Fundraising and Recruitment through
Robotics Camps and Programs

Andrew Wilson and Steve Ung
Hampton High School
2929 McCully Road
Allison Park, PA 15101
andy92573@verizon.net
412.486.1498

Fundraising and Recruitment through Robotics Camps and Programs

1 Reasons for Club-Run Camps

For almost any school based team who has competed in a robotics competition, including Botball [1], two major issues must be confronted virtually every year. These two issues are club membership and funding. Some schools are fortunate to have wonderful compensation for their programs and/or sponsorship opportunities for their programs; however, like us, there are some clubs who are constantly looking for funding, as well as new participants to maintain and expand their robotics programs in their school and area.

One method that our club at Hampton has tried for the past three years is through the education of the robotics program through these robotics camps. After three years trial and error testing of different methods and styles of camps, we have been moderately successful in beginning to control our expenses and draw interest into the program at our school.

This paper is not about the Hampton club, rather, we would like to share some of our techniques and ideas of different camps and strategies that have worked, and the preparation and skills needed to successfully educate as well as build a base of funding and interest through robotics camps and workshops.

2 Resources Needed for Any Robotics Program

Running educational camps in robotics is an investment for a club; however, it is almost all a one-time investment. For all of our camps so far, we have focused on the Lego Mindstorms kits [2] because of the relative ease for beginning students at the elementary and middle school level. Although, camps can be expanded to include other sets, possibly even the XBC or Handyboard [3], the Lego kits offer the best starting camps. Our first investment was in six of these Lego kits which have been used in all of our camps. The sets retail for about $200, but after only about two courses, the money can be made up for the kits and the only costs for all the successive

camps become optional food provided as well as awards and costs to make any challenge boards.

In addition to the physical costs of the courses, each course requires a considerable amount of commitment from the club to have enough members to assist with the students, generally about one or two club members for a group of four or five students. Although at times you may choose to have a group lesson with instruction from one presenter, a majority of the time will be in teams with the club members learning by actually building and programming for various challenges.

Another important resource is a location for the camps. While almost any large area will suffice for a camp, a large computer lab, as well as another room for setting up challenges is ideal. The students need a fairly large area for building and there should be a sufficient number of computers available per group to allow all of the students to try out their new programming skills. One issue to keep in mind is that the Mindtorms USB tower [2] requires administrator privileges to install, so arrangements need to be made to install on many school computers with restricted access.

3 Two Main Styles of Robotics Camps

We will explore two different styles of programs that we have utilized to attract interest and funding to our club. Both types of camps have their strengths and weaknesses in education, planning, and organization. It is in using a combination of techniques that will result in the greatest success each year for the club.

3.1 The Robotics "Camp" Style

This first type of robotics programs is the longer and more in depth camp curriculum which we have used for many of our programs in the past years. This style of program is particularly good for any camps during the summer since it is easier to have a series of uninterrupted days for the camp. We have tried to setup a similar, in depth camp twice a week after school for three to four weeks; however, it takes up a great deal of time in planning and teaching during the school year and is much more manageable over the summer.

Our general model for these camps has come from the Robocamps hosted by the National Robotics Engineering Center [4], part of the Robotics Institute of Carnegie Mellon University [5]. Discussed later is a very well designed software program created by the center that can be used as the curriculum for a camp or as a supplement to the general program.

The best format we have found for these camps is one week long, Monday through Friday, with the camp running about three hours either in the morning or afternoon to avoid running over lunch. Including lunch is a nice incentive for a camp; however, this will take significantly more planning and add cost to the camp. The final day of the camp, probably Friday, is usually used as a "competition" and awards day. It is nice to invite the parents this day to see what the

students have learned and put to use throughout the four prior days.

The week-long camp requires greater commitment and time from the club; however, it is necessary to provide in-depth teaching and really teach a comprehensive course on robotics. This format also allows for time to explain more about a club and the Botball program [1], drawing more interest from the participants in the camp. The best ages for this style are generally middle school grades since they will be the next club participates and have the attention span for a whole week of instruction.

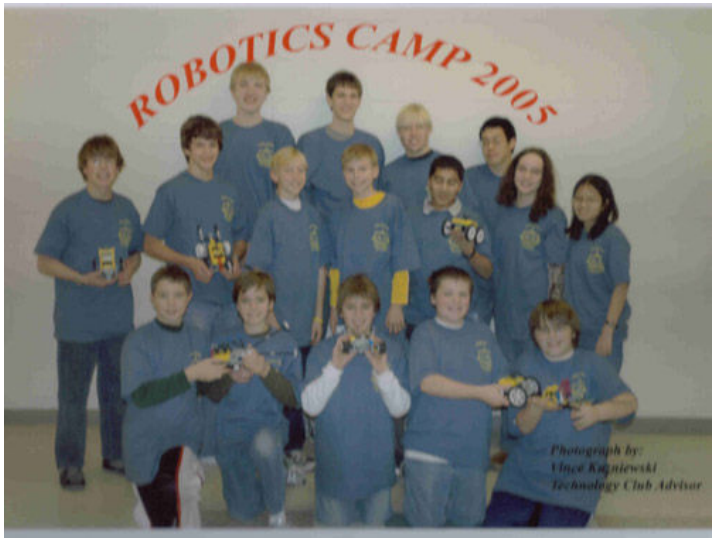

Figure 1: Students and staff from a middle-school robotics camp.

3.2 The Robotics "Workshop" Style

Over the past year, our club decided to try a condensed version of our robotics camp which we had run before. Since there are a limited number of middle school students in our district, we also decided to try to gear this program to elementary level students. This style of program proved to be very worthwhile as the shorter course can accommodate many more students with less extensive planning and continuous preparation than the camp counterpart.

Our experimental workshop ran over the course of two days, a Friday and Saturday, for approximately three hours both days. Instead of using the full camp curriculum which will be discussed later, we settled on a series of a couple small challenges which would allow the students to learn basic mechanical design the first day, and basic programming the second. More ideas for the layout of the curriculum will be discussed next.

The workshop style allows for a greater number of participants since the topics will be more fundamental and one on one instruction is just not as necessary as in a week-long program. Hosting this type of event is more toward satisfying the funding aspect of the club since there is not as much time in two short days to form a relationship with any of the students who may have

a potential interest in the club. This type of course is much better for elementary age children, which we first tried with, as well as a more advanced short course for high school or even middle school. The topics are also virtually endless which allows for more variety and less planning and less coordination efforts that a series of weeks of camps would require.

4 Robotics Course Curriculum

Planning the curriculum for a robotics camp or workshop can take some of the most time and effort, but overall, for most of the students, any sort of exposure to the robotics programs and building will be enjoyable. The first consideration in planning is the target audience of students, whether it is a beginner class, or a more advanced camp. Ages must also be a considerable factor in planning and grouping individual students.

4.1 General Course Methods

The general format for any program that has seemed to work the best is an opening lesson on the very basics, or some review in building, followed by a challenge that utilizes the building and engineering aspects of robotics and then move on to a programming lesson and a challenge in programming.

It also is usually best to divide a program into teams of students, preferably by age, to allow stronger students to also teach other teammates and encourage team skills as part of the educational process. Each team should have a dedicated club member who can guide the team but not help the team to the point of defeating the learning process.

Our personal preference in the first basic robot which we teach is the Tankbot (figure 2) from Lego; however, any simple robot design can be used such as the Demobot and other easy robots. After the teams build their first robot from the instructions, the challenge and lesson becomes how to modify the structure to overcome its limitations and be successful in a certain challenge. A favorite building challenge is the Sumo Competition because it can run off the same program for each team, yet have different results based on a particular design.

Programming follows a similar method by beginning a simple program in a group lesson and modifying it to fit a challenge. Follow the Line challenges as well as the Sumo Challenge can expose the students to sensors and different programming tactics to improve their robot.

In longer, camp programs, this series of lessons and challenges continues each day, using lessons on sensors, programming loops, and more advanced commands, as well as gearing and advanced designs. The limit of the lessons is only the knowledge of the club members and the ability of the students involved.

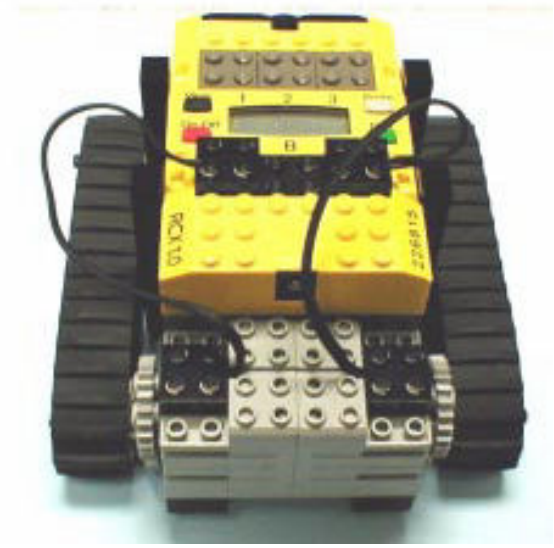

Figure 2: The Tankbot robot

4.2 Robotics Curriculum Available for Purchase

There are a couple of different programs available for robotics camps, but we have found the curriculum created by the National Robotics Engineering Center [4] to be extremely well done for many camp courses and can be adapted to shorter workshops. This curriculum can be followed line by line to run a camp, or can be used as a supplement to a planned curriculum for the students.

The software we have purchase is called PROBE Camp-On-a-Disk [6] which contains all of the components to run a successful week-long robotics camp. The software presents a themed curriculum which numerous challenges culminating in a final, end of the week challenge similar to a Botball challenge, on a simpler level. While we do not use the software as the sole curriculum, we take some of the challenges as well as the final challenge as some good ideas for the students in the camp to strive for. The software is $100 which is another expense for a camp, but can be used for many camps and workshops hosted by the club. The software and curriculum is available at http://www-education.rec.ri.cmu.edu/roboticscurriculum/index.html.

For programming, we have found that the Robolab software [7] works extremely well for teaching beginning classes because of the icon based programs and ease of use. Robolab software is programming for the Lego Mindstorms kits and uses icons and "wires" to connect the program and visually shows the flow of a program. It is much easier to learn quickly than a text based programming language such as NQC; however, if some students find Robolab to be too simple, C-based programming may be a good challenge for advanced lessons for a camp. A Robolab site license is available for $265 from http://www.legoeducation.com.

5 Conclusion

While robotics camps can take a decent amount of planning with regards to curriculum and organization of the camp, the benefits from such an endeavor are good. Many of our current members of the Hampton Club have participated in camps hosted one or two years ago and more are coming. Though our funding is still wavers greatly from year to year, the camps do provide something to get us going, and with more workshops and varieties of offerings, the funding can rise.

No matter what curriculum or type of camp is run, constant changes and observations need to be made based on the abilities of the participants. Some camps accomplish more than others, and some teams will accomplish more than others. Many of the students will have the Lego kits, but some will not. Overall, the camps will be successful if attention is paid to the students, and the participants are allowed to move forward at their pace and have an incentive to learn.

References

[1] KIPR. Botball Robotics Education. http://www.botball.org, 2002.

[2] Lego. Lego Mindstorms Education. http://www.legomindstorms.com, 2006.

[3] KIPR. Botball Store. http://botballstore.org, 2006.

[4] NREC. National Robotics Engineering Center. http://www.rec.ri.cmu.edu, 2006.

[5] Robotics Institute. Carnegie Mellon University. http://www.ri.cmu.edu, 2006.

[6] PROBE Camp-on-a-Disk. National Robotics Engineering Center. http://www-education.rec.ri.cmu.edu/roboticscurriculum, 2006.

[7] Robolab. National Instruments. http://www.ni.com/company/robolab.htm, 2006.