



A Break in the Storm

USAFA's K-12 STEM outreach center

works to engage southern Colorado's youth by David Bergeman

In

2005, the National Academy of Sciences (NAS) issued a sobering call to action titled, “Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future.”

This watershed treatise disseminated grave warnings to the country’s literati; if immediate measures were not taken to enhance the state of America’s math and science education, our country’s ability to compete globally in the science, technology, engineering and mathematics (STEM) fields would continue to diminish at an alarming pace.

This was, and remains, discouraging on many levels. Consider: STEM jobs have grown at a rate three times faster than non-STEM jobs over the past decade. Additionally, STEM workers earn 26% more than their non-STEM peers and enjoy greater job stability. STEM has produced a ray of sunshine in an otherwise stormy economic time.

Education is the key to seizing these STEM opportunities; more than two thirds of STEM workers have a degree, as opposed to less than one third of non-STEM workers. Yet, due to a decades long cocktail of systemic failure ranging from lack of government support to deficiencies in curriculum and teacher training, the country doesn’t currently have the ability to capitalize on the STEM surge. In fact, the U.S. has fallen to 52nd in the World Economic Forum’s quality of math and science education rankings. Another downright disturbing fact: one in five STEM workers is foreign born.

Back at the Academy, the implications of the NAS report landed with a thud. USAFA has a proud history of STEM outreach dating back to the institution’s infancy; the work that has been done serves as a point of pride and emphasis up on the Terrazzo. Two of the Academy’s STEM crusaders who took great heed to the NAS report were Engineering Division Chair, Col. Neal Barlow, along with Col. Rob Fredell.

The report gnawed at Col. Fredell as he contemplated the next step toward tackling the STEM education enigma. Enter Dr. Billy Crisler, Director of the recently formed USAFA K-12 STEM

Outreach Center. Col. Fredell approached Crisler in the fall of 2008 to help him address the NAS report from an Academy perspective.

“He didn’t know that I had taught high school for two years. He didn’t know that I had been an enterprise business development manager at Harris Corporation. He had no idea that I was the guy that he needed,” Crisler laughed.

Since that time, Crisler has worked to breach the paradigm surrounding Academy STEM outreach in pursuit of best practices and novel approaches. He likens the Academy to a “consumer” and “refiner” of STEM talent, which he conceded is part of the solution, but not an end all. “We need to be on the supply side,” said Crisler.

But how to do that? “My role is finding resources and bringing them to bear on some of these problems,” he continued. These resources include money, of which Crisler has helped bring \$300,000 annually to the Academy courtesy of a National Defense Education program—virtually all of the money goes to programs “outside the gate.” Crisler is also an adept networker, “I’m very happy if I can just make a phone call and introduce a person with a need with a person who wants to help,” he said.

Another invaluable resource is the Cadet Wing. Crisler explained, “If I go out to school, you know



C2C Victor Lopez. Lopez is the STEM Club president.

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what it looks like to the kids. It’s just another old guy coming to talk about something their teacher has been talking about and they’re bored to tears,” he chuckles, “The cadets go out and it’s like they’re rock stars.”

One of those “rock stars” is C2C Victor Lopez. Lopez is the STEM Club president and one of its founders. He’s a classic go-getter, the type of bright-eyed, energetic cadet that young kids are drawn to. A 2009 Coca-Cola Scholarship winner, Lopez generated the idea for a STEM Club while watching a short-lived television show called “School Pride.” It was a program where kids and teachers assisted in remodeling their hard-up schools. One particular episode featured college volunteers from Harvard and Yale. Lopez wondered, “Why can’t we do that?”

Lopez has major philanthropic designs, but he realized he needed to start small. He decided his first step in helping kids in the community would be by starting a STEM club, which could unify cadet volunteers from across different areas of study. Now with 30 members, the club works to donate time to any STEM related project that may need cadet support.

An example of their work is a recent youth science carnival in which the cadets demonstrated some fun science experiments and helped kids complete their own projects. “We had a smorgasbord of great things for the cadets to do. We had gliders, we had satellites, we had space blankets, we had rockets,” said a beaming Lopez. “It was really getting the kids excited about all of these science, engineering and math majors.”

Crisler lauds these types of events, “Every engineer you meet can tell you that there was a day that they realized that, not only could they do STEM, but that it was fun,” he continued, “It could be the day they took a lawnmower apart and put it back together with their dad. It could be the day they set something on fire and it smelled bad and everybody got excited. Every single one of them had what we call that kindle the fire experience.”

“Kindle the fire” is a turn of phrase born of Plutarch’s “The mind is not a vessel to be filled but a fire to be kindled.” C2C Lopez is a perfect illustration of this maxim. His moment of ignition came in high school, “To me, STEM is very important because I almost didn’t pursue STEM.”

After his sophomore year, the Houston native had two divergent job opportunities. The first was to create music videos while interning for a rapper named Chamillionaire. The second was a summer job at NASA’s Goddard Space Flight Center. Summer came and the rapper never replied to his emails or calls, as it turns out the production company had run out of money and gone under. Fortunately, another strong STEM mind would be kindled as Lopez took the position with NASA.

Members of the USAFA STEM Club help children make paper airplanes. (U.S. Air Force photo)

C2C Victor Lopez volunteering at a local science festival.



“Around that time I decided that video production was more of a hobby and STEM, engineering and math is where I wanted to be,” said Lopez, who is majoring in Astronautical engineering, “because that’s what’s going to help our country to continue being number one. For me, not seeing enough kids get excited about this, seeing young girls be demotivated and not having enough role models, seeing underprivileged kids from low socio-economic backgrounds not have leadership and role models they can follow, that to me is heartbreaking.”

One of the people who is helping get cadets like Lopez out into the community is Dr. Ron Furstenuau, ’78. Furstenuau positively exudes excitement for STEM; it’s not difficult to imagine why kids find him and his work enthralling. He has been a chemistry professor at the Academy for 26 years and has been integral to numerous STEM outreach activities such as the Academy’s wildly popular Chemical Magic Show. “We probably do close to 60 or 70 of those a year now. So we do lots of Chemical Magic Shows. I personally do about 30 or 40 of those a year,” said Furstenuau. The program brings cool chemistry demonstrations into local classrooms. Think smoke, explosions and frozen carnations shattering like glass. The kids go crazy.

“What you’re really trying to do is spark their imagination, to let them do things and see things that they’ve never seen before,” Furstenuau reiterated. “It’s important to me because that’s our future. We want these kids growing up to be our scientists and engineers. In the United States, technology in particular is getting very competi-

tive and there’s no reason that we want to rely on other countries—the Chinese, the Japanese, the Indians—to be our driver for technology. We want our own people to be able to do that.”

STEM outreach is vast and varied at the Academy, taking many forms that include everything from hosting teacher boot camps to providing chemistry and engineering workshops for girl scouts. Last September, the Academy donated a YJ-69-T-9 turbojet engine to Denver Public Schools for use in preparing kids for a career in aviation. It’s all work that has led to Crisler winning the Federal Laboratory Consortium’s Mid-Continent Region 2011 STEM Mentorship Award.

These are all great things that are helping stem STEM’s problems locally, so to speak. It is not, however, the Academy’s objective to run STEM outreach in New Mexico, or Nebraska, or even in Denver. Crisler is working to build something bigger, something more sustainable, “I would much rather create a program that we can bring to other areas and say, ‘Here’s how we talked to the mayor. Here’s how we talked to the school board. Here’s how we got local industry involved. Now you go solve your community’s problems.’”

In the end, it’s all about helping the kids and finding solutions to a very complex dilemma. In the future, the Academy hopes to lead the charge. ✓



C2C Yasmin Sarmiento shows a group of Daisy Scouts how to create a sudsy reaction by placing dry ice into soapy water. (Photo by Dr. Ronald Furstenuau)

Dr. Billy Crisler, Director of the USAFA K-12 STEM Outreach Center, recently won the Federal Laboratory Consortium Mid-Continent Region 2011 STEM Mentorship Award. (U.S. Air Force Photo/ David Edwards)