



From the PTA Archives: In 1957, U.S. educators stepped up their emphasis on math and science learning at all grade levels. This emphasis was kicked into high gear when the Soviet Union launched its first man-made space satellite. It was at that time that Americans knew that students needed to be well equipped and prepared in math and science, starting with what they were learning in the classroom and at home. This, in essence, was the birth of STEM.

STEM

Use the Power of PTA to Make
**Science, Technology,
 Engineering and Math**
 Part of Your Mission

By Jenny Kopach



PTA members with backgrounds in the sciences, such as these medical professionals, can bridge the gap between classroom and career in STEM enrichment activities like Science Olympiad Fun Nights.

The news is everywhere. While U.S. test scores and achievement in science and math are down, the number of jobs in those fields is up, and everyone is focused on a new acronym: STEM (Science, Technology, Engineering and Math). According to the U.S. Department of Commerce, STEM jobs are expected to grow by 17% from 2008 to 2018, making STEM one of the hottest topics in education today. The question is: What can PTAs do to improve K-12 STEM outreach locally?

Resolving to Act

In 2011, the California State Parent Teacher Association (PTA) passed a STEM Resolution, stating that in order to “remain competitive in a global society, the U.S. has a responsibility to provide educational programs and support services to develop responsible, productive citizens of tomorrow.” Their call-to-action resolved that their “units, councils and districts support efforts to improve STEM education, encourage the integration of STEM into everyday activities, and increase awareness of opportunities available to students.” The Utah State PTA website features a page of STEM Education ideas for local PTAs, including starting a Science Olympiad program, holding an engineering fair, or applying for new school technology and computers.

Mad Scientists and STEM Nights

PTAs are listening, and getting creative. In Royal Oak, Mich., the Northwood PTA is in the fourth year of its Science Enrichment Program “The Mad Scientists.” According to PTA committee chairs Susan Bannan and Bonnie McDonough, “the mission is to get kids excited about science and offer a variety of activities and events throughout the school year.” Northwood PTA hosts a Hands-On Science Assembly and a Science Olympiad Fun Night.

Across the country in Colorado’s Boulder Valley School District (BVSD), the Aspen Creek PTA holds a STEM Night for the community, showcasing exhibits from The Denver Museum of Nature and Science and The Denver Zoo, hands-on activities like making a potato battery,

catapult or string instrument, and sessions about video game science, marshmallow towers and pasta bridges hosted by Aspen Creek teachers. Principal Robbyn Fernandez says, “We want to show students what STEM looks like in the real world and how fun and exciting it can be. Activities are tied to the BVSD curriculum and engage the whole community in STEM-focused events.” The PTA uses not only its school website to disseminate information, but also set up a Facebook page to engage parents and community members.

A Case Study in PTA STEM Outreach

In the Midwest, STEM activity has grown exponentially over the past 14 years in Elmhurst, Illinois, driven by the innovation and energy of each of the 12 schools’ PTAs. After two parents and the building science representative got the first Edison Elementary School Science Olympiad Fun Night started in 2001, the concept quickly spread to all eight elementary schools. By 2006, the Elmhurst District 205 Council of PTAs added a Science Chairperson to its roster to oversee STEM outreach and improve K-12 academic achievement via the home-school connection of the 12 PTA units. This strategic addition enabled the Council to apply for grants and awards totaling more than \$16,000, shared among the schools for activities like Science & Hobby Nights, Science Olympiad clubs and science assemblies. In 2014, STEM enrichment activities in District 205 involved more than 3,000 students and 1,000 parents, reaching nearly 40% of the population.

Community Engagement through STEM

One of the most popular PTA activities is the Science Olympiad Fun Night, where small groups of students and a parent cycle through a series of half-hour, high-energy STEM sessions led by local science professionals and educators. Upon arriving in the Science Crime Busters event, students are greeted by Elmhurst Police Department Officers, who use fingerprint and footprint technology, deduction and a series of clues to solve “The Case of the Missing Scissors.” Chicago’s ABC 7 News weatherman Phil Schwarz explains severe storm concepts and demonstrates how to make Pop Bottle Tornadoes, while Elmhurst College chemistry professor Dr. Michelle Applebee assists budding forensics investigators identifying a variety of compounds in Mystery Powders. These events provide a way for local businesses to “give back” to schools and give teachers a chance to interact with students and parents outside the boundaries of a typical school day.

“A PTA-sponsored Science Olympiad event is a wonderful way for all students to develop teamwork and critical thinking strategies,” said Geri Sorrentino, Hawthorne Elementary teacher and Science Olympiad volunteer. “The age-appropriate activities allow students to seek creative and innovative ways to solve problems and to explore the scientific method.”

Each district STEM activity requires close connections between PTA organizers, parent volunteers, educators and administrators. The PTA chairperson works with teacher advisors to select science events that intersect with the school’s grade-appropriate science curriculum. Grades K-1 may concentrate on a unit on measurement and estimation, making “Puff The Stuff” a hands-on building and data-collection event, a perfect fit with science standards and interest already built in the classroom. Homework assignments on meteorology for fourth graders are enhanced by their experience with the Science Olympiad event “Weather or Not,” where students make clouds using matches, water and 2-liter containers.

District 205 Superintendent David Pruneau adds, “I’m tremendously impressed by the way the PTA Council works seamlessly with its individual building PTAs, as well as the District 205 administration, to promote parent involvement in STEM outreach activities. I believe this parent support model will be a critical component in the successful infusion of the new Next Generation Science Standards. It’s a model that could be replicated in District PTA Councils across the state and the US.”

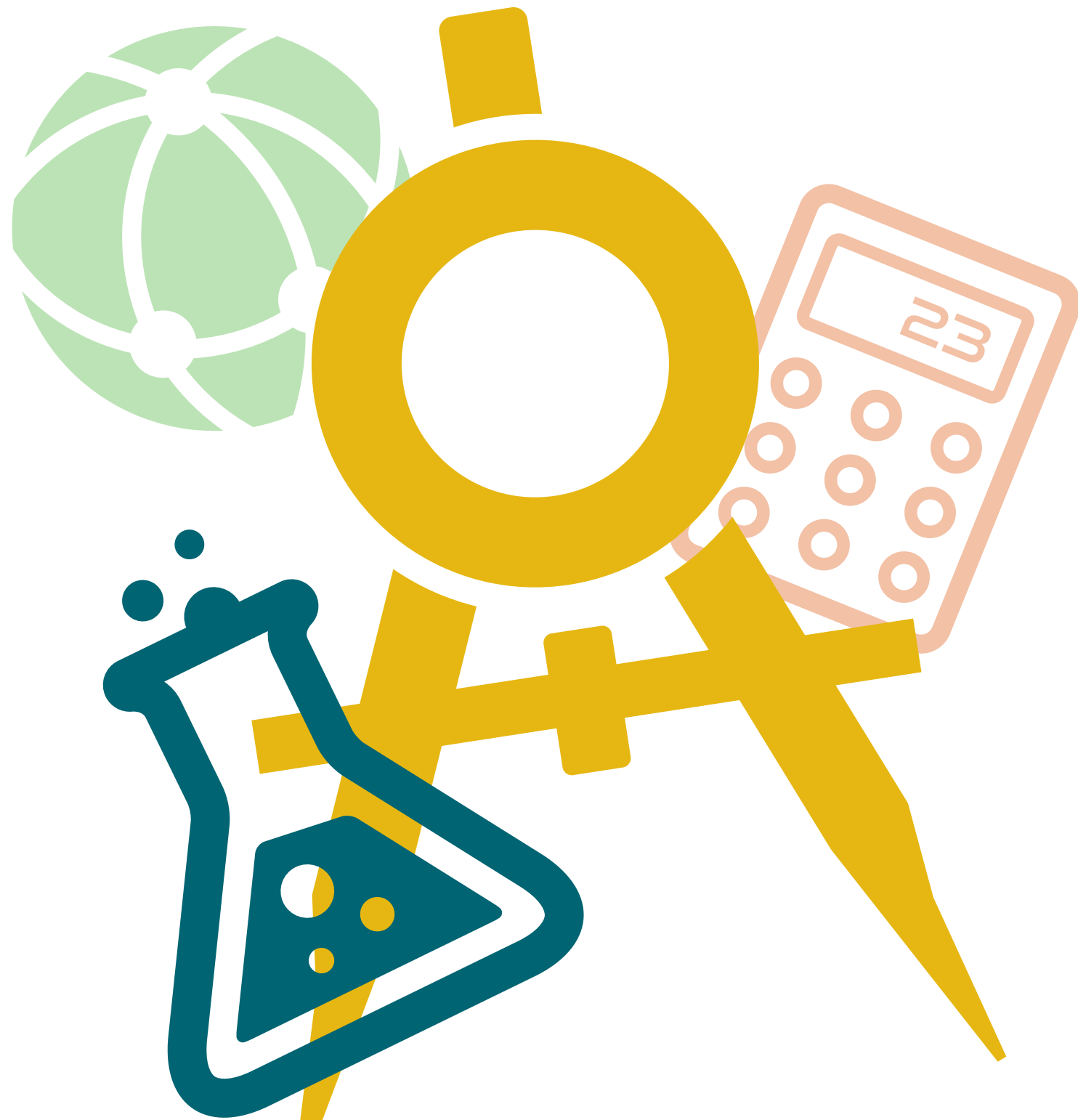
Jenny Kopach has been the Science Chair for the Elmhurst Council of PTAs in Elmhurst, Illinois, since 2006, and has volunteered in her school district as a coordinator of Science Olympiad Fun Nights, as PTA liaison to Science Olympiad teams, and as a science coach and grant writer. In 2005, her efforts netted a Midwest Living magazine Champions in Education Award. In March 2015, Jenny will join Dr. Kelly Price, Director of Academic Standards for Forsyth County Schools and Science Olympiad State Director for Georgia, as co-presenter on Elementary Science Olympiad at the National Science Teachers Association National Conference in Chicago. For more information on Science Olympiad visit <http://soinc.org>.



Students at a Science Olympiad Fun Night in Elmhurst, Illinois, determine the identity of substances in the Mystery Powders event.



Elmhurst Police Department officers from the Evidence Collection Unit help Edison Elementary students solve a case in the Science Crime Busters event.



Making Sure PTA STEM Activities Meet the Standards is Key!



Students from California compete in the Elastic Launched Glider event at the 2013 Science Olympiad National Tournament at Wright State University.

While some schools operate under state-generated science standards, many have adopted the Next Generation Science Standards (NGSS), based on the Framework for K-12 Science Education developed by the National Research Council. NGSS aims to “provide all students an internationally benchmarked science education.” Since thousands of schools across the United States use Science Olympiad as their PTA-sponsored activity, the following are examples of Science Olympiad activities and how to align them to NGSS.

According to Jim Woodland, former State Science Supervisor for the Nebraska Department of Education and Science Olympiad Rules Committee Chair for Inquiry, “The triad structure of NGSS bases student performance expectations for grades K-12 on three things; disciplinary core ideas, science and engineering practices, and crosscutting concepts. While the six core practices stay the same at all grade levels, the complexity of the skills and the overall student performance expectations change from elementary to middle to high school.”

In the Division A Science Olympiad Chopper Challenge for grades 3-5, contestants are asked to build and test three choppers using only the materials provided at the competition. This activity meets science and engineering practices 2-6*; elementary student performance expectations about motion/stability/gravitational force; and engineering design standards related to problem solving, controlled variables and prototyping.

Teams are only given one sheet of 8.5” x 11” card stock and 3 standard paper clips in order to make three choppers that rotate clockwise, counter-clockwise and vertically. Using scissors, pencils and a ruler, students must design, plan, build and test their choppers, readying them for a drop from a specified height. The choppers with the longest total flight time win, and students meet all three defined standards.

At the secondary level, Science Olympiad flight events escalate in complexity. In the Division B event for grades 6-8—Elastic Launched Glider—teams design, construct and test gliders made of ultra-light materials and powered only by elastic to achieve the maximum time aloft. In the Division C Wright Stuff contest for grades 9-12, student teams design, construct, and test free flight rubber-powered monoplanes to achieve maximum time aloft. While both of these challenges fulfill NGSS science and engineering practices 2-6*, Elastic Launched Glider additionally exemplifies middle school engineering design standards related to evaluating competing designs, analyzing data and developing models.

**NGSS Science and Engineering Practices 2-6: Developing and using models; planning and carrying out investigations; analyzing and interpreting data; using math and computational thinking; constructing explanations for science and designing solutions for engineering.*

Reference Websites:

<http://www.nextgenscience.org/next-generation-science-standards>

http://soinc.org/align_natl_stand