



MODULE 2

RESEARCHING AND PROGRAMMING BASICS

MODULE OVERVIEW

MODULE NUMBER: 2

DURATION: 2.5 hours

SUMMARY

In Week 2 the team will begin the design process for both the Innovation Project and the Robot Game. They will explore and research the Project and learn how to make the robot perform basic functions with introductory programming concepts.

Core Values to Focus on in This Module

- We do the work to find solutions with guidance from our Coaches and Mentors.



OUTCOMES:

Educational standards alignments can be found at

<https://www.firstinspires.org/community/educators>

MATERIALS

1. *FIRST*® LEGO® League Robot Set
2. *FIRST* LEGO League Challenge Set
3. Whiteboard or other writing surface
4. Sticky notes
5. Pencil/Pens/whiteboard markers
6. Computer or tablet to program the robot
7. 2 Tokens per team member (pennies or any small item will do)
8. Printed Field Research handouts



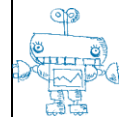
Note from An Experienced Coach:

Mission planning is best done using visual and tactile activities around the table. Post-it notes and mission planning cards work great. Keep in mind 2.5 minutes goes by fast and you need to build in time for trips back to home. Start small and focus on missions that can be completed with consistency.

The Project can be overwhelming for young teams because there are so many great ideas. At first, focus on the problem and ignore solution discussion. The biggest tip is to walk the team through the Project rubric. It clearly explains what to focus on for the Project. Line up experts early. Most importantly, do not forget to share your Project!

Scott Rakestraw

Coach, VA-DC Judge Advisor and Founder of StartingPoints.com, useful technology for *FIRST* LEGO League teams.



Capital Teens

INSPIRATION

SUGGESTED TIME: 15 minutes

The teamwork exercise for this module is called Name the Team! The team's name becomes part of the team's identity. Many teams pick a name that will be used for more than one year. If your team's name will be used for more than the current season, the team should be careful to avoid an identity based on this season's challenge.

Brainstorming a Name

1. Begin by giving each student a stack of sticky notes and a pen or pencil.
2. Give the students the rules of the brainstorming game:
 1. You have five minutes to write as many name ideas as you can (one per sticky note) and place them on a board or wall.
 2. All ideas are valuable in brainstorming (even silly ones).
 3. We do not make fun of anyone else's idea. Even a crazy idea may spark inspiration for another idea.



HINT: Some teams like to look at the names that other teams have chosen to help them get ideas about what kinds of names they might like.

HINT: Monitor the activity and make suggestions to the team about being inclusive and listening to all ideas if the team seems to be excluding individuals, or individuals aren't participating, but let the kids come up with the ideas, record the ideas, and decide how to organize/prioritize or even keep/discard the ideas. A younger team may need more guidance and hands-on facilitation from the coach in this first brainstorming activity to help build a foundation for more self-directed brainstorming in the future.

Narrow the Choices

1. Reinforce this session's Core Value (We do the work to find solutions with guidance from our Coaches and Mentors) by reminding the team that this is their name and they get to choose!
2. Have the students narrow the choices by:
 1. Remove duplicate names (leave at least one of course!).
 2. Have each student tell the group their favorite name and why.
 3. Remove names that were not mentioned by any team member.
3. Finally, choose the official name! You might:
 1. Vote on it:
 1. Give every team member 3 tokens (tokens can be anything from pennies to paper clips).
 2. Ask team members to vote for their favorite team names. How they use the tokens is up to them - for example, they can put all 3 tokens on one name, or they can spread the tokens out to their top 3 choices.
 3. The team name with the most tokens wins! If there is a tie, choose the most popular names and re-vote. If everyone votes for their own, re-vote and no one can vote for their own.
 2. Use your team's decision-making strategy.



HINT: There are many ways to get the work done. Some teams will divide into groups to work on the day's Innovation Project and Robot tasks. If you do this, you might want to vary the groups so that students have a wide range of experience working with different people. You can change the groups every practice or every week. Writing down who is in each group will help you remember.

INNOVATION PROJECT

SUGGESTED TIME: 45 minutes

1. Discuss the Field Research from the Last Module

Have each student share their responses to the two Field Research questions.

1. What is something you know about the Challenge theme?
2. What is something you would like to know about the Challenge theme?



HINT:

Many successful teams pick a problem that has some sort of personal connection they can get excited about. As a coach, you might think one problem is a better choice, but be sure the kids choose something they are excited about and that will maintain interest throughout the season.

2. Now it's time to research!

1. Make sure everyone understands the parameters of the theme and any exceptions to the problem you can choose.



HINT:

Remember, the parameters are outlined in the Challenge materials.

2. Begin research on the theme.
 1. Each year's challenge will include a starting point for your research. Begin with this activity.
 2. Find out how the Challenge theme affects your local community.
 3. Do general research on the Challenge theme.
 4. Use these resources for information:
 1. Internet
 2. Books or magazines from the library
 3. Current events
 4. Personal stories the kids shared in the last module



HINT:

As you research the Challenge theme, keep an eye out for related problems that scientists and engineers are working on in the world today.

LEARNING RESOURCES

- Design Process Video - This is a very accessible (made by kids, for kids) description of the process your team will use throughout the season.
<https://youtu.be/uTyfJK-bNfY>



ROBOT

SUGGESTED TIME: 60 minutes

1. Blindfolded programming activity

1. Ask for two volunteers. One person will be the "robot", and the other person will be the "programmer."
2. Blindfold the robot.
3. Place a cup on a table on the other side of the room.
4. The programmer must give instructions to the robot to walk across the room and pick up the cup. Be sure they tell the robot every step or movement to take to complete the task.



HINT:

Depending on the size of your group, you may have students pair up and each pair complete this activity.

2. Discussion

Ask the students questions about the activity.

1. What happened when the programmer told the robot to walk forward?
2. How does the robot know how far to go or when to stop?
3. How specific did the instructions have to be?

This game helps teach the team the importance of clearly and exactly communicating what the robot must do. Make sure the team understands how this game relates to programming for the *FIRST*® LEGO® League robot game. Having the robot teammate blindfolded prevents them from offering help or using their own initiative to navigate obstacles - just like the EV3 robot will only do what it is programmed to do.



3. Master basic programming skills by completing the challenges below. Make your robot:

1. Move forward
2. Move backward
3. Make a 90 degree turn to the right and left



HINT:

Make sure each team member gets to control the keyboard and mouse while going through the programming tutorials.

LEARNING RESOURCES

- EV3 Robot Educator Basics Tutorials
 - EV3Lessons.com: <http://ev3lessons.com/>
-

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last practice.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished. The team:

1. Decided on a team name.
2. Began the design process by researching the Challenge theme.
3. Learned how to write basic robot programs.

3. Reflect

Ask the team:

1. What interesting thing they found when researching the Challenge theme?
2. How they felt about programming the robot? Was it easy? Hard?
3. What should we do when we run into hard problems?



4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

- Find and bring one magazine article and one internet source related to the Challenge theme to share with the team.

Robot

- With a parent or caregiver, look up and watch two YouTube videos of *FIRST*® LEGO® League teams from previous seasons.
- Write down three things you learned from the videos.



NEXT TIME

In the next module, the team will begin to think critically about the Challenge topic and brainstorming solutions to the Robot Game Missions.



Make sure that before you come to the next meeting you have reviewed *Module 3* thoroughly.



Field Research

Module 2

Innovation Project

1. Find and bring one magazine article and one internet source related to the Challenge theme to share with the team.

Robot

1. With a parent or caregiver, look up and watch two YouTube videos of *FIRST*® LEGO® League teams from previous seasons.
2. Write down three things you learned from the videos.

1.

2.

3.