

# Engineer in the Classroom sets kids free to learn skills — and confidence

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Roads. Bridges. Sewers. Water treatment and distribution systems. These and other civil, electrical, mechanical and structural features of daily life aren't glamorous, but they are essential, and it takes engineers to build and repair each one.

There's a problem in the United States, though, according to Emil Cook, vice president of Crawford, Murphy & Tilly in Springfield. Our universities aren't graduating sufficient numbers of students to maintain the country's aging infrastructure.

So, Cook and a team of local engineers from nearly a dozen area firms are on the job, promoting engineering as a career choice across Sangamon County — not in colleges or high schools, but in fifth-grade classrooms. Free for all participating schools, the hands-on program, Engineer in the Classroom, brings the work of engineers to life.

"The program started eight years ago in Decatur," Cook says. Now in its second year in Springfield, he says, "It's focused on getting fifth-graders interested in the engineering profession. You never know what's going to stimulate or trigger someone's imagination or motivation."

Once a week or so during January and February, teams of two engineers or an engineer and a helper go into classrooms selected on a first-come, first-served basis. They spend a few minutes teaching basic engineering and physics principles, then they work with student teams to design, build, decorate, make notes about and present an elaborate Rube Goldberg contraption that will, this year, stack three objects.

The construction materials mainly are odds and ends the kids gather from home. Among other constraints, the entire machine must fit into a 3-foot-square area; cannot use open flames, glass or electricity; and must be completely visible from all sides. The machine also must be portable, because the final exam is a countywide Rube Goldberg contest at Lincoln Land Community College the first week in March.

This year's contest was Saturday. (Please see Voice on Tuesday for competition results.)

Winners earn a trip to the University of Illinois at Urbana-Champaign to face winners of the competition in Macon County, to see the high-school Rube Goldberg competition and tour the university's engineering open house.

Points are awarded for completing the task in up to 10 steps, for creativity in theme and presentation, for maintaining a complete project journal, successfully running twice in the time limit and more. One of the most important considerations is how well the Rube reflects student ownership, national director Rexlynn Nicole says from her home in Decatur. "It's important that it not be the engineers trying to prove themselves. It should be the kids' project."

How can they tell?

"You can just see it in the way the kids move around the machine," Nicole says. "They know that machine, how to fix it, how to make it work. Look and see who's protective of it, who says 'Stand back, I'll fix it!' when something needs an adjustment. That's kid-driven. Kid ownership."

The program is catching on. Some of the program's earliest students are returning to help as facilitators, there already are more classes asking to participate than engineers to staff them, and the presentations at the contest are wonderful, both Nicole and Cook say.

Last year, Kathy Fishburn's winning team from Auburn Middle School had, as Nicole says, "a wonderful, powerful Rube" and an excellent presentation detailing what it would do, including a song-and-dance number to the tune of "Get Your Kicks on Route 66," which tied into their theme.

Singing and dancing are fun but not the main thing, adds Nicole, who is most excited about the "Eureka!" aspect of the program. Getting to that point takes a lot of time, persistence and a hands-off approach, as Springfield Christian School teacher Anne Jakaitis is learning.

"I'm always surprised after the engineers have talked to the students that they're ready to go," she says. "They have an idea. They don't need nearly as much adult direction as I think they'll need."

Jakaitis' class Rube depicts world travel through several landmarks between Illinois and Korea, the home of this year's exchange students.

Nick Jackson, a student in Jakaitis' class, says building the Rube is "fun and creative. I've always tried to build a machine at home — a boat, lots of things — and it's been really hard. That's why I think this is fun. This one is going to work."

Jakaitis' class is one of two Springfield Christian School classes competing for a trip to Champaign-Urbana. Teresa Wolters' class has modeled the Eiffel Tower, Great Wall of China, Bullet Train and more. Their machine will stack three sections of an Egyptian pyramid made of Styrofoam.

They placed high enough last year to go to UIUC, and they hope to repeat their success. Wolter says the students can be highly creative "when you let them play a little bit," and they've all seen how relevant the project is to real-world problem solving.

“Some of their ideas worked, and some didn’t work at all,” Wolters says. “They would hit road bumps, like life, and have to make a new plan.”

But, all the time, she adds, “they were doing science and math without having any idea that it was science and math until we sat back and explained it.”

It’s a friendly competition between the classes at Springfield Christian, perhaps because if one team wins, both classes will go to UIUC. Not so at Auburn Middle School, where projects and windows are covered and the sign on Tonya Busby’s closed classroom door reads “Engineers at Work,” a warning to keep clear for that hour.

“It’s very, very competitive,” principal Matt Grimm says with a smile. “I think it adds an element of fun and excitement as they’re learning.

“If we could figure out ways to educate students like this all the time,” he says, “we could reach all levels of learners. Even students who may not be engaged in other classes are engaged. Everybody has a job to do. This is how education should be.”

Busby’s class developed a theme around being at home sick with a cold, and they’ll stack a video case, tissue box and pill bottle.

“It’s really fun working with the engineers,” student Kyle Aldridge says. “The building part was very confusing at first, but we’re at the very end now, and all we have to solve is one problem, so the box lands exactly where it’s supposed to.”

Fishburn’s class hopes to keep the traveling trophy for a second year.

“The program is working. It’s opening their eyes to a profession they might not otherwise have been exposed to,” she says. “And a lot of the time, it’s not the straight-A kids; it’s those who want to get their hands dirty taking something apart and putting it back together.”

Brock Jones is a sixth-grader who enjoyed Engineer in the Classroom last year in Fishburn’s class. He’s been visiting her classroom after school at least once a week to see how this year’s project is going.

“I look at the Rube and Mrs. Fishburn tells me the new stuff they’ve done and the building process they went through,” says Jones, who adds that he hopes to be a pilot or an aeronautical engineer when he grows up.

Last year, when Fishburn’s class returned home with the trophy, there was a police escort and parade of cars back into town “just like winning sports teams,” she says.

“This is a time when academics actually gets recognized instead of sports,” she says, “which is what I like about it. Not everybody can be a good athlete, and you have to find something that every kid can be a success at.”

Jakaitis agrees.

“There are always three or four kids in a class who don’t do so well at sports, music or anything else, and they just run with this. They

find their niche and they're so proud," she says. "The other kids look up to them and ask for their help. And. They. Just. Glow."

DiAnne Crown is a freelance writer who can be reached through the features editor at 788-1515.

### **A teacher's advice**

Auburn Middle School teacher Kathy Fishburn's class took home the trophy last year for the Rube Goldberg contest, run through the Engineer in the Classroom program.

She offers next year's would-be competitors the following advice: "Build in teamwork and cooperation, have fun, show it off to your parents, school board, superintendent and younger classes.

And then let the kids take home a piece of the Rube when it's over. Those are the memories they're going to remember.

"Win or not, it's a good experience, and everyone who gets a machine that runs is a winner."

To view a slide show from the Macon County unit of Engineer in the Classroom, go to <http://web.extension.uiuc.edu/macon/EngineeringGal/6.html>

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