



Teaching Girls to Code

With SmartGurlz Products

Curriculum Overview

This curriculum is designed to teach coding concepts through hands-on activities. Activities are based on SmartGurlz products, such as SugarCoded app and Siggy robots. The curriculum lessons are designed to give students an amazing experience while coding. Each new concept is clearly explained and all activities are described in details.

The curriculum is well-suited for use in the classroom and it is mapped to both Computer Science Teachers Association (CSTA) K-12 Standards and 21st century skills Standards. In addition, it comes with a “Teacher’s Guide” which contains Standards alignments, and other teacher’s resources.

Though the curriculum was originally designed to help teachers, it can also serve as a good starting point for self-paced learners, parents, makers, artists, designers, and engineers who would like to explore STEM with SmartGurlz products.

Structure

The curriculum is divided into 12 units. And each unit is divided into 3 sections: Concept discussion, hands-on activity, and assessment.

A typical learning flow is as follows:

1. Concept discussion: An introduction of activities
2. Hands-on activities
3. Summaries and Assessments: Discussions of observations and insights from the activities (Sample questions can be found at the end of each unit in the curriculum).

Each unit is designed as a 50 minutes class period.

Level: Beginners to Advanced

Content Level: Kindergarten to 5th Grade

HANDS-ON INTRODUCTION TO CODING

With SmartGurlz Products

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Unit 1: Introduction to Coding

Purpose

This lesson plan is designed to explain the concept of coding and introduce learners to the SugarCoded Application.

Objectives:

In this activity, students will...

1. Learn to communicate using clear instructions
2. Understand what coding is and how to do pseudocode
3. Tour the SugarCoded app
4. Recognize command blocks and know how to use them

Vocabulary: Coding and Pseudocode

Materials:

- Tablets or Smartphone with the SugarCoded App installed
- A blank piece of paper and a pencil for each student

Lesson Guide:

- I. Concept Discussion (10 min):
 - a. **Discuss coding.** Ask students how they would define coding. Summarize the discussion by defining coding as giving a computer or a robot commands to follow. Those commands or instructions are called codes.
 - b. **Explain Pseudocode:** Pseudocode is not actual code. It is clear and simple step-by-step instructions written in English before a programmer starts coding.

Pseudocode example:

1. Move forward 1 inch
2. Turn left 90 degree

II. Hands-on Activity (30 min)

Pseudocode activity:

1. Each student gets a blank piece of paper and a pencil
2. Ask students to draw a small shape, such as square, on their papers
3. Instruct students to write pseudocode for the robot to make the shape they drew. For a square shape, the pseudocode should look like this:
 - a. Move forward 5 inches (instructions need to be specific)
 - b. Turn right 90 degrees
 - c. Move forward 5 inches
 - d. Turn right 90 degrees
 - e. Move forward 5 inches
 - f. Turn right 90 degrees
 - g. Move forward 5 inches
4. For students who experience difficulties in writing, have them draw the shapes and communicate the pseudocode steps verbally.

c. App Overview and Coding Commands

- 1) Each group of students gets at least one tablet
- 2) Provide the password to unlock the tablet (if applicable). If tablets have passwords on them, discuss with students why passwords are important (hint: for digital safety reasons.)
- 3) Instruct students to navigate tablet applications and locate SugarCoded app. Then, tap to open it. (*see slide #3 in the teacher slides*)
- 4) Once on SugarCoded app's welcome screen, tap on "choose activity" button (*see teacher slides: slide #4*)
- 5) Afterwards, tap on the "SugarCoded with SmartGurlz" option (*see slide #5*)
- 6) Show students different command folders (*see slide #6*)
- 7) Show students coding commands by clicking on the folders (*see slide #7*)

- 8) Have students drag and drop a few coding commands to learn how to use the commands and understand coding sequence. *(see slide #6 and slide #8)*
- 9) Have students explore app tools, such as zooming in and out, deleting a block, and scrolling up and down. *(see slide #9)*
- 10) Finish up the lesson by showing students what to do after writing their code, such saving it, running a simulation, or running it on the robot. *(see slide #10 and slide 11)*

III. Assessment and Lesson Summary (10 min)

- Conduct a verbal assessment. See the sample questions below to do get an idea of questions to ask. Finally, summarize and conclude the lesson.

Sample Discussion Questions:

1. What is pseudocode?
2. What is a simulation or test mode?

Unit 2: Line Coding

Purpose

In this lesson, learners will start coding through “draw your path” activity. Students will practice pseudo coding and do line coding by drawing a path. Afterwards, they will run code in test mode to observe Siggy robot driving in simulation mode.

Objectives:

In this activity, students will...

1. Practice writing pseudocode
2. Explore the “draw your path” activity
3. Code using line commands
4. Use the test mode

Materials:

- Tablets or Smartphone with SugarCoded App installed
- A blank piece of paper and pencil for each student

Lesson Guide:

I. Concept Discussion (10 min):

Review pseudocode concept. (See *Slide #13* for an example)

Ask students on the importance of pseudocode.

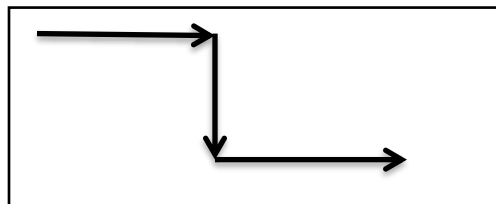
Remind students that coding is giving commands to a computer or a robot. Inform the students that in this lesson, they will be writing line codes and using test mode to run their code on a virtual Siggy robot.

II. Hands-on Activity (30 min)

a. Pseudocode activity:

1. Have students draw a simple maze on their papers

Example:



2. Ask them to write pseudocode for the maze

⇒ If any student experiences difficulties in writing, they can verbally explain pseudocode steps the robot would do to complete the maze.

b. Line Coding:

- 1) Each group of students gets at least one tablet
- 2) Provide the password to unlock the tablet (if applicable).
- 3) Instruct students to navigate tablet applications and locate SugarCoded app. Then, tap to open it. (*teacher slides: slide #14*)
- 4) Once on SugarCoded app's welcome screen, tap on "choose activity" button (see *teacher slides: slide #15*)
- 5) Afterwars, tap on the " Draw your path" option (see *slide #16*)
- 6) Have students explore app tools, such as drawing a line, zooming in and out, erasing a line, and clearing the drawing area. (see *slide #17*)

c. Saving, Loading, and Testing Codes

- 1) Have students draw a path and save their code. *(see slide #18)*
- 2) Have students clear their coding area and load the program they previously saved. *(see slide #17 and #18)*
- 3) Have students run their code in test mode *(see slide #18 and #19)*
- 4) If time allows it, give students time to freely draw and test paths.

III. Assessment and Lesson Summary (10 min)

- Conduct a verbal assessment (See sample questions below). Finally, summarize and conclude the lesson.

Sample Discussion Questions:

1. What is coding?
2. Why is it important to run code in test mode?

Unit 3: Variables in Coding

Purpose

This activity is designed to guide students through SugarCoded app tutorial 1, 2, 3, 4, and 5. The lesson is positioned not only to teach basic coding commands, but also to show the application of math and raise students' confidence in math.

Objectives:

In this activity, students will...

1. Understand what a variable is
2. Make Siggy move with different speed inputs
3. Learn to code Siggy to make precise turns
4. Understand that coding commands are executed in sequence
5. Learn program flow

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots

Lesson Guide:

- I. Concept introduction (10 min):
Discussion: As a class, discuss about device inputs.

Ask students to give you examples of technology devices they use or have seen people using. Examples can be tablets, smartphones, computers, or robots.

Tell students that people communicate to those devices through instructions called inputs. Examples of inputs include buttons, camera, touchscreen, and microphone.

Inform students that some coding commands take inputs from the user, and those inputs are called variables because they can take different values. For instance, a speed command can take different numbers as its speed value (*see slide #21*)

II. Hands-on Activity (30 min)

a. Activity 1: Direction and Speed

- 1) Each group of students gets at least one tablet and one robot
- 2) Instruct students to locate and open SugarCoded app
- 3) Next, go to app activity options
- 4) Afterwards, they need to tap on “Learn how to code with SmartGurlz” activity. (*See slide #22*)
- 5) Remind students that they need to run code in test mode before running it on the robot. (*See slide #23*)
- 6) Let students do tutorial 1 (the app explains the tutorial). The goal is to have them learn how to change the default speed and distance numbers while practicing sequence coding by putting together the speed and move commands.
- 7) Ask students to complete tutorial 2 and tutorial 3

b. Activity 2: Angles and time

- 1) Review math concepts (*see slide #24*)
 - a. Angles
 - b. Circle: radius and diameter
- 2) Have students complete tutorial 4
- 3) As a challenge, ask students to take tutorial 5; the figure eight challenge.

III. Assessment and lesson summary (10 min)

Conduct a verbal assessment (See sample questions below). Then, summarize and conclude the lesson.

Sample Discussion Questions:

1. What are the examples of technology devices inputs?
2. What input variables do we use in coding Siggie to move?

Unit 4: Challenge-based Coding

Purpose

This activity is designed to guide students through the following SugarCoded app tutorials: 7, 8, 9, 6, and 10 (in this order).

Objectives:

In this activity, students will...

1. Use feedback outputs: light and sound
2. Know how to use “repeat” (loop) function
3. Apply coding skills

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggie robots

Lesson Guide:

- I. Concept Discussion (10 min):
 - a. **Discussion:** As a class, discuss about device outputs.
Ask students to remind you on examples of technology devices they use. Examples include smartphones, computers, or robots.

Explain to student that devices have responses called outputs, such as vibrations and sound.

Inform students that they can code Siggy to communicate back to them using its output capabilities, such as sound and light.

In addition, let students know that they will learn how to use the “repeat” command in their code. It is a command that helps programmers write less code by repeating specific commands instead of writing the same commands over and over again.

II. Hands-on Activity (30 min)

a. Activity 1: Outputs and repeat command

- 1) Each group of students gets at least one tablet and one robot
- 2) Instruct students to locate and open SugarCoded app
- 3) Next, they should go to app activity options
- 4) Afterwards, tap on “Learn how to code with SmartGurlz” activity (*See slide #22*)
- 5) Remind students that they need to run code in test mode before running it on the robot (*See slide #23*)
- 6) Let students take tutorials 7, 8, and 9 (the app explains the tutorial activities).

b. Activity 2: Figure 8 challenge

- Ask students to complete tutorial 6

c. Activity 3: Driving Challenge

- Ask students to complete tutorial 10

III. Assessment and Lesson Summary (10 min)

Conduct a verbal assessment (See sample questions below). Then, summarize and conclude the lesson.

Sample Discussion Questions:

1. What output feedback can Siggy give?
2. Why do we use the “repeat” command?

Unit 5: Problem-Solving Coding

Purpose

This lesson plan is designed to challenge students in applying the coding skills they have learned at this point in the curriculum. It focuses on the “SugarCoded with SmartGurlz” app activity. Students will perform challenges that involve combining coding commands. The coding challenge is a maze.

Objectives:

In this activity, students will...

1. Learn how to combine coding commands
2. Practice task-based coding
3. Complete a coding task
4. Gain more confidence in their coding skills

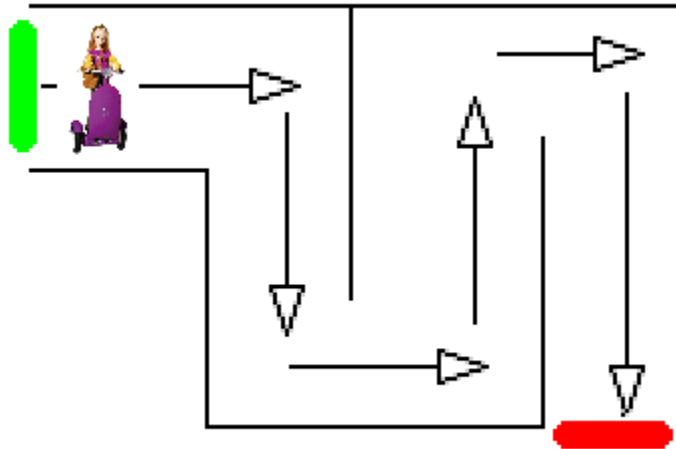
Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggie robots
- Supplies, such as tape to mark out the maze course or solid objects for maze boundaries.

Lesson Guide:

- I. Concept Discussion (10 min):
 - Explain the maze challenge.
 - The challenge requires students to code their robot to make precise movements as it navigates the maze. The robot has to autonomously move from the starting line to the finish line.
 - Use tape to mark out the maze boundaries on the floor or use solid objects to create the challenge maze.
 - Inform students that when it comes to completing a maze challenge, it is better to do the challenge in small tasks. For example, code and test the robot to do the first “move forward”, next do the first turn, and so on.

- Let students ask questions after you describe and show the maze to them.
- Maze example:



II. Hands-on Activity (30 min)

- 1) Each group of students gets at least one tablet and one robot
- 2) Instruct students to locate and open SugarCoded app
- 3) Next, they should go to app activity options
- 4) Afterwards, tap on “SugarCoded with SmartGurlz” activity. (see slide #5)
- 5) Remind students that they need to run code in test mode before running it on the robot.
- 6) Ask students to complete the maze. They have to include at least two output commands (sound, light, or music) in their code; one in the beginning and one at the end. Students can add more than two outputs if they decide to.

III. Assessment and Summary (10 min)

Conduct a verbal assessment (See sample questions below). Then, summarize and conclude the lesson.

Sample Discussion Questions:

1. What do you think about today’s challenge?
2. Give two examples of coding commands you used to finish the task?

Unit 6: Fun Coding

Purpose

This lesson will help students have fun with SmartGurlz products. Students will explore the “play” mode of the SugarCoded app and code their Siggy robot to dance.

Objectives:

In this activity, students will...

1. Learn how to use the “Instant play” mode of the SugarCoded app
2. Code Siggy to dance

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots

Lesson Guide:

- I. Introducing the concept (10 min):
 - a. Explain and demonstrate how SugarCoded app can be used in remote mode to control the robot. The “Instant Play” mode. *(See slide 26)*

- II. Hands-on Activity (30 min)

Activity 1:

- 1) Each group of students gets at least one tablet and one Siggy
- 2) Instruct students to locate and open SugarCoded app
- 3) Next, they should go to app activity options
- 4) Then, they need to tap on “Instant Play” activity. *(see slide #26)*
- 5) Give permission to use the “instant play” mode to remote control the robot and let them have fun
- 6) Use this opportunity to teach students about collaboration by taking turns to play with the robot and be friendly as they communicate with each other.

Activity 2:

- 1) Each group of students gets at least one tablet and one Siggy
- 2) Instruct students to locate and open SugarCoded app
- 3) Next, they should go to app activity options
- 4) Then, they need to tap on “SugarCoded with SmartGurlz” activity.
(See slide #27)
- 5) Have students go to the dance folder. (See slide #28)
- 6) Students should take turns trying out different dances.

III. Assessment and Lesson Summary (10 min)

Conduct a verbal assessment (See sample questions below). Finally, summarize and conclude the lesson.

Sample Discussion Questions:

- What fun things did you make your Siggy do?

Unit 7: Mission Coding

Purpose

In this lesson, students will explore the “mission” mode of the app. They will work on completing missions as described in SugarCoded app. They will also learn and perform troubleshooting exercises.

Objectives:

In this activity, students will...

1. Write codes based on mission requirements
2. Experience the “trial and error” part of coding
3. Go through “code-test-improve” process
4. Learn troubleshooting skills

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots
- Paper and pencil for each group
- Mission/obstacle course supplies, such as solid standing objects.

Lesson Guide:

- I. Concept introduction (5 min):
 - a. Explain to students that the goal of missions is to gamify coding and make learning fun. Each mission has specific story elements and is designed to teach problem-solving and collaboration.
 - b. Explain troubleshooting
Sometimes the robot does not behave like it is supposed to. This means the code is not working right. The process of trying to find and fix problems is called troubleshooting.

- II. Hands-on Activity (40 min)
 - a. Missions
 - 1) Each group of students gets at least one tablet and one Siggys
 - 2) Instruct students to locate and open SugarCoded app
 - 3) Next, they should go to app activity options
 - 4) Afterwards, they need to tap on “SmartGurlz Missions” activity
(See slide #30)
 - 5) Instruct them to select a mission by tapping on it.
 - 6) Encourage students to draw the mission map on a piece of paper as the way they understand it.
 - 7) Ask students to code Siggys to complete the mission as drawn on the map.
 - 8) There is a total of 4 missions, and students can do as many missions as time permits them to.

 - b. Troubleshooting and fixing the code when the robot is misbehaving:
 - i. Ask students to describe by as step-by-step sequence what they think is happening in the program
 - ii. Together, students and teacher, trace through the program and identify where the robot’s behavior diverges from the student’s intent.
 - iii. If the robot is misbehaving, students need to analyze what parts of the program works and identify the point where the robot stopped doing what they want it to do.
 - iv. Then they need to figure out what to change in order to fix the problem

- v. Together, students and teacher, analyze what students misunderstood
- vi. Then, help students correct their misunderstanding and fix their program.

III. Assessment and Lesson Summary (5 min)

Conduct a verbal assessment (See sample questions below). Then, summarize and conclude the lesson.

Sample Discussion Questions:

1. Any comment on today's activity?
2. What did you learn today?
3. What do you need to do when a robot misbehaves? When it does not do what it is supposed to do.

Unit 8: Design and Code

Purpose

This lesson will train students to collaborate while creating solutions. They will work together in designing their own maze and later on, code their robots to navigate the maze.

Objectives:

In this activity, students will...

1. Design and create their own maze
2. Code robots to complete the maze
3. Communicate and collaboratively work together

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots
- Papers and pencils
- Supplies, such as tape to mark out the maze or other objects to create an obstacle course.

Lesson Guide:

I. Introducing the concept (5 min):

Explain the challenge.

- a. The challenge requires students to come up with their own maze design. Students need to decide on a design, create the challenge course, and then code the robot to do the challenge
- b. Before students start creating the challenge course, they need to get an approval from the teacher. The maze has to be challenging enough
- c. Also, for each maze design submitted for approval, the teacher will need to check if there are enough supplies available to create the challenge course.

II. Hands-on Activity (40 min)

a. Design your own mission

- 1) Students get tablets, robots, papers, and pencils
- 2) First, students have to work together, brainstorm, and come up with a maze design. They can use papers and pencils to write down or draw their ideas.
- 3) Each group has to present their design to the teacher before building the challenge course and coding

b. Create, code, and test

- 1) After the maze design approval, students should proceed to create the challenge course. Then, they will code and test their programs
- 2) Encourage students to write pseudocode for their programs before they start coding.
- 3) Remind students that they will be coding inside the “SugarCoded with SmartGurlz” activity
- 4) Then, let students work on their missions.

c. Improve

- Keep monitoring students' collaboration, teamwork, and help them with troubleshooting.

III. Assessment and Lesson Summary (5 min)

Conduct a verbal assessment (See sample questions below). Then, summarize and conclude the lesson.

Sample Discussion Questions:

1. How was today's activity and how did it differ from previous activities?
2. Do you have any observations or insights from the activity?

Unit 9: Introducing the final project

Purpose

In this lesson, students will receive project requirements and start working on the project. The requirements and other projects details can be found in the teacher's guide that's included in this curriculum.

Objectives:

In this activity, students will...

1. Learn how to identify and understand task requirements
2. Experience team brainstorming and planning
3. Recognize projects constraints
4. Learn how to divide tasks and assign roles
5. Plan, design, create, test and improve

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots
- Papers and pencils

Lesson Guide:

- I. Introducing the concept (10 min)
 - Explain project requirements. Consult the teacher's guide for details.

- Answer any questions students may have about the projects and clarify any requirements they seem not to understand.

II. Hands-on Activity (30 min)

- Once students have received the project's requirements and asked relevant questions, they can start working on the project.

III. Assessment and Lesson Summary (10 min)

At the end of the class period, conduct a verbal assessment (See sample questions below). Finally, summarize and conclude the lesson.

Sample Discussion Questions:

1. How much progress did your group make?
2. Did you encounter any challenges that the teacher can help solve?

Unit 10: Finishing up the Final Project

Purpose

In this lesson, students will wrap up their final projects and plan their “Show off” presentations.

Objectives:

1. Learn how to identify and understand task requirements
2. Experience team brainstorming and planning
3. Recognize projects constraints
4. Learn to divide tasks and assign roles
5. Plan, Design, create, test, and improve

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots
- Papers and pencils

Lesson Guide:

- I. Introducing the concept (5 min)
 - Discuss with students about the final project. Find out if they are making progress and if they are working as a team.
 - Check to see if there is any group that needs help with supplies, such as presentation materials, etc.

- II. Hands-on Activity (40 min)
 - Let students start working on their project on their own, but remind them to manage their time efficiently.

- III. Assessment and Lesson Summary (5 min)

Conduct a verbal assessment (See sample questions below). Then, summarize and conclude the lesson.

Sample Discussion Questions:

1. Did your team make progress as planned?
2. Did your team experience any challenges that the teacher can help solve?

Unit 11: Project Show off

Purpose

In this lesson, students will present their final projects.

Objectives:

In this activity, students will...

1. Practice communication skills
2. Experience team work and collaboration
3. Show off their coding skills
4. Be motivated to love coding

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots

- Poster (optional)

Lesson Guide:

- I. Introducing the concept (5 min):
 - a. Based on the number of groups, set a time limit on presentations
 - b. Review presentation guidelines. Consult the teacher's guide for details.

- II. Hands-on Activity (40 min)
 - 1) One by one, let groups start their presentations
 - 2) Teachers should make presentation time an enjoyable experience for everyone.
 - 3) All students have to respect and appreciate the work put into every single project and presentation. No mean and negative behaviors should be tolerated at all.

- III. Closing remarks (5 min)

Thank students who presented their projects and those who supported others through their presentations.

Unit 12: Project Show off

Purpose

In this lesson, students will present the results of their final project

Objectives:

In this activity, students will...

1. Practice communication skills
2. Experience team work and collaboration
3. Show off their coding skills
4. Be motivated to keep coding

Materials:

- Tablets or Smartphone with SugarCoded App installed
- Siggy robots
- Posters (optional)

Lesson Guide:

- I. Introducing the concept (5 min):
 - a. Based on the number of groups, set a time limit on presentations
 - b. Review presentation guidelines. Consult the teacher's guide for details.

- II. Hands-on Activity (40 min)
 - 1) One by one, let groups start their presentations
 - 2) Teachers should make presentation time an enjoyable experience for everyone.
 - 3) All students have to respect and appreciate the work put into every single project and presentation. No mean and negative behaviors should be tolerated at all.

- III. Closing remarks (5 min)
 - Thank students who presented and those who supported others through their presentations.
 - Communicate and conclude the course as you see fit.