North Brunswick teacher has facilitated a pilot program designed to make learning about science fun

By Richard Khaykine
Staff Writer

There are beakers, desks and chairs, even a periodic table in Dee Guarino's eighth-grade science classroom at Linwood Middle School in North Brunswick.

But it's much easier to spot the inflatable pool, the hydroponic garden and the luminescent, 3-foot robot in Guarino's spacious classroom, a former industrial shop where she teaches six periods a day.

In its own way, Guarino's classroom is its own petri dish. For the past couple of years, she has taught — facilitated might be a better word — a pilot program designed to take the abstract, even obscure, concepts that are the stuff of science and explore them through their functional aspects.

Traced back to its Latin root, science means "to know." And, in a word, that's Guarino's mission: to make those elusive concepts familiar.

"You see a pool in here, you see a robot, you want to do something," Guarino said on a recent afternoon, as a trio of students used the pool in the back of the room to work on an underwater robotics project. "It's not like a regular textbook class. It's real world stuff."

Pilot programs in middle and high school classrooms throughout the nation are introducing creative problem-solving to science learning. And Guarino's eighth-graders are in the vanguard.

STEM — for science, technology, engineering and math — programs have the ostensible purpose of curbing declines in the country's science education. But the programs also have another application: making learning fun.
In the spacious room, lit mostly by four skylights, the
teachers of the room, Mike Hudson, 14, is distilling a few of Newton's laws of
motion.

"I've always been good at creating things," Hudson said. "It
started in elementary school. I just loved it. It just progressed."

And, if the country is to reverse a decades-long trend, that
passion needs to be cultivated, said Guarino, who has taught for
23 years, the last eight at Linwood.

Still, she said, some of the greatest resistance to new ways of
learning comes from educators. Stagnant learning methods
must be revamped if the nation's students are to compete in an
increasingly global scientific playing field.

"No one is going into the sciences. Where does that leave us?

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Left, science teacher Dee Guarino of Linwood Middle School
in North Brunswick listens as eighth-grader Mike Zimmerman,
13, explains how he built his robot. At top, Guarino discusses
easpace and flight plans with eighth-graders Michael Stasik,
14, left, and Tommy Ikuss, 13.

GUARINO

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"Where does that leave these kids?" she said. "This society is
moving faster than we know."

STEM is an experiment in the making, and students take
it to heart, Guarino said. So much so that while Guarino officially
teaches just one STEM course out of her six daily classes, she
teaches extracurricularly to other students online, and even extends it in certain
aspects.

"It certainly enhances the curriculum, but it also pulls in a
lot of the math and technology standards," Guarino said.

While Guarino uses textbooks to delve into science topics,
she said, the open use of science books can be counterproductive to the learning rather than bolster it.

"That's where we lose the kids — they're not motivated," said Guarino, a member of the
National Academies' Teacher
Advisory Council, the Washington, D.C.-based body that helps draw up teaching and learning standards and
strategies.

Guarino, a NASA Presidential Award winner and a
former Congressional Ein-
stein Fellow, said she's there to
support the students rather than
to direct them.

"It's a fluid group," she said. "It's very motivating for them.
This is a real problem-solving
class. I'll prep them, but I won't
tell them how to do it."

At a certain point in the learning,
error, becomes its own
motivator, she said.

"There's so much potential in these kids, which is usually
not allowed to show itself," Guarino said. "When they're
allowed to take off and given parameters, look at what they
can do."

Mike Zimmerman, 13, built
the 3-foot robot, named Gizmo,
out of more than 1,000 parts, including motorized arms, legs
and head, in about six weeks.

"When I was working on
him, I would come in whenever
I could," he said. "Luckily, I've
had more trials. The biggest
error is when he punched me
in the face."

Zimmerman, articulate and
enthusiastic, then showed off a
row of model cars, each with
its own "engine. The pair of
plastic tubes protruding from
inside the cars' chassis hint
that these are not your father's
internal combustion engines.

Zimmerman next demonstrates the models' applications. A set of batteries
has separated hydrogen and ox-
gen molecules from water, creating enough energy to propel one of pollution-free
miniature vehicles a few feet.

"It's been a lot of fun," Zimmer-
man said of Guarino's class. "It's been one of my
favorite subjects."

Like many if not most of the class' hands-on projects, Guar-
ino received the money for the
model-car experiment by applying
for a pilot program grant
or by reaching into her own
wallet.

"That the only way I can get
money," she said. "I don't wear
jewelry. I would prefer to do
this. But they're worth it."

For now, the single drawback to getting into Guarino's classes is that, at about 40 minutes, they're too short. "It's
hardly any time at all," she said.

To open up the class — "a
mini Liberty Science Center," as one visitor put it recently —
to more kids, students attend
every other day for half a year.

In the summer months, and
on occasion during the school
year, Guarino spends time as a
student, attending workshops and
classes at Stevens Institute of
Technology in Hoboken,
Princeton or Rutgers. This
summer, Guarino will attend
Stevens to get tips on how
everyday technological applica-
tions, such as Bluetooth wireless
device, can further learning.

In a sense, Guarino said, she
will be catching up to technolo-
gical knowledge of her eighth-
graders already possess.

"They know how to use it.
Let's engage it," she said. "I
don't want to be bored in a
classroom either."
Dee Guarino, a science teacher at Linwood Middle School in North Brunswick, talks to her eighth-grade class about their special aerospace and robot projects.