## When a Teacher Is 2 Feet Tall

School Experiments Use Robots as Learning Tools; a Dragon for Lifestyle Tips

## By SOPHIA HOLLANDER



Kevin Hagen for The Wall Street Journal

'Projo' the robot, part of an experiment run by Teachers College, Columbia University, works with Oumou Doumbia at a New York school.

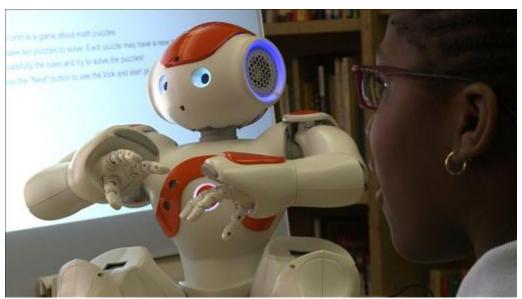
Scientists raised on "The Jetsons" and "Astro Boy" have theorized for decades that robots would make the perfect helper and companion. Now a handful of public schools in the U.S. are putting that idea to the test.

This year, robots will be teaching everything from math to vocabulary to nutrition inside classrooms in California and

New York, a move the researchers call a first in American education.

The Los Angeles experiment, scheduled to start later this spring, will use a robotic "dragon" to teach first-graders about healthy lifestyle habits. Students will help show the robot how to prepare for a race; the hope is that by sharing tips with the dragon, they take their own lessons to heart.

## Teaching, With Help From a Robot



At a Harlem elementary school, a robot named "Projo" works with students on math puzzles and more as part of an effort to connect with students.

The robot in the Los Angeles trial costs about \$5,500 when stylish touches such as fur, feet and wings are added. The effort is the first of several robot experiments planned and is backed by a five-year, \$10 million grant from the National Science Foundation. It will be conducted by a coalition of researchers from Yale University, the Massachusetts Institute of Technology, the University of Southern California and Stanford University.

Researchers see the classroom robots not as replacements for teachers but as whimsical assistants programmed to push kids' buttons. But some see the mechanization as the latest

example of technology undermining the importance of human connections in the classroom.

The robot educators, most of which are small enough to perch on a table, don't replace teachers, exactly. Kids generally take turns with them in special sessions in a library or on the side of the classroom. The robots are programmed to mimic human behaviors: swiveling their heads when students speak, crying out when overeager kids get physical, and gesturing as they talk.

"How can you get the kids to do more math? They don't want to. But they do want to play with the robots," said Maja Matarić, professor of computer science, neuroscience and pediatrics at USC, who is helping to lead the project in Los Angeles. Robots in the experiments are teaching and reinforcing lessons over several weeks, researchers say, even though it seems they are merely serving as electronic playmates.

The New York robot experiment relies on a basic insight: Children don't like admitting mistakes but they enjoy pointing out someone else's. The idea was to "use that to our advantage," said Sandra Okita, an assistant professor at Teachers College, Columbia University, who is leading the experiment.

She programmed her robot—a \$14,000 android nicknamed "Projo," with glowing eyes, bulging triceps and a futuristic-looking white and orange spacesuit—to make carefully calculated errors when working with students. As the children correct their 2-foot-tall partner, she hopes they become more aware when they make the same mistakes.

"I think the imperfect robot is good for humans," Ms. Okita said. "It has to be a give-and-take relationship where you influence the robot and the robot influences you."

It took only one session in a Harlem school for 11-year-old Oumou Doumbia to declare Projo a "friend" and collaborator—although she was relieved to see the machine's small stature. A human-sized robot "would definitely freak me out," she said.

The American experiments follow a South Korean effort that brought nearly 50 robotic English teachers into more than 20 schools beginning in 2009. Some educators and parents objected, said Young-Ho Park, a spokesman at KIST, the national research institute that built South Korea's machines.

"They said that it is ridiculous to learn from the robot," he said of the criticism.

Still, in rural South Korea, Mr. Park said the robots might help make up for a lack of English speakers in the local communities. The trial program will be revived later this spring.

Like doting parents, the robot researchers worry about the inner lives of their machines and how best to guide them through sticky social situations. Bullying by children has already been a problem. Researchers at the University of California, San Diego were horrified when toddlers learning vocabulary at the university's Early Childhood Education Center took only minutes to bash apart a robotic arm assembled over more than six months.

"As long as we were there, the robot was safe," said Javier Movellan, founder of the Machine Perception Laboratory at UCSD. "But if we were not there, the children could be ruthless."

In 2010, Mr. Movellan received a three-year, \$750,000 grant from the National Science Foundation for his robot experiments. Ultimately, he said he hopes robots become a "must-have tool for early-childhood-education classrooms."

But some critics remain skeptical that robots could ever

become true companions.

"It could be the greatest robot in the world," said Sherry Turkle, a professor at MIT and author of "Alone Together: Why We Expect More From Technology and Less From Each Other." But a robot teacher still won't "understand what is going on in these human interactions."

In Los Angeles, some parents have bristled at the thought of robots supplanting teachers. One parent even referenced the "Terminator" movies, in which intelligent robots take over the world and hunt humans.

"I was like, 'I don't think they'll take over the world but they may take all our jobs,' " laughed Victor Sanchez, the magnet coordinator for the 32nd Street/USC magnet school for visual and performing arts, which participated in the robot test.

Still, he counted the robots as an example of the school's innovations. "That's what we're promoting," Mr. Sanchez said.

Write to Sophia Hollander at sophia.hollander@wsj.com

A version of this article appeared April 11, 2013, on page A3 in the U.S. edition of The Wall Street Journal, with the headline: When a Teacher Is 2 Feet Tall.