Using STEM Competitions to Promote Team Building...

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Objective

By the end of the session, we will have...

- An understanding of several different STEM related competitions to promote team building.

- An overview of MESA, Lego Robotics, and Future City.
Purpose

- Improve students’ attitudes toward STEM fields and careers
- Increase STEM knowledge and skills
- Increase the likelihood of graduation and pursuing a STEM career
STEM @ Southwest Academy
Magnet School for Science and Engineering

- Magnet school within a comprehensive school
- 6th, 7th, and 8th grade
- Approximately 750 students; 106 magnet students
- 65 teachers; 2 magnet; 3 certified PLTW
- Over 250 applicants; 52 vacant seats
- Incorporating comprehensive students with magnet activities
- Promoting STEM - related after school activities
What’s in it for the students?
- It’s a cross-curricular educational program
- Provides students an opportunity to do the things that engineers do using the Engineering Design Process.
- An engaging way to build students’ 21st century skills.
What’s in it for the students?

Students are able to:

- Apply math and science concepts to real-world issues
- Develop writing, public speaking, problem solving, and time management skills
- Research and propose solutions to engineering challenges
- Discover different types of engineering and explore careers options
- Learn how their communities work and become better citizens
- Develop strong teamwork skills
• **Mathematics, Engineering, Science Achievement (MESA)** is nationally recognized for its innovative and effective academic development program.

• **MESA** partners with all segments of higher education as well as K-12 institutions.
History

• 1960s
  – A group of concerned Berkeley educators launched a study to determine why so few African Americans, Latinos, and American Indians are enrolled in the UC Berkeley College of Engineering. They develop a solution based on pre-college intervention.

• 1970s
  – The MESA program is founded at Oakland Technical High School with 25 students.
MESA’s Goal

- develop academic and leadership skills
- instill confidence in students historically underrepresented in engineering, physical science, or other math-based fields
- increase the number of African American, Latino American and American Indian graduates from a four-year university.
MESA has a proven track record with over 40 years in producing math-based graduates.
MESA Programs

- MESA School Programs
- Community College Program
- MESA Engineering Program
- MESA Day
- National Competition
MESA School Program

- The MSP assists students at middle and senior high schools (and some elementary schools)
Community College Program

- The MCCP provides math, engineering, and science academic enrichment to community college students so they excel academically and transfer to four-year institutions in calculus-based majors.
MESA Engineering Program

- The MESA Engineering Program (MEP) supports university students enrolled in colleges of engineering
MESA Day

- MESA Day is an annual engineering, math and science competition that will be held in each MESA state.

- MESA Day provides an opportunity for each student to design and build projects, win medals, learn by doing, visit a college campus, and interact with each other.
National Competition

- Designed to bring the best of the best from each MESA state to compete at a national level.

- Overall, MESA will start off with 49,000 middle and high school students ending up with only 72. This is a high level competition.
How to Get Started

• Visit the MESA USA website to see if your state is listed

• If not, contact MESA USA to find out how you can become a part

• Download the competitions from the website
Cost

- Approximately $100
  - Includes materials (balsa wood, display boards, for national project)
  - Also includes ‘found materials’ /‘recycled materials’
Presented by

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What is it?

- a national, project-based learning competition
- 6th, 7th, and 8th graders imagine, design, and build cities of the future
Students work as a team with an educator and engineer mentor

- plan cities using SimCity™ 4 Deluxe software;
- research and write solutions to an engineering problem
- build tabletop scale models with recycled materials
- and present their ideas before judges at Regional Competitions in January.

Regional winners represent their region at the National Finals in Washington, DC in February.
We Visited the White House!

Look where designing and building cities of the future can take you. [VISIT THE SHOWCASE]

The Future City Competition is just one of several National Engineers Week initiatives...
Future City Components

**Getting Started**
Register team(s), learn about team formats, find a mentor, review the calendar, & see a planning timeline.

**Design the Virtual City**
Use the provided SimCity™ 4 Deluxe software on your PC or MAC to design a virtual city of the future.

**Write the Research Essay**
Write a research essay describing how you would manage stormwater runoff in your future city.

**Write the City Narrative**
Describe your city and its key design attributes.

**Build the Model**
Build a physical model of your city using recycled materials.

**Team Presentation**
Show your city to a panel of judges at the Future City competition.

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**Rules & Rubric**
All the rules and rubrics for every component in one place.

**Competition Forms**
Download writeable PDFs of all competition forms.

**National Standards**
See how Future City aligns with National Standards.

**STEM Learning Blocks**
Get additional class activities.
• **Resources**
  - SimCity Software
  - Program Handbook
  - Web Site with links and info
  - Mentor
  - Technical support

• **Costs**
  - Virtual
FIRST® LEGO™ League Robotics
Getting Started
http://www.firstlegoleague.org
http://www.firstlegoleague.org
Regional Contacts

For more information on FIRST programs in your area, select a program and area. Some areas may have multiple contacts.

Step 1: Select a program.
- FIRST Robotics Competition (Grades 9-12)
- FIRST Tech Challenge (Grades 7-12)
- FIRST LEGO League (Grades 4-8)
- Junior FIRST LEGO League (Grades K-3)

Step 2: Select an area.

Select Area
- Alabama
- Arkansas
- Arizona
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Iowa
- Idaho
- Illinois
- Indiana
- Kentucky
- Louisiana
- Massachusetts
- Michigan
- Minnesota
- Missouri (Eastern Missouri - St. Louis)
- Missouri (Western Missouri - Kansas City)
- Montana
- Nebraska
- Nevada - Las Vegas
- Nevada - Reno
- New Hampshire
- New Jersey
- New Mexico
- New York - Finger Lakes
- New York - Long Island
- New York - Mid-Hudson Valley
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Virginia
- Washington
- Wisconsin
- Wyoming

If you do not see an area, please contact us for further assistance.
Regional Contacts
FLL in Maryland

Partner
Anna Spence
aspenec@umbc.edu

Partner
Jamie Guranus
jguranus@umbc.edu
http://www.fllmaryland.org/

Find another contact.
Global Impact

• FLL Robotics is a program for 9 to 14 year olds designed to get students excited about science and technology while teaching them valuable employment and life skills.

• FLL Robotics is part of a global movement that has over 200,000 students; 22,000 teams; and 750 qualifying tournaments in 60+ countries.*

*Argentina, Australia, Austria, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Czech Republic, Denmark, Egypt, Estonia, Faroe Islands, France, Germany, Haiti, Hong Kong, Hungary, Ireland, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kuwait, Lebanon, Lithuania, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Pakistan, Palestine, Peru, Philippines, Poland, Portugal, Qatar, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, R.O.C., Thailand, Tunisia, Turkey, United Kingdom, United States, Yemen.
Founders

• “We want to change the culture by celebrating the mind.”
  - Dean Kamen Founder, FIRST

• “FLL encourages children to design, construct, and program their own intelligent inventions. This allows them not only to understand technology, but to become masters of it.”
  - Kjeld Kirk Kristiansen Owner & Deputy Chairman, the LEGO Group
3 Tier Challenge

1. Research Project
2. Robot Game
3. FLL Core Values

The Robot Game and Project are **what** teams do. The FLL Core Values are **how** they do it.
Research Project

- Teams learn more about the science behind the Challenge theme
- Kids use their creativity to design a solution (or modify an existing solution) to solve a real-world problem
Robot Game

• Build and program an autonomous LEGO MINDSTORMS® robot

• Robot navigates, captures, transports, or delivers objects on a printed mat (the Field)

• Robot completes as many missions as possible in 2½ minutes
FLL Robotics Core Values

• We are a team.
• We do the work to find solutions with guidance from our coaches and mentors.
• We know our coaches and mentors don't have all the answers; we learn together.
• We honor the spirit of friendly competition.
• What we discover is more important than what we win.
• We share our experiences with others.
• We display Gracious Professionalism® and Competition® in everything we do.
• We have FUN!
What is FLL?

An international program created through a partnership between *FIRST* and The LEGO Group

- **INSPRIRES** children, ages 9 to 14, to participate in science and technology
- **ENGAGES** children in playful and meaningful learning
- **PROVIDES** a fun, creative, hands-on learning experience
- **CHALLENGES** children to solve real-world problems using robotics
- **TEACHES** children to experiment and overcome obstacles
- **BUILDS** self-esteem and confidence
How it Works

PROBLEM SOLVING AND CREATIVITY
- Present children with a real-world problem
- New scientific theme each year

TEAMS OF STUDENTS AND MENTORS
- Work as a team
- Learn with adults and mentors

DO IT ALL IN 8 WEEKS
- Building, programming, testing, investigating solutions
- Competing with peers in high-energy tournaments
- Presenting solutions to a real-world problem to a panel of judges
**FIRST Programs**

- **Jr. FIRST LEGO League**
- **FIRST LEGO League**
- **FIRST Tech Challenge**

Grade Level:

- K
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

**FIRST Robotics Competition**
FIRST LEGO League

Helps children, ages 9 to 14, discover the fun in science and technology while building self-confidence, knowledge and life skills

“I want to build things nobody else has even though of yet.”
Charles Peterson, FLL Team Member (10 years old)
Teams

Up to 10 children, ages 9 to 14, and at least one adult coach

COST

$1500 for new teams- registration, field set up kit, robotic kit, event/tournament fee

FLL SEASON

May – September --------On-line registration
Mid-September ------------Challenge is revealed
October – November ------Build & research
November – January ------Tournament season
April -----------------------World Festival
More information

- **On the web**
  - www.usfirst.org
  - www.firstlegoleague.org
  - www.juniorfirstlegoleague.org
First LEGO League
FFL
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