Unit 3: Drones

Content Area: **Engineering**
Course(s): **STEM**
Time Period: **Week 12**
Length: **17 Days**
Status: **Published**

Unit Overview

In this unit, students will learn the basics about drones. Students will learn how certain professions use drones on a daily basis, and the programming needed to get the drone off the ground. Students will begin by learning about the functionality of drones, and the major components of drones. Students will then build on that knowledge and work in teams to create a drone (provided from a kit). Students will finally apply their programming knowledge to being able to program a drone to perform a given task.

Standards

6-8.MS-ETS1-3.ETS1.B.1	There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
SCI.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
TECH.8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
TECH.8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
TECH.8.2.8.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

Essential Questions

1) What careers utilize the capabilities of drones to accomplish a task?

2) How can you apply your knowledge of programming to being able to fly a drone?

Application of Knowledge: Students will know that...

- A drone can be programmed to fly and complete a given set of tasks.
- A drone is able to turn by increasing the speed of some of its rotors while decreasing the speed of its others.
- A drone uses rotors for propulsion.
- Drones are a common name for an unmanned aerial vehicle.
- Drones are used now for a variety of different purposes.
- Many drones are found with additional hardware attached to them (such as a camera).

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

- Complete a required task once their drone is constructed.
- Construct a drone from an accompanying kit.
- Discover a variety of jobs that use drones in their day to day operations.
- Research the science behind how drones are able to fly.
- Work as a team to correctly program their drone to fly.

Assessments

- Journal logs: Will be used for students to share anything that worked out well during the design process or anything unexpected they encountered.
- Science behind drones worksheet: Students will research the science behind what makes drones actually work.
- Peer scoring rubric: Students will grade their peers based on the characteristics of their drone.
- Completed drone rubric: The teacher will grade students on their ability to successfully create and program their drone.

Suggested Activities

- Drone creation: Students will be paired off into teams to successfully create and program a working drone. This will be accomplished by first having students research the science behind drones followed by students receiving a kit in which they actually build their drones. Once the drones are built, students will then be required to complete a given task.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:

- Modifications & accommodations as listed in the student's IEP
- Assign a peer to help keep student on task
- Modified or reduced assignments
- Reduce length of assignment for different mode of delivery
- Increase one-to-one time
- Prioritize tasks
- Think in concrete terms and provide hands-on-tasks
- Position student near helping peer or have quick access to teacher
- Anticipate where needs will be

- **Content specific modifications may include:**
  - Breaking a project up into attainable goals that can be met each period.
  - Providing students with the beginning (or if necessary the full) programming language to accomplish the programming aspect of the project.
  - Provide small group instruction (if needed).

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan
  - Collaboration with ELL Teacher
- **Content specific vocabulary important for ELL students to understand include:** drone, physics, propulsion, rotors

Differentiation to extend learning for gifted students may include:

- Have students come up with a way to delive a small "payload" with their drone.

Integrated/Cross-Disciplinary Instruction

ELA: Practice formulating complete and grammatically correct responses for the given journal entries.

Technology: Successfully program the drone to take off and change direction mid-flight.

Science: Understand the physics as to how drones actually fly.

Resources

https://scratch.mit.edu/: (SCRATCH Programming)

Rubrics for drone construction

Youtube videos: self directed videos that can help students along in the design process

21st Century Skills

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.