

These kids have it down to a science

Program transforms classroom into learning lab

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Laurel Walker

They're aptly named, this S.M.A.R.T. team of eighth-graders at St. Dominic School in Brookfield.

They know their DNA from their RNA (or deoxyribonucleic acid from ribonucleic acid, for the acronym-challenged).

They know how to pronounce *polymerase* - and what it means, too.

On a computer screen, they can paint a picture of a molecule that resembles a wad of kinky, colorful spaghetti - much, much different from the simple ball-and-stick models of my youth.

They've visited a bona fide researcher at work in his laboratory, where they've seen high-tech tools such as X-ray crystallography for analyzing crystalized molecules in three dimensions and where they've sucked DNA into a micro-sized glass pipette and deposited it into a receptacle.

They've learned what it means to do real, cutting-edge science.

And that, after all, is the whole point.

Much of the credit for this mind-growing adventure goes to their science teacher, Donna LaFlamme, 53, who has taught at St. Dominic's the last 16 of her 28-year career. For the past five years, she has interested her eighth-graders in the S.M.A.R.T. program and - as is quickly apparent - has spent much of her spare time helping them through this rigorous process.

"It's fun. I'm learning, too," LaFlamme said. "It's transformed our curriculum."



**Teacher, Donna LaFlamme
Student, Katie Russell
St. Dominic School, Brookfield**

Though the program is geared to high school science students, LaFlamme's middle schoolers have carried their weight despite their younger age every year, with encouragement from their scientist-mentor, Vaughn Jackson, an associate professor and researcher at the Medical College of Wisconsin.

"I think middle schoolers can do it," LaFlamme said. "They wow me with what they can do."

S.M.A.R.T. stands for Students Modeling a Research Topic. The annual program was launched five years ago by the Milwaukee School of Engineering's Center for BioMolecular Modeling with a grant from the National Center for Research Resources of the National Institutes of Health.

Beginning six months ago, the students learned how to use computer software and get qualified as a team by designing part of the SARS, or severe acute respiratory syndrome, virus that hit Asia in 2003.

Next they had to research and design a molecular structure related to a certain virus - in this case, for all you science junkies out there, it was an RNA polymerase molecule of something called the T7, which infects bacteria. Using that design, a model was then produced on special MSOE machinery. The model is one that their scientist-mentor can actually put to use as a "thinking tool" in his lab and classes.

Finally, the students have to simplify all this science and present it clearly, concisely on Saturday to audiences of both science-literate people and people like me who are dizzied by molecular biology.

I dropped in on St. Dominic's last week as the writing team - a group of seven students among the 26 S.M.A.R.T. Team members - was preparing its presentation. My contribution was to show the students just how simple they have to make it.

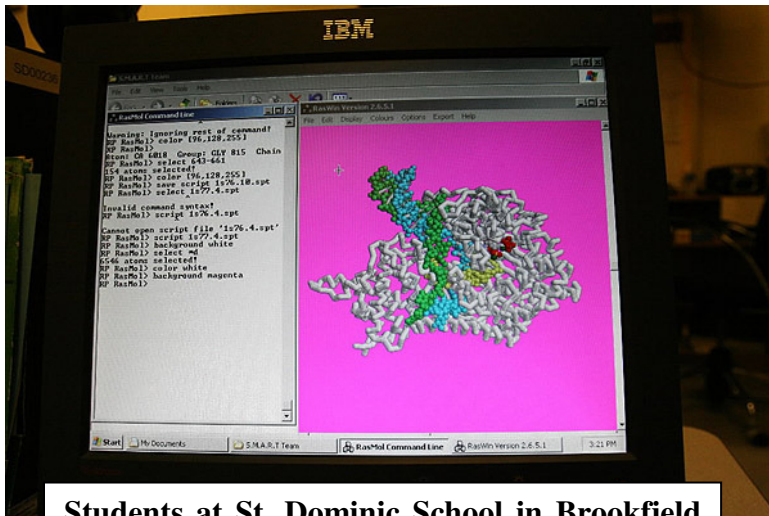
Pietro Boffeli, 13, began: "We're making a model of a polymerase . . ."

A what?



Members, S.M.A.R.T. Team, St Dominic School

(From left,)Katie Hildebrand, Caroline Klinker, Pietro Boffeli, Stephanie Prince, discussing molecular models in their classroom at St. Dominic' School, Brookfield.



Students at St. Dominic School in Brookfield use computers to study molecular models while preparing for a presentation Saturday at Milwaukee School of Engineering as part of the S.M.A.R.T. program, which stands for Students Modeling a Research Topic.

"A molecule in the cell that makes a copy of DNA into RNA," he continued.

I've heard about DNA, I said, but RNA?

Caroline Klinker picked up where Pietro left off: RNA, she said, is a lot like DNA. The messenger RNA can leave the nucleus but the DNA cannot . . .

OK. Caroline, you just lost me.

Catie Carter tried next. The RNA copies the genetic code from the DNA. This RNA copy leaves the nucleus. Then ribosomes in the same cell read the code in the messenger RNA and make a protein.

Why care about such an obviously tiny thing with the big-sounding, T7RNA polymerase name? I wanted to know.

"Good question!" LaFlamme said, telling her presenters that they had to explain why

this work was important. It's this kind of research that enabled scientists to make the first human insulin from a human insulin gene, she said, rather than from pigs as in the past.

I couldn't help but wonder what part of microbiology class I had missed back in my high school days, but Caroline comforted me.

"This isn't stuff they found years ago," she said. "This is all new stuff."

We put the science aside for a minute, and the students told me why they liked the S.M.A.R.T. Team project.

"You have to like science to be in this project," Katie Russell said, and her fellow students agreed it was a lot of hard work. Stephanie Prince said she likes it enough to want to become a doctor some day.

They said they were learning a lot. Katie Hildebrand said she didn't understand it - just like me - until they studied it and saw some of it firsthand in the scientist's lab.

"Mrs. LaFlamme explains it really well," Jessica Lieb said.

In fact, LaFlamme - as all teachers working with a S.M.A.R.T. Team - had to first take a class offered through the Center for BioMolecular Modeling called "Genes, Schemes and Molecular Machines," which updates them about the latest in the world of molecules.

One of the toughest tasks was to read a research paper about the subject, and they had to tackle it page by page - sometimes word by word. Even LaFlamme struggled with it, she said.

"They make it really hard to read the papers," said Katie Russell.

"It's really hard work for me, but I can't pass up this opportunity," LaFlamme said. "Some of them will never be that close to what science is really like again. They certainly have learned that scientists don't know everything, but that they're asking questions. It puts them at the cutting edge."

For all their hard work, LaFlamme hands out medals to the students after their presentation.

She deserves one, too.

** Photos by William J. Lizdas, Milwaukee Journal Sentinel*



**St. Dominic Students
use computers to study
molecular models.**