Growing a Robotics Club: Increasing Membership and Raising Funds through Robotics Camps
Evan Wilson
Hampton High School
evan02@verizon.net

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1 Obstacles Faced by Robotics Clubs

Most club-run robotics organizations participating in competitions, including Botball, face the same yearly ritual of attempting to boost membership and searching for ways to fund their registration, travel, and miscellaneous costs. A few lucky clubs receive generous funding from their school districts while others may receive grants from external organizations. For the vast majority, however, raising money is nearly as important and time consuming as participating in the competitions themselves.

Our small club falls in the majority and is continually looking for ways to raise money and garner the interest of students. Although often overlooked, students are capable of planning, organizing, and conducting extremely successful, large scale fundraisers. The most successful and simple means of raising funds and awareness we have found is through holding student run robotics camps. These camps introduce robotics to students at a young age and are capable of keeping them involved until they reach high school. Involvement is the most important result of holding camps because without members, it does not matter how much money the club has.

Our club has been holding various types of camps on and off for many years. However, until last fall, we had not hosted one in about two years. We dug deep into the club's records that documented previous camps' methods and curriculum to devise a system which provides the best result. The outcome was an event with 500% higher participation and income as any previous camp.

This paper is not about the Hampton High School Robotics Club; instead, it documents the system we have found to be extremely successful for raising funds and enhancing the future membership base. We wish to share this method so it may be utilized by any club planning a camp or wishing to broaden its presence in the school and community.

2 Planning a Camp

The first task in planning a robotics camp is deciding on a date, time and venue. These choices may not seem like they will play a major role in attendance, but they definitely will. For example, avoid scheduling around a major event such as the beginning or end of the school year, or during a popular travel season. Through our experience, we have found that an excellent time

to hold a camp is about two to three weeks before winter break. Around this time, parents are often scrambling to find time to go shopping. They are very grateful for the shopping time they will gain and the fun, educational session their child will experience. When choosing the time of day for a camp, the curriculum and activities, which will be discussed later in the paper, must be considered and the length of the camp determined based on these factors. One possibility for the timing of the camp is to have it in the evening. This gives the parents some time to be alone and possibly go out to dinner or just relax. These simple decisions can easily become a few of the camp's selling points, requiring little additional effort if planned thoroughly and in advance.

2.1 Getting the Word Out

Communication is extremely important in planning a camp. If nobody knows about the camp, nobody will sign up. Furthermore, if people see poor representations of the camp or club, they will be hesitant to spend money to have their kids attend a second rate educational experience.

Begin publicizing the camp early and in many ways. A flyer should be created clearly stating the time, location, and price of the camp. It should also include the various activities students will participate in and the benefits of attending. Mailing in forms is one method of registration; include a section at the bottom of the flyer with concise, specific instructions on how to sign up.

Have an announcement placed online on the school district or organization website. Ask the webmaster to upload the flyer and place a link with the announcement so parents will quickly know how to register. Put an announcement on the robotics club website. With only a small amount of HTML and PHP experience, a form can be placed online to allow registration. Keep records of who has already paid or set up a PayPal [1] account allowing for secure online transactions, creating the ultimate combination of instant registration and payment. This approach builds confidence with adults, showing them that the club is tech savvy, even if web design is fairly unrelated to robotics.

Request an article be placed in the local newspaper or cyclic publication about the robotics club. Use the article to mention the upcoming camp and the many enrichment opportunities that will be offered.

The most effective way of gaining publicity is visiting the target audience. With permission, stop by elementary schools and talk to students during their lunch periods. Take an old Botball robot or other project to show them what they will learn about. Children love teenagers, and they love the opportunity to talk to high school students. Explain all the fun activities they will do, and hand each student a flyer individually. They will inevitably go home and excitedly tell their parents what happened at school and that they must attend the camp. Using this technique, we have had eighty students register in the span of two days following school visits.

3 The Curriculum

Most children have relatively short attention spans. For this reason, it is essential to have a well planned, interactive learning environment. The best way to make a robotics camp interactive is

to have the students build a robot. However, everyone cannot build one robot, so it is necessary to split the participants into groups. The optimal group size is three to four so everyone is able to actively participate, but there are enough peers to collaborate with and discuss ideas.

An excellent way of demonstrating the various ways of approaching problems is to have each group be a team and at the end of the day, hold a competition among the different teams. This allows the students to see the different approaches teams attempted to better their opponents.

Students in different grades are obviously not prepared to be learning the same curriculum. Because of the range of ages, a range of activities is necessary. For example, the youngest age group performs a simple task like building a sumo robot meant to push the opposition out of the circle (Figure 1). For slightly older students, a jousting competition supplies slightly more complex ideas with line following (Figure 2). In this competition, students attempt to build their robot to push the other off the line or backwards. For students around nine and ten years old, creating a line following program creates the opportunity for learning more advanced programming. Teams in this age group try to reach the other end of the line in the least time.

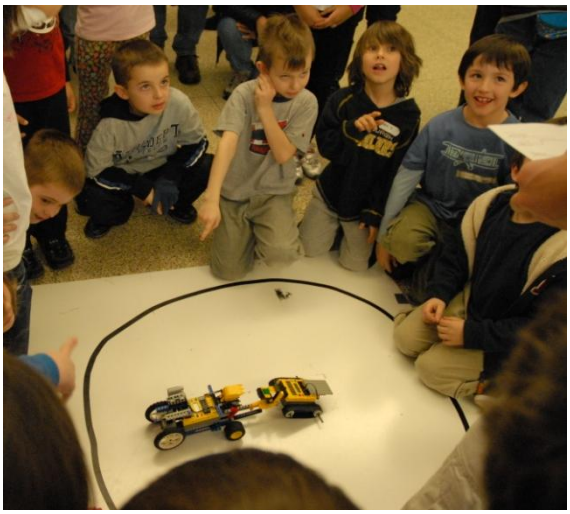

Figure 1: Sumo competition

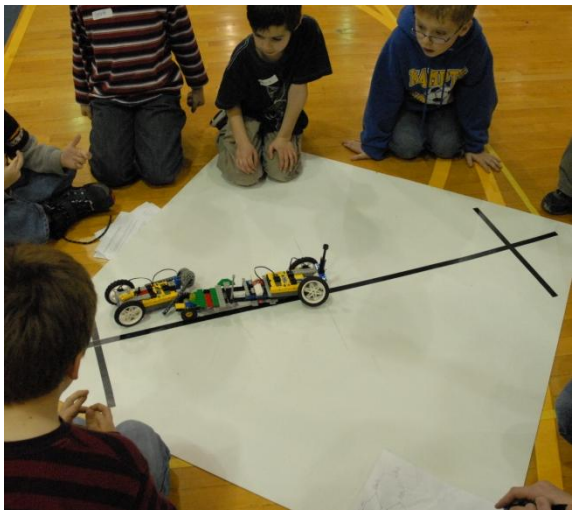

Figure 2: Jousting Competition

3.1 Concepts Taught

This simple, competition-centered, teaching style allows for many concepts to be taught while keeping the students on task. At all ages, the engineering design process [2] can be introduced. Have students brainstorm ideas, then discuss and build a robot. When building is complete, take it apart and build an improved version based on lessons learned from the first.

With very young students, grades kindergarten through third, the day is mostly focused on mechanical design and problem solving. Introductions to gearing concepts can be can be taught for the purpose of increasing torque for the pushing aspects of the competition. The second and third graders may be introduced to programming and taught that a robot is coded to do certain tasks. However, they are still fairly young to write the actual program. They get to see the results of programming with the line following phase of the jousting competition.

Fourth and fifth graders can start programming. By learning to create a line following program, they learn basic programming skills to make their robot move, and, more importantly, they learn essential programming concepts such as loops and if statements. Further, they are able to gain an appreciation for the importance of sensors. They realize that sensors are what allow robots to interact with their surroundings to become autonomous robots.

3.2 Robots in the Real World

It's often difficult to conceptualize where playing with some Lego components is going to lead. For this reason, it is fantastic to search out a local individual in the field of robotics to come to the camp and talk to the students. This experience provides students with the opportunity to see that robotics can turn into a career. Further, it demonstrates to them the immense variety of fields robotics can be a part of. At a recent camp, we had Mr. Ken Wolf from RedZone Robotics [3] talk about his company and how they create robots. He even brought one of their Solo robots [4] (Figure 3), which inspect sewers, to show the students during his presentation (Figure 4).

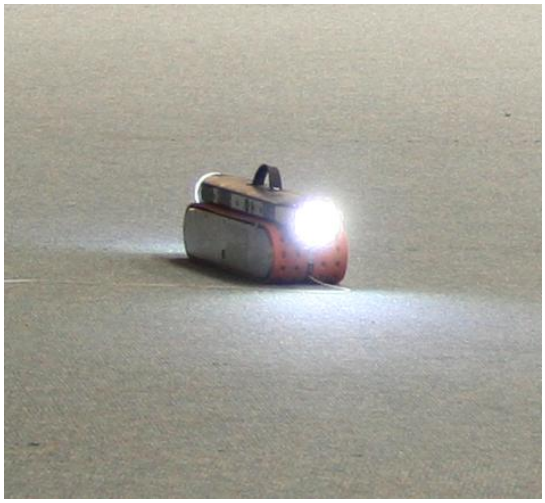

Figure 3: Solo Robot

Figure 4: Mr. Wolf talks with the participants

4 Equipment Needed

The amount of equipment necessary to conduct a camp varies widely based on number of participants, but the type of equipment is largely the same. Kits of essential parts are needed: motors, wires, wheels, and a processor. Other pieces are needed for additional building by the teams. We prefer using the Lego Mindstorms [5] system. We use a combination of the older RCX based kits and new NXT based kits. These kits are easy to build with because they are built by Lego. They also come with a very easy to use drag-and-drop programming interface. One difficulty with Mindstorms is that its computer program must be installed by administrators on many computers for use during the camp. Although we like the simplicity the Mindstorms kits provide for building and programming, old Botball controllers, motors, servos, and sensors can be utilized as well. Other necessary equipment includes tables or playing surfaces, such as pieces of old Botball tables.

For clubs that do not already possess Mindstorms kits, the costs can be high to hold an initial camp. However, these kits must be viewed as an investment. They will last for many, many years. The Lego RCX was released in 1998 [6] and the Lego NXT was released in late 2006 [7]. Even though the Lego RCX is no longer sold, previously purchased kits can play an important role in educating the students. There is a very good possibility that kits purchased for a camp will still be used when the participants of the camp are in high school running their very own robotics camps.

The purchase of equipment is a large component of the purpose for the camp. New resources, such as Lego kits, are assets that will allow the club to grow. New kits solidify the club and will allow it to hold fruitful fundraisers for years after the current club members are gone. For example, for our last camp, we reinvested 80% of our gross profit to acquire ten new NXT kits. This greatly reduced our profits for that camp, but now we will only need to purchase about one NXT kit per year to continue our expansion into the newer technology.

5 Sealing the Deal

An extremely important part of running a robotics camp is making sure students and parents will be excited to sign up for the next one. There are multiple steps to achieve this goal. One is to convince the parents of the value of the programs. To do this, hold a short introductory meeting with students and parents at the very beginning of the camp. Tell the attendees what the robotics club is about, what the club does, including Botball. Explain the growing importance of robotics and the extreme versatility of the skills learned through robotics. The second half of this equation is the competition at the end of the day. This allows parents to see the fruits of a long day of hard work.

Another way to convince parents that the camp is a worthwhile experience is to make it run smoothly. For this to happen, external volunteers are often needed for conducting large camps. These volunteers are general supervisors to make sure everything is going well for the students. For their efforts they can receive community service hours. These workers play an instrumental role in how well the camp will run from beginning to end. They must be energetic individuals who enjoy working with kids (Figure 5).

Figure 5: Robotics Club Members and Camp Volunteers

Finally, it is often beneficial to give participants a souvenir. This way they are able to remember everything they did at the camp and how great an experience it was. The giveaway could be anything from a certificate to a t-shirt. At our camps, we give out Hexbugs, small toy robots which are very fun for children to play with. We even have parents ask to buy additional bugs which we sell through the Hexbug fundraising program [8].

Most importantly, the camp is a success if the campers had fun and if the helpers had fun, too.

6 Conclusion

Robotics clubs are often largely run by the students in the organization. Therefore, students should also be highly involved in choosing and organizing fundraisers. Running a large scale robotics event can be daunting; however, it is a wonderful alternative to traditional fundraisers. Not many students enjoy going door to door asking neighbors if they would like to buy candy bars. Robotics camps sell themselves and serve two vital purposes. They raise money, but they also raise awareness about robotics. With regular cycles of camps, it is possible to keep students active and interested in robotics until they are old enough to join the club themselves. In the long term, early and continued involvement is the most important goal of holding robotics camps and the most crucial component of growing a robotics club.

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