Drones Take Their Place in the K–12 Classroom

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By Wylie Wong

Many children look at drones as cool toys. But from an educational perspective, teachers Ray Sevits and David Steele see an **emerging technology that could steer their students toward a potential career**.

Last summer, the two educators from Colorado Springs School District 11 took a two-week drone-flying course, became drone pilots certified by the **Federal Aviation Administration** and now teach classes focused on the technology.

Sevits's North Middle School students master the art of flying drones as they learn the conceptual physics of how the aircraft work, their different parts and how to fix them when they crash or break. Steele teaches the same concepts at Coronado High School, but in much greater detail as students design and **build their own drones** and prepare to earn FAA certification as drone pilots.

"It's easy to attract students and hook them with the coolness of flying drones. The burden is on us to **show them the career connection** — that a drone is a tool and that many industries use it," says Duane Roberson, CSSD11's director of career and technical education and concurrent enrollment.

Many districts now use drones as an educational tool, as part of a current classroom curriculum, such as computer programming, or in specific courses covering drone technology that prepare students for jobs in the fast-growing, multibillion-dollar industry.

As companies such as Amazon and UPS prepare for autonomous drone package deliveries, public safety organizations and various industries — including **agriculture, construction, entertainment and oil and gas** — have also upped their use of unmanned aerial vehicles.

Drones armed with cameras and special sensors can inspect oil refineries and detect damaged equipment, for example. Drones in schools expose students to potential jobs in the fast-growing drone industry or a broader career in aviation. Besides becoming a pilot, they could look at jobs in programming, design, engineering, mechanics and data analysis.

"Students get exposed to the rigors of piloting an unmanned aircraft, and can decide if they want to **continue to pursue a career in aviation**," says Nick Morrison, co-founder and chief pilot at Advanced Aerial Education, a drone training company in Anchorage, Alaska. AAE has developed a curriculum for schools and trains teachers.

PRODUCT REVIEW: *DJI Phantom 4 Pro+ Enables to Unique Film Production for Students.*

Strategies for Teaching Drones in K–12

Most districts invest in **low-cost, entry-level drones that can be easily repaired**. Some higher-end commercial drones that include cameras allow students to take aerial photos and video as they gain experience with drone technology.

CSSD11's Career and Technical Education Department purchased more than **20** beginner drones for about **$100** apiece for each of its Flight and Space programs at North Middle School and Coronado High School. The district also bought several higher-end DJI Phantom 4 drones equipped with 4K cameras.

Sevits and Steele, who were trained by AAE, teach their students to fly

with entry-level drones because they are affordable and because students are **required to control them manually** with handheld controllers at all times.

The kids will go crazy with the designs, and I will let them. They will learn quickly why they are designed the way they are."

In contrast, higher-end drones typically leverage **built-in GPS and hover in place** when users take their hands off the controllers.

The team's approach ensures that, as students graduate to more expensive drones, if an aircraft ever loses its GPS signal and starts to fall, students will know how to use the controls to keep it airborne, says Sevits, who saw 100 students enroll in three drone courses this school year.

"If something happens when they are flying a **$1,500 drone**, it's not as big of a deal. They'll know what to do," he says.

During the winter months, students fly drones inside the gym and cafeteria. In the spring, Sevits allows them to fly the machines outside. He assigns two or three students to each drone, who **take turns acting as the pilot**, as a visual observer in charge of safety, or as the team mechanic.

MORE FROM EDTECH: *See how K–12 schools can use drones to teach math and computer science.*

Teachers Require Support From IT Department for Drone Integration

Teachers do the heavy lifting when it comes to managing and maintaining drones. The IT department gets involved when teachers need access to **computers, software and the network**.

At Coronado High School, Steele is developing a comprehensive, two-year, four-semester drone program. Students will learn to fly, design and build their own drones the first year.

Later they will learn about photography, videography and surveying land using geographic information system technology. To prepare for the drone certification test, students **move through online course materials from AAE**, learning about FAA regulations, how to read aviation maps and how weather affects performance in flight.

Last fall, as students finished an online section, Steele held group discussions to ensure everyone understood the material. Once or twice a week, students practiced flying.

This spring, students will use Autodesk Inventor to design drones on their notebook computers and flight simulation software to see how their designs will fly. Once they perfect a design, they will b**uild the frame using a 3D printer, then install a motor and other wiring**.

“The kids will go crazy with the designs, and I will let them,” Steele says. “They will learn quickly why they are designed the way they are.”

Drones Benefit At-Risk K–12 Students

In Washington state, Tacoma Public Schools launched a drone piloting class at Oakland High School, whose student body is **predominantly credit-deficient for on-time graduation**.

The district’s goal is for students to graduate with one or more certifications, and drones fit nicely with that initiative, says John Page, the district’s Career and Technical Education director. Not only do students **gain experience in a technology-rich setting they would otherwise not have access to**, they also gain eventual advantage in the job market, Page says.

100,000+

Number of people who have obtained remote pilot certification from the FAA to fly drones

Source: Federal Aviation Administration

Digital Media Teacher Dave Kellogg, who earned his FAA drone pilot's license this past summer, uses AAE's online curriculum to teach some of the material himself, but also allows students to practice flying in the gym or cafeteria. Before each class, **students borrow notebook computers from the library to access the online coursework**.

The district purchased **10 entry-level drones** and a few advanced DJI Phantom drones. Before trying to fly the advanced drones, students practice using flight simulation software on tablets, Kellogg says. "It's safer on the tablet first," he says.

Drone Are Effective Tools to Teach Code

For the past two years at Sioux Falls (S.D.) Catholic Schools, O'Gorman High School students have used drones as part of their introductory class in computer programming. First, they learn the Python programming language, then they **use their notebook computers in the course's final week to program drones** to fly around the school's gymnasium.

"It's a great learning experience. **They can see the cause and effect of their programming**," says Tara Johanneson, a computer science teacher and technology integrationist. "They troubleshoot and figure out why it isn't working. Then they fix the code."

She uses five programmable drones on loan from a nearby university, with integrated Wi-Fi that allows direct connection to each student's computer.

Typically, groups of three students use a Python software application to **program their drones to take off, turn left and right, and go forward and backward**.

Besides programming, students learn important soft skills, such as communication, collaboration, critical thinking and problem-solving, she says. "Anytime you give students hands-on, applicable experiences, it elevates their interest in the content and helps them better retain the information," she says.