

Top 10 Myths about STEM & STEAM

BORN TO CALCULATE. Many in our society have come to believe that we are either born with math skills or not. In reality, no one is born with a “math brain.”

LIFE IS MATHLESS. We often do not realize that the world around us has underpinnings of math everywhere. It touches our life in so many ways!

MEMORIZATION NEEDED. Many young people are dissuaded from studying science because the first step in the learning process is a litany of things to memorize. Although students need to know the common language in their specific field, memorization does not play a major role in job performance.

STUFF YOU DO IN SCHOOL, SAME AS THE JOB. In reality, the attributes needed to be a successful student in STEM are not the same as those needed in an actual career. School demands problem solving, persistence, and exploring/discovering skills, while working in science also requires observing, deep thinking, and curiosity/questioning.

STEM SHOULD BE TAUGHT ON TRACKS. Our current educational system is built on tracks that do not allow parallel growth in such fields as chemistry, physics, and biology. In the real-world workplace, these disciplines often converge and therefore need to be taught in an integrated manner.

PLAY IS JUST FOR KIDS. Wrong! Everyone can benefit from play and it continues to enrich our lives, our brain, and our relationships no matter what age we are. Play can ignite interest in STEAM and serve as an effective learning tool throughout a person’s lifetime.

FOLLOW THE RULES. Our society’s norms need to be challenged to innovate. Games and toys allow one to explore simply for the fun of it. Unlike academic studies, play allows us to break the rules and establish new norms?

ONLY WHITE MEN NEED APPLY. Not anymore! STEAM experts come in all sizes, shapes, cultural backgrounds, and sexes.

LIBERAL ARTS DO NOT RELATE. There is often a mistaken belief that skills and competencies developed by a liberal arts education will not help in a STEM career. However, a broad humanities-oriented curriculum is critical to innovation, creativity, and “whole brain thinking.”

YOU NEED MATH FOR THAT. A common misconception is that students need to be highly proficient in math to explore other areas of science, engineering, or technology. This is not true. According to E. O. Wilson, biologist and author of Letters to a Young Scientist, “Many of the most successful scientists at work today are mathematically semi-literate.”

The Toy Association’s STEM/STEAM Strategic Leadership Committee

The primary goal of this Committee is to help toy manufacturers, parents, and teachers better understand the concept of STEAM and how toys and play can contribute to building STEAM skills in children.

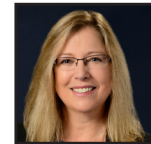
Committee Members:



Babette Allina

Director of government and corporate relations at the Rhode Island School of Design

“Tinkering” is at the heart of the ideation process, and the more “useless” the object you’re working on, the better.”



Karen Bartleson

President and CEO of IEEE (Institute of Electrical and Electronics Engineers)

“The two biggest obstacles for kids to pursue STEM are lack of awareness about how really cool STEM is and traditionally gender-directed expectations.”



Dr. Jo Boaler

Professor of mathematics education at Stanford University

“The most important message parents and teachers can convey to a student struggling with math is, “I believe in you.”



Dr. Knatokie Ford

Founder and CEO of Fly Sci Enterprise

“I don’t think kids are born being intimidated by STEM... their environments condition them to embrace it or be afraid of it.”



Janet Iwasa

Assistant professor in the biochemistry department at the University of Utah

“Staying curious is the key to being a good scientist!”



Roger Malina

Co-director of the Art Sci Lab at the University of Texas at Dallas

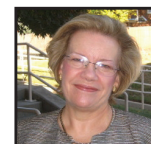
“Working on hard problems can sometimes only be solved by combining STEM with the arts, design or humanities.”



Rafael Núñez

Professor of cognitive sciences at the University of California, San Diego

“Science and math should be taught as a human (collective) form of sense making—which is the process by which people give meaning to their experiences.”



Lucinda Presley, executive director of ICEE

(Institute of Creativity Empowers Education) Success Foundation

“The perceptions that STEM is for “smart” white males only and that it’s for people whose families have money to send them to college are not true.”

Decoding STEM/STEAM

Myths and Messages



the **toy**
association™

The information is brought to you by The Toy Association’s STEM/STEAM Strategic Leadership Committee.
See back cover for details.

What is STEM?

STEM is an acronym that stands for science, technology, engineering, and math. STEM education emphasizes an interdisciplinary approach to learning these subjects and combines rigorous academic concepts with real-life lessons to allow students to explore and apply science, technology, engineering, and mathematics in contexts that make sense to them.

How is STEM Different from STEAM?

The “A” in STEAM stands for “arts” and represents the artistic, creative side of the brain. It emphasizes the importance of tapping into creative and imaginative skills to release the power of innovation, which is critical to successful pursuit of science, technology, engineering, and math.



“It’s in Apple’s DNA that technology alone is not enough — it’s technology married with liberal arts— that yields us the result that makes our hearts sing.”

Steve Jobs, Apple co-founder and former CEO



What Can We Do to Encourage Interest in STEM & STEAM?

BE A ROLE MODEL (OR FIND ONE). Children need role models to imagine themselves as someday being scientists, technology experts, engineers, artists, or mathematicians. Providing children with role models and cultural examples of diversity within these fields can help combat stereotypes and encourage kids from diverse backgrounds to pursue STEM studies.



“In 2015, women constituted only 28 percent of workers in science and engineering occupations, although they accounted for half of the college-educated workforce overall.”

National Science Foundations, National Science Board, Science & Engineering Indicators, 2018

SEEING STEM AROUND THEM. Like oxygen, kids are not aware of all the elements of STEM/STEAM in their life. STEM is an abstract concept for them that is unconnected to their daily existence. To get kids interested in STEM/STEAM, we need to find a way to put abstract science concepts into real-world context.

CONQUER THE “M” FEAR. Math anxiety impacts 50 percent of the population and is also the major barrier to pursuing STEM careers. Teachers who are intimidated by math influence young children and parents. To help kids conquer their fear of math, we need to start by conquering it within ourselves.



“When parents are more math anxious, their children learn significantly less math over the school year and have more math anxiety by the school year’s end.”

“Psychological Science, 2015

DON’T FORGET ABOUT THE “A”! Historically, art played a big role in the work of scientists. Encouraging a broad, well-rounded liberal arts education will help ensure our kids’ ability to be creative, visualize, think holistically, and imagine.

WORK THE HANDS, GROW THE BRAIN. Did you know that our finger and hand movements occur in the same areas of the brain as math? Toys that encourage fine motor skills have the added benefit of growing the brain. Even letting kids count with their fingers helps them understand math kinetically.

MAKE IT OPEN ENDED. If we want to raise scientists, artists or successful individuals in general who can imagine things that have not yet been created, then we must allow kids to play with things that prompt the use of their own individual imaginations. There is no one way to play!

KEEP IT SIMPLE. Exploratory play with simple materials contributes to cognitive development. It opens kids up to learning and especially to creative and innovative thinking. No step-by-step instructions... simply tell kids the outcome they need to achieve and their constraints. Sometimes the fewer items and the simpler they are, the more creative the result will be.

Top 10 Ways Toys Can Teach STEAM

Play is how kids learn the skills they need for success in life. Here are the top **10 benefits of toys and play as they relate to STEM/STEAM:**

1. Toys get kids **involved and passionate about STEAM** subjects, leading the way to a joyful, healthy relationship with these disciplines.
2. Mistakes are OK – fail first, fail fast. Play is a risk-freezone and toys can teach kids how to fail and still have fun, which helps them **develop perseverance**.
3. Toys **teach collaboration and build social skills**, which are greatly needed in the workforce.
4. Toys **expand stereotype roles and foster diversity** of cultures and perspectives.
5. Toys also teach kids to **take healthy risks in a playful environment** and transfer that confidence and courage to their future endeavors.
6. Toys **promote hands-on exploration**, which helps the brain improve cognition including math.
7. Toys encourage kids to **explore their owntalents and develop their passion** through play. This allows them to expand their interests and tryout new things.
8. Toys help kids **relate STEAM to the world around them**, making math and science relevantto things they experience every day such as cooking, running, and building.
9. Toys teach kids to **problem solve, think deeply, and take their time** – in addition to many other transferable skills and competencies.
10. Toys help **integrate the arts into STEAM projects** by encouraging creativity, intuition, and imagination.

The Genius of Play™, a movement by The Toy Association, wants all parents and educators to understand the importance of play.

TheGeniusofPlay.org offers in-depth information on the benefits of play to child development, as well as expert tips, play ideas and more!

