Unit 4: Introduction To Computer Programming and Robotics

Content Area: **Technology**
Course(s): **Technology**
Time Period: **Generic Time Period**
Length: **8 Weeks**
Status: **Published**

Unit Overview

Students will be given an introduction to Lego robotics and computer programming

Standards

TECH.8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.
TECH.8.2.2.C.CS3	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving
TECH.8.2.2.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.
TECH.8.2.2.D.2	Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
TECH.8.2.2.D.3	Identify the strengths and weaknesses in a product or system.
TECH.8.2.2.D.CS1	Apply the design process.
TECH.8.2.2.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.
TECH.8.2.2.E.1	List and demonstrate the steps to an everyday task.
TECH.8.2.2.E.2	Demonstrate an understanding of how a computer takes input through a series of written commands and then interprets and displays information as output.
TECH.8.2.2.E.3	Create algorithms (a sets of instructions) using a pre-defined set of commands (e.g., to move a student or a character through a maze).
TECH.8.2.2.E.4	Debug an algorithm (i.e., correct an error).
TECH.8.2.2.E.5	Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).
TECH.8.2.2.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

Essential Questions

- What is a robot?
- How can you use the computer to make your robot do different things?
- What's a gear used for?
- What are belts and pulleys?

- What is technology?
- What are the positive and negative impacts of technology?

Application of Knowledge: Students will know that...

- Technology by itself is neither good or bad, but decisions about the use of technology has positive and negative impacts.
- Belts and pulleys transfer mechanical energy from place to place and can go longer distances than gears.
- Computers are used to program robots.
- Engineers have an impact on the world they live in and their daily lives.
- Gears transfer mechanical energy from place to place.
- Technology is more than just computers.

Application of Skills: Students will be able to...

- Create algorithms using a pre-defined set of commands
- Identify the strengths and weaknesses in a product.
- Program and code a robot
- Use belts and learn that it can change the speed of a machine

Assessments

The teacher will informally assess students throughout the unit by observing their natural usage of the following skills:

- Observe students performing their task of building a robot.
- Check for cooperative learning skills and for performance of the task.
- During discussion, check for understanding of key concepts.
- Dancing Bird worksheet should be checked for understanding if used.

Suggested Activities

- Engineer of the Week: Each week, a new engineer will be briefly introduced to the class, highlighting their impact on their current world.
- Dancing Birds Lego WeDo Robotics- Students will build and program two mechanical birds that make sounds and are motorized to dance using a pulley and belt drive system.
- Simple Machines Website- Simple Machines is a science game to identify simple machines around the house, and simple machines that make up compound machines in the tool shed.
- Code.org Stage 2- Learn the basic concepts of Computer Science with drag and drop programming.

This is a game-like, self-directed tutorial starring video lectures by Bill Gates, Mark Zuckerberg, Angry Birds and Plants vs. Zombies. Learn repeat-loops, conditionals, and basic algorithms.
- Hour Of Code-Anna and Elsa Frozen Challenge- Learn to code with Anna and Elsa as they explore the magic and beauty of ice. You will create snowflakes and patterns as you ice-skate and make a winter wonderland that you can then share with your friends!

Activities to Differentiate Instruction

- Provide individualized checklists of the directions for a task in support of the thorough execution of directions.
- Proximal seating for all large group work
- Behavior modification reward system to encourage time on task so that work is completed
- Partner with a capable learner. Closely monitor partner work

Enrichment Opportunities:

The Great Marshmallow Challenge- Students will use a worksheet to create a robot that kicks marshmallows.

https://drive.google.com/drive/u/2/my-drive

Integrated/Cross-Disciplinary Instruction

Science-

- Transmission of motion and transfer of energy through the machine
- Identify the pulley and belt drive mechanism
- Effect of changing the belt has on the direction and speed of movement

Engineering-

- Build and test dancing birds' movements
- Modify the dancing behavior by changing the pulleys and belt to affect the speed and direction of motion

Math

- Understand and use numbers to represent the amount of time the motor is turned on in seconds and in tenths of second.

Resources

- WeDo Robotics Kits
- Code.org Stage 2
- Simple Machines Website