Mini-Drones in a Physical Science Classroom

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Made Possible By

USD 113 Foundation Appleseed Grant through donations by Kent & Donna Saylor
Drone Organization / Preplanning

- Drone’s Assigned Name & Number
  - Selected a name related to mechanics and drone/helicopter development.
  - Used numbers as drones are too small to label with the name only on the belly.
- Purchased & Set-Up Hanger
  - Secure Storage for all drones, batteries, and spare parts.
  - A way for both the drone and a spare battery to charge.
  - A way students could quickly find and return drones. (Labeled spots in Hanger)
Lesson 1: Manual Flight Controls

Covered the basic anatomy of the drone.

Demonstrated how to connect with the manual controls through FreeFlight Mini app.

Demonstrated the flight controls that they can use.

Set expectations for safe flying practices.
Lesson 2: Drone Speed

Students calculated the average speed of the drone.

We discovered that there are settings that can change the maximum speed of the drone.

Drawbacks to changing speed include reduced control and faster draining of the battery.
Lesson 3: Payload Transport

Students had to use the claw to grab a Lego block and transport it to a landing zone, then return the drone to its original launch pad.

Students had been working in teams of two, so this was a simple activity that allowed both to participate.
Lesson 4: Autonomous Delivery

Students had to accomplish yesterday’s task, but use a coding program to complete the task.

Used the Tynker to program the drones for the autonomous tasks.
Lesson 5: Autonomous Payload Drop

Similar challenge to the last two days, but instead of the drone landing to drop off the Lego block, it would drop it into a drop zone.
What did the students learn?

<table>
<thead>
<tr>
<th></th>
<th>Experience Level</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Flying Drones</td>
<td>1.9</td>
<td></td>
<td>3.9</td>
</tr>
<tr>
<td>Comfort Level</td>
<td>2.8</td>
<td></td>
<td>4.2</td>
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<tr>
<td>Programming / Coding</td>
<td>1.7</td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td>Comfort Level</td>
<td>2.0</td>
<td></td>
<td>3.7</td>
</tr>
</tbody>
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Ratings were from 0 to 5. 0 = no experience or comfort, 5 = expert
What did I learn?

- The lifting ability of the drone was not near what I expected.
- Too much weight in the claw causes drone to not lift off or flight issues.
- People moving around the drone can affect its flight.
- Drones a pretty temperamental when using programming.
What is next?

- Use other pieces of technology with the various challenges. (Vernier Motion Detectors/Video Physics app)
- Have students engineer a solution to lifting a mass with the drone. (suspended under or on the back)
- Find ways to use the camera that is on the belly of the drone.
Contact Information

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