A new school

Monday, 14 December 2009
Story and photos by Lee Morris | Times-Record

In Don Mugan’s lab, a low-end version of an engine pumps back and forth.

A flame burns one end of a glass test tube, expanding air in the tube and making it tilt. As it rocks to the other side, the air cools and contracts, creating a vacuum and pushing the tube back the other way.

The test tube, filled with five marbles to help move the air, seesaws on its own. Heat becomes work.

This is a Stirling engine, says Mugan, a Valley City State University technology professor. It competed with the steam engine that carried boats along the Mississippi River before it proved too costly for 19th-century use.

“What the Stirling engine can do is it can generate enough energy for a village,” Mugan says.

And, he hopes, enough interest to help save a nation’s education system.

The rough-hewn Stirling kit is among those VCSU’s technology department sends to undergraduate and graduate students who take online technology education courses. The goal: inspire current and soon-to-be teachers about science, technology, engineering and math – or, to use the term coined in the early 2000s – STEM. Then those teachers can instill a love of the related fields, through fun and practical lessons, in children.

“There’s probably 100 statistics about how negative our school system is,” Mugan says, naming a few, adding that the number of patents to Americans is declining, that the number of engineers from America compared to China is a sliver.

And corporate America – people such as Microsoft founder Bill Gates and entrepreneur Dean Kamen – are pushing for the nation to catch up, Mugan says.

Congress is pushing, too.

The House passed an appropriations bill last week, expected to pass in the Senate this week, that awards $750,000 to VCSU’s STEM program. North Dakota’s congressional delegation helped secure the funding.

Rep. Earl Pomeroy, D-N.D., says America is falling behind the rest of the world in the STEM fields.

“It’s vital that teachers have the skills required to deliver top-quality instruction in these areas,” Pomeroy says.

“And that doesn’t mean wait until we graduate a new generation of teachers. We want that to happen now.”
The university’s STEM efforts also garnered a $381,000 federal grant in October.

**STEM leader**

STEM at VCSU has evolved over the past 10 years, but its full entry into the arena came with the university’s February 2008 partnership with the Museum of Science in Boston.

That was when the university became a leader in an initiative to close the gap in technology and engineering teaching. Mugan says VCSU was the first university with a teacher’s education program to join with the museum, which founded the National Center for Technological Literacy.

Since then, along with teaching an average of six to seven online courses to students nationwide a semester, VCSU has hosted STEM workshops for current educators.

One was a training using LEGO Robotics earlier this month, a STEM-stimulating activity Washington Elementary fourth graders will learn about at VCSU this Thursday.

Another VCSU-led workshop was in June in West Fargo, where the state’s first STEM school opened this fall. The West Fargo STEM Center’s principal is VCSU graduate Tabatha Joyce.

VCSU is a leader in the field. Pomeroy says VCSU “is ahead of the curve in positioning itself to be the trainer of trainers, the teachers of teachers in this STEM area.”

In West Fargo, where about 160 sixth- and seventh-graders chose to attend the STEM Center over Cheney Middle School, Gov. John Hoeven made a proclamation last month. Hoeven said in North Dakota, Nov. 24 will always have its own designation: STEM Day.

**Like Wildfire**

STEM is not a content area as much as a way to teach. Its projects provide students with hands-on, concrete applications for science, technology, engineering and math – which are interrelated.

“These curriculums are all about real-world things,” says Pete Gjovik, a VCSU technology instructor. “Without ever asking, (students) are going to go, ‘Oh, that’s why we’re learning math!’”

Lessons can teach students math itself, for instance. Or a project – such as the Stirling engine or LEGO Robotics – can excite kids about any STEM aspect, kindling interest in the others.

When the $750,000 grant funding arrives next year, Mugan hopes to hold a STEM workshop every couple of weeks. The VCSU technology department may even add to its staff.

In his lab, surrounded by other STEM projects, Mugan is sure of this: Education in America needs changing. If there’s no solution, math and science will be taught how they’ve always been taught. The nation will fall behind even further.

Luckily, he says, STEM is spreading like wildfire.

“For really motivating kids, you need to really bring it down to earth,” he says.

In Mugan’s lab, the glass test tube rocks back and forth, waiting to help capture the attention of a nation’s children.