Green Meadow Robotics Team Wins Championship Alliance

They're called The Poly-Gnomes.

They are a group of eight Waldorf students in grades nine through twelve who design and create robots.

And they made up half of the championship alliance that won the Snow Day Showdown tournament in Hightstown, N.J. on December 15 -- an event that is part of FIRST, an international program designed "to inspire and recognize excellence in science and technology through robotics co-opertitions."

Green Meadow Waldorf School's robotics team includes Alexander Evans, Nicolas Frei, Noah Kaplan, Gavin Langdon, Aidan Nelson, Charles Rudish, Sung-Pil Moon, and Sung-Ryul Moon. The team gathers together after school every week under the guidance of GMWS's robotics coach and high school physics and math teacher James Madsen. Together they strategize, plan, program, and build.

"FIRST calls them 'co-opertitions' because you have to cooperate as well as compete," says Madsen. "Sometimes during the competition someone from another team will help nudge a stuck robot, or we'll share software. The point is to help everyone do their best, as well as to win."

The FIRST Robotics Competition challenges teams to design a robot that will win against a robotics game designed by FIRST founder Dean Kamen and a committee of engineers and other professionals.

Students are rewarded for excellence in design, demonstrated team spirit, gracious professionalism and maturity, and the ability to overcome obstacles. Scoring the most points is a secondary goal.

Winning means building partnerships that last.

All these goals are inherent in every aspect of the Waldorf curriculum, which may be one of the reasons for the Green Meadow students' success.

The game rules are different every year. This year's game was called Quad Quandary. "On the playing field there are bunch of three-inch rings and different types of goal," Madsen describes it. "The teams are trying to gather rings and score them on goals. The goals move. It gets pretty fast and serious."

You can check out the game on the FIRST web site:
http://www2.usfirst.org/FTC/2007GameAnimation/FTC_Animation_07_640x480.wmv

The Poly-Gnomes spent a couple of months thinking about how they could create a robot that would win the game. "The students have to constantly apply all the physics and math they've been learning; weighing cost and benefits of using one design over another," says Madsen. "And

without a lot of money to invest in research, you have to be more creative. There's a maximum of ten students on any team, which means that everyone needs to be active and participate.

"This is a terrific place for these students to be successful at something they are good at. It takes a lot of physics and programming to get the robots to do what they want them to do. They're computer whizzes; they are great at playing computer games, but with this program that FIRST offers now they can get really creative.

"During the first twenty seconds of each match the robots must operate completely on their own by following programming instructions written and pre-loaded by the team. After that the controls can be taken over by the students for two more minutes. Team alliances are selected randomly, chosen two on two, in a mini arena. In any given match another team could be an opponent or a partner. After numerous qualifying matches, the teams with the best scores choose an alliance partner, and one of the rules is that the top teams can't choose other top teams. The Poly-Gnomes team was selected by the winning team to be their partner because of their design and their collaborative efforts, as well as their software."

And so the Poly-Gnomes combined with Team Overdrive from Bridgewater, N.J. to win the scrimmage. They'll next be heading to NJ Tech Challenge in February, and then hopefully to the Javits Center in New York City in April.

FIRST emerged from a strong personality, a New Hampshire entrepreneur called Dean Kamen, who had several scientific patents to his credit. In the late nineteen-eighties, he saw something occurring in the United States that troubled him: Science and math heroes were simply not valued by young people in the same way that were rock stars, athletics champions, and movie idols.

Kamen set out too create a venue that would inspire young kids to be scientifically and technologically challenged – something so exciting that it would be as exciting as performing at a rock concert.

In 1989, he founded FIRST, an acronym meaning: "For Inspiration and Recognition of Science and Technology." By 2007, 37 competitions were held in places across the world such as Israel, Brazil, Canada, and the U.S.A. Kamen remains the driving force behind the organization, and continues to gain support and publicity from major corporations, universities, and colleges.

"The way these events occur is very exciting," says Madsen. "There's loud techno music, it's all highly animated, and it's very exciting for the kids. It's nothing like a spelling bee or a science fair; instead there's intense animation, excitement, yelling, screaming. And what's really great is that gracious professionalism imbues everything we do in all the competitions. Dean Kamen's ideal of helping your competitors permeates every aspect. Being a monopoly and destroying everyone else doesn't help anyone. Helping each other helps everyone. And you see that in the competitions. The students are all helping each other, sharing software, helping with spare parts."

What are robotics? Simply put, robotics is the science and technology of robots, their design, manufacture, and application. Robotics requires a working knowledge of electronics, mechanics, and software, and needs to be accompanied by a large working knowledge of many subjects.

Although the appearance and capabilities of robots varies, all robots share features of a mechanical, movable structure that is under an autonomous control. The structure of a robot is mostly mechanical; its functionality is similar to the skeleton of the human body: formed of links (bones), actuators (muscles), and joints.

The first program developed through FIRST was the FIRST Robotics Competition (FRC), which was designed to inspire high school students to become serious engineers by giving them real world experience working with professional engineers to develop a robot. The competition challenge changes each year, and the teams cannot reuse components created for previous robots. The robots weigh around 120 pounds, depending on the current year's rules.

“Competing on a stage brings to the participants as much excitement and an adrenaline rush as do conventional varsity tournaments that are sports or performance-based,” says Madsen.

Mr. Madsen’s children attended the Monadnock Waldorf School through eighth grade, but since there was no high school there at the time they attended public high school. “At the public high school there was this fantastic robotics team the students could join. When I got the job as physics and math teacher at Green Meadow Waldorf School. I wanted to offer the possibility for students to take part in the FIRST competition.”

An interesting aspect of the Green Meadow Waldorf students doing so well with robotics is that in the Waldorf curriculum computer science is taught only after the students are adept in algebra and physics, typically not till high school. This is because in the Waldorf curriculum children learn conceptually only what they can actually do in practice. So they learn first how a computer is made and how programming works, ideally before they use it to play games or conduct research. In this way they become masters of the tool, not the reverse.

An educational environment in which students typically make most things themselves throughout the elementary grades, including their own, individual text books, might ultimately be the best place to achieve real expertise in technology, and to experience all its creative, imaginative possibilities.

Additionally, Waldorf interfaces particularly well with FIRST’s ideal of collaboration, team spirit, graciousness, perseverance. Any Waldorf school interested in getting involved in FIRST can go to http://www.usfirst.org/contact.aspx?id=2878 to find a FIRST contact person near them that will help.

Winslow Eliot
January 2008