Getting Started with Your Robotics Competition

As you begin to consider hosting a robotics competition in your school or school district, there are several things to consider. What follows are potential items for your consideration and information that you may find helpful as you plan.

I. Focus of Competition

There are several different types of robotics competitions that you may want to consider. One type of competition focuses on students designing, building, and programming a robot in order to address a specific problem or to complete a specific task. In this competition students are provided with the problem or task and, with guidelines, design and building their own robot. At the competition students bring their robot and demonstrate how their robot will solve the problem or complete the task.

A second type of competition focuses on students programming a specific robot to complete a task. Here, students are provided with the robot specifications up front and they then bring this robot to the competition. At the competition students are presented with the task and as part of the competition they work together to program their robot and are judged on how well their robot completes the task.

Each of these two options provides students with opportunities for critical thinking, experiences with planning and designing, and opportunities to engage in STEM thinking. However, there are aspects of each that should be considered prior to determining the focus of your competition. The main aspects are the availability of resources and student access to those resources.

Availability of Resources: In the first type of competition students will need to have access to a variety of resources (hardware for construction and software for programming) in order to design their robot. In the second type of completion students are all provided with the same hardware and software, which can be purchased in bulk, with which to build and program their robot. While some may see this option as a less creative option, for younger students who may not have as much experience with designing, building, and programming a robot, this option serves as an effective entry point into this field. They are able to learn about the parts of a robot, the parts' role in the programming output, as well as how to program a robot to perform a specific task.

Accessibility of Resources: For both types of competitions, the number of students who have access to the competition robot resources should be considered. In the first type of competition, it may prove to be more challenging to provide a large number of students with the variety of resources that are needed to design and build unique robots. The second type of competition may allow, based on overall budgets, more students to have access to the competition

robots as the materials, or kits, may be purchased in bulk.
At R.A.I.L., for the present, we have chosen to focus on the second type of competition as a way to provide a larger number of students with the opportunity to engage in STEM learning through utilizing robotics programming tasks as a way for students to think critically, collaborate with others, and make connections between STEM disciplines. For this reason, the guidance that follows still focus on considerations for planning this type of competition.

II. Grade Level of Participants

After determining the type of competition that you wish to hold, you may need to consider what grade level of students you will open the competition to for participation. The grade level determination can play a critical role in determine the overall structure of your final competition. For example, if you open the competition to grades 3-8, will you have two or more separate tasks, or will you expect all students to complete the same task with a variance coming in the judging criteria? These questions need to be considered so that all students are provided with the opportunity of success.

III. Competition Structure

Here the structure of the competition refers to the number of rounds or levels of competition that you will offer. Will you use a single competition structure, such a single class competition, single school competition, or one large district competition? Or, will you implement a multiple competition structure where students first start at the class or school level and then the winners of those competitions move on to a higher round of competition? Often, the number of students involved, and/or the availability of resources determine the structure. An additional consideration is that each level or round of competition should have its own task, judging criteria, prizes, etc. You may want to start off small with a single structure and then expand the competition in subsequent years into a multiple competition structure. Either way, providing access to the competition can provide students with an engaging, challenging, and enjoyable learning experience.

IV. Time and Location

No matter your competition structure you will need to determine the time and location for each round or level of competition. When considering the time you may want to think about the following:

- School day competitions: These provide easy access for getting students to the competition, however it may limit the number of adults and/or volunteers that may be available to either observe or assist in running the competition.
- Evening/Weekend Competitions: These may allow for more adult participation, however it may limit the number of students who are able to participate. Also, especially in the case of an evening competition, you will need to consider whether or not you will provide or sell food/snacks

for student participants.

When considering the location of your competition, you may want to think about:

- Is there space enough for students to work, unencumbered, on their task without any adult interference?
- Is there adequate space for observers so that parents and others are able to watch their student compete but, and the same time, be kept away from their student?
- Is there access to the location in the evening or on the weekend?
- How will students be transported to the location?
- Who will be in charge of setting up and tearing down the competition tables, etc.

You may find that you have to answer additional questions based on your potential locations, so begin with these and then think through your competition time and location from multiple angles so that you decrease the likelihood of last minute challenges.

V. Task Selection

The selection of the task is one of the most important aspects of the competition. You may choose to develop your own task or use a variation of a task that has been used in similar competitions. When choosing or designing your task you will want to consider students prior experience with programming the robots and/or the accessibility that they will have to the resources prior to the competition. Along with students' experience you may want to consider the following:

- Will the task be created/chosen by one individual or will it be a team decision?
- How/who will test the task? (This is extremely important because often tasks look good at the design phase but then become overly challenging when tested.
- How will the task completion be judged? A rubric will need to be created that aligns to the specific task. Just as the task needs to be tested, so should the rubric to ensure that each assessment criteria are clear and are able to be applied to the task.

Again, you may have additional questions, but also remember that each level of competition will need a unique task and students and teachers/coaches, will not receive the actual task until the start of the competition. For additional assistance with choosing a task, R.A.I.L. has provided a copy of the tasks and scoring rubrics from our previous competitions as examples.

VI. Personnel

All competitions, no matter the size, will need multiple individuals to assist in its implementation. The following are examples of the volunteer positions that will need to be filled and a suggested ratio of volunteer to students that

you may find helpful.

- Registration – 1 volunteer to every 10 student participants. This position will check students in to the competition, gather all required forms, and distribute any competition materials.
- Judges – 2 judges per every 4 student teams. The judges will assess each student team's final programming solution using the provided scoring rubric. We recommend that the judging structure be one where more than one judge scores any individual team so that there is consensus built among scorers.
- Competition Monitors- 1 monitor to every 2 student teams. These individuals will be responsible for monitoring students' work during the competition, ensuring that students do not receive any adult intervention during the competition, and making sure that students stay within the competition area. One good source of volunteers for this position are student groups at higher grade levels than the competition participants.

VII. Additional Considerations

Below are some additional questions that may or may not apply to your competition situation, but are those that you may want to consider:

- Will you provide prizes, trophies, and/or certificates for participants and/or winners?
- How will registration be handled?
- Will you need parental permission for students to participate?
- Will you provide, or will it be up to coaches to provide, spare parts and extra batteries for the robots during the competition?
- Will you promote the competition through the media or social media? If so, will you need a media release form from students?
- Will you keep the competition only within your district or will you invite other districts to participate?

While we have covered a number of areas for consideration here, know that you are invited to submit additional questions to one of our R.A.I.L. representatives by emailing railmaster@uga.edu.

Remember, the competition should be an engaging, challenging, and ENJOYABLE learning opportunity for students!