

2009 – 2010 National Engineers Week Future City® Competition

Mentor Guide

QUESTIONS:

Why should I volunteer?

How much time do I need to spend at the school?

How do I work with the teacher?

Can a volunteer mentor more than one team? Can a team have more than one mentor?

Does the mentor need to be an engineer? Does the engineer need to be licensed?

Is one type of engineer (e.g., civil or electrical engineer) better to mentor the project?

The theme (essay question) is not in my area of expertise ... should I still volunteer?

What other resources are available to help me?

What does it mean to be a mentor?

I have not worked with young students before. What will interest them?

Can my participation really help and influence students?

How do I bring engineering to the FC project?

What do I NOT do?

What is the most important thing for the new volunteer to know?

Hints to make the process a success for all (successful collaboration)

Why should I volunteer?

Technical professions will be even more important as we move forward into the 21st century. Future City is a wonderful way to get 7-8th graders involved in thinking about engineering and a career they might not otherwise have considered. Post-program surveys show that a majority of students become more interested in math, science and engineering after completing Future City.

And, mentoring helps the volunteers as well.

- “I enjoy seeing the transformation of these junior high school kids into becoming young adults and future project managers. I also enjoy seeing these kids discover some strengths from within themselves that they never thought that they had.”
- “I cannot put into words the thrill and satisfaction I get out of seeing eager minds enthralled by the concepts of engineering as I work with them on the FC competition.”
- “It’s not about me. However, it is great to get recharged and lead a richer life from time well spent.”
- “I have spent quality time with my two sons who have been in the program. I’ve made professional friends. I’ve helped the kids excel a bit more than they might have otherwise.”
- “It’s amazing what 7th and 8th graders can do -- makes you optimistic about the future.”
- “It’s actually a lot of fun. As dorky as it sounds, I like seeing the kids get excited about engineering, even if they don’t fully realize it’s engineering.
- “I love working with the kids, hearing their ideas, seeing their excitement. Future City has a great structure for learning. It’s not all “geeky” engineering. There’s planning, computers, writing, hands-on building, presentation - all of the skills a modern engineer needs.”

How much time do I need to spend at the school?

On the average, volunteers spend about 30-40 hours working with the student teams over a 3-4 month period (Sept-Jan). Some schools work on Future City during class, some work on it after-school. The Mentor's time at the school tends to be concentrated in the early and late weeks of the project.

Mentors should begin by becoming familiar with the rules and the yearly theme. In the early weeks, they meet with the team to get to know the students and focus on the big picture: good urban design, overview of the essay topic, brainstorming. Later, mentors devote time to helping with the model, teaching the students about scale, and working on the presentation. They also make themselves available by email for reviewing things like the essay and ideas of futuristic components.

How do I work with the teacher?

The teacher is the leader. Start by discussing the teacher's needs on each phase of the project (city planning, computer model, physical model, essay and presentation) and how you as the mentor can contribute. Establish a schedule.

Teachers differ in the way they bring Future City to the students. Some work on the project as part of the class curricula. In this case, they may have a whole class (or classes) that work as a team on one design. Or, they may break the class up into smaller groups and work on multiple designs. Some teachers work with smaller groups – like the science club – in an after-school environment.

Just remember: The mentor is a member of the team, but the teacher is the leader.

Can a volunteer mentor more than one team? Can a team have more than one mentor?

Per Future City rules, each team has one mentor, but, each team does not necessarily have to have a different mentor. If the mentor and the teacher agree, a volunteer can work with more than one team.

Conversely, more than one volunteer can help mentor a team. A volunteer might want to enlist help on the project (for whatever reason: technical expertise, time constraints, etc.) and should do so with the agreement of the teacher. However, one volunteer needs to be listed as the official team member for the competition.

Does the mentor need to be an engineer? Does the engineer need to be licensed?

The mentor should have a technical background sufficient to understand the project and be able to coach the team. While an engineering background is preferable, it is not mandatory. Nor is it mandatory that the mentor be licensed.

Is one type of engineer (e.g., civil or electrical engineer) better to mentor the project?

It's the basics of the engineering process that are important: identifying and analyzing problems, determining requirements, developing and testing solutions. A city is a complex structure and there will always be aspects that will be beyond any one engineer's realm of expertise. However, all engineers have the background and the skills to go out and find the solutions – and that is what needs to be passed along to the students.

The theme (essay question) is not in my area of expertise ... should I still volunteer?

Of course! Engineers are trained to solve problems. And, problem-solving is an essential skill that the mentor needs to help the teacher instill in the students. Teach them how to break a problem down into parts, research alternatives and develop a solution. And, as you would in your job, enlist the help of other engineers who are experts in the field.

What resources are available to help me?

The Teacher Handbook describes the program rules and includes tips on how to incorporate the project into the curriculum. There is also a mentor's guide with some background information on Future City. All of this, as well as copies of past national winner's essays and pictures of models, can be found on the national Future City website: www.futurecity.org. Many regional websites have additional resources.

The N TX regional website (www.dfwfuturecity.org) has a page of resources that includes: pictures of regional and national models, material lists for models, past winning essays, and links to additional information on topics related to the FC effort (urban planning, essay topic research, SimCity, etc.).

What does it mean to be a mentor?

Being a good mentor means you show up when you promised and you hold the students to their promises too, such as research assignments, or draft essay components, etc. Make it easy for the kids to talk to you and to ask questions. If you are intimidating, they will shy away. Be a team player. Be enthusiastic about your work and tell stories about projects when you can relate it to a subject being discussed. Let's face it; engineering is fun, a great career choice, and they need to know it.

I have not worked with young students before. What will interest them?

There are many good resources available. Recent research emphasizes that it is important for mentors to help students understand that engineering is a creative and helping profession. (They are less interested in the process of becoming an engineer.) It is important that students understand that engineers work in teams. You and your student might enjoy www.discoverengineering.org, which has three kid-tested, popular videos. You might also want to check out www.engineeryourlife.org. While this is intended for high school students, you will find lots of great information about the kinds of messages that will resonate with your students. They can watch very cool videos of engineers who love their jobs and make a difference.

Can my participation really help and influence students?

A recent study by the National Academy of Engineering states that students who study engineering design can learn 'engineering habits of mind'. These habits of mind are defined as systems thinking, creativity, optimism, collaboration, communication, and attention to ethical considerations. Future City addresses all of these. Also according to the report, exposure to engineering education 'boosts youth interest in pursuing engineering as a career' and may increase student ability in math and science.

How do I bring engineering into the FC project?

Coach the team in problem-solving and provide insights into what engineering might need to be considered. Guide them to where they can find the answers, bring in examples or subject-area experts, explain information that may be a bit over their head, etc. Show them how what they are doing for Future City is similar to what engineers do in their jobs: take a problem, research ideas, determine possible solutions, test those solutions with simulations and scale models, and communicate the results.

Help to ignite the students' imaginations about what the future will be like. Example: how engineering took us from ENIAC to today's micro computers. Or, what things were like 200 years ago (George Washington) versus what they are like now and extrapolate to what they will be like in another 200 years. Try not to stifle their imagination and ideas of what the future will hold (you will be amazed), but do try to keep them somewhat grounded in reality. The laws of physics and nature and the principles good design still apply: nuclear power plants need to have a large source of water, city residents will need employment (but they don't want factories next door), cities in extreme locations (underwater or on the poles) need to consider the effects of climate on plants and animals (for instance, it will be hard to power a city in Antarctica solely with solar energy).

Teach the students about scale models and why they are important. Example: one veteran FC mentor teaches the students about scale by having them go out and measure his car and then come back inside and draw the car to scale.

What do I NOT do?

Do not do the work for the students. Plant the seeds and watch them grow. And, remember to be supportive (not sarcastic), no matter how absurd some of their ideas may seem. Don't lecture – encourage discussion and talk to the students at their level of understanding.

What is the most important thing for the new volunteer to know?

Experienced mentors tell us:

- Future City is a multi-faceted program, so don't get overwhelmed trying to tackle it all at once. Set up a schedule and pace yourself to accomplish all of your goals.
- Like any team, your Future City group will have ebbs and flows of energy. Keep them motivated and focused.
- Don't let your adult world limit the students' imaginations. It is amazing what ideas these kids will generate. Once they have settled on a concept, make sure that it has a sound scientific basis.
- Help the students get the most out of the program – e.g., how to: solve problems, work as a team, share ideas, think in 3D, and communicate their results.

Hints to making the process a success for all (successful collaboration):

Team work and capitalizing on everyone's strengths. It all needs to get done, so pace yourself and don't leave it all to the end. Shoot for singles and not homeruns. Celebrate results.