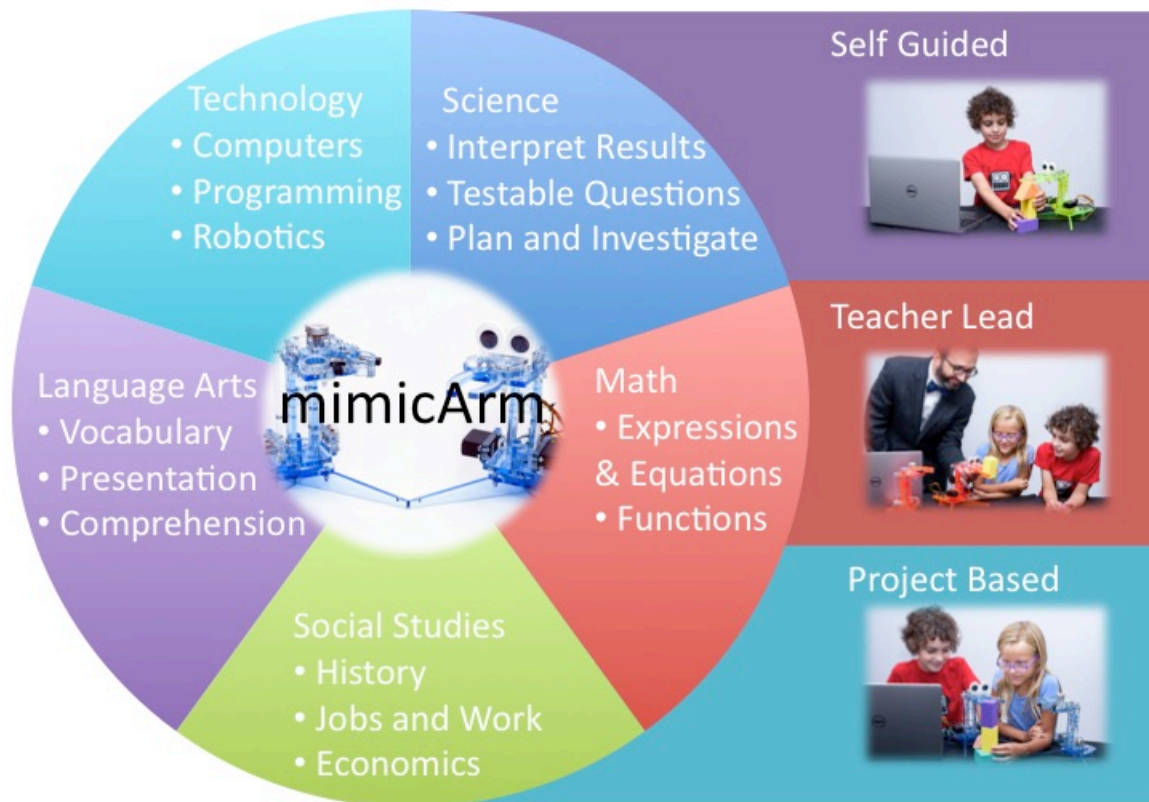


Curriculum Overview:



Learning Objectives by Level

Using Block Programming in mimicBlock

Level 1: Load a pre-written program onto robot

Level 2: Change a value in a prewritten program to achieve a result

Level 3: Add a command to a partially completed program

Level 4: Add motion commands to a program shell

Level 5: Create a new program to move the robot

Level 6: Create a program to determine the robots state

Level 7: Create a program using conditional operators (if, then, else, while, for)

Using C++ in Arduino IDE

Level 8: Create a C++ program to move robot

Level 9: Write a program in C++ to perform a task

Level 10: Use conditionals in a C++ program so robot interacts with its environment

Level 11: Write a C++ program so the robot to take multiple possible actions

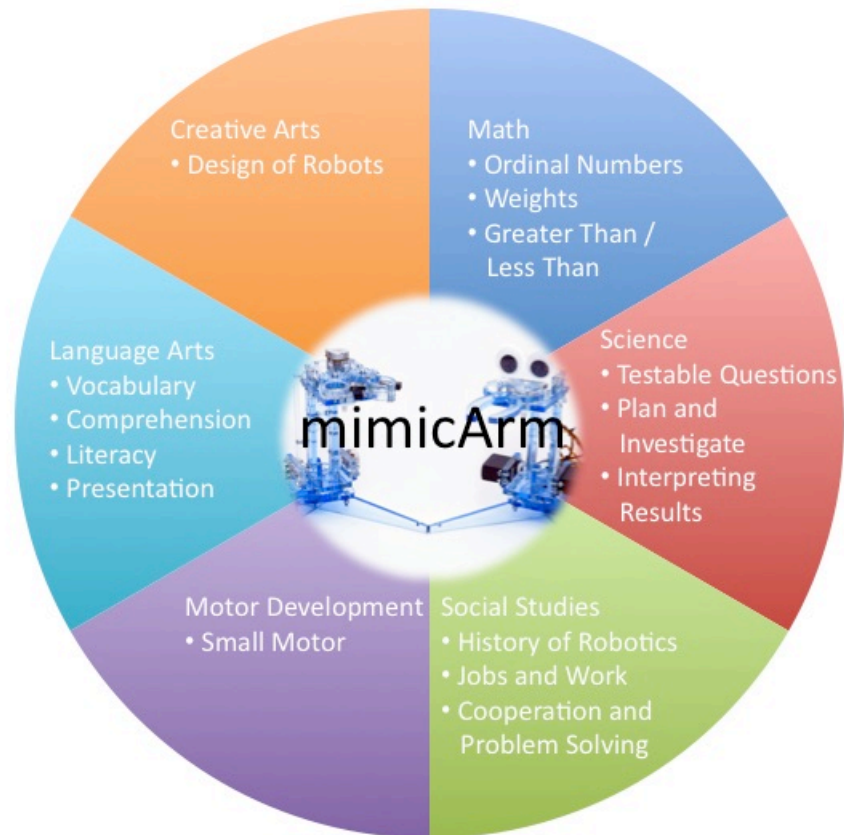
Level 12: Create a C++ program that determines the correct action based on inputs

Level 13: Program the robot in C++ to adjust movements based on inputs

Level 14: Create a C++ program that performs flexible tasks based on user input

Level 15: Using C++ program the robot to interact with humans and its environment in flexible ways

Level 1 – Intended for Grades k-3:
Curriculum:



Students will learn:

- What is a robot
- How to move the robot to a position
- Matching colors
- Matching numbers
- Matching letters
- Hard and soft
- Heavy and light
- Bigger and smaller
- What is a program
- How to upload a program

Learning Objectives:

- Technology
 - Robotics
 - Computers
 - Programming
 - Design technical/engineering solutions
- Science
 - Living/non-living

- Interpret Science Concepts
- Energy through movement
- Math
 - Greater than/less than
 - Ordinal numbers
- Language Arts
 - Vocabulary
 - Reading/following instructions
 - Presentation
- Social Studies
 - Objects in students' homes
 - Need/want

Teacher Lead 1: What is a robot

Teacher explains how robots differ from machines. Examples from students' lives, such as cars, washing machines, and computers are compared to robots. Students discuss what the robot could do in their lives.

Chapter 1: Moving the robot

1.1: Move the robot arm

1.2: Move the robot arm to a specific place

1.3: Explore higher and lower with robot arm

1.4: Explore left and right and closer and farther with robot arm

1.5: With a partner direct the robot left and right, higher and lower

Chapter 2: Moving robot to a target

2.1: Move the robot to a specific spot

2.2: Touch color pad with the robot

2.3: Touch the number pad with the robot

2.4: Touch the letter pad with the robot

2.5: Identify colors, numbers, and letters with a partner

Group Project 1: What would you have a robot do and how?

Students brainstorm uses for a robot. Using the robot students explore how to implement their ideas. Students explore whether the robot is living or non-living and why. Using vocabulary learned from their lessons students present their ideas to the class.

Chapter 3: Moving the gripper

3.1: Open and close the gripper quickly and slowly

3.2: Grab a hard block with tight and loose grip

3.3: Explore hard and soft with gripper

3.4: Explore heavy and light with gripper

3.5: Move items from one place to another, explore how much grip it takes

Teacher Lead 2: Heavy and light, strong and weak. Explore limits of robot
Teacher explains that the robot has limited strength and cannot lift item that students lift easily. Discuss how heavy things are relative to strength. In classroom discussion develop an experiment to determine how strong the robot is.

Chapter 4: Capabilities of robot

- 4.1: Stack light blocks, explore near/far and high/low
- 4.2: Stack heavy block, explore strong/weak
- 4.3: Lift and move irregular shapes, name the shapes
- 4.4: Lift and move big and small shapes
- 4.5: Move and stack a variety of materials and observe limitations

Group Project 3: Bring objects from home. Describe the robots limitations.
Students bring irregularly shaped and sized objects of different weights. Students present to the class whether or not the robot can lift them and why or why not.

Teacher Lead 3: What is a program?

Teacher explains how a program is a set of instructions to tell a computer or robot what to do. Students learn technical vocabulary, how computers are all around us, and how a robot uses a program.

Chapter 5: Uploading Programs

- 5.1: Upload example 5.1 to the robot, observe it's behavior
- 5.2: Change the numbers in channel 3, see the effect of more/less
- 5.3: Change the numbers in channel 2, see the effect of near/far
- 5.4: Change the numbers in channel 1, see the effects of left/right
- 5.5: Experiment with the numbers in all three channels

Chapter 6: Complete a program

- 6.1: Using example 6.1 add a command to move channel 3
- 6.2: Upload example 6.2, which moves the robot to two positions
- 6.3: Change value of channel 3 to explore up/down
- 6.4: Change the value of "delay" to see how the movement speeds up or slows down
- 6.5: Change numbers to explore behaviors

Group Project 4: Using these skills what do you see a robot doing now?

Students discuss what they would program a robot to do. Students discuss whether this task is a need or a want.

Chapter 7: Repeating programs

- 7.1: Upload example 7.1, which makes the robot wave forever
- 7.2: Change the channel 3 value, observe the up/down behavior
- 7.3: Change the "delay" values, see how behavior changes
- 7.4: Upload example 7.4, which does a "queen wave"
- 7.5: Explore the effect of changing the channel in 7.4

Teacher Lead 4: Gripping harder or softer:

Teacher leads students in a discussion about gripping stronger or weaker. Students pick up objects with their own hands and determine if heavier objects need a stronger or weaker grip. Moving to the robots students learn about the similarity between the robots grip and their own.

Chapter 8: Grab Objects

8.1: Upload example 8.1, which waits 5 seconds then grabs a block

8.2: Explore effect of heavier and lighter objects

8.3: Explore the effect of bigger and smaller objects

8.4: Explore irregularly shaped objects, rough and smooth objects

8.5: Grab items around the room and explore the effect

Group Project 5: Describe how the robot grabbing on it's own is different than with user help.

Students explore greater than/less than with regard to numbers used to determine robots grip. Students talk about planning robot grip based on heaviness/roughness/hardness of object. Students present to class using concepts learned.

Chapter 9: Strong and Weak grip

9.1: Upload example 8.1, change robot grab number using heavy/light objects

9.2: Find the lowest grip that can lift heavy and light objects

9.3: Using rough and smooth objects find if grip strength makes a difference

9.4: Using different shapes find if grip force matters

9.5: With a partner guess at grip force for different items. Were you right?