

# **Fundraising From Experience: How to Pull Off an Educational Robotics Camp with Eight Unmotivated Teenagers**

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### **1 Introduction**

No matter how large or small an organization is, money is always necessary. This maxim is especially true for high school robotics teams. Throughout our robotics experiences, we've made money through garage sales, LAN parties, car washes, and selling crafts. However, none of these activities raised as much money as a robotics camp. A day-long, elementary-school-targeted camp at a gifted and talented symposium raised about \$2400 for our school's Botball booster club. We taught the elementary schoolers basic programming for the LEGO Mindstorms NXT kit and had them work on several goals, such as a robot that could follow a line or a robot that can stop whenever it hears a clap, etc.

The experience was far from perfect. There were several elements of our robotics camp that were planned and carried out extremely well: the computer lab in which we were teaching was prepared for the thirty-three children we taught and the material was very clear and easy to understand. However, the staff was not competent with the NXT programming software and no one anticipated the fast learning curve of second-to fifth-grade children. A successful robotics camp is characterized by planning for all contingencies, in-depth and easy-to-understand lesson plans, and a group of knowledgeable leaders to teach the attendees.

### **2 Why A Robotics Camp?**

Before our school's robotics team had the idea to put on a robotics camp, we made our money through LAN parties and garage sales. Each event would net us around \$500 maximum. The ratio of effort-to-cash seemed to be very high, so our team began reconsidering our options.

Several years ago, our teacher at a middle school hosted a robotics camp for third-to-sixth graders. At a cost of fifty dollars a person, few children were expected to attend. However, more than thirty children registered, eventually raising more than two thousand dollars. Many of the Smith robotics team members had helped staff this camp and the effort-to-cash ratio was relatively low.

### **3 Organizing the Robotics Camp**

#### **3.1 The Curriculum**

After deciding to host a robotics camp, the two Newman Smith High School teams began debating what exactly third-to-sixth graders want to learn. We borrowed eleven LEGO Mindstorms NXT kits from our school district's technology department, which had held a week-long robotics program for fourth graders based on the LEGO Mindstorms NXT curriculum. The curriculum, purchased separately from the kits, has a self-pacing, self-teaching tutorial with several challenges that would provide us with the technique for teaching.

### **3.2 The Meeting Place**

Now that we had our kits, only one major problem remained: where and when could a robotics camp be taught? The curriculum required computers for each kit so the children could program their NXTs. Our school's computer lab was out of the question simply because we did not want to handle upwards of twenty children in an empty school building.

After some additional collaboration with our district's Advanced Academic Services department, our robotics team discovered that a Gifted and Talented Symposium was willing to sponsor a robotics camp. It was the perfect venue: the Symposium was to be held in the school district's Technology Learning Center, which contained several new computer labs we could commandeer. It also had the advantage of being a Gifted and Talented Symposium, which meant that there would be an excess of bored, gifted third-to-sixth graders in the building. After a short discussion with AAS, we reserved two computer labs and we began advertising for our camp in conjunction with the symposium.

### **3.3 Getting the Word Out**

Our team put several ads in the local newspaper and the G/T newsletter for our district and set the price at sixty-five dollars per child because we wanted a manageable group of around twenty kids. However, the camp turned out to be so popular that we had to cut off registration at thirty-three children, which provided eleven teams of three children each.

### **3.4 The Workforce**

The hardest part of pulling the robotics camp together was finding enough high-schoolers to teach thirty-three third-to-sixth graders how to program robots. With thirty-three "campers" and eleven NXT kits, we divided the children into eleven teams of three. We attempted to group the campers by age and school.

With eleven teams, the lead organizer attempted to recruit eleven high school helpers. Unfortunately, the G/T Symposium was held on the same day as prom, disqualifying any seniors that may have wanted to come. This situation left us with a handful of freshmen, two sophomores, and a junior. Some coercion was required to gather this group of volunteers, but they became volunteers nonetheless.

## **4 The Robotics Camp**

As an ice-breaker assignment, the campers worked, without talking, to build the tallest structures they could using only balloons and masking tape. This led to the discussion that the structure needed to have a good base, that it was easier to modify than to rebuild, and that each member of the team needed to have a

job to do in participating. This then led to a discussion concerning the similar requirements for a successful team building a good robot.

The curriculum for the robotics program was set up into six modules: programming robots to go straight, use sensors, follow a line, listen for clapping, use sonar, and how to build the robot using gears. Our camp was meant to last from nine in the morning to three in the afternoon, so obviously we thought that little children could not finish all of those objectives and build a robot in five hours, so we cropped out some of the more esoteric lessons and left a basic crash course in elementary robotics: programming the robot to move and follow a line.

The ultimate goal was to get the kids to build a robot that could follow one of two line “courses”: one easy and one hard.

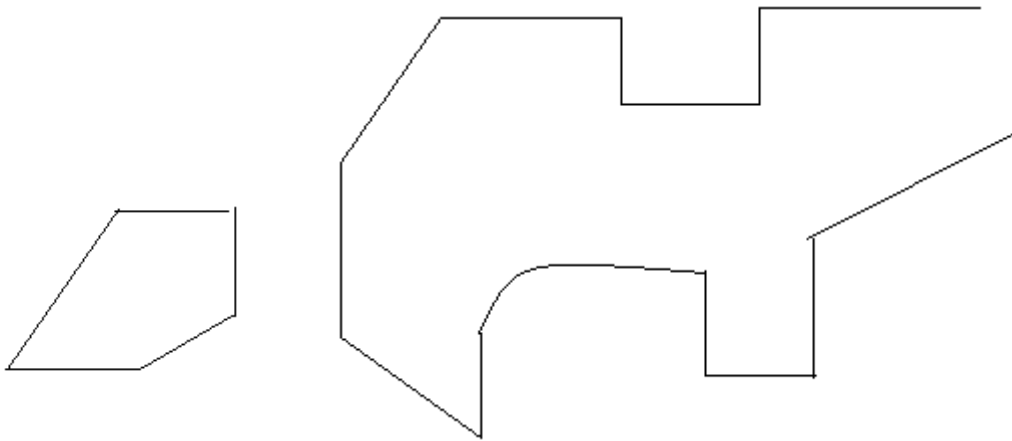


Fig. 1: The easy track

Fig. 2: Artist's conception of the hard track (after simplification)

After receiving the curriculum for the robotics course, it was passed around to each staff member several weeks in advance in order to keep everyone up-to-speed on the material we would be using during the camp. In true robotics fashion it was not read at all (not even by the organizer), leaving our team clueless as to how to program the NXT. This led to many silences during the presentations while the presenter attempted to learn the programming on-the-fly.

The other problem we faced was the apparent ingenuity of the elementary schoolers. While we had allotted an hour and a half to build the robot based on trial runs with other children, the camp attendees had their robots built in forty-five minutes. This, coupled with the ever-increasing desperation of the staff, led to many assignments along the lines of “read the manual and see what you can get your robot to do.” Since the curriculum was basically self-taught and self-paced, this did work!

Also, the original concept of the hard track was so fiendishly difficult that it was actually physically impossible to complete with the camp's suggested programming. This led to simplification of the track, as evident in Fig. 2. However, even in the simplified state, only one team could actually finish the course. Every child received a participation certificate after a public contest to follow the line around the course.

## 5 Conclusion

In the end, even with the lack of planning, genius attendees and several points at which the team leader had to leave the room in order to prevent a nervous breakdown, the camp ended up being a huge success with the children who attended it, and it netted our robotics team around \$2400. The effort-to-cash ratio was very low, providing a very nice boost to the team's morale.

The points that should be planned thoroughly are the curriculum, the teaching, and the competency of the staff members. Each team needed to have one high schooler to moderate roles and keep everyone busy and satisfied. Next time, we will limit our camp registration to only two team members, which will make it easier to keep everyone busy. We will also prepare for contingencies, such as what to do during "dead" time. And we will over plan, making sure that we run out of time before we run out of activities.

Even with the lackadaisical attitude of many of the high schoolers, the campers felt good about their accomplishments and were able to show off in front of their parents while running the robots on the track in the final competition. Each child had participated in the building, programming, and running of the robots. No one was bogged down with documentation or double elimination requirements, so the stress level was very low.

In addition, the campers and their parents were so excited about robotics that they asked for further camps. Now Newman Smith High School has purchased its own Mindstorms kits with grant monies, and we are looking into beginning and advanced levels of week-long courses for which we can charge more money. If we hold two such camps every summer, we can effectively pay for our Botball team registration expenses. If we can get more motivated, we can start fundraising for travel expenses as well!