

# **ROOKIE COACHES**

## 2.1 NEW: Coach and Team Web Resources

There are many sources of information for a coach on the web. This page describes the primary web resources for teams.

The FIRST website:  
[www.usfirst.org](http://www.usfirst.org)

### Training Materials – materials to get started

Go to the FIRST website at [www.usfirst.org](http://www.usfirst.org)  
At the bottom, click on *FIRST LEGO League*, then at the bottom click on *Team Resources*, then in the middle, click on *Coach Tutorials*.

### Mentors - find a FIRST Robotics Team to help you

One way to find mentors - the FIRST website at [www.usfirst.org](http://www.usfirst.org)



At the top click on  
Then on the right click on  
Choose your state or province, then click on [Who are the teams from this state?](#)  
This will give you a list of High School FIRST Robotics teams in your area. Use the contact information on each team's website, or call the help number at FIRST to request contact information for a team.

The International website:  
[www.firstlegoleague.org](http://www.firstlegoleague.org)

### The Challenge – released in September

Go to the International website at [www.firstlegoleague.org](http://www.firstlegoleague.org) On the left click on *North America*, then on the left click on *Challenge 2003*.

### Forum – talk to other teams

Go to the International website at [www.firstlegoleague.org](http://www.firstlegoleague.org) On the top click on



### Tournament Information – different for every region

Go to the International website at [www.firstlegoleague.org](http://www.firstlegoleague.org) On the left, click on *North America*, then click on *Tournaments*.

Other Websites:

### Other FLL Organizations – lots of amazing resources

Try <http://www.hightechkids.org/fll/> - Local organizations, such as this one for Minnesota FLL, also have excellent information.

## 2.2 The Team

There are many factors that must come together to create a FIRST LEGO® League team. This section will provide you with a better understanding of how to organize the people, resources, and time necessary to put your FLL team on the path to success.

### 2.2.1 Choosing a Coach

There are a few critical elements to look for when choosing a coach. He or she should:

- Use group management, communication, and prioritization skills
- Have a technology background, but this is *not* necessary if the team has a technology mentor or guest speaker(s)
- Be 18 years or older: A teacher, parent, or technology professional is a good choice

The coach will direct the process the team follows to solve the *Challenge*, but not provide the content of a solution. The next section explains the role of the coach in detail.

#### WHY

Why are group management skills critical for a coach?

A coach must build teamwork and team spirit, settle disputes fairly, and observe team member interactions.

#### WHY

Why are communication and prioritization skills important for a coach?

Sending schedules to parents, talking about next steps to the team, and helping the team demonstrate are all part of the coach's role.

#### WHY

Why is technology expertise not a requirement for a coach?

The coach does not need to have the answers; learning alongside the team is expected. Mentors will provide technology assistance.

## 2.2.2 Team Members

Go team go! Seven participants is the recommended team size, and the maximum is ten. We also recommend that the age difference on the team not exceed three years. The age requirement is 9-14. Child participants must not be older than 14 as of January 1, 2003.

When recruiting or signing up participants, seek out a diverse membership. Team roles and responsibilities extend beyond building and programming. Here are some common roles:

- Marketing – Design and create the team logo, buttons, banners, etc. Contact the local media, surrounding schools, or civic organizations to increase public awareness of the team and how the team benefits from the FLL experience. Make them aware of event dates and times.
- Fundraising – Think of ways to raise money for the team. Recruit parents and children in the thinking, planning, and doing processes.

### WHY

Why is seven the magic number?

A team smaller than four does not gain a true team experience, an important part of FLL. A team of seven can accomplish a great amount without limiting anyone or straining the coach. Teams of ten are best managed with sub teams and/or multiple coaches.

### WHY

Why should the age difference on a team not exceed three years?

Developmental differences in this age group are sharp. For example, a nine-year-old and a twelve-year old will learn differently, conceptualize ideas differently, and may have difficulty working together.

### WHY

Why should you seek a diversity of team members for a team?

In addition to the benefit as a learning experience, a team of different genders, interests, and backgrounds is more likely to find a more creative and varied solution. For example, on average, teams of mixed boys and girls find more effective solutions than teams of a single gender.

- Documenting – Record and document the entire team’s thoughts, actions, failures, and successes throughout the FLL season in a journal, story board, video, or other form that you can display or present. During the season, these efforts help the team organize information for decision making. At tournaments, they are an excellent way to showcase the team’s activities for the Judges
- Conducting quality control – Conduct independent tests of the robot’s performance to identify potential weak points. Test for functions that do not work reliably and make recommendations for improvement.
- Researching – Lead the team’s effort to gather information and prepare a research presentation as described in the *Challenge*. In support of the Research Assignment Presentation, quality research will reflect a broad understanding of the various issues and scientific disciplines involved with the theme of the *Challenge*.
- Analyzing strategy – Analyze the Playing Field and formulate various methods for conquering the *Challenge*. Lead a team effort to establish a consensus on the final strategic plan based on risk and reward.
- Managing the project – Get everyone focused; get everyone’s ideas heard; find compromises; and keep everyone on schedule with a project timeline.

## WHY

Why should a team recruit members for all of these roles?

Students with interests beyond building and programming are essential for a balanced team where each participant has a role. Also, the broader the range of interests of members a team attracts, the greater the number of students that will know the excitement of science and technology and become confident in their own abilities.

### 2.2.3 Mentors

A mentor is a guest who works with the team in his/her area of expertise. Typically, a mentor will visit the team multiple times.

## WHY

Why are mentors so important?

First, mentors help the coach and add an outside perspective for the team members. Also, mentors serve as powerful role models for the team members.

Here are some mentor types and possible team contributions:

- Engineer – speak to the whole team, then work with the builders and programmers on the robot’s design
- High school participant in the FIRST<sup>SM</sup> Robotics Competition – walk through a practice programming challenge with the team; share strategy planning methods
- Professor or expert on the science in this year’s *Challenge* – present real examples of science in practice; advise on the research
- Graphic artist – provide advice on the team logo and T-shirts
- Young adult mentor (a young person in high school or college) – It is important that such a “coach in training” learns to become a role model, but not do any hands-on work for the team.

## WHY

Why is it important to have a mentor(s) comfortable with technology?

If the coach is not comfortable with technology, it is imperative that the team has the support of an engineer or someone familiar with solving technical problems.

### 2.2.4 Volunteers

Volunteers help keep the team running. Here are some volunteer examples and their team contributions:

- Parent – transportation, snacks and refreshments, fundraising help
- Carpenter – build the playing field borders and/or the optional FLL table

## 2.2.5 Facilities

Your team will need to access the following:

- Computer with Internet access – Most computers today are suitable. Check the FLL web site for details. In addition, you will need to bring a computer to any event(s) your team attends.
- Practice facility – A room or place to meet with smooth floor space for the 8' by 4' rollout playing field. You may want to use the optional FLL table and place the rollout playing field on it. Everything on the field is supplied by FLL and can be assembled by the team, with the exception of the field borders made from wood 2'x4' pieces. Multiple teams can often share the use of a practice facility and playing field.
- Time to meet – We recommend two or three meetings per week for at least two hours, as well as a weekend day prior to a tournament.

*Refer to Appendix C for a sample Team Sample Schedule*

### WHY

Why is Internet access required?

Internet access is required for maintaining contact with the FLL web site community, including learning about the *Challenge* at the beginning of the season. Teams are urged to visit the FLL web site during team meetings for updates and notices throughout the *Challenge* season.

### WHY

Why build the optional FLL table?

Especially for older teams, it is convenient not to have to work on the floor. You can use the table for demonstrations and to duplicate tournament conditions for practice. This also makes sense if sharing a practice field with one or more teams.

## 2.3 Coaching

The coach is the cornerstone of a FIRST LEGO® League team and plays specific roles while helping the team toward success. Teams require at least one adult coach, however, many teams have 2 or 3 adult coaches. This section will explain the role of the coach as a facilitator, mentor, and organizer.

### WHY

Why should you facilitate instead of teach, when you can frustrate team members by not giving the answer?

There are no levels of success without levels of frustration. Facilitation helps the team get past any frustration or difficulties to find its own answer to the problem.

### 2.3.1 Facilitation

*A facilitator controls the process, not the content.* Facilitation is a process through which a person helps a group complete its work and improve the way it works together. Replying to a question with another carefully thought out question is a useful facilitation method. Use the following questions to force team members to use their knowledge of science and hypothesize logical outcomes:

**What would happen if . . .**

**And then . . .**

**How will that affect . . .**

### WHY

Why should you become a facilitator?

Team members learn to look for their own answers. *A coach does not need to have the answers* and should not expect the solution the team finds to fit his/her own expectations.

### **EXAMPLE OF FACILITATION:**

JOSE: I DON'T KNOW HOW TO MAKE THE ROBOT TURN BACK THIS WAY.

COACH: HOW DID YOU DO THAT DURING THE PRACTICE SESSION?

JOSE: I DON'T REMEMBER.

COACH: HOW DID YOU MAKE IT GO STRAIGHT? SHOW ME WITH THE ROBOT. HOW IS TURNING DIFFERENT FROM THIS?

JOSE: (MOVES ROBOT WHEELS WITH HIS HANDS) TO GO STRAIGHT, I THINK WE TURNED ON BOTH MOTORS LIKE THIS. COACH: DOES ASHLEY REMEMBER? SHE HELPED PROGRAM THAT PART IN PRACTICE.

ASHLEY: I THINK WE TURNED ON ONLY ONE MOTOR. COACH: CAN YOU SHOW JOSE WHAT YOU REMEMBER?

## **2.3.2 Creative Thought Promotion**

In the world of FLL, there are no absolutes and there are many solutions. A coach should work to promote the independent and creative thought of team members.

Brainstorming is an important part of a team's planning process. It brings out creative ideas and produces better-thought-out solutions. A detailed guide to leading your team through a structured brainstorming is available in the Appendix.

### **WHY**

Why should you structure the brainstorming process?

The first solution thought of is rarely the best.

### **WHY**

Why should you encourage independent thinking?

The team will feel accomplishment and pride knowing they worked together to create their own solution.

### EXAMPLE OF PROMOTING CREATIVE THOUGHT:

COACH: WE HAVE LEARNED WHAT THE *CHALLENGE* IS. REMEMBER, WHILE WE ARE THINKING OF IDEAS OR BRAINSTORMING, EVERY IDEA IS A GOOD ONE. WE WILL NOT DECIDE HOW GOOD AN IDEA IS UNTIL WE HAVE AT LEAST TWENTY DIFFERENT SOLUTIONS TO THIS ONE PROBLEM.

KIMBERLY: I HAVE AN IDEA. LET'S BUILD A CAR THAT DRIVES OUT AND DROPS THE PIECE.

[COACH WRITES DOWN THE IDEA ON THE BOARD.]

SHANTELL: YEAH, I LIKE THAT IDEA, LET'S DO THAT. I'M GOING TO USE THE BIG WHEELS ON A CAR RIGHT NOW.

COACH: NOT YET SHANTELL, WE DON'T KNOW WHAT IDEA WE WILL CHOOSE YET. DOES KIMBERLY'S IDEA GIVE YOU ANY DIFFERENT IDEAS? I WANT THE WACKIEST IDEAS YOU CAN THINK OF, EVEN IF YOU THINK THEY ARE SILLY.

RAMONA: HOW ABOUT IF WE MADE A DUMP TRUCK TO DRIVE OUT AND DUMP THE PIECE?

[COACH WRITES DOWN THE IDEA ON THE BOARD.]

KIMBERLY: YEAH, OR HOW ABOUT A LONG ARM THAT STRETCHES OUT WITH THE BACK OF A DUMP TRUCK?

[COACH WRITES DOWN THE IDEA ON THE BOARD.]

RAMONA: NO, I WANT JUST THE DUMP TRUCK. THAT PLAN WON'T WORK.

COACH: RAMONA, WE ARE NOT DECIDING WHICH IDEAS WE LIKE OR WHICH WE WILL USE YET. ALSO, IT IS OK TO ADD TO OR COMBINE IDEAS.

[PAUSE OF A FEW SECONDS]

KIMBERLY: THERE ISN'T ANY OTHER WAY TO DO IT.

COACH: OK, IF YOU ARE HAVING DIFFICULTY, I WILL SAY A WORD AND I WANT EVERYONE TO SAY WHAT IDEA POPS INTO HIS OR HER HEAD WHEN I SAY IT. READY? "SHAKE." (THIS IS A TRICK FROM THE ACTIVITY ON THE WEBSITE.)

RAMONA: SPIN THE ROBOT UNTIL THE PIECE FALLS OFF!

SHANTELL: HOW ABOUT A LONG ARM THAT JUMPS UP AND THROWS THE PIECE WHERE IT SHOULD GO?

### 2.3.3 Learning Environment Support

It is critical for a coach to give choices to the team members. The coach should still control the process the team follows to get to its goal, but should allow choices within that process. One way to do this is for the coach to offer choices where every outcome offered is acceptable. He or she then helps the team come to consensus in a fair way. Another tool to empower team members is to schedule time for them to demonstrate

#### WHY

Why take time for the team to show what it knows?

The recognition will help the team members cohere, motivate them, and help them value their own expertise.

Why do team the members need to make important choices for the team?

Team members will gain a personal investment in the team and its results and therefore take responsibility and be accountable for their actions

what they know to their peers, teachers, parents and community, both in terms of content and application.

**EXAMPLE OF GIVING THE TEAM CHOICES:**

COACH: SO, I SENSE THERE IS A PROBLEM WITH WHAT SOLUTION WE WILL USE FOR THE THIRD MISSION. TAMITHA, I BELIEVE I HEARD YOU SAY YOU WANT TO LEAVE THE ROBOT AS IT IS, AND ONLY ADD A NEW PROGRAM TO SOLVE THE NEXT MISSION, IS THAT WHAT YOU WERE SAYING?

TAMITHA: YES, THAT WAY WE WON'T HAVE TO CHANGE PIECES ON THE ROBOT IN THE MIDDLE OF COMPETITION, IT ALWAYS BREAKS WHEN WE DO THAT HERE.

COACH: OK, AND SAM YOU WERE SAYING YOU WANT TO CREATE A NEW ARM THAT LIFTS UP HIGH THAT WOULD ATTACH TO THE TOP OF THE ROBOT, IS THAT RIGHT?

SAM: YEAH, SO WE WILL BE SURE TO GET THOSE POINTS, BECAUSE JORDAN AND I TRIED IT AND IT CAN'T REACH THE WAY IT IS NOW.

COACH: WELL, I WOULD LIKE TO SUGGEST AN IDEA, AND THEN WE WILL TALK AS A TEAM TO DECIDE. WOULD IT BE POSSIBLE TO HAVE SAM AND JORDAN WORK ON THEIR IDEA FOR THE ARM FOR NOW?

TAMITHA, YOU AND THE TESTING TEAM CAN DECIDE WHAT WILL BE NECESSARY TO ALLOW THE TEAM TO USE THE ARM, AND IF THE ARM WORKS RELIABLY WE WILL USE IT, BUT OTHERWISE WE WON'T.

TAMITHA: BUT I STILL THINK IT WILL BREAK IN THE COMPETITION!

COACH: TAMITHA, WHAT WOULD YOU NEED TO KNOW ABOUT THE ARM TO BE SURE IT WOULDN'T BREAK? IF THE TESTING TEAM TRIED IT TEN TIMES AND EACH TIME IT NEVER BROKE WOULD THAT CONVINCE YOU?

TAMITHA: YEAH, I GUESS . . .

COACH: OK, SO WHAT WOULD THE TEAM LIKE TO DO? REMEMBER, WE ONLY HAVE TWO WEEKS LEFT, AND THE TIME SAM AND JORDAN SPEND ON THE ARM WON'T HELP US IF WE DECIDE IN THE END WE CAN'T USE IT.

**WHY**

Equally critical for a supportive learning environment and a coach's success with a team is a mutual foundation of trust and respect.

Part of a coach's role is to listen to students and keep lines of communication open. The coach should become aware of team members' verbal and non-verbal cues and interpret the conversation. By validating the team members' feelings, they are more likely

Why do you need to work to gain a foundation of trust and respect?

A team that is a partnership between coach, mentors, and team members is a more important result for the team than the final performance of the robot. The experience is more meaningful with a team that trusts all around.

to discuss their problem. Positive feedback may be the only response a team member needs.

Another coaching tool is to ask each team member to sign contracts with the coach and with the team itself. This may be a good way to start the season.

### **2.3.4 Group Awareness**

The coach must be aware of and help regulate the group dynamics. A coach should be conscious of team members' personalities and the interactions of different members. If a dispute between team members arises, the coach should resolve the dispute and focus everyone back toward a productive task. Effective coaches use the similarities and differences of team members as assets to help the team get its projects done.

#### **WHY**

Why might you take the time to discuss what will be on a contract and then ask each team member to sign it?

The contract can be referred back to at a later time if the team has trouble working together, and increases the involvement of each member.

#### **WHY**

Why does your awareness of group dynamics affect the team's ability to achieve?

A team runs more smoothly if you can turn group difficulties into useful learning experiences. Teams that learn to work together produce better results, especially under the pressure of an event.

**EXAMPLE OF GROUP AWARENESS:**[THE TEAM IS WORKING IN THREE GROUPS: TWO PEOPLE ON WORK ON LOGO DESIGN, TWO ON MISSION STRATEGIES, AND THE BUILD TEAM, NICK, JOSIE, AND TOM, ARE WORKING ON THE ROBOT ITSELF.

TOM: I'M GOING TO PUT WHEELS FAR OUT ON THE EDGES HERE SO IT WILL TURN EASIER, THEN THERE WILL BE ROOM IN THE MIDDLE FOR ANYTHING WE ADD LATER.

NICK: OK, THAT'S FINE.

[TOM TAKES THE ROBOT AND THE WHEELS IN NICK'S HANDS AND BEGINS TO ATTACH PIECES TO THE ROBOT. NICK BEGINS TO LOOK FOR OTHER PIECES IN THE PARTS BIN.]

JOSIE: IF WE DO THAT, THE ROBOT WON'T FIT THROUGH THE NARROW PART ON THE COURSE.

TOM: NO, I'LL JUST TRY IT FIRST.

JOSIE: [REACHING HANDS TOWARDS ROBOT.] LET ME SEE, I DON'T THINK IT WILL FIT.

[TOM TURNS SLIGHTLY AWAY FROM JOSIE AND CONTINUES WORKING. JOSIE GLARES AT HIM AND TURNS TO THE WALL WITH HER ARMS CROSSED.]

NICK: HERE'S A LONGER PIECE FOR THE SIDE. [NICK BEGINS TO FIT THE PIECE ON THE ROBOT IN TOM'S HANDS, AND TOM TAKES THE PIECE AND BEGINS TO ATTACH IT HIMSELF.]

COACH: [MOVING CLOSE AND FACING ALL THREE, INCLUDING JOSIE WHO IS OFF TO THE SIDE] BUILD TEAM, GATHER AROUND ME. TOM, LET ME HAVE THE ROBOT PLEASE. [THE COACH TAKES THE ROBOT TO FOCUS THE GROUP'S ATTENTION.]

COACH: TEAM, I SEE YOU ARE HAVING DIFFICULTIES. REMEMBER, THE RESULT WILL BE A TEAM EFFORT. JOSIE, YOU LOOK UNHAPPY, WHY IS THAT?

JOSIE: TOM WON'T LISTEN TO ME!

TOM: JOSIE WOULDN'T LET ME TRY SOMETHING!

COACH: [THE COACH, REALIZING BOTH TOM AND JOSIE HAVE STRONG PERSONALITIES AND ARE ATTEMPTING TO CONTROL THE PHYSICAL ROBOT ITSELF, DECIDES ON A STRATEGY PREVENTING EITHER FROM CONTROLLING WHILE ALSO INVOLVING THE PASSIVE NICK MORE DIRECTLY.] OK, I UNDERSTAND BOTH OF YOU ARE FRUSTRATED. HERE'S WHAT WE WILL DO FOR THE NEXT TWENTY MINUTES. NICK WILL HOLD THE ROBOT, AND ADD ANY PIECES. JOSIE AND TOM, YOU CAN HELP NICK AND GIVE HIM IDEAS, BUT FOR NOW, YOU NEED TO COMPLETELY EXPLAIN YOUR IDEAS TO NICK BEFORE HE WILL WORK ON IT.

### 2.3.5 Age Differences

Depending on the age and development of the team members, a coach may see two distinct developmental phases. In general, the coach and mentors should:

#### Team members 11 years old and younger

- Always present problems or explanations visually or with hands-on examples.

#### WHY

Why do you need to give younger team members visual and hands-on examples?

This age group does not think abstractly and has difficulty conceptualizing objects having more than one use. Not being able to envision an end solution, this group needs to get their hands on the pieces and try different possibilities.

- Allow students the time to understand the game and missions through manipulating and testing repeatedly.
- Be careful to ensure that all decisions are completely fair.

### **Team members older than eleven**

- Create structure to encourage creative, “out of the box” ideas.
- Provide the older team members leadership opportunities, such as explaining ideas and next steps to the rest of the team.
- Be aware of group “cliques.” When you see members excluded, or the focus moves away from the whole team, hold discussions, and rearrange individual roles.

## **WHY**

Why do older team members need strong encouragement and a trusting setting to think creatively?

During this stage, students become more concerned with social affairs and fitting in, and resist any thoughts of outside the norm or that could produce ridicule.

Why can you approach ideas from the adult’s perspective only with older team members?

Now able to grasp abstract thoughts, this age group can understand a problem by thinking through to the end. You can take advantage of this by encouraging the solving of problems using scientific thought, a hypothesis, and collecting data before coming to a final solution.

### 2.3.6 Self Awareness

Finally, coaches should be aware of themselves and how they impact the group.

They should ask themselves: Would I want everyone on the team to copy my actions right now? What do I see in this situation that could make it better?

Coaches should use themselves as models for types of behavior everyone expects from the team.

The first step for a coach preparing to lead a team should be to set personal goals for the season. Put goals on paper that include expectations for the group's success at functioning together as a team. Record mission expectations as well as their difficulties. Write down what concepts you expect the team to internalize by the end of the season.

#### WHY

Why should you write down personal goals for the season?

This will help you keep on track throughout the season with what you and the team learn. This will also help you set out ahead of time what you are comfortable teaching. Finally, this allows you to include your interests in the team plan, since you are part of the team too!

#### WHY

Why is it important for you to define roles for each team member?

This keeps everyone on task, and insures that many skills are learned. Specific roles on a team allow individual members' abilities and knowledge to be recognized by others, both on and off the team. In many cases everyone on the team will get some time to work on the activities they want to, but certain members take a leadership role for the piece for which they are responsible.

#### WHY

Why are your actions and attitudes around the team so important?

Often the FLL experience can be an intense one. All team members will watch your behavior under pressure. You are a role model, and you set the tone for the team.

### 2.3.7 Organization

The planning and scheduling of meetings, visits, facilities, and trips are the coach's responsibility.

The coach acts as a bridge between team members, mentors, parents, and volunteers. Communication includes distributing calendars to the parents to ensure team attendance, as well as to mentors and volunteers. Let them know when you expect them.

It is important for the coach to be specific regarding each individual's role of participation on the team. The coach should assign one or more role or job to each team member. A list of suggestions is available at the end of the previous section. Carefully discuss responsibilities for each role with the whole team. The decision in handing out roles should have team input, but the coach ultimately decides.

A coach should clearly explain to each team member his or her individual role on the team, including what he or she should leave up to the coach. This applies to mentors and volunteers as well.

Coaching a FIRST LEGO® League team is a challenging yet rewarding experience! For an FLL team to be successful, both the coach and the team members must commit to the entire process, including researching, designing, building, experimentation, and testing. Unlike exercises with predetermined outcomes, FLL requires problem solving, risk taking, experimentation, failure, and success.

#### WHY

Why is it so important for you to create and hand out a schedule that includes project deadlines, when guests will visit, and when you need outside help?

You should be comfortable with the team's progress throughout the season. Let mentors and volunteers know when you expect them. Such planning ensures the team has everything it needs on time.