

# LEMELSON-MIT

*Celebrating invention, inspiring youth*

## FINDING PROBLEMS IN YOUR COMMUNITY

Invention Education  
Webinar Series

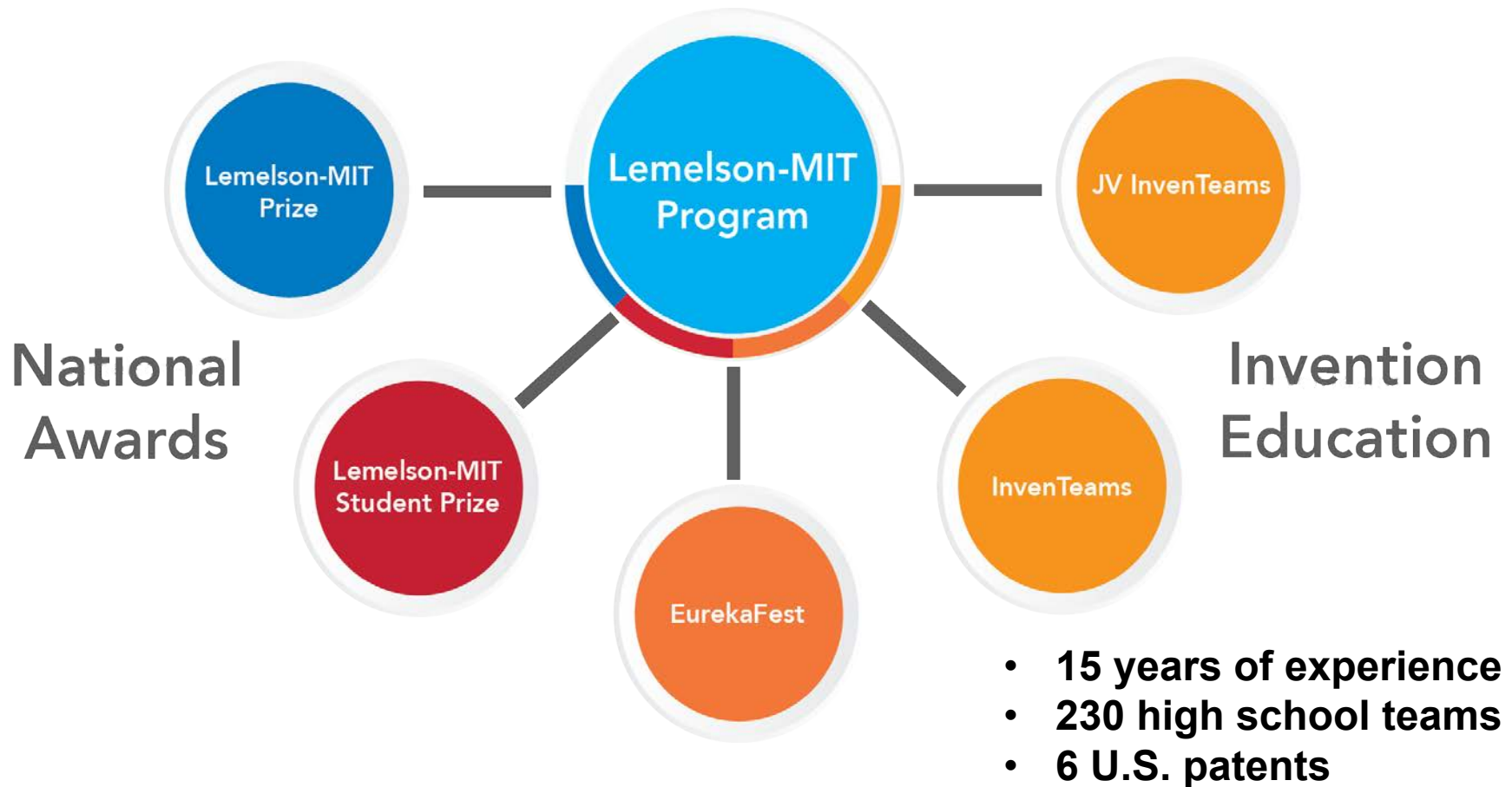


Thursday, October 5, 2017

6:30 – 7:00 p.m. EDT

# Lemelson-MIT Program Overview

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# Presenter Doug Scott

- Robotics and Engineering Teacher at Hopkinton High School, MA.
- Technology/Engineering Subject Matter Leader for Grades 6-12 in the Hopkinton Public Schools
- STEM Teacher of the year, Massachusetts, 2014

## Lemelson-MIT InvenTeam Experience

- Natick High School (MA) InvenTeam in 2013
- Received a U.S. patent for their Search and Rescue Remote Operated Vehicle.



# Finding the Problem

- Why did the team select the ice search and rescue problem?
- What was the journey of selecting this problem?



# Students Select the Problem

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- Foster sense of ownership
- Ensure high relevance to their lives
- Connect to students' personal interests
- Motivate students' passion and enthusiasm

**It is critical to allow students to select the problem they want to work on!**

# Students Communicate with the Community

- Natick students talk with the Army Lab



# Students Communicate with the Community

- Natick students talk with the search & rescue team



# Start Communicating with a New Community

- Fire Department visits school





# Who's in your "backyard"?

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- Town government
  - Safety and security
  - Health department
- Industry
  - Mentors
  - Rusty, the welder
- Parents and family members



# Examples for Inspiration

**What's in the news?** Reading local news reports on the lack of clean water after the 2011 earthquake in Haiti inspired Northeast High School (FL) students.

Portable Bicycle-powered  
Emergency Water Filtration  
Station

Northeast High School (FL),  
InvenTeam  
2012

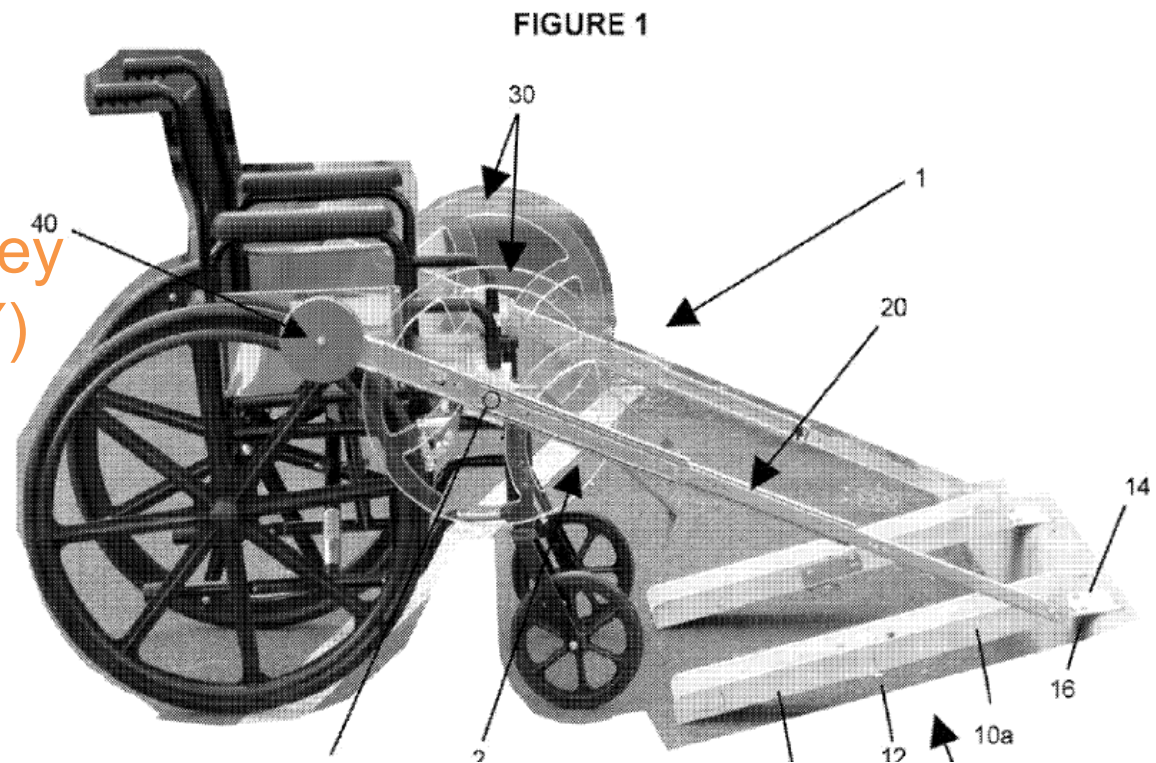


# Examples for Inspiration

## Inspiration can come from family

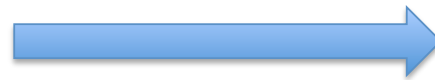
**member's needs.** One team member's sister needed her wheelchair to climb curbs because there were not curb cuts.

Curb Climbing  
Wheelchair Ardsley  
High School (NY)  
InvenTeam  
2007  
U.S. Patent  
7,850,189



# Examples for Inspiration

**Look around your school.** A group of student inventors looked around their 97-year old high school and found chewing gum on the sidewalks especially around trash cans.



Gum Removal Machine  
Tustin High School (CA)  
InvenTeam  
2017



# What's your problem? I'm an Inventor.

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- Students need to reach out to community members and ask, “What’s your problem?”
- The problem has to be local and really important to the students for them to persevere and be an inventor!

# Resources

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- Lemelson-MIT Program  
<http://lemelson.mit.edu/>
- InvenTeams National Grants Initiative  
<http://lemelson.mit.edu/inventeams>
- JV InvenTeams Curriculum Materials  
<http://lemelson.mit.edu/jv-inventeams>
- Design for the Other 90% Network  
<http://www.designother90.org/>
- Makershare <https://makershare.com/>
- Grand Challenges <https://grandchallenges.org/>

# Q & A

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*I wonder if there are opportunities to invent any solutions to help those in Puerto Rico? Florida? Texas?*

Sure, there are! Students can be emotionally moved and inspired to help others by catastrophic events. This is how they can develop empathy for people in need. Encourage students to focus on individual problems in specific geographic regions. For instance, root problems for the lack of drinking water in Houston may differ from the root problems for drinking water in Puerto Rico. It's helpful to have a problem board and lots of "sticky notes." Encourage students to identify individual problems and post them on the board. Then, sort and organize the problems. Are there problems that are common to the students?

*What is the typical time frame students need to see a project through to completion (successful prototype)?*

This is difficult to answer. The time can be lengthy or short, depending on the problem and technical solution. How deep do you want students to dive into the problem? Based on our experience of working with InvenTeam, students typically spend six to eight months building their invention with lots of iterations. This is *after* working for at least a couple of months defining the problem and conceptualizing solutions. The JV InvenTeam projects are more defined and typically take from a few days to two or three weeks. You can also do "design challenges" like Grab Bag Inventing that can take 30 minutes to an hour. You may want to start inventing with students on projects that don't require as much time as an InvenTeam project.

# Q & A

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*How long does it take on average for students to lock into a problem?*

*Locking into a problem is sometimes the hardest part of inventing!* Locking into a problem requires continuously researching and communicating with people who experience the problem, community members and mentors with knowledge that addresses the problem, as well as within the student teams. It's one of the longest and the most important steps of the invention process. Problems often evolve as students dive deeper into the problem space and explore the root causes of the problem.

*Have schools from different areas collaborate on an invention?*

Yes, schools do collaborate on invention projects. For example, academic and tech schools can collaborate. This is what happened with an InvenTeam from an academic high school near MIT. The students had a great problem and devised a unique solution. However, their school lacked the tools and the students were not as strong in the hands-on skills as the minds-on knowledge. They remembered a friend who had chosen to attend the local technical high school and they reached out to him. Collaboratively, the students built the invention – a re-usable firefighting “grenade” that, when deployed, smothered a fire. Even within schools, there are opportunities for engineering or science programs to collaborate with a business program or club. After all, there are many skills beyond the technical skills and scientific knowledge necessary to the process of invention like managing finances, designing graphics, organizing meetings, and managing the project. There is also a great need for communicating with the community and potential supporters as well as the ultimate user of the invention.



# Q & A

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*Is there a go no-go test for students to help them either abandon idea or go onto a different problem?*

Again, this is a difficult question to answer. Invention is an iterative process so the students need to stay focused on the problem they are working to solve. Students need to conduct a lot research, get feedback from mentors and users, and test models of early designs. They should always ask themselves, “Does this help solve the problem?” Sometimes, however, students realize that their problem had not been fully understood so their problem may need to be better or re-defined. All changes need to be agreed upon by the students and recorded.

*I'm wondering how you manage the reasonableness of a problem students find. Often, they find real problems, but they may be limited by their materials and the experts available?*

Go with the real problem. Materials and experts will find their way to a real problem! Encourage students to go with the real problem and find people in the community, including parents and family members, local companies and organizations, town government, or anyone who may have experience and knowledge with the problem. With guidance, students may even seek out college or university experts. Remember that Mr. Scott’s students reached out from Massachusetts to experts in Colorado who provided critical information. Encourage students to communicate what their needs are to the community by utilizing the school or local newspaper and social media. Raise awareness of the problem. Have the students determine what their needs are and ask for what they need.

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**THANK YOU!**

Contact Us at  
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Invention Education  
Webinar Series



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