

The Growing Appeal of TOGA PARTY

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TOGA PARTY (Team OSU Grandview Heights American Electric Power Preparing And Readyng Today's Youth) competed in FIRST for a second consecutive year. FIRST is a national competition designed to stimulate interest in science and technology among high school students. Each year teams obtain boxes of components, a limited dollar charge account from Small Parts Inc., and a description of the objectives for the competition. Once the materials are received, each team has six weeks to construct a robot capable of playing a competitive game or sport. The components used and the contest played by the robot changes from year to year. For some the head-to-head competition of robots is the primary focus, but other competitive aspects of the FIRST program are as closely scrutinized by officials as the actual robots. Teams also compete for the Chairman's award (presented to the team judged to have best exemplified the spirit of FIRST), an animation award created with 3-D Studio Max, team spirit award, design creativity, and others.

Our partnership involved four engineers from American Electric Power (AEP), nineteen high school students from Grandview Heights High School, twenty university students from The Ohio State University, one high school and one university faculty advisor. The high school and university students had diverse backgrounds, interests, and educational objectives. High school students were all currently taking physics, but not all were interested in technology or engineering. The OSU students were from the colleges of engineering and arts and science. The AEP engineers were from different divisions with diverse experiences. This combination led to a partnership which provided everyone with a positive learning experience. The enthusiasm,

excitement and support of the Grandview Heights community was equal to, if not superior to that of last year, when the project was new and many people showed support because it was unique. This year the high school physics teacher was awarded a supplemental contract for her efforts on the project, which marked the first time in the school district that a supplemental contract was awarded for an academic effort. FIRST is regarded as the premiere outreach program within the College of Engineering at OSU and has gained a solid reputation as a good student project. Interactions of team representatives with the director of AEP were persuasive and resulted in bringing the program to a higher level of visibility and support. This year the AEP engineers were allowed flexibility's which were not previously available. Therefore, it is easy to see that within the communities of Grandview Heights, OSU, and AEP there is a growing appeal for TOGA PARTY.

Early development of a sense of belonging to the team are essential. Beginning in October the university students, working with suggestions from AEP engineers, organized weekly two hour meetings between the AEP engineers, high school, and university students. These meetings were designated as EF (Engineering Fundamentals) labs. University students who had previously worked on the project lead group activities focusing on essential concepts (power, torque, electric circuits, etc.) and skills they had (soldering, welding, design concepts, etc.) which are all needed to build our robot. Team members were divided into groups, with each given a relatively simple problem to solve in a finite time. The solutions were shared with the entire group and the logic behind the solution discussed. The groups changed from week to week, as did the level of difficulty of the problems. Some of the OSU students and AEP engineers worked on the project last year and were comfortable working together. The high school students were eager and willing to learn as they participated in the activities. For some, it was their first encounter with a teaming effort in which building working relationships with complete strangers in a short time frame is essential to completing a task.

The involvement of university students was solicited by word-of-mouth communications between previous team members and class mates, as well as an engineering student project fair held in September. A total of forty students showed interest in the project at the time of the student project fair. Twenty OSU students committed to the entire project, with twelve traveling to the national competition in Florida. University students were able to earn credit for their efforts through a course specifically developed for the FIRST project. Students could earn variable credit, up to a maximum of four hours. Those planning to participate for multiple years

had to judiciously select the number of credit hours they wanted to commit to. Student grades were determined based on the number of hours they worked and the credit hours they signed up for. Assuming a student should spend two hour out of class for every hour in class, one credit required a commitment of 30 hours to earn an A grade. Other grades were based on a linear ratio of time worked (B = 27 hours, C = 24 hours, etc.). Not all students received an A.

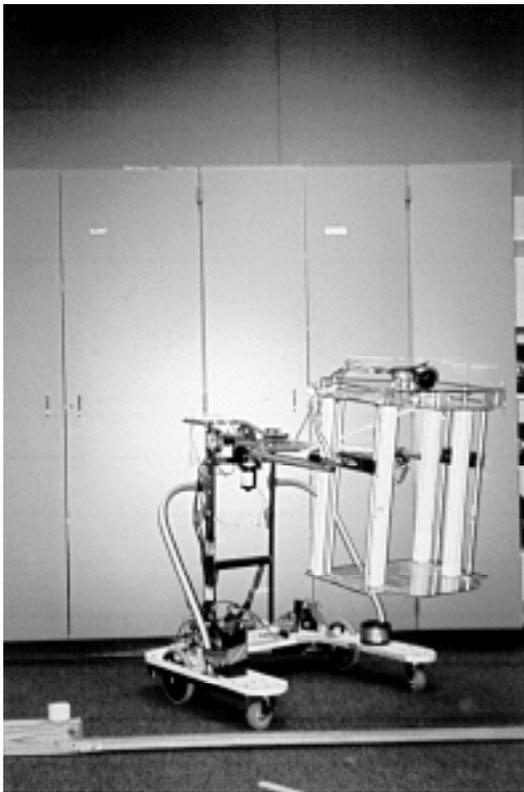
The university students were placed in a unique position as mentors to the high school students and mentorees for the engineers. As mentors they were invaluable in making the high school students feel like contributors to the overall project. This lead to a heightened enthusiasm and concentrated involvement on the part of the high school students. Additionally, university students interacted with high school students as peers. High school students admired and respected the abilities of their college peers who were almost the same age. It made some re-visit their career choices. A student who applied to, and will likely be accepted to Harvard, did not apply to MIT for fear of being stereotyped. As a result of this project requiring her to work with engineering students and an MIT graduate, she is considering taking some courses at Harvard and going part time to MIT until she can be admitted there. As mentorees, the university students gained valuable experience in several critical aspects of engineering. The problem of continually blowing fuses could not be solved by the university student overseeing the controls component of the project. Eventually an AEP engineer with years of experience in controls solved the problem, which proved to be a valuable lesson for the university student. On another occasion a special component had to be machined in order for an integral part of the robot to function. A university student stood at the shoulder of an experienced machinist from 2 -11 PM while the part was being made. The student later claimed that he had learned more useful information in that time than in the last year of college. University and high school students gained a much broader view and a deeper fundamental realization of the gap between traditional classroom education and experience.



Students assemble components under the watchful eye of an AEP engineer.

This project has built friendships and loyalties which will have lasting effects on all three partners. The national competition is two weeks away, but discussions regarding next year's efforts are beginning. The time spent by each AEP engineer was uncompensated and after normal work hours, but each is looking forward to next year with ideas for improving the preparation of each student. The high school students have learned more from the university students than they could have by interacting only with the AEP engineers, while the OSU students learned more from the AEP engineers than they could in a traditional classroom setting. One of the most important lessons they learned was that with hard work and task dedication an impossible task can be completed.

Many lasting relationships and memorable experiences have resulted from this project. The role of the university student cannot be over-stressed. They gave more than time and effort and gained more than experience. They helped bring an added dimension to the intention of FIRST. As a tool promoting an interest in science for high school students, FIRST is an excellent program. A university considering involvement with FIRST should find it a very rewarding experience. The time commitment is enormous, and staffing is sometimes problematic, the rewards are tremendous. I enthusiastically endorse the FIRST competition as a mechanism for promoting interest in science and technology, and highly recommend it as an excellent program for all universities to be involved with.



The final product ready to be shipped