



DAWGMA

FRC TEAM I7I2

Robotics Summer Camp for
Elementary School Students

1 Overview

During the summer of 2015, FRC Team 1712, Dawgma, created and ran a STEM based summer camp called 'Sealed Off'. This camp challenged students to design, build, and compete with a robot in the style of an FRC game. The goal of the camp was to provide local elementary school students with a fun and educational experience with STEM with a secondary goal to raise money for Dawgma. Moreover, the camp gave Dawgma an opportunity to have a larger presence in its community.

2 Team Benefits

2.1 Presence in the Community

Being known in the community is important for any FIRST team. This was a great way to make people aware of our club because it got our name out to students, parents, and teachers. For teachers, it is important because they will think about us when they want to do an activity involving engineering and might ask us to help them. As a result, we would gain even more of a presence in the community. It is important for parents to be aware of us because they can mention us to others and also make us more present. Finally, it is important for the students to know about us because they will think positively about us and mention us to their friends.

2.2 Training the Future

The camp was marketed to elementary school students in our school district. These students will probably go on to go to our high school, and may join Dawgma now that they have had an experience with us. Not only did we make the children and their parents aware of us, we gave them a positive memory of things that we do, thereby increasing the chance that these students who participated in our camp would join our club once they get to high school.

2.3 Promoting STEM

In the camp, students had to use science, math, and engineering skills to design and build their robots. For example, they learned about gear ratios and how they make things either stronger or faster. Then they used their math skills to figure out the ratio. In building, they used STEM to figure out what would work and considered concepts from math and science in figuring out what would work better. Not only did they use STEM in these activities, but the activities helped them to enjoy it.

2.4 Teaching the Strategic Design Process

Students are given a game with distinct rules and specifications. The students are then taught to analyze the game and design a robot that can play it. We made sure that they came up with more than one design before they picked the best one. We also made sure that they reevaluated their designs throughout the building

process so that they could improve it when they saw that things were not working. Even though the camp only took place over the course of five days, we made sure that the students got the same kind of experience in designing their robots as they would in a larger project.

2.5 Teaching Basic Building Skills

Students learned how to put together their robots. They learned about matching the right size bolts up with the nuts, filing, and other necessary parts of building anything. They also learned how to use basic hand tools and safety involved in using them. Not only did students learn new skills that they did not have before, it was a fun activity for them and encouraged them to find more opportunities for building.

2.6 Fundraiser

Because the summer camp took place over five days during the normal time for day-camps, it made sense to charge a fee. We decided to charge \$100 per person. Compared to other camps, this was fairly inexpensive, so it could not be a reason for a parent not to send their child to the camp. It also gave us a good amount of profit. The materials we used for the children to build the robots was from old fundraisers and was already paid for. Therefore, our only cost was the snacks. Overall, we made close to \$900 dollars by getting nine students to sign up.

3 Camp Specifics

3.1 Utilizing Resources

Before you do anything to design your camp, you must know what you have to work with. In our case, we had some VEX robots from other outreach activities we had done. We decided to use these for a few reasons. One is that we know that children are comfortable with VEX and like using it. The other is that we have already had these materials for a long time. We would not have to take it out of our budget, so we could make more of a profit in this fundraiser.

If your team does not already have materials that you could use for something like this, you could buy new things. There are several robot teaching kits available on the market.

3.2 Creating a Game



3.2.1 Creating the Theme

Once you know what materials you can use, you can plan out the game. In our case, we decided to do a game that involved picking pieces up or pushing them out of the way because we know that VEX robots can perform those actions. Once you know the general idea of what the robots will do, you should come up with a fun kind of theme for the game. In our case, we called it *Sealed Off*. The goal was to clear the rubble from an earthquake in order to rescue a baby seal. This makes it easier to market it, especially since the camp is designed for children in elementary school.

3.2.2 Making the Rest of the Materials

After you have designed your game, you should know what the game pieces are. In our case, we took from our scraps to get pieces of foam and metal. We made the field out of foam mats from a teacher (get permission for using materials from teachers first) and tape to mark the sections. Make sure to have barriers for the field. Even if it seems like they might hinder the players, they actually end up helping. Design the barriers in advance of the competition day so that they stay attached to it.

3.2.3 Creating the Game Manual

We created a 7 page manual in a shortened style similar to the FRC Game Manual. For the most part, we copied its format and precision and fitted it to our game. We split it up into five sections, The Game, The Arena, The Robot, The Tournament, and Safety. The manual describes in detail the robot specifications, the rules, the game pieces, the arena setup, and all safety rules that must be followed. We also created a scoring guide, assigning different point values as well as penalties for fouls.

3.3 Making Student Resources

Because most of the students are at an age where they have probably not used the engineering design process before, they will need a guide for it. We decided to create sheets which provided a guide for students to make sketches of their ideas.

This was also a good way to make sure that they came up with more than one idea before picking a final design.

Another resource was puzzles and coloring books related to the theme of the game. We tried to move the teams on to the next step at around the same time, so students who finished each task earlier needed activities. These activities should have some educational element so that no matter what they are doing they are learning more about STEM.

The final resource was videos. We found some clips about simple machines and topics relating to our game. The videos should not run for much longer than 10 minutes, because the students get bored.

3.4 Making Administrative Resources

There are many other necessities for running a club besides those things which occupy the students.

3.4.1 Release Forms

Parents need to sign a permission slip for the camp because it involves materials that could potentially be dangerous. We based the permission slip off of the Mid-Atlantic Robotics one and changed the wording to be appropriate for our camp. The team should also be taking pictures of what is going on in the camp, so there needs to be a photo release for the permission slip. We put in three options for the parents to sign off on: pictures may include the child and his or her face, pictures may not include the child's face, and pictures may not be taken of any part of the child.

3.4.2 Registration Form

We made a Google form for parents to register their children. The information we asked for was: the student's name, the parent/guardian's name, the grade that the student was entering, the emergency contact name and phone number, and the parent/guardian's email. We also asked them to list any allergies and medical issues we should know about. Allergies are not really a problem if you do not serve food, but we provided a snack. If your camp goes through lunch, keep track of the allergies as well. We got the form to parents by putting the link for it on our flyer and by asking for them to email us if they were interested so that we could send it to them.

3.4.3 Sign-In Sheets

We made a sign-in sheet that asked for the time in and out for students because we need to know who came in and at what times in case something happened to one of the children. We also needed to know who was picking them up.

3.4.4 Scoring Sheets

For the competition, we needed to have a way of tallying their scores. We created a scoring system that would make sense for the game and based the scoring sheets off of it. We tried to base our system off of FRC games. When it comes to creating it, try to make sure that the system will encourage more creative

designs. Although it is a good exercise in strategy to be able to win with a very simple design, it would be good for the students to be more creative.

3.5 Marketing

3.5.1 Making a Flyer

We decided to advertise by making a flyer. In it we included all of the necessary information, like the time, place, and price. We also put pictures of some of the pieces for the game on it so that people could get some idea of what it would be like. Finally, we put on our email and a link to the Google form so that they could register.

3.5.2 Contacting teachers and administrators at local elementary schools

The single most important place to reach out to is the local elementary schools. The teachers were all very supportive and excited by the process, and sent the flyers home to the parents.

3.5.3 Reaching out to the local FLL community

The camp is for the age group of children in the FLL program, and those just leaving the FLL Jr program. We reached out to the lead coaches of some teams in our area with the hopes of not only getting those students, but also for them to reach out to other parents hoping to have their children pursue stem.

4 Running the Camp

4.1 Design

4.1.1 Warm-up Activities

It is a good idea have a variety of warm-up activities for the kids. Make sure to have a combination of videos and hands-on activities. Videos should not be any longer than ten minutes (as the kids will get bored).

4.1.2 The first two days

The first one and a half days of the camp should be devoted to design. Go over the game manual thoroughly with the kids, with a special emphasis on how to score. Have the kids draw several designs, and choose one to submit on the design sheet to the team member volunteers. Team members must review them, ensure that they are structurally sound and follow the laws of physics, and if they pass, give a signature and/or mark of approval (consider getting fun robot stickers).

4.2 Build Season



4.2.1 Days 2 through 4

During the second, third, and fourth days, students began to build their robots. We supplied them with pre-built drive bases so that they could focus on building the attachments. We had one FRC team member stay in the room with the materials to keep track of what was taken out and put back as well as to make sure that the students handled materials properly. This also allowed members to stay with the rest of their group. If students finished building early, they could practice.

4.2.2 Re-designing

Throughout the build process, students saw that some of their designs were not the best solution and got to redesign as they went. We made sure that they understood why some ideas failed and knew how to fix them. This gave students a real feel for how the build process works.

4.3 Competition

4.3.1 Competition Schedule

By the time competition comes around, some teams will be more prepared than others. When creating the schedule, try to put these teams first. Each team should have at least four matches, and each team should have the same amount of matches. Make sure to set aside enough time for all of these matches, with field reset time in between. It is not necessary to scramble the teams (so they don't have all matches at once), but it is a good idea.

4.3.2 Practice Matches

Sometimes teams will be done long before other teams (and before the competition portion is scheduled to start). It is at this point where you allow those teams to have practice matches. They should be run just like a normal matches.

4.3.3 Matches

All members of each team should get a chance to drive during matches. Teams should also have a match strategy going into each match. Team members should make sure that students understand the concepts of Gracious Professionalism and only cheer for good things happening, even when it is not their own team.

4.3.4 Timing and Scoring

At least two FRC team members are required to run a competition- one for timing and score counting (which is done at the end), and one for refereeing. The score counter should let the kids know when they have 30 seconds, 15 seconds, and five seconds left, as well as keeping track of any time-related scoring. At the end of the match, they should count up all the points. The referee is in charge not only of ensuring that the students follow all the match rules, but also in charge of safety and gracious professionalism.