stand here. Finally, if you used ice cream more than once, stand here. Can you find someone who put the moves in the exact same order as you? If you find someone, say, “Same sequence!”



([Print-out signs](#) to give visual cues.)

13. **Debrief:** (Have one or two Same Sequence groups perform their sequence in front of the class. Have the audience name the steps in the sequence.)
14. Let's look at our [special chart](#) to celebrate what we're learning in computer science. Today, we practiced putting handshake moves (wave, jellyfish, ice cream, and our own ideas) in different orders. The order that we choose is called the *sequence*. Let's say the word together! Sequence! When you paid very close attention to what came first, second, and third, you were practicing *sequencing*! Congratulations, you've earned your sequencing star today!

Differentiation:

Depending on the group of students, students can complete only challenges 1 and 2.

Extension: Provide an opportunity to complete challenges 3 and 4 listed below:

- Challenge 3: I love seeing your thinking! Now, let's make up a move using our imagination - that's called choreographing. Take a moment and think, "What could it look like? What will I call it? What symbol will I use to represent it?" Now put it into a three-move sequence. When you're done recording your sequence on your Sequence Sheet, teach it to someone else!
- Challenge 4: Such variety! Such creativity! You've made up one move already. Can you make up another? Let's create the ultimate four-move secret handshake sequence! Take a moment and think, "What could my new move look like? What will I call it? What symbol will I use to



represent it?” When you’re done recording your sequence on your Sequence Sheet, teach it to someone else!

Provide clear directions for moving around the room

Provide extra time for students to complete the sequencing sheet in between challenges (lesson may need to be divided into multiple sessions/days).

Resources Provided:

- [Handshake Icons](#)
- [Sequencing Sheet](#)
- [Print out Signs](#)
- [Computation Star Chart](#)
- Video: <http://www.viewpure.com/Dv4-YouYn9Y?start=o&end=o>
- Extension Video: <http://www.viewpure.com/zHzJnRSGnTw?start=o&end=o>
- Extension Video: <http://www.viewpure.com/BKNLYx7QbM4?start=o&end=o>



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	x		
Allow for student choice	x		
Provide scaffolding for acquiring targeted knowledge/skills		x	
Integrate global perspectives	x		
Integrate 21st century skills	x		
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	x		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	x		
Are varied to address different student learning styles and preferences	x		
Are differentiated based on student needs	x		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	x		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	x		
Provide opportunities for student reflection and self- assessment	x		
Provide data to inform and adjust instruction to better meet the varying needs of learners	x		

Curriculum Design Template

Content Area: Computer Science	Grade Level: Kindergarten	Unit Title: Unplugged CS
Created: June 2022	Board Approved on:	Type Here



Unit Overview Template

Content Area: Computer Science **Grade Level:** Kindergarten **Unit Title:** Bee-Bots

Unit Summary: In this unit, students apply the computational skills they practiced in the previous unit on actual computers; Bee-Bot robots. Students use this bee-shaped robot to express themselves and reinforce language arts standards as they learn to program increasingly complex sequences of simple commands. Students gain fluency with planning, testing, and debugging programs as they work with familiar characters in The Very Hungry Caterpillar, More-igami, nursery rhymes, and fairy tales.

Primary Interdisciplinary Connections:

[21st Century Themes](#) ✕ Creativity and Innovation ✕ Critical Thinking and Problem Solving ✕ ICT Literacy
☐ Information Literacy ✕ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy

Unit Rationale: In this unit, students will learn to program Bee-Bots using sequences of simple commands. By doing so, they will gain fluency with planning, testing, and debugging programs of increasing complexity.

Career Readiness (Standard 9):

- 9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.DC.1: Explain differences between ownership and sharing of information.
- 9.4.2.DC.5: Explain what a digital footprint is and how it is created.
- 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.5: Describe the difference between real and virtual experiences.
- 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

Learning Targets

Standards: 8.1.2; K.MD; R.I.K

Content Statements: Computer Systems; Data & Analysis; Algorithms & Programming; Measurement and Data; Reading Informational Text

CPI#:	Cumulative Progress Indicator (CPI):
8.1.2.CS.1	Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.



8.1.2.CS.2	Explain the functions of common software and hardware components of computing systems.
8.1.2.CS.3	Describe basic hardware and software problems using accurate terminology.
8.1.2.DA.2	Store, copy, search, retrieve, modify, and delete data using a computing device.
8.1.2.AP.1	Model daily processes by creating and following algorithms to complete tasks.
8.1.2.AP.2	Model the way programs store and manipulate data by using numbers or other symbols to represent information
8.1.2.AP.3	Create programs with sequences and simple loops to accomplish tasks.
8.1.2.AP.4	Break down a task into a sequence of steps
8.1.2.AP.5	Describe a program's sequence of events, goals, and expected outcomes
8.1.2.AP.6	Debug errors in an algorithm or program that includes sequences and simple loops.
K.MD.A.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.
RI.K.1.	With prompting and support, ask and answer questions about key details in a text.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.

Unit Essential Questions:

- How do we program Bee-Bots using sequences?
- How do we use Bee-Bots to tell a story?
- How do we debug a Bee-Bot's program?
- How do we delete data on a Bee-Bot?

Unit Enduring Understandings:

- Bee-Bots can be programmed to complete a sequence of moves.
- Tasks can be broken down into a sequence of steps.
- Bee-Bots' hardware and software allow students to complete a series of tasks.

Unit Learning Targets:

Students will....learn to program Bee-Bots using sequences of simple commands.



Evidence of Learning

Summative Assessment: 6 days

Equipment Needed: Bee-Bots, mats, activity cards

Teacher Resources: Laptops

Formative Assessments:

- Applying sequences to Bee-Bots
- Debugging Bee-Bots
- Using Bee-Bots to represent words or numbers



Lesson Plans

Lesson	Time Frame
Lesson 1 How does a Bee-Bot Work?	2 hours/2 days
Lesson 2 The Very Hungry Bee-Bot	2 hours/2 days
Lesson 3 Let's Debug!	2 hours/2 days

Teacher Notes:

These lessons are designed to introduce students to programming using the Bee-Bot Robots

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

<https://sites.google.com/sfusd.edu/k-2cs/red/unit-2-bee-bots>

<https://www.csunplugged.org/en/topics/>

<https://www.pattan.net/Supports/STEM/computer-science/CS-Teacher-Toolkit/Lesson-Resources>



Lesson Plan 1 Template

Content Area: Computer Science	Lesson Title: How does a Bee-Bot work?	Time Frame: 2 hours/2 days
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Lesson Components

21st Century Themes

- | | |
|---|--|
| ☐ Global Awareness | ☒ Financial, Economic, Business and Entrepreneurial Literacy |
| ☐ Civic Literacy | ☐ Health Literacy |

21st Century Skills

- | | | |
|---|---|--|
| ☒ Creativity and Innovation | ☒ Critical Thinking and Problem Solving | ☐ Information Literacy |
| ☐ Life and Career Skills | ☐ Communication and Collaboration | ☐ Media Literacy |
| | | ☒ ICT Literacy |

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Bee-Bots Robots (1 per group), Driver Lanyard (1 per group), Timer , White Board/Chart Paper to create Anchor Chart

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Discover and articulate the functions of each button and switch on a Bee-Bot. - Use Bee-Bot as a tool for self-expression and group play.	Lesson Sequence Welcome: Robots are a type of computer! (Remind students of their own work designing computers earlier in Unit 1.) Computers need humans, like us, to give them directions in a way they can understand. - Today, we have two goals: Learn how a Bee-Bot works (all the buttons and switches) and how to take care of it. Learn one way of taking turns with Bee-Bots: Timed Turns.	- Monitor student participation. Are students able to equally express ideas and creativity? - Encourage students to experiment/explore with the Bee-Bot



3. **Warm-up:** Discuss and practice Bee-Bot rules and procedures within the demo below.
4. Model Timed Turns with one partner. (2 minutes)
Put a visible [one-minute timer](#) up on the screen. The linked video has a 10-second transition time built in before the next minute begins.
5. The first driver wears the [Driver lanyard](#). Model talking through your thinking. Push and slide buttons and switches with freedom (no button press maximum) to figure out what each means. Other students actively observe so they already know some things (e.g. the switch on the left turns the Bee-Bot on, press Go last) before it's their turn.
6. When the timer is up, the Driver turns off the Bee-Bot and passes it to the next Driver to turn on.
7. All groups participate in Timed Turns. (4-5 minutes)
8. **Main Activity:** Debrief the warm-up. What does each button do? What does each switch do? Where do clear (X) and go come into play? Record learning onto an anchor chart.



9. Launch creative group project using Timed Turns: (8-9 minutes)
10. Driver programs Bee-Bot to do a dance (30 seconds). Groupmates dance along with it (30 seconds).
11. Driver programs Bee-Bot do 1-3 steps (e.g. forward, forward, back). Groupmates follow the moves along with Bee-Bot. Repeat with new sequences until time is up.
12. **Circle share:** Student showcase (1-3 groups).
13. Debrief content: What problems came-up while we were programming Bee-Bot?
14. Debrief process: Who would we like to thank in our group for taking turns, treating Bee-Bot kindly, having great ideas, etc.?

Differentiation:

Divide students into small groups or partners. Display Anchor chart during main activity for students who need visual support. Provide extra opportunities for students to experiment with the Bee-Bot

Resources Provided:

- [Beet-Bot 3-Button and 4-Button Sequence](#)



Lesson Plan 2 Template

Content Area: Computer Science Lesson Title: The Very Hungry Bee-Bot Time Frame: 2 hours/2 days

Lesson Components

21st Century Themes

☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☐ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Bee-Bots, 1 for each group, [Recording Sheet](#), [Recording Sheet Example](#), [Color Shape Mat](#), [Paper Bee-Bot](#) for planning, [Bee-Bot 3-Button Sequence](#) image, [Driver lanyard](#), 1 for each group, [Sample Menu](#) for inspiring food choices, [The Very Hungry Caterpillar](#) animated read-aloud (or Book).

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Rehearse several possible paths before selecting one to program. - Incorporate original storytelling with colors and shapes on the Bee-Bot Color Shape Mat.	Lesson Sequence Welcome: Review the anchor chart from last class. Highlight what each switch and button does and how we need to press Go at the end. - Give a brief synopsis of The Very Hungry Caterpillar then say today's lesson is the Very Hungry Bee-Bot! Show the Color Shape Mat, and lead students in a brief brainstorm of what foods the colors and shapes can represent.*	Review students recording sheets when completed



3. Today, you will tell your own Very Hungry Bee-Bot story as you program Bee-Bot to eat from a starting place to an ending place!
4. Some ideas. Please use examples that your students will relate to:
 - Orange Circle: bowl of phở or ramen,, birthday cake, tortilla, falafel, carrot, orange, peach
 - Green Rectangle: box of cereal, kale, pesto, avocado, granola bar
 - Red Triangle: pizza slice, Sriracha sauce, chili, salsa, watermelon
 - Blue Hexagon: blueberry, honeycomb, _____ on a hexagon-shaped plate, blackberry
 - Purple Cube: ice cream, box of pasta, grape, ice cube
 - Yellow Square: curry, mango, rice, banana, french fry
5. **Warm-up:** Choose one partner to model with. Choose a starting and ending spot. Use the [flat Bee-Bot](#) to rehearse different paths. Choose one path as a group and draw a line connecting the start to the end point. [The Very Hungry Bee-Bot Recording Sheet Example sheet](#)
6. Model the Three-Button Protocol. (1-2 minutes)
The Driver wears the



	lanyard and presses Clear (X), Orange (arrow), Go. 7. Use arm gestures such as 1) crossing arms into an X, 2) pointing up/down/sideways, 3) arms forward) 8. Even if there's a bug in the program, pass the Driver lanyard to the next groupmate to debug. 9. Main Activity: Each group needs: -One Color Shape Mat -One flat Bee-Bot -One Driver Lanyard -One Recording Sheet -Colored pencils/crayons to draw foods and the Bee-Bot path -Have extras, in case groups finish one path and have time to plan a second or third path. 10. In small groups, students will create the paths to the food for the Bee-Bots. Students will record their paths on the recording sheet 11. Circle share: Student showcase (1-3 groups). -Can be them presenting their Recording Sheet under a document camera. 12. Debrief content: -How did your group decide which path to take? 13. Debrief process: -Who would we like to thank in our group for taking turns, treating Bee-Bot kindly, having great ideas, etc.?	
Differentiation:		



Depending on the group, read “The Very Hungry Caterpillar”, some students may not understand the concept based on a synopsis.

Students should work in small groups.

Provide visual aides for students.

Resources Provided:

- [Recording Sheet](#)
- [Recording Sheet Example](#)
- [Color Shape Mat](#)
- [Paper Bee-Bot](#) for planning
- [Bee-Bot 3-Button Sequence](#) image
- [Driver lanyard](#), 1 for each group
- [Sample Menu](#) for inspiring food choices
- [The Very Hungry Caterpillar](#) animated read-aloud



Lesson Plan 3 Template

Content Area: Computer Science Lesson Title: Let's Debug! Time Frame: 2 hours/2 days

Lesson Components

21st Century Themes

☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☐ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Bee-Bots, 1 for each group, [Debugging Sheet for Students](#) (cut in half - 5 puzzles), [Color Shape Mat](#), [Bee-Bot 3-Button Protocol](#) images, [Driver lanyard](#), 1 for each group, Pencils

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Debug pre-sequenced algorithms.	Lesson Sequence 1. Welcome: Review a Very Hungry Bee-Bot recording sheet from last class. Explicitly discuss debugging. 2. Highlight how we made a plan, but when we programmed it, sometimes we made some mistakes. We might have mixed up turn right and turn left, or forgot to press clear at the beginning. 3. Warm-up: I have a friend who teaches computer science at another school. Their	• Review students Debugging sheets when completed • Monitor student understanding of the Bee-Bot controls-take anecdotal data



class did the same activity you did last week! The thing is, some of the students did their work a little too quickly and made some mistakes. I thought about all of you, and how you are so helpful. I told my friend that we can help **debug** the mistakes! We are going to find and fix the errors. Let's [try one together](#), then you and your groups will help debug the rest.

4. (Model with a small group of students. Take turns passing the Driver lanyard and programming the Bee-Bot one step at a time (X, arrow, Go) to find the bug. If time permits, go all the way back to the beginning and test the entire algorithm. **Start** where the Bee-Bot icon is, including the direction it is pointing, and **end** at the F (finish).)
5. **Main Activity:** Now it's your turn to help fix more buggy algorithms. (Pass out the [Debugging Sheet for Students](#), Bee-Bots, Driver lanyard, and the [Color Shape Mats](#).)
6. Students will work in small groups to debug the algorithms. Monitor students as they work.
7. **Circle share:** What was challenging about



debugging someone else's work? How did you feel when you found a bug? Who do you want to appreciate for helping you do this challenging work?

Differentiation:

Provide additional time to review Bee-Bot controls and procedures

Preview Vocabulary :

- input - ways to enter data into a compute
- output - information produced by a computer
- perseverance - continued effort to do or achieve something despite difficulties, failure, or opposition
- sequence - events arranged in a specific order, from beginning to end

Resources Provided:

- Bee-Bots, 1 for each group
- [Debugging Sheet for Students](#) (cut in half - 5 puzzles)
- [Color Shape Mat](#)
- [Bee-Bot 3-Button Protocol](#) images
- [Driver lanyard](#), 1 for each group
- Pencils

Extra Resources:

- [Bee-Bot Job Cards](#)
- [Blue-Bot Instructional Guide](#)



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	X		
Allow for student choice	X		
Provide scaffolding for acquiring targeted knowledge/skills	X		
Integrate global perspectives	X		
Integrate 21st century skills	X		
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	X		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	X		
Are varied to address different student learning styles and preferences	X		
Are differentiated based on student needs	X		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	X		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	X		
Provide opportunities for student reflection and self- assessment	X		
Provide data to inform and adjust instruction to better meet the varying needs of learners	X		

Curriculum Design Template

Content Area: Computer Science	Grade Level: Kindergarten	Unit Title: Bee-Bots
Created: June 2022	Board Approved on:	



Unit Overview Template

Content Area: Computer Science **Grade Level:** K **Unit Title:** ScratchJr

Unit Summary: Students will use the block coding programming application ScratchJr to create real computer algorithms and programs. Students will apply all their previous knowledge to create algorithms and programs, model processes, use numbers and symbols to represent information, create programs with sequences and loops, and debug algorithms and programs. In this unit, students will learn a series of concepts and skills that are applied in two primary creative projects -- an interactive collage and an animated story. Through these lessons, students will learn how to express their own ideas in a way that a computer can understand.

Primary Interdisciplinary Connections:

21st Century Themes ✕ Creativity and Innovation ✕ Critical Thinking and Problem Solving ✕ ICT Literacy

☐ Information Literacy ✕ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy

Unit Rationale: In this unit, students will learn a series of concepts and skills that are applied in the creation of games that students will be familiar with. Through these lessons, students will learn how to express their own ideas in a way that a computer can understand. Using the ScratchJr app, children can create their own interactive collages, animated stories, games, and other programs. ScratchJr is a developmentally appropriate programming language designed specifically for children aged five through seven by teams at Tufts University and MIT.

Career Readiness (Standard 9):

- 9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.DC.1: Explain differences between ownership and sharing of information.
- 9.4.2.DC.5: Explain what a digital footprint is and how it is created.
- 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.5: Describe the difference between real and virtual experiences.
- 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

Learning Targets

Standards: 8.1.2; K.MD; RI.K



Content Statements: Computer Systems; Data & Analysis; Algorithms & Programming; Measurement and Data; Reading Informational Text

CPI#:	Cumulative Progress Indicator (CPI):
8.1.2.CS.1	Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
8.1.2.CS.2	Explain the functions of common software and hardware components of computing systems.
8.1.2.CS.3	Describe basic hardware and software problems using accurate terminology.
8.1.2.DA.2	Store, copy, search, retrieve, modify, and delete data using a computing device.
8.1.2.AP.1	Model daily processes by creating and following algorithms to complete tasks.
8.1.2.AP.2	Model the way programs store and manipulate data by using numbers or other symbols to represent information
8.1.2.AP.3	Create programs with sequences and simple loops to accomplish tasks.
8.1.2.AP.4	Break down a task into a sequence of steps
8.1.2.AP.5	Describe a program's sequence of events, goals, and expected outcomes
8.1.2.AP.6	Debug errors in an algorithm or program that includes sequences and simple loops.
K.MD.A.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.
RI.K.1.	With prompting and support, ask and answer questions about key details in a text.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.

Unit Essential Questions:

- How do you use each block on the ScratchJr app?
- How do you model processes using ScratchJr?
- How do you store and manipulate data on ScratchJr?
- How do you create programs with sequences and simple loops on ScratchJr?
- How do you debug errors on ScratchJr?

Unit Enduring Understandings:

- Block coding languages have students apply all major computer science concepts.
- Simple loops and sequences can be programmed into ScratchJr.
- ScratchJr can be used to tell stories and communicate ideas.

Unit Learning Targets:

Students will....express their own ideas in a way that a computer can understand by using a block coding language.



Evidence of Learning

Summative Assessment: 6 days

Equipment Needed: iPads, ScratchJr app

Teacher Resources: iPad, ScratchJr app, laptop

Formative Assessments:

- Student created block coding programs using ScratchJr
- Debugging activities



Lesson Plans

Lesson	Time Frame
Lesson 1 Friendly Playground	2 hours/2 days
Lesson 2 Talent Show!	2 hours/2 days
Lesson 3 Squad Goals	2 hours/ 2 days

Teacher Notes:

These lessons have been created to use with the Scratch Jr. App

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

<https://sites.google.com/sfusd.edu/k-2cs/red/unit-3-scratchjr>

<https://www.csunplugged.org/en/topics/>

<https://www.pattan.net/Supports/STEM/computer-science/CS-Teacher-Toolkit/Lesson-Resources>



Lesson Plan 1 Template

Content Area: Computer Science	Lesson Title: Friendly Playground	Time Frame: 2 hours/2 days
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Lesson Components

21st Century Themes

- | | |
|---|--|
| ☐ Global Awareness | ☒ Financial, Economic, Business and Entrepreneurial Literacy |
| ☐ Civic Literacy | ☐ Health Literacy |

21st Century Skills

- | | | |
|---|---|--|
| ☒ Creativity and Innovation | ☒ Critical Thinking and Problem Solving | ☐ Information Literacy |
| ☐ Life and Career Skills | ☐ Communication and Collaboration | ☐ Media Literacy |
| | | ☒ ICT Literacy |

Interdisciplinary Connections:

ELA, Mathematics

Integration of Technology:

Computer Programming

Equipment Needed:

Tablets: 1-2 per pair of students

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Program one sprite to greet another stationary sprite using movement and looks blocks. - Initialize their programs to begin with a Start on Green Flag and Go Home (Return to X). - Make connections between programming a sequence of movements with Bee-Bots and Scratch Jr. sprites.	Lesson Sequence Welcome: Celebrate beginning a new unit! Make the explicit connection between programming our own stories with Bee-Bots and being able to do the same, and more, in Scratch Jr. Discuss and practice iPad rules and procedures Warm-up: Model how to open a new project. - Add one more sprite. Drag the other sprite to a different part of the screen so the two do not overlap. - Reselect Scratch Kitten and initialize it like a	- Monitor student progress - Look for students who successfully: -Added a second sprite. -Moved their second sprite to a new place on the screen. -Initialized their Scratch Kitten with a Start on Green Flag and Go Home (Return to X). -Sequenced blue movement blocks to reach their second sprite. -Used a purple say block to say "hi" after Scratch Kitten reaches the other sprite.



Bee-Bot: Start on Green Flag, Go Home (Return to X).

5. Program Scratch Kitten to visit the other sprite with the blue motion blocks, then say “hi” with the purple speech block.
6. **Main Activity:** Students create their own Friendly Playground projects. Look for students who successfully:
 - Added a second sprite.
 - Moved their second sprite to a new place on the screen.
 - Initialized their Scratch Kitten with a Start on Green Flag and Go Home (Return to X).
 - Sequenced blue movement blocks to reach their second sprite.
 - Used a purple say block to say “hi” after Scratch Kitten reaches the other sprite.
7. Extensions:
 - Mild:* Instead of pure trial-and-error, show students the grid overlay. How can they use their background knowledge from programming Bee-Bots to program their sprites more efficiently?
 - Medium:* Program the second sprite to respond with a hello as well. Add a When Sprite is Bumped and Speech Bubble Block.
 - Hard:* Students look for patterns in their code and



	replace identical movement blocks (e.g. 3 forwards) with a single forward, with a 3 entered beneath it. <i>-Challenge:</i> Choose a background. If the second sprite is in a tree, for example, program Scratch Kitten to climb the tree. If there are rocks or benches in the way, program Scratch Kitten to go around obstacles. 8. Circle share: How was programming in Scratch Jr. similar to programming Bee-Bots? If available, use an iPad dongle to project a few student projects. 9. Leave space for the child programmer to speak a bit about their inspiration and process, and for classmates to provide positive feedback.	
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Differentiation:

Depending on the student group, allow students to try extension activities listed below. Allow students who struggle to continue with trial and error, or offer them assistance to get them started.

Extensions:

-Mild: Instead of pure trial-and-error, show students the grid overlay. How can they use their background knowledge from programming Bee-Bots to program their sprites more efficiently?

-Medium: Program the second sprite to respond with a hello as well. Add a When Sprite is Bumped and Speech Bubble Block.

-Hard: Students look for patterns in their code and replace identical movement blocks (e.g. 3 forwards) with a single forward, with a 3 entered beneath it.

-Challenge: Choose a background. If the second sprite is in a tree, for example, program Scratch Kitten to climb the tree. If there are rocks or benches in the way, program Scratch Kitten to go around obstacles.



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Resources Provided:

- [Friendly Playground - Mild](#)
- [Friendly Playground - Medium](#)



Lesson Plan 2 Template			
Content Area:	Computer Science	Lesson Title:	Talent Show
		Time Frame:	2 hours/2 days
Lesson Components			
<u>21st Century Themes</u>			
☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☐ Civic Literacy ☐ Health Literacy			
<u>21st Century Skills</u>			
☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☐ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy			
Interdisciplinary Connections: ELA, Mathematics			
Integration of Technology: Computer Programming			
Equipment Needed: Tablets: 1-2 per pair of students			

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Program one sprite to run more than one Start on Green Flag program simultaneously. - Initialize their programs to begin with a Start on Green Flag and Go Home (Return to X). - Evaluate the limitations of programming with Bee-Bots after programming sprites in Scratch Jr.	Lesson Sequence Welcome: Review an artifact from last class. Highlight its learning objectives. Warm-up: Guess the Program. -Use presentation mode to show students a short program. Have them think through what blocks may have been used to make it. Use a second iPad to test students' theories. Run both iPads at the same time to check for accuracy. - Important, this is the lesson objective: Model	- Monitor student progress: Look for students who successfully: -Chose one sprite, and deleted any others. It doesn't have to be Scratch Kitten. -Selected a background for their sprite to perform. It does not have to be the stage background. -Initialized their sprite with a Start on Green Flag and Go Home (Return to X).



	adding a second, even third Start on Green Flag program to the same sprite, to show that a single sprite can do more than one thing at a time. Showcase Scratch Kitten's talent! 4. Main Activity: Students create a solo Talent Show act using mostly movement and looks blocks. Look for students who successfully: -Chose one sprite, and deleted any others. It doesn't have to be Scratch Kitten. -Selected a background for their sprite to perform. It does not have to be the stage background. -Initialized their sprite with a Start on Green Flag and Go Home (Return to X). -Sequenced blocks to simulate a talent (e.g. acrobatics, dancing). 5. Extensions: -<i>Mild:</i> Attach a repeat forever block to the end of the program. -<i>Medium:</i> Experiment with adding repeat blocks to shorter sequences within a program. -<i>Hard:</i> Use the microphone block to record a joke, singing, or sound effects like clapping to go along with the original program.	-Sequenced blocks to simulate a talent (e.g. acrobatics, dancing).
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6. **Circle share:**

- What can you program Scratch Jr. sprites to do that you can't program a Bee-Bot to do?
- If available, use an iPad dongle to project a few student projects.
- Leave space for the child programmer to speak a bit about their inspiration and process, and for classmates to provide positive feedback.

Differentiation:

Depending on the student group, allow students to try extension activities listed below. Allow students who struggle to continue with trial and error, or offer them assistance to get them started.

Extensions:

Mild: Attach a repeat forever block to the end of the program.

Medium: Experiment with adding repeat blocks to shorter sequences within a program.

Hard: Use the microphone block to record a joke, singing, or sound effects like clapping to go along with the original program.

Resources Provided:

- [Friendly Playground - Mild](#)
- [Friendly Playground - Medium](#)



Lesson Plan 3 Template			
Content Area:	Computer Science	Lesson Title:	Squad Goals
		Time Frame:	2 hours/2 days
Lesson Components			
<u>21st Century Themes</u>			
☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☐ Civic Literacy ☐ Health Literacy			
<u>21st Century Skills</u>			
☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☐ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy			
Interdisciplinary Connections: ELA, Mathematics			
Integration of Technology: Computer Programming			
Equipment Needed: Tablets: 1-2 per pair of students			

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Program multiple sprites to simultaneously run programs when the green flag is clicked. - Initialize their programs to begin with a Start on Green Flag and Go Home (Return to X).	Lesson Sequence Welcome: Review an artifact from last class. Highlight its learning objectives. Warm-up: Show students a short video of a group performing at a talent show or in a flash mob. Emphasize how often, but not all the time, the dancers are doing the exact same moves at the exact same time. - Model how to create a dance algorithm for one sprite, then drag it to another sprite to copy the code exactly.	- Monitor student progress Look for students who successfully: -Added multiple sprites. -Selected a background for their sprites to perform. It does not have to be the stage background. -Initialized their sprites with a Start on Green Flag and Go Home (Return to X). -Sequenced blocks to simulate a talent (e.g. acrobatics, dancing).



4. **Main Activity:**
Students create a group Talent Show act using mostly movement and looks blocks. Look for students who successfully:
 - Added multiple sprites.
 - Selected a background for their sprites to perform. It does not have to be the stage background.
 - Initialized their sprites with a Start on Green Flag and Go Home (Return to X).
 - Sequenced blocks to simulate a talent (e.g. acrobatics, dancing).
5. Extensions: *Mild:* Create a dance algorithm for one sprite. Attach a Red Repeat Forever block at the end. Drag the code onto other sprites to instantly copy the program, creating a perfectly synchronized flash mob. *Medium:* Use the microphone block to record a joke, singing, or sound effects like clapping to go along with the original program. (Have students who experimented with this last week teach their peers.) Adding a microphone block will disrupt the synchronization. *Spicy:* Use the wait block to have one sprite say or do



	something before the rest join in. 6. Circle share: -Would it have been possible for us to program a Flash Mob of Bee-Bots? How? -If available, use an iPad dongle to project a few student projects. -Leave space for the child programmer to speak a bit about their inspiration and process, and for classmates to provide positive feedback.	
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Differentiation:

Depending on the student group, allow students to try extension activities listed below. Allow students who struggle to continue with trial and error, or offer them assistance to get them started.

Extensions:

Mild: Create a dance algorithm for one sprite. Attach a Red Repeat Forever block at the end. Drag the code onto other sprites to instantly copy the program, creating a perfectly synchronized flash mob.

Medium: Use the microphone block to record a joke, singing, or sound effects like clapping to go along with the original program. (Have students who experimented with this last week teach their peers.) Adding a microphone block will disrupt the synchronization.

Hard: Use the wait block to have one sprite say or do something before the rest join in.

Resources Provided:

- Squad Goals - Medium
- Squad Goals - Mild



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	X		
Allow for student choice	X		
Provide scaffolding for acquiring targeted knowledge/skills	X		
Integrate global perspectives	X		
Integrate 21st century skills	X		
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	X		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	X		
Are varied to address different student learning styles and preferences	X		
Are differentiated based on student needs	X		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	X		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	X		
Provide opportunities for student reflection and self- assessment	X		
Provide data to inform and adjust instruction to better meet the varying needs of learners	X		

Curriculum Design Template

Content Area: Computer Science	Grade Level: Kindergarten	Unit Title: ScratchJr
Created: June 2022	Board Approved on:	



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ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS

IEP AND 504 ACCOMMODATIONS AND MODIFICATIONS FOR EARLY CHILDHOOD AND ELEMENTARY SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
Review of directions
Use of mnemonics
Have student restate information
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Use of a study carrel
Assistance in maintaining uncluttered space
Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Use of manipulatives
No penalty for spelling errors or sloppy handwriting
Follow a routine/schedule
Alternate quiet and active time
Teach time management skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Adjusted assignment timelines
Visual daily schedule



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Untimed tests
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book tests
Read test and directions to student
Provide study outline prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator and/or number line for math tests
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS MODIFICATIONS:



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GLOBAL SKILLS**

Breaks between tasks
Cue expected behavior
Daily feedback to student
Have contingency plans
Use de-escalating strategies
Use positive reinforcement
Use proximity/touch control
Use peer supports and mentoring
Model expected behavior by adults
Have parent sign homework
Have parent sign behavior chart
Set and post class rules
Chart progress and maintain data



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GLOBAL SKILLS

IEP AND 504 ACCOMODATIONS AND MODIFICATIONS FOR MIDDLE AND HIGH SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
A locker with adapted lock
Review of directions
Review sessions
Use of mnemonics
Have student restate information
Provision of notes or outlines
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Weekly or bi-weekly home-school communication
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Lab and math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of tape recorder for lectures
Use of Interactive notebook
Use of a scribe
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Ability to type all assignments
Follow a routine/schedule
Teach time management and organizational skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Daily check-in with case manager or special education teacher
Adjusted assignment timelines
Visual daily schedule



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book or open-note tests
Read test and directions to student
Provide study guides prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Pace long-term projects
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Allow outlining, instead of writing for an essay or major project
Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator for math tests
Film or video supplements in place of reading text
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands



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GLOBAL SKILLS**

Pass/no pass option
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS FOR STUDENTS:

- Breaks between tasks
- Cue expected behavior
- Daily feedback to student
- Have contingency plans
- Use de-escalating strategies
- Use positive reinforcement
- Use proximity/touch control
- Use peer supports and mentoring
- Model expected behavior by adults
- Have parent sign homework
- Set and post class rules
- Chart progress and maintain data



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GLOBAL SKILLS

Accommodations and Modifications for ESL Students

- Give tests orally
- Give instructions/directions in writing and orally
- Assign a peer tutor, same language or English speaking
- Allow use of bilingual/translation dictionary
- Provide summaries of text or study guides of particular chapters
- Allow errors in speaking
- Allow errors in writing
- Accept writing in first language
- Highlight key vocabulary
- Reduce amount of work required
- Assess comprehension through demonstration or other alternative means (gestures, drawings)
- Rephrase questions, directions, and explanations
- Reduce multiple choices on assessments
- Provide study guides and/ or outlines
- Shorten reading assignments
- Allow extended time for test/project completion
- Use of audio books
- Use of graphic organizers
- Use reduced text, so that print is not dense
- Use visuals/pictures throughout lesson/unit/assignment
- Adapt homework to reflect language proficiency/home support
- Adapt homework to reflect home support
- Provide hands-on activities and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Use of translation dictionaries to locate words in the native language
- Use anecdotal records and portfolio of work as forms of assessment
- Use story retellings to assess comprehension