S:T:E:M

Science, Technology, Engineering, and Mathematics in Scouting



BOY SCOUTS OF AMERICA® NATIONAL FOUNDATION



Science,

Technology, Engineering, and Mathematics in Scouting



THE BSA'S STEM-RELATED MERIT BADGES: AMERICAN BUSINESS • ANIMAL SCIENCE •

Fun. Excitement. Leadership. Service. These words capture the heart of Scouting.

The Boy Scouts of America has created leaders for more than 100 years, and today's world needs leaders of character more than ever before. Our survival as a nation depends on our youth "being prepared" to address the challenges facing America. Our youth must take the lead in science and technology. We must harness their inquisitive minds and Scouting spirit to forge a new strength in engineering and math. Quite simply, we must give them the tools to succeed.

The history of Scouting is full of science and wonder, insight and problem-solving. Scouts have long embraced science, technology, engineering, and math (STEM) with real-world projects—from learning how to clean habitats in national parks to programming a robot.

We're looking to visionary leaders like you for help in building upon this foundation. As we develop and implement new and modern methods that blend Scouting and STEM, we need your assistance. We need your creativity in planning our program. We need your organizational skills to achieve a laser focus on results. Lastly, we need your colleagues to build a network of support.

Imagine a world where America is No. 1 in science again, with a workforce that not only is technically superb but exemplifies the Scout Oath and Scout Law. You can help bring this vision to life.

Scouts sense they are important as individuals because they know those in the Scouting family care about what happens to them. Whether it's a time of reflection around a campfire or a helpful hand with a Scouting skill, caring adults give Scouts direction that helps them find the right path in life—perhaps a path focused on STEM. With personal responsibility and proper self-esteem, our youth will make the right choices when faced with difficult decisions throughout life, and America will be a better place as a result.



AVIATION • BACKPACKING • BIRD STUDY • CAMPING • CANOEING • CHEMISTRY • CINEMATOGRAPHY •

Why Is STEM Important?

The need for greater scientific literacy isn't just about creating another generation of scientists. The National Science Foundation says it's about helping our youth understand information and concepts "to optimize economic productivity, inform personal decision-making, and participate in civic decision-making." It is more about figuring out how something works, understanding why, and being able to analyze and evaluate scientific information. And those with a deep, lifelong understanding of these concepts will fuel our country's innovation into the future.

"STEM education creates the pipeline of future innovators that will move this country forward. Making STEM education a priority is important, for our nation's short- and long-term future."

-Francis Eberle, Ph.D., executive director, National Science Teachers Association

"The global economy has 'flattened' the world in terms of skills and technology. A new workforce of problem-solvers, innovators, and inventors who are self-reliant and able to think logically is one of the critical foundations that drive a state economy's innovation capacity."

-National Governors Association

COMMUNICATION • COMPOSITE MATERIALS • COMPUTERS • COOKING • DENTISTRY •



The STEM Crisis

American 15-year-olds rank 17th in science and 25th in math compared to their peers in other countries. -Program for International Student Assessment, 2009 U.S. Department of Education

In 2011, fewer than one-third of eighth-graders tested demonstrated proficiency in science.

-National Assessment of Educational Progress U.S. Department of Education

Even for students with undergraduate STEM degrees, only half are still in a STEM occupation 10 years after graduation.

– Georgetown University Center on Education and the Workforce

The U.S. ranks 20th internationally in the number of graduate degrees awarded in STEM subjects. –U.S. Department of Education

Twenty-nine percent of K–5 teachers teach science on two or fewer days a week. -Bayer Facts of Science Education X, 2004

STEM occupations are projected to grow by 17 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations.

–U.S. Department of Commerce

DISABILITIES AWARENESS • DRAFTING • ELECTRICITY • ELECTRONICS • ENERGY • ENGINEERING •

In Japan and China, more than half of all bachelor's degrees are in science and engineering, whereas in the U.S., science and engineering degrees only account for one-third of all bachelor's degrees earned. -Science and Engineering Indicators 2012 National Science Board, National Science Foundation

Only 30 percent of the tested 2011 high school graduates are considered college-ready in science, and only 45 percent college-ready in math.

-ACT College and Career Readiness report

Also, the problem isn't just about a shortage of scientists or scientific literacy. Yes, it's difficult to get young men and women excited about STEM careers, but it's equally difficult to keep them in those careers. The only way to avoid this compound problem is to create and nurture a passion, appreciation, and curiosity for STEM in the early years.

STEM education creates critical thinkers, increases scientific literacy, and enables the next generation of innovators. Their innovation leads to new products and processes that sustain our economy.

It is clear that most jobs of the future will require a basic understanding of math and science. Thus, it is imperative that, as a nation, we make STEM education a top priority.



ENTREPRENEURSHIP • ENVIRONMENTAL SCIENCE • FARM MECHANICS • FINGERPRINTING •

Schools Aren't the Only Solution

"Beyond the schoolhouse door, opportunities for science learning abound." –"Learning Science in Informal Environments" Board on Science Education

Schools must clearly take the lead, and primary responsibility for STEM education and training has always been centered in grades K–12. But these efforts have not been sufficient. Research suggests that interest in science careers may develop in the elementary school years, so science learning in Cub Scouting during grades 1–5 can help lay a strong foundation for more advanced interest and study as boys develop.

There are numerous barriers that schools and teachers must overcome when trying to provide STEM-related education, including the following:

- A lack of funding and qualified teachers
- Inadequate policies to recruit and retain STEM teachers
- Classroom time constraints
- Inadequate teacher preparation
- Teacher beliefs that STEM fields are not for everyone
- Little effort made to show youth the relevance of STEM education
- Difficulty of attracting and keeping youth in STEM classes and careers

STEM in Scouting provides fun activities that supplement classroom learning.



FIRE SAFETY • FIRST AID • FISH AND WILDLIFE MANAGEMENT • FISHING •

FLY-FISHING • FORESTRY • GARDENING • GEOLOGY • GOLF • GRAPHIC ARTS • HORSEMANSHIP •

Inspired ... by Scouting

What do you see in a block of wood? Most people see little more than a piece of firewood or a doorstop. But somewhere in there is a screaming-fast hot rod with red and orange flames. Or the Batmobile, a shark, or a skateboard. This is the beauty of the pinewood derby for Scouts. The Scouts just want to make something fast and cool.

But for those of us who understand Scouting, we see a crossroads of imagination, creativity, and innovation. It is a crossroads visited by Scouts on a weekly basis.

Scouting sparks the imagination, inspiring our young men and women to dream and then figure out how to turn those dreams into reality—like what a young Bill Gates, Walt Disney, and Neil Armstrong probably did when they were Scouts.

The innovations and inventions today were, at one time, merely dreams of a young man or woman. Scouting may be the last great key left in our society to unlock the dreams of tomorrow's leaders, innovators, and inventors. Scouting helps children take any block of wood the world can give them and turn it into something far, far greater.



INSECT STUDY • INVENTING • LANDSCAPE ARCHITECTURE • LAW • MAMMAL STUDY •

MEDICINE • METALWORK • MODEL DESIGN AND BUILDING • MUSIC • NATURE • NUCLEAR SCIENCE •



OCEANOGRAPHY • ORIENTEERING • PERSONAL MANAGEMENT • PHOTOGRAPHY •

Scouting: A Perfect Partner in STEM

"The outdoors is a classroom without walls that's ideal for teaching and for learning Scout skills. In the outdoors, Scouts can immediately use the information they are mastering."

– The Scoutmaster Handbook

Scouting uniquely exposes our youth to-and prepares them for-a world of wonders, challenges, and uncertainty in contexts in which they can relate.

Scouts get to know trees and plants not as botanists, but as integral parts of their world. They look at stars not as astronomers, but as explorers. Their interests in animals are not as zoologists, but as adventurers.

Discovery and the sharing of discovery are at the core of Scouting, just as they are at the core of most scientific endeavors. For many, these interests grow into obsessions which, in turn, grow into careers.

Research shows that women and minorities continue to be vastly underrepresented in STEM careers. Scouting addresses this by removing socioeconomic barriers and social pressures and giving everyone a chance to succeed. So with a mixture of STEM in traditional Scouting and special outreach programs, plus the coed programs of Venturing and Exploring, the BSA can indeed reach a highly diverse and substantial number of youth. But we must remember that regardless of their background or appearance, young people only develop positive feelings toward STEM when it is fun and relevant for them. Then they become lifelong learners.

Perhaps most importantly, the BSA has the potential to reach out to more than 50 million living alumni.



REPTILE AND AMPHIBIAN STUDY • ROBOTICS • SCHOLARSHIP • SCUBA DIVING •

The science learned in Scouting just feels different from the science taught in school. For more than 100 years, the BSA has provided out-of-school STEM education—something not widely acknowledged, understood, emphasized, or sufficiently researched. The BSA has always provided Scouts with a nonformal, hands-on, real-world education using activities, trips, the outdoors, regular meetings, and recognitions. Scouting's emphasis on "fun with a purpose" is perfect for STEM.

Even in the earliest days of Scouting, boys were challenged to:

- Learn astronomy, weather, and Morse code to be prepared when outdoors
- Become highly trained in ecology, conservation, and wildlife and plant identification
- Design and build things such as log cabins and radios, using math and engineering skills

And Scouts have made a profound impact in STEM fields. A Scouting alumnus was the first to transplant a permanent artificial heart. Out of 12 men to walk on the moon's surface, 11 had been Scouts. And former Scouts have even explored Antarctica.

The Values of Americans study (Harris Interactive, 2005) pointed out that more than half of all Boy Scouts agree that Scouting has improved their performance in science and math. Scouts are more likely than boys who have never been Scouts to earn mostly A's. A 2009 Ohio State University study found that more than 85 percent of Boy Scout merit badges included a requirement that met National Science Education Standards, giving Scouts a foundation in everything from nuclear science to robotics. And three out of four Scouts agree that earning merit badges helps them do better in school.



SOIL AND WATER CONSERVATION • SPACE EXPLORATION • SURVEYING • TEXTILE •



TRUCK TRANSPORTATION • VETERINARY MEDICINE • WEATHER • WHITEWATER • WOODWORK

Funding STEM in Scouting Initiatives Through the BSA Foundation

In our pursuit of a stronger, more diversified focus on STEM training, the BSA has identified some specific initiatives, programs, and needs. We are always open to other donor suggestions, but these are the areas where we feel we can be most effective and efficient in delivery and results.

Summary of STEM projects, initiatives, and funding sought at the national level:

| Robotics kits for Scout troops, packs, and crews | \$1,000,000 |
|--|--------------|
| Minority, female, and after-school STEM programs | \$5,000,000 |
| STEM specialty programs at high-adventure bases | \$5,000,000 |
| "Out of the box" STEM projects for Scouts | \$2,000,000 |
| Funding of STEM specialty camps | \$3,000,000 |
| STEM facilities for local BSA camps | \$5,000,000 |
| College scholarships for Supernova achievers in Scouting | \$2,000,000 |
| STEM Training for adult Scout volunteers and mentors | \$1,000,000 |
| Training and support for STEM professional staff | \$9,000,000 |
| Competitive STEM innovation grants for local councils | \$5,000,000 |
| TOTAL | \$38,000,000 |
| | |

Making an Investment in Scouting and STEM in America

Those who have walked the Scouting trail understand the magnitude of that experience in a young person's life. When you support STEM in Scouting initiatives, you aren't just making a gift—you are investing in our youth, our communities, and our future. Your investment will change the destiny of America's youth and touch the lives of millions.

Mission

The mission of the Boy Scouts of America is to prepare young people to make ethical and moral choices over their lifetimes by instilling in them the values of the Scout Oath and Law.

Vision

The Boy Scouts of America will prepare every eligible youth in America to become a responsible, participating citizen and leader who is guided by the Scout Oath and Law.

On my honor I will do my best To do my duty to God and my country and to obey the Scout Law; To help other people at all times; To keep myself physically strong, mentally awake, and morally straight.

Scout Oath

Scout Law

A Scout is: Trustworthy Obedient Loyal Cheerful Helpful Friendly Courteous Kind

Thrifty Brave Clean Reverent

For more information, contact:

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