Know your Audience:
How to Present your Profession to K-12 Students

Presented by:
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Olivia Richards, PE *BSCES Outreach Committee Chair, current*
Presenters

Reed Brockman

- Associate Vice President, Structures Inspection Program Manager & Senior Structural Engineer, AECOM
- Future City Regional Co-Coordinator 2009 – present
- Chair of the BSCES Public Awareness and Outreach Committee 2004 – 2015
- Author, From Sundaes to Space Stations: Careers in Civil Engineering, Bonamy Press 2010
- Co-host, Civil Engineering Today, BNN-TV and YouTube, 2006 – present
- Founder / Organizer of ThinkFest 2005 – 2015
- Co-founder / Co-Organizer of Infrastructure Day 2015 – present
- Founder / leader, Boston Bridge Tours, 2004 – present.
- Creator, Ralph Salvucci Online Bridge Design Contest
Presenters

Olivia Richards

• Structural Engineering, *Gill Engineering*
• Future City Regional Co-Coordinator 2013 – present
• Chair of the BSCES Public Awareness and Outreach Committee 2015 – present
• BSCES Model Bridge Competition Coordinator 2014 – 2015
• Volunteer Coordinator for BSCES Outreach activities, 2013-2015
• BSCES Younger Member Group Liaison to Worcester Polytechnic Institute Student Chapter, 2012-2016
Topic Overview

1. Speaking to K-12 Students in a Classroom
2. Mentoring a Team of K-12 Students
3. Recommended Activities for K-12 Students
4. How to Get Involved in Volunteering with K-12 Students
Speaking to K-12 Students in a Classroom
Prepare your Presentation

• Presenting to kids is very different from presenting to professionals
• Discuss the students’ interests and capabilities with teacher
• Use minimal words on slides & many pictures
• Insert videos to break up the presentation
• Minimize handouts, 1-2 pages
• Keep the presentation short
• Include stories from work
• Use props to explain engineering concepts
Adjusting for Age Groups

• Elementary School Level
  • Minimize presentation time (15 minutes max.)
  • Do hands on activities with students
  • Limit to a few topics for the students

• Middle School Level
  • Challenge them – developing critical thinking skills
  • Longer presentation, many visuals
  • Hands on activity that can be challenging

• High School Level
  • Understand basic physics and advanced math
  • Engaging presentation with discussion and video
  • End with a competitive challenge
Mind your Words!

• Avoid industry jargon!
• Avoid elaborate explanations of theoretical ideas
• Avoid tangents – kids can have questions that may distract from your main point
• Be animated while speaking!
• Relate to them (e.g. “have you ever looked up when your parents drove under a bridge?”)
• Don’t try to use words that “kids say these days”, avoid patronizing
Use Many Visuals

• Pictures help them to visualize and understand
• Videos capture their attention
• Include as many pictures as you can of yourself at work or in the field
• Draw on the blackboard
• Call up volunteers to help you demonstrate
• If showing clips of plans, highlight important pieces, don’t overwhelm
Repeat Repeat Repeat!

• Echo your message at the end of your presentation
• Try to bring up previously mentioned concepts to reiterate
• Have the students say important words with you to help them remember
• Associate new terms with an action (e.g. tension force with pulling your arm)
Mentoring a Team of K-12 Students
Mentoring Overview

• Many STEM programs include professional engineers as mentors for student teams
• Mentors visit with a student team and provide guidance through a project or competition
• BSCES Model Bridge Competition and Future City Competition provide engineers as mentors to the student teams from September through January
Preparation for the First Visit

• Contact the teacher and confirm ages of the students and number of students attending
• Ask the teacher about a CORI check (background checks for working with kids), it is required in Massachusetts
• Estimate the number of visits and set milestones
• Review the competition rules or syllabus
• For the first visit, consider a quick presentation about your profession or the engineering topic to help get the brainstorming started
Layout a Basic Schedule

• 1 hour visits go by fast! Be mindful of the time you have with them.
• Try to remain consistent with visits, same time each week.
• Keep the students committed to completing a task before your next visit.
• Provide enough guidance so they can complete the work without you there, review their accomplishments during your next visit.
Let Them Do the Work

• Avoid implanting your ideas into their heads, let them start with the idea and you can help them refine it.

• Try not to give 1 example (e.g. “you can power your city with wind turbines!”) or else everyone will use the same example, keep the ideas diverse.

• Watching them build a model can test your patience but avoid doing the work for them. You can build example figures or draw sketches.

• When crunch time happens, try not to take over!
Remember You Are the Mentor, not Teacher

- Sometimes the mentor position could turn into more, we don’t want you getting pushed into a role like this.
- The teacher is in charge of supervising and reprimanding, refer to the teacher for this. The teacher should be present at every visit.
- You are not expected to be running the class or group, you provide guidance. The teacher should be keeping them on track and should know the competition rules.
- You are providing ideas, discussion topics, and guidance – not being a parent or teacher to the kids.
Recommended Activities for K-12 Students
Our List of Activities

1. Toothpick and gumdrops structures (middle school to high school)
2. Balloon towers (K-12)
3. Paint stirrer catapults (middle school)
4. Detour plans (high school)
5. 40” Model bridges (middle school to high school)
6. Mini-Future City (K-12, can be adjusted)
7. Water Quality Testing (high school)
8. Straw Puppets (K-12)
9. Dance-Dance Revolution Circuits (middle to high school)
10. Can Towers (K-12)
11. CD Cars (middle school)
12. Jenga Structures (K-12)
13. West Point Bridge Design (high school)
14. Card Towers
15. Dam Challenge
16. Wind Sail
17. Read a Book
Activity Demo
How to Get Involved in Volunteering with K-12 Students
Upcoming STEM Events

• Future City Competition
  • Saturday, January 20th, MassDOT HQ
• BSCES Model Bridge Competition
  • February 3rd, Wentworth
• Girls STEM Summit
  • Sunday, April 8th, Weston, MA
• Cambridge Science Festival
  • April 13th – 22nd, Cambridge Rindge & Latin
• Girl Scouts of Eastern Mass STEM Expo
  • Saturday, beginning of March, Framingham, MA
• Wellesley STEM Event
  • Saturday, Mid-April, Wellesley, MA
Mentors Needed!

- Model Bridge Competition
  - Esperanza Academy, Lawrence, MA
  - Northbridge Middle School, Whitinsville, MA
  - Dupont Middle School, Chicopee, MA

- Future City Competition
  - East Hartford, CT
  - Brockton, MA
  - Chelmsford, MA
  - Somerset, MA
  - Somerville, MA
  - Fremont, MA
  - Rockland, MA
  - Salem, MA
  - Wakefield, MA
  - Provincetown, MA
  - Framingham, MA
  - Cotuit, MA
  - Westfield, MA
  - Bolton, MA
Future City Competition

• Middle School Students
• Theme is Age-Friendly City
• Deliverables
  • SimCity Virtual City
  • Essay about City
  • Physical Model
  • Presentation
• Regional Competition is January 20th at MassDOT HQ
• Need Competition Day Volunteers!
Model Bridge Competition

• Middle School and High School Students
• 40-inch long model
• Material varies each year
• Compete to hold the most load
• Regional Competition is February 3rd at Wentworth
• Need Competition Day Volunteers!
Recommended Books for Elementary School Students

• Tinkering Tink (Disney Press)
• Rosie Revere Engineer (Andrea Beaty)
  (Has an activity book, too!)
• Bridges are to Cross (Philemon Sturges)
Recommended Books for Middle / High School Students

- Is There an Engineer Inside You?
- From Sundaes to Space Stations
- Why Buildings Fall Down
Resources and Questions

• BSCES Outreach Committee’s list of activities
  • https://docs.google.com/spreadsheets/d/1ngFzyPxFIm8vV3MkOsKaQSKLsAM62DifSUkLw2NP34/edit?usp=sharing

• BSCES Volunteer Call, Winter 2017-2018
  • https://drive.google.com/file/d/1wv0M0FqbGyaqek-LxjfOoP86UFt_TvE-/view?usp=sharing

• Future City Competition Day Volunteer Sign Up:
  • https://goo.gl/forms/BYicrGS83K8uoxUt1

• Model Bridge Competition Day Volunteer Sign Up:
  • https://goo.gl/forms/EGRerWHQVxIMRy0m1