

12-1-2010

Increasing High School STEM Participation Through Robotics Training and Tournaments (FINAL REPORT)

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Recommended Citation

Kline, Richard, "Increasing High School STEM Participation Through Robotics Training and Tournaments (FINAL REPORT)" (2010). *Cornerstone 2 Reports : Community Outreach and Empowerment Through Service Learning and Volunteerism*. Paper 22.
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Provost's Thinkfinity Grant Final Report

Increasing High School STEM Participation Through Robotics Training and Tournaments

Cornerstone II: Community Outreach and Empowerment
Through Service Learning and Volunteerism

Principal Investigator: Richard Kline, Seidenberg School

December 15, 2010

A. Review of Project Objectives and Expected Outcomes

The overall goal of this project was to engage high school students in an exciting way to increase their interest in science and technology. We planned to accomplish this by making Pace University an official Affiliate Partner of the FIRST Tech Challenge (FTC) robotics competition, a fast-growing program with more than 1,100 participating teams in 2009-2010. In FTC, high-school age participants design, build, and program their own robots to enter into regional and national competitions. Building on the Seidenberg School's past success as a partner to FIRST with its FIRST LEGO League program, we intended to organize, host, and run several top-notch FTC events, bringing smart and enthusiastic high school students to our campuses to interact with Pace students and faculty.

Objectives:

- To increase the student interest in science and engineering (the STEM fields) in high schools throughout the Lower Hudson Valley area and beyond.
- To improve technology and science education in the 9th-12th grades.
- To have the Pace University community reach out to prospective students interested in technology. The community includes alumni, advisory board members, and corporate partners.
- To provide an opportunity for high school students interested in technology to attend a high-quality program at Pace University
- To provide an opportunity for former FLL (middle school-aged) students to advance to a high school-level robotics competition.

Anticipated outcomes:

- Within the fall semester, the Seidenberg School will have reached out to 10 area high schools promoting FTC.

- At least two “veteran” teams and three new/prospective teams will participate in a season kick-off / information event in the Kessel Student Center in Pleasantville.
- At least six teams will participate in an all-day robotics training workshop at Pace.
- On February 21, approximately 500 individuals will be in the Goldstein Fitness Center watching twenty-four high school-aged teams (approximately 120 – 200 students) compete in a challenge with their robot. Those in attendance include parents and friends, engineering mentors, judges and referees from industry and the Pace community, and Pace student volunteers.

B. Actual Project Outcomes

Each of the anticipated outcomes enumerated above were achieved. Specifically:

The Seidenberg School successfully convinced FIRST to name Pace University the FTC Affiliate Partner for the Hudson Valley, NY region covering the southern half of New York state outside of New York City.

We reached out to more than 20 area high schools to encourage the formation of new teams and programs. Since our efforts began, new FTC teams in our region have been started in Croton-Harmon, New Rochelle, Yonkers (3), Yorktown (3), Suffern (2), Albany, Schenectady, and New Hartford.

A season kick-off / information event was held on the Pleasantville campus on Friday, October 9, 2009. It was attended by approximately 30 students and teachers from the area.

A training workshop was held on the Pleasantville campus on Sunday, December 6, 2009. It was attended by eight area teams. A representative from PTC was on hand to provide free CAD (computer-aided design) training to participants.

The first annual Hudson Valley FTC Championship Tournament was held on the Pleasantville campus on Sunday, February 21, 2010. Twenty teams registered for the event. Teams came from the Hudson Valley and from all over the Northeastern U.S. Participating teams joined us from Delaware, Pennsylvania, New Jersey, Virginia, Connecticut, and Massachusetts. Approximately 160 team members, plus their coaches, mentors, parents, siblings, and friends, spent the day on the Pace campus. A follow-up survey of tournament participants showed that teams were very satisfied with their experience, and many cited their extremely positive interactions with Pace volunteers as a highlight of the event.

The event also drew the volunteer support of more than 20 working professionals from IBM, Bayer, AT&T, and Gartner Group. They also reported a positive experience at the event. We expect many of them will be willing to participate in planned FTC activities in the 2010-2011 academic year.

We agreed to allow FIRST to run a beta test of a new prototype robot control system at the Pleasantville tournament. A FIRST engineer and the FTC Partner Services Manager came to run the test, and Dr. Kline trained 10 Seidenberg students to support them in their activities. The test exposed significant problems with the system not seen at smaller-scale tests, so the exercise was very valuable to FIRST, and their employees were very impressed with the tournament and the

Pace volunteers. Teams were temporarily inconvenienced but were very supportive of the test.

In recognition of our early successes and in making use of the wonderful collaborative relationships we built with the FTC organizations in New York City and New Jersey, we added an extra FTC event to our schedule, which was planned and held on the New York City campus on Saturday, May 8, 2010. Seven area teams participated, including six from New York City who had not come to the Pleasantville tournament. We also invited FIRST to bring back their prototype control system for another test, and this brought engineers from FIRST, Cisco Systems, and National Instruments to the campus. All thanked us for our participation and complimented the organization and our student help. This test went much more smoothly.

FIRST was grateful for our participation in the development of the new robot control system. Development was completed over the summer, and every team in the current season is using the new technology.

During the fall of 2010, Pace held three FTC events on the Pleasantville campus, which together attracted at least 16 different teams from the region.

The 2011 Hudson Valley FTC Championship Tournament is scheduled for Sunday, January 30 on the Pleasantville campus. More than 40 teams have registered their intent to compete. Due to logistical reasons, we are capping participation at 32 teams for this season.

The events generated considerable excitement on the Pace campuses and were featured in the Pace Pulse, Pace Magazine, and Seidenberg e-Communique.

C. Impact on Students

The February tournament was supported by the enthusiastic help of more than 60 Pace University students. More than a dozen Seidenberg majors served as technical experts and as some of the referees; students in three different Seidenberg civic engagement courses performed many different roles throughout the day; students from the football and lacrosse teams helped with set-up and tear-down of the event; and other students from around the university also contributed to the success of the tournament.

More than 15 students, who were either Seidenberg majors or students in Seidenberg civic engagement courses, volunteered to put on the May 8 event. They also had the opportunity to interact with the expert outside engineers.

The Tetrix robotics equipment purchased through the grant has been used for several different projects. Students being trained as expert volunteers for the FTC competition have been the primary users to date. The equipment has been used for training, workshops, and testing at our hosted FTC events. We are also exploring the idea of offering a robotics course based on the Tetrix equipment in the near future.

D. Impact on Faculty

The efforts of this supported work complemented separately funded efforts by Dr. Pauline Mosley of the Seidenberg School to increase local participation in robotics activities. Dr. Mosley

provided equipment loans, financial and/or technical help to teams at Woodlands High School in Hartsdale; Roosevelt High School in Yonkers; and Carmel High School in Carmel.

Drs. Joe Ryan and Kathy Winsted volunteered as announcers at the February event. Seidenberg faculty Matt Ganis, Jimmy Chin, Henry Wong, and Pauline Mosley were among the many volunteer judges for the event. Seidenberg faculty Andrea Taylor, Sung-Hyuk Cha, and Julia Khan-Nomee were instrumental in providing support and coordinating student volunteers.

The events also benefitted from the volunteer contributions by many staff and administrators. Bernice Houle is the co-chair of the Hudson Valley FTC Committee and used her considerable experience in FIRST LEGO League to successfully organize the inaugural tournament. Other staff who volunteered their time and effort included Dean Constance Knapp, Assistant deans Eileen Murphy, Louise Kleinbaum and Jonathan Hill, Dawn Rigney, Tricia Brogan, Brendan Halligan, Geoff Harter, Andreea Cotoranu, Lynne Larkin, Fran O’Gara, Lovette Esliker, Gerry Forstrom, Matthew Poli, Thomas Reivik, Nicholas Rudzwick, Susan Downey, and Wilfredo Pena.

E. Next Steps

Our efforts to date have been extremely successful. In 2010 we brought approximately 200 FTC team members interested in science and technology to Pace University campuses from all over the Northeast. In January 2011 we expect more than 300 motivated, smart high school students at our second annual championship tournament.

During the 2010-2011 year, we will continue our outreach and the rapid growth of this exciting, effective program. We will continue to speak with area high schools to promote the program and offer support activities to those considering starting a team.

We will continue our efforts with area professionals to further their involvement in FTC and Pace University. These people have told us they enjoyed their participation and in working alongside Pace students.

We will seek additional funding for future activities, both internally and externally. The growth of the tournament provides additional revenue through team registrations to help offset the event costs. Dean Knapp and the Seidenberg School are committed to this worthwhile effort.

Respectfully submitted,

Richard Kline
Seidenberg School