

What lies ahead ... and what lies within

4/11/07 By George Loftus, OSHEAN Executive Director

I may not know what kind of technology kids will be carrying on campus in 2015. I recently found out *which* kids will be doing the carrying...

These rivals usually stand on opposite sides. Face-to-face on the line of scrimmage, awaiting the drop of the puck, or the tip of the basketball, they carry on a long tradition of competition. But on Saturday, March 31st, collaboration was the goal as students from Mt. Hope High School stood side-by-side with teammates from Burrillville High School and Ponaganset High School. At stake: Rhode Island's top prize for the US FIRST VEX robotics challenge. They had worked hard, worked together, and competed against the best of the best to come so far.

I was privileged to serve as a judge in the competition.

The US FIRST VEX robotics challenge is a national event in which teams of high school students compete with robots that they have built from kits. This year – thanks to funds allocated to high schools by Governor Carcieri for purchase of the kits – 27 of RI's 67 high schools participated in the competition, held at New England Institute of Technology's Automotive Center in Warwick. The state's investment had been recommended by the Rhode Island Economic Development Corporation's Business Innovation Factory and was supported by the RI Science and Technology Advisory Council (STAC), the RI Department of Education, New England Tech and Tech Collective.

From what I witnessed, it was money well spent.

All kinds of schools – urban, suburban, charter schools – were represented. The arena came alive with the cheers of parents, teachers, judges, and students. And many lessons were learned – some expected and some completely out of the blue.

About the competition

The teams – ranging in size from three to ten members – had had six weeks to build a robot that would be able to perform better and faster than its competitors. The teams also kept journals to chronicle their journeys, documenting everything from dreaming up their first designs to the many redesigns they undertook as they built and tested the robot's functions. Lessons were learned every step of the way, as these young people practiced problem-solving skills, cemented their understanding of algebra, geometry, and physics, and – perhaps most importantly – learned to function as members of cohesive teams in order to develop strategies and solutions. They were learning lessons that would serve them well in college, and in life, as well as in the competition ahead.

Two teams – the Red Alliance and the Blue Alliance, each made up of two high schools – competed head-to-head in an 8x8 foot square arena, which was on a platform about six inches off the ground with a six inch border. In one match, the Red Alliance might include Barrington High School and Feinstein School. In another match, each school would be paired with another team, and Barrington and Feinstein could be on opposing teams. About 36 matches were conducted continuously throughout the day.

The students' robots competed to place as many soft balls as possible into triangular goals on each sidewall of the arena. In the middle of the arena, straddling both teams' home courts, was a giant exercise ball, called the Atlas ball. A team would double its score if its robots could push the Atlas ball to its side of the court and keep it there until the two-minute competition ended. If a team was able to park its robot on the lazy Susan upon which the Atlas ball rested at the beginning of the match, it scored 5 more points. And the ability to leave a robot "hanging" from the overhead bar that had originally held the Atlas ball in place was worth an additional 15 points. (No team was able to accomplish this feat, but near the end of the competition one team tried. They ran out of time, but the crowd was on its feet cheering them on as ear-splitting pop music blared and New England Tech's Steve Kitchin provided vivid play-by-play commentary.)

Along with the two competition arenas, New England Tech had provided "pit" areas for the teams to prepare, repair, tweak and improve their robots between matches – learning to make modifications to their designs after each match and adapting their robots to capitalize on strengths and address weaknesses.

About the robots

The teams in the US FIRST VEX challenge compete with radio-controlled robots – made from erector-set-type materials that also include gears, motors, pulleys, wheels, and tracks – which also can be programmed to operate in autonomous mode, following the prescribed commands of the programming, independent of a radio-controller operator. There are two types of robots: *lifters* and *dozers*.

The *lifters* have an arm that can scoop up a softball, lift it three feet, and deposit it in a goal for three points. (Very few teams were able to master the engineering necessary to make this happen – and those that did found themselves in the finals.) The *dozers* are powerful enough to bulldoze large quantities of balls into the goals – scoring only one point per ball, but boosting the team's score through sheer volume.

As the day wore on, the students gained a new appreciation of the value of each kind of robot – each making a different contribution, just as different team members bring different skills to a challenge.

Lessons learned

As part of the competition, each of five two-judge teams interviewed about five student teams. During our conversations with these energetic, bright young adults, it became

clear that they had all emerged as better team players and more confident problem-solvers.

In the earliest rounds, each team focused as a self-contained unit – concentrating on making the most of its own robot’s abilities and ignoring the robot of the other team in their alliance. So the dozers focused on pushing balls into the corner, and the lifters perfected their craft of scooping up balls and gingerly placing them in the goals. And no one paid much attention to the Atlas ball.

Slowly, as the competition built to its climax, the students began to see that using the combined strengths of both robots in their alliance – robots constructed by different schools – would be more powerful than using two robots independently. It became clear that a good lifter and a good dozer, working together, could easily lead to victory. And when the score-boosting power of the Atlas ball was finally realized, the humble dozer emerged as a power partner that could launch teams into the finals.

After the 36 qualifying rounds had been completed, each of the eight top teams moved swiftly to draft two other teams to join its alliance for the finals. Teams of lifters and dozers – designed to place as many balls as possible into the goals and push the Atlas ball into winning position – were assembled. Ultimately, it was Mt. Hope’s lifter, Burrillville’s lifter and Ponaganset’s dozer that prevailed. Two longtime rivals – Ponaganset and Burrillville – had learned to work together, utilizing each other’s strengths, to win a championship.

Unexpected victories

Throughout the day, the young men and women involved in the US FIRST VEX robotics challenge showed tenacity, agility, resilience, team spirit, and innovative thinking. But their finest hour came when they rallied to support a kid who needed help.

One young man arrived at the competition to find that the rest of his team had not shown up. A coach from another team immediately offered to provide the student with their spare robot so he could compete – an extremely kind gesture, but one that would require a Herculean performance as the student would have to work with a strange robot. So the team from the Woonsocket Career and Technical Center (CTC) stepped in. They adopted the young man, helped him prepare for his early competitions, and – when it became clear that, in spite of his courageous performance, he would be eliminated – they invited him to join their team..

At the end of the day, after prizes were given for winning the competition and for engineering prowess – it was time to present the *Amaze Award*, an accolade given to the team that simply astounded the judges with its overall quality. The judges unanimously chose the Woonsocket Career and Technical Center team for its selfless act of adopting the lone student from another school. When they approached the podium to accept the award, the members of the Woonsocket team insisted that their adoptive teammate join

them. And, as they returned to the stands, their teacher wrapped her arms around each of them and wept with pride.

What lies ahead

As I contemplate the intersection of society and technology eight years from now, I think of these young men and women – today's high school freshmen, who will become the college graduating class of 2015. They will have been involved in hands-on technical challenges as part of their learning experience. They will be strong problem-solvers and community leaders, thanks to new methods of teaching and learning.. They will have experienced myriad new technologies – and their generation will have helped to shape the societal impact of those technologies.

While I find it hard to predict what specific technologies they will carry on campus, I feel more confident than ever that students like the ones who competed in the US FIRST VEX challenge will carry with them the skill sets and character traits to tackle the challenges of a rapidly changing world. And I hope each of them faces the future with the same sense of generosity, humanity, compassion and basic decency that our Woonsocket team showed last weekend.

P.S. The winning team of Mt. Hope, Burrillville and Ponaganset, are competing in the national championship this weekend in Atlanta, GA. Not bad for first time winners!