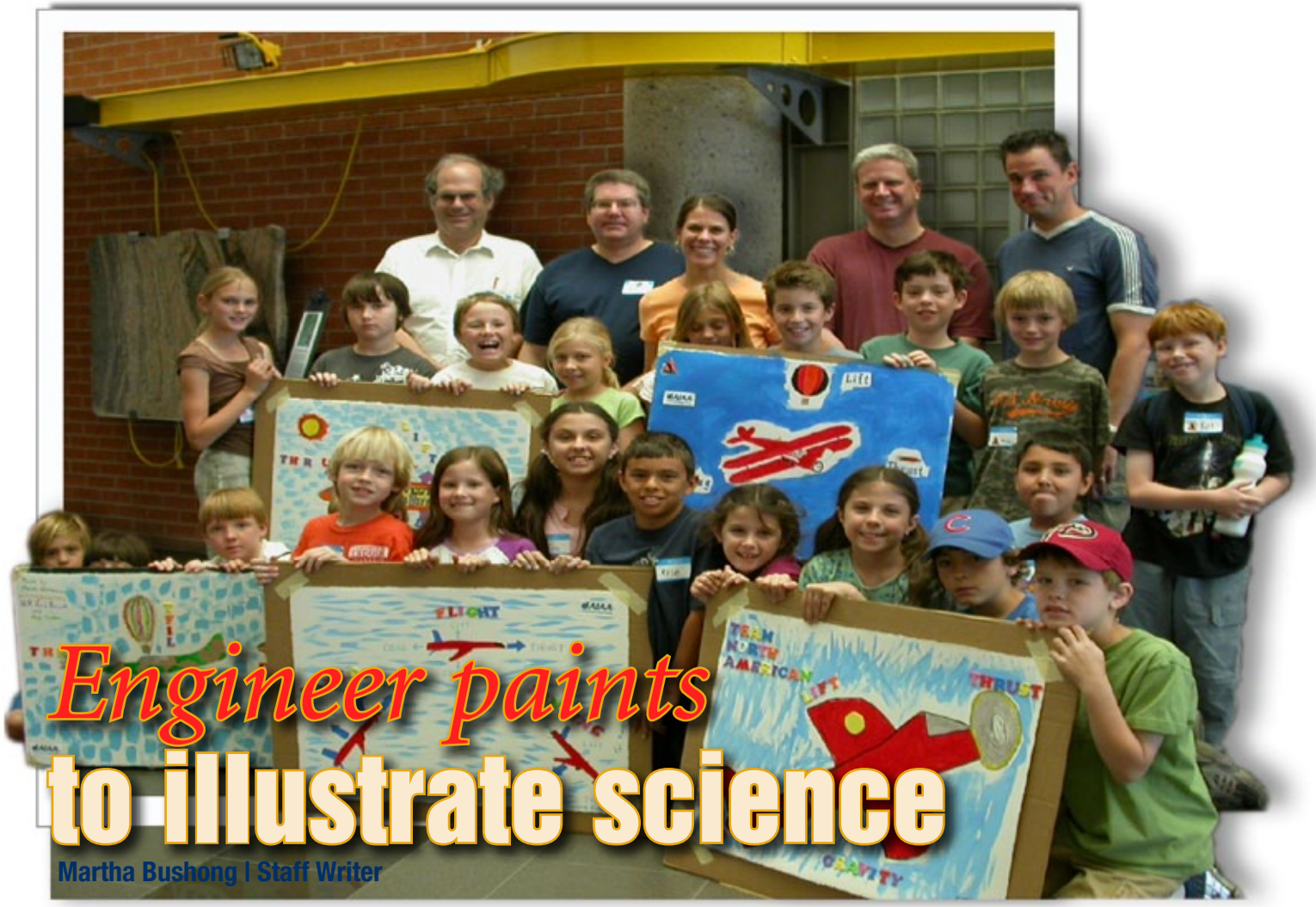

Engineer paints to illustrate science

Martha Bushong | Staff Writer

Students show off their artwork after being instructed by Michelle Rouch (back middle), Defense Contract Management Agency Ratheon Tucson engineer. Rouch teaches the students the complexities of math and science through painting. (Images courtesy of Michelle Rouch)

Engineers often use well-honed analytical skills, teamwork and collaboration to solve a wide array of problems. Michelle Rouch, an engineer at Defense Contract Management Agency Raytheon Tucson, Ariz., discovered unique applications for her systems engineering knowledge — she pairs it with her painting expertise. Rouch blends the seemingly disparate areas of interest creating original aviation art and encouraging elementary school children to explore the world of flight, math and science.

Whether working with DCMA engineers, family members who support her artwork or local schoolchildren, Rouch's main objectives are remarkably similar. In each endeavor, she strives to help the teams achieve and maintain a collaborative approach, resolve issues, share lessons learned and stay committed to continuous improvement.

Rouch began working for the Department of Defense in 1990, but she has been painting for much longer. "I started my first mural on a household wall at age 3 — until my mother took my crayons away," said Rouch. Later, her mother focused Rouch's artistic energy by enrolling her in Saturday afternoon art lessons in their hometown of Dayton, Ohio. When Rouch started college, she intended to major in art, but her studies veered toward science and higher math. "I kept hearing my father say, 'Find a job that puts food on the table,'" she said.

"In college, my brother asked me what I thought I would do after taking courses in algebra, trigonometry and calculus. I thought I might be a math teacher. Instead, he encouraged me to follow him in the field of engineering," she continued. Rouch graduated with a Bachelors of Science in electrical engineering in 1990 and later earned a Masters of Science in information systems engineering.

"Now when I start any project, I think like an engineer," she said. "I calculate the total cost, schedule and performance, much like a program manager."

When starting a painting, Rouch evaluates the project to see if she can stay within cost. She measures how long the piece will take and considers whether she can fit the work into her life. Being a full-time mom and engineer keeps her busy, so she plans carefully. After considering the cost and schedule constraints, she creates a rapid prototype to explore every possible scenario before executing the painting.

"Rapid prototyping is essential because it brings the final painting to a well-thought out plan," said Rouch. "My son plays an important role when I ask for his advice. He loves airplanes and hopes to learn to fly before he gets his driver's license. Once I have the artwork sketched

in pencil, I request inspection by my quality manager, my husband (Fotios), to ensure all angles are correctly defined. He has a critical eye and can detect the slightest imperfections."

"A lot of people don't understand aviation art," said Rouch. "Some people will view my work and think, 'Nice landscape, but why did she put an airplane in there?' My whole philosophy is the airplane is not big enough!"

Fotios, an engineer assigned to DCMA Raytheon Tucson, designs one-of-a-kind resin airplane models. He convinced her to paint her first airplane in 2002.

"Thankfully, I listened to him," said Rouch. "The first painting, 'C-2 Greyhounds in Tandem,' was published on box tops for an airplane model company. My second painting, one of my son at the Pima Air & Space Museum, is sold on stationary at the museum's gift shop. The aviation art world got serious fast," said Rouch who now has more requests for paintings than she can handle.

The team approach she uses with her painting shows up in her work at DCMA, too. "We have a wonderful group of engineers synergizing with one another and collaborating in many different functions," said Rouch. "We work well as individuals, but we work better as a team. Our monthly leadership council meetings and engineering forums provide an environment to share knowledge and facilitate open discussions."

"One of the biggest challenges is communicating with other DCMA systems engineers. The Concurrent Engineering/ Systems Engineering Cross Talk and Systems Engineering headquarters' monthly teleconferences offer insights on how the systems engineering workforce changes and provides opportunities to improve our surveillance tools and processes," she said.

DCMA Raytheon is a relative newcomer to Tuscon's aviation and aerospace traditions. The area's rich history of aviation, aerospace and astronomy date to the early 20th century. Seven years after the Wright Brothers flew on North Carolina sand dunes near Kitty Hawk, Arizona's desert provided a landing for Charles "the Birdman" Hamilton. Tucson houses America's first municipally-owned airport, the Pima Air & Space Museum, and is the site for Kitt Peak National Observatory, so opportunities abound to learn about aviation, aerospace and astronomy.

During one educational program at the Pima Air & Space Museum in 2007, Brian Ewenson, former director of education, introduced Rouch to Sara Falconer, lead organizer of the award-winning American Institute for Aeronautics and Astronautics Kids Club.

"Sara asked me if I could create a three-hour program for 8-, 9- and 10-year-olds and I seized the opportunity. Since then, I donate my time once a year to support the club," she said. Her engineering/ art projects teach team building and communication skills to resolve problems and create large, colorful art depicting the four forces of flight — lift, drag, thrust and weight. Twenty-two pieces from these programs are displayed at the Tucson Juvenile Justice Hall.

"I want to reach into the minds of kids and use art as a vehicle to communicate technology concepts," said Rouch. "In 2010, we fine tuned our engineering/ art project by assigning roles and responsibilities to a program manager on each of the six teams."

The program manager chose a chief engineer and ensured project requirements were met. The program managers also explained why their team's design should be awarded first place.

"The kids' energy and enthusiasm helped them take off and fly with the project," said Rouch. "They all had the same requirements, materials and schedule constraints. The program managers and chief engineers asked interesting questions and made good decisions. Each team had an adult for assistance, but the kids pulled it all together. What I like best about this project is witnessing these kids understanding life skills that will support them in the future."

"Greyhound C-2A" depicts two planes flying side-by-side above a patchwork of fields and farms. In this watercolor, Rouch demonstrates her keen eye for sharp detail on the airplanes' fuselages while evoking movement with blurred propeller blades.

This original watercolor by Michelle Rouch shows her son walking toward rows of airplanes at the Pima Air & Space Museum. This image is one of Rouch's first works as an aviation artist.