

December 2019

GEORGIA PATHWAYS

M A G A Z I N E

What Most Americans Do

Left Brain / Right Brain
Maya Chande

The STEM of Boring Airline Food



SAT PREP




Evidence Based Reading and Writing
Strategies with Mrs. Evelyn

TUESDAY EVENINGS

7:30 EST FROM YOUR DEVICE

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Advocacy, Mentor, Tutor,
Homeschool Teacher, Faith
and Philosophy Instructor
Grace and Growth

It's Tuesday, which means SAT prep for your teenager from the comfort of your home! Your student needs a device, a writing utensil, and paper. Flashcards and highlighters are encouraged. I will guide them through research-based strategies for successful reading and writing preparation for the SAT. Students have 65 minutes for reading and vocabulary in context as well as 35 minutes for grammar and usage.

My certifications include gifted education, special education, and general education with an emphasis on reading and language arts. In addition, I am Orton-Gillingham trained. SAT Prep Tuesdays will be ongoing from January through May of 2020. I use Zoom.us for safe, password protected interactions with my students. Participation is encouraged, and high achievement is the outcome.

The class takes place on Tuesday evenings at 7:30 EST and has limited availability. Comment below, or reach out to me, and I will send you the link for the Zoom classroom experience. littleladyteacher@gmail.com Be blessed!

Welcome to our latest edition of Georgia Pathways STEM Magazine.



It is incredible to witness the growth of STEM education efforts across Georgia and the country. Equally as encouraging are the many ways in which educators, parents, community leaders and even celebrities have joined in to expand STEM opportunities for all students.

Grammy Award winning singer-songwriter Ciara recently paid a surprise visit to a Norcross STEM school to watch students use their computer coding skills to remix her songs. Students there use a platform called EarSketch, developed by Georgia Tech, that teaches computer science skills through music remixing.

Students compete to present their creations as part of Amazon's future engineer program, according to a USA Today article. By learning to code, students earn a chance to win gift cards and prizes, not to mention make music for a star.

Creative approaches to STEM learning are delivering a significant boost to the opportunity pathway for students who pursue technology careers. Still, not enough students are obtaining degrees for the available tech jobs that could be within their reach.

The U.S. Bureau of Labor Statistics predicts that there will be some 1.4 million computer-science related jobs available next year, but only 400,000 graduates with the skills needed to apply for those jobs.

In fact, employment of computer and information technology occupations is projected to grow 12 percent from 2018 to 2028, much faster than the average for all occupations. These occupations are projected to add about 546,200 new jobs.

Engaging students through popular mediums like music and video games increases the chances that students will stay engaged enough to eventually pursue those needed degrees.

This publication is dedicated to shining a spotlight on the creative pursuits of STEM learning.

As you read through the stories and features, I hope you will find inspiration and be encouraged to pass along information about STEM techniques and approaches that can grab the attention of students and keep it through their first day on the job.

Thanks for your support!

Larry K. Williams
President
TAG-Ed

Larry K. Williams serves as the President and CEO of the Technology Association of Georgia (TAG) and President of the TAG Education Collaborative (TAG-Ed). TAG-Ed's mission is to strengthen Georgia's future workforce by providing students with relevant, hands-on STEM learning opportunities by connecting Technology Association of Georgia (TAG) resources with leading STEM education initiatives.

The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEM learning opportunities and connecting them to Technology Association of Georgia (TAG) resources. Formerly the TAG Foundation, TAG-Ed is a 501(C)(3) non-profit organization formed by TAG in 2002. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEM education in Georgia.

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What Americans Do

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Laboratory Safety

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To understand STEM...

...you must DEFINE STEM, but you cannot define an acronym using the words it stands for; *you must define the words the acronym stands for.*

Universities and organizations around the world continue to debate what a STEM career is. There is no doubt that “every career” uses STEM skills and this observation remains the focus of STEM Magazine.

SCIENCE: “The systematic accumulation of knowledge” (all subjects and careers fields)

TECHNOLOGY: “The practical application of science” (all subjects and careers)

ENGINEERING: “The engineering method: a step by step process of solving problems and making decisions” (every subject and career)

MATHEMATICS: “The science of numbers and their operations, interrelations, combinations, generalizations, and abstractions” (every career will use some form[s])

For a moment, set aside any preconceived notions of what you think a STEM career is and use the above dictionary definitions to determine the skills used in any career field you choose.

These definitions are the “real” meaning of STEM and STEM careers.



What Most



Americans Do For A Living

A 2020 series by Wayne Carley

This series of articles is designed for students and their parents to read as well as for classroom discussion. Numerical data is provided by the Department of Labor and Statistics.

With the push for students to pursue careers in science, technology, engineering and math, it's important to keep an objective view of American careers and a balanced, realistic and practical vision of opportunities.

It's always been popular to tell our children and students to chase their dreams, regardless of that dream. I'm certainly a supporter of encouragement and optimism as it applies to chasing dreams. I personally feel we would be doing our youth a disservice to lead them astray down a road of disappointment, debt and confusion. They deserve and expect the truth from us in regard to their futures.

“What do most Americans do for a living?” will be a 2020 theme for STEM Magazine. Reality is usually more beneficial than dreams when planning our futures, so it’s important to provide realistic information to our students and children as they choose their dreams and explore actual career opportunities in light of their interests, job competition, educational preparation, costs, and actual job availability.

Plan A

Having a plan A, or “what I would really like to do” plan, is a wonderful thing. We need not pour cold water on dreams but show responsibility by encouraging a plan B, C and maybe D as our career paths unfold. It is estimated that this current generation of students will have an average of 4 distinct careers during their lifetime.

“In 2020, over 4.2 million American students are expected to graduate high school”

Not everyone can be an astronaut. Sadly, even those who are qualified to be astronauts are rejected due to lack of placement availability. As of November 2018 the astronaut corps had 38 active astronauts and 18 “management astronauts” (employed at NASA but are no longer eligible for flight assignment). The highest number of active astronauts at one time, was in 2000 when there were 149. What happened?

The American space program has changed in many ways. Manned flight has greatly declined, budgets have been reduced and the need for astronauts just isn’t there anymore. Private space exploration is now the trend for the foreseeable future, and astronaut qualifications have become international in scope. As we include the world’s human population of about 7 billion, vast numbers of aspiring astronauts from around the world increase the competition exponentially.

Regardless of any degree that we might possess, expectations remain about having several separate careers.

Plan A should certainly be explored to discover the need, projected hiring numbers, salary, location and so forth. An important factor to remember regarding future career openings is that someone may have to retire or resign to provide opportunity. Of the 10,000 professional athletes in the U.S., most still have years of career ahead of them, so the actual job openings are a mere fraction of that 10,000 positions. Will you put your life on ‘hold’ waiting for a shot? What are the real chances if you wait? What is the cost? Investigate thoroughly to make a wise and realistic choice.

For much of my high school years I wanted terribly to be a Biological Oceanographer. During my high school senior year, I spent only a few days researching the

actual career opportunities and discovered that the pay was very poor, usually associated with a special limited “Grant” of funds that were few and hard to attain, an entry level hourly wage, and the work was not steady. They often spent all their time at sea doing research and establishing some experience, and at that time, there were less than 1,000 positions....all filled. I then decided to create a ‘NEW’ plan A, B and C.

In 2020, over 4.2 million American students are expected to graduate high school. What if just 1% of graduates wanted to become astronauts? That’s 42,000 people. Someone’s dream will not come true no matter how hard they believe or work. If you do the math, a current realistic percentage is 0.00095. This is that reality.

This year there will be just over 157+ million employed Americans. What will they be doing from day to day to provide for themselves, families and pay the bills? Here are the current top 17 career fields and the number of employees working in them:

- #1. Retail salespersons - 4.48 million workers earning an average of \$25,370.
- #2. Teachers (substitutes and assistants included), 3.6 million earning \$31,000 - \$45,000 each.
- #3. Cashiers- 3.34 million workers earning \$20,420.



Retail Sales
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 Experienced Retail Salesperson with a background in Web and Print Design, Photography and Social Media as well as excellent communication skills and accuracy and efficiency.
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 Retail Salesperson, Microsoft, Adobe, PowerPoint, Excel
 POSITIVE ACHIEVEMENTS
 Salesperson II
 Duration: May 2010 - January 2011

Helped customers try on clothing, exchanged merchandise, opened and closed cash register, preparing charge slips, making deposits, answered questions regarding merchandise.
 Salesperson
 Corporation - 2005 - 2010
 Responsibilities:
 Meet customers and assist them in selecting merchandise and accessories.
 Recommend, select, and package merchandise according to customer needs and desires.
 Answer questions regarding merchandise and services.
 Help customers try on clothing.

- #4. Food prep and serving staff - 3.02 million workers earning \$18,880
- #5. General office clerk - 2.83 million working earning \$29,990
- #6. Registered nurses - 2.66 million workers earning \$68,910
- #7. Waiters and waitresses - 2.40 million workers earning \$20,880
- #8. Customer service representatives - 2.39 million workers earning \$33,370
- #9. Laborers, and freight and material movers - 2.28 million workers earning \$26,690
- #10. Secretaries and admin - 2.16 million workers earning \$34,000
- #11. Janitors and cleaners (not maids), 2.10 million workers earning, \$25,140
- #12. Stock clerks and order fillers - 1.9 million earning \$23,460
- #13. Secretaries - 1.8 million earning \$31,000
- #14. Bookkeeping, accounting - 1.8 million earning \$34,750
- #15. General managers - 1.7 million earning \$110,500
- #16. Tractor-trailer truck drivers - 1.56 million earning \$39,000

#17. U.S. Military, 1.3 million

If you do the math with these numbers, you'll see that about 44,446,000 fall into these top 17 most popular categories. So what do the other 112 million Americans do?

There are hundreds if not thousands of sub-categories, specialty jobs and unique career fields that make up the remaining 112 million workers. Here are some interesting examples:

Pile-Driver Operators – 3,450

Podiatrists (foot doctor) – 9,500

Political Scientists – 5,660

Postmasters and Mail Superintendents – 13,770

Radio and Television Announcers – 27,780

Sociologists – 2,710

Subway and Streetcar Operators – 8,850

Cooks, Private Household – 460

The list goes on and on.

Over 16 million Americans are self-employed and do everything imaginable from freelance design, carpet cleaning, plumbing and construction to running their own business in real estate, entertainment, the arts and music.

The list of occupations with 500,000 professionals or less is huge and includes bus drivers, landscapers, bankers, writers, farmers, firemen, and machinists. A complete list from the Department of Labor is available on their site and has about 1,300 categories.

For this issue of STEM Magazine, let us explore a more popular and diverse field such as engineering. It's important to be very specific when discussing this field as it is very misunderstood and rarely defined well. To begin, engineering is broken down into a variety of specialties that include:

Computer hardware engineering
60,750 positions

Electrical engineering
186,000 positions

Electronic engineering
134,000 positions

Aerospace engineering
64,000 positions

Mechanical engineering
303,000

Civil engineering
306,000

Online engineering
Sub-category

Environmental engineering
53,000

Architectural engineering
188,000

Geotechnical engineering
New category

Chemical engineering
32,000

Biomedical engineering
19,000

Agricultural engineering
1,630

Automotive engineering
Sub-category

Energy engineering
New category

Materials engineering
27,000

Software engineering
Sub-category

Nano engineering
New / sub-category

Sales engineering
55,000

Robotics engineering
- less than 1,000

Nautical engineering
Not an official category

Petroleum engineering
32,500

Nuclear engineering
16,000

Industrial engineering
305,000

Aircraft pilots and flight engineers
120,000

- *Physical requirements*
- *Financial compensation*
- *Software applications*
- *Size of staff*
- *Working budget*
- *Technologies*
- *Term of employment*

Perhaps your education choice should be very broad and well rounded when we



- and hundreds of sub-category engineering applications. *Let's not forget Locomotive Engineer - 34,850*

It's important to consider that each of these engineering fields requires different:

- *Education curriculum's*

consider the 3-4 completely different careers you may have during your working life. During 2020, STEM Magazine will continue to explore "What most Americans do for a living". I look forward to providing information about your dream careers and their STEM characteristics.



Looking to the Future

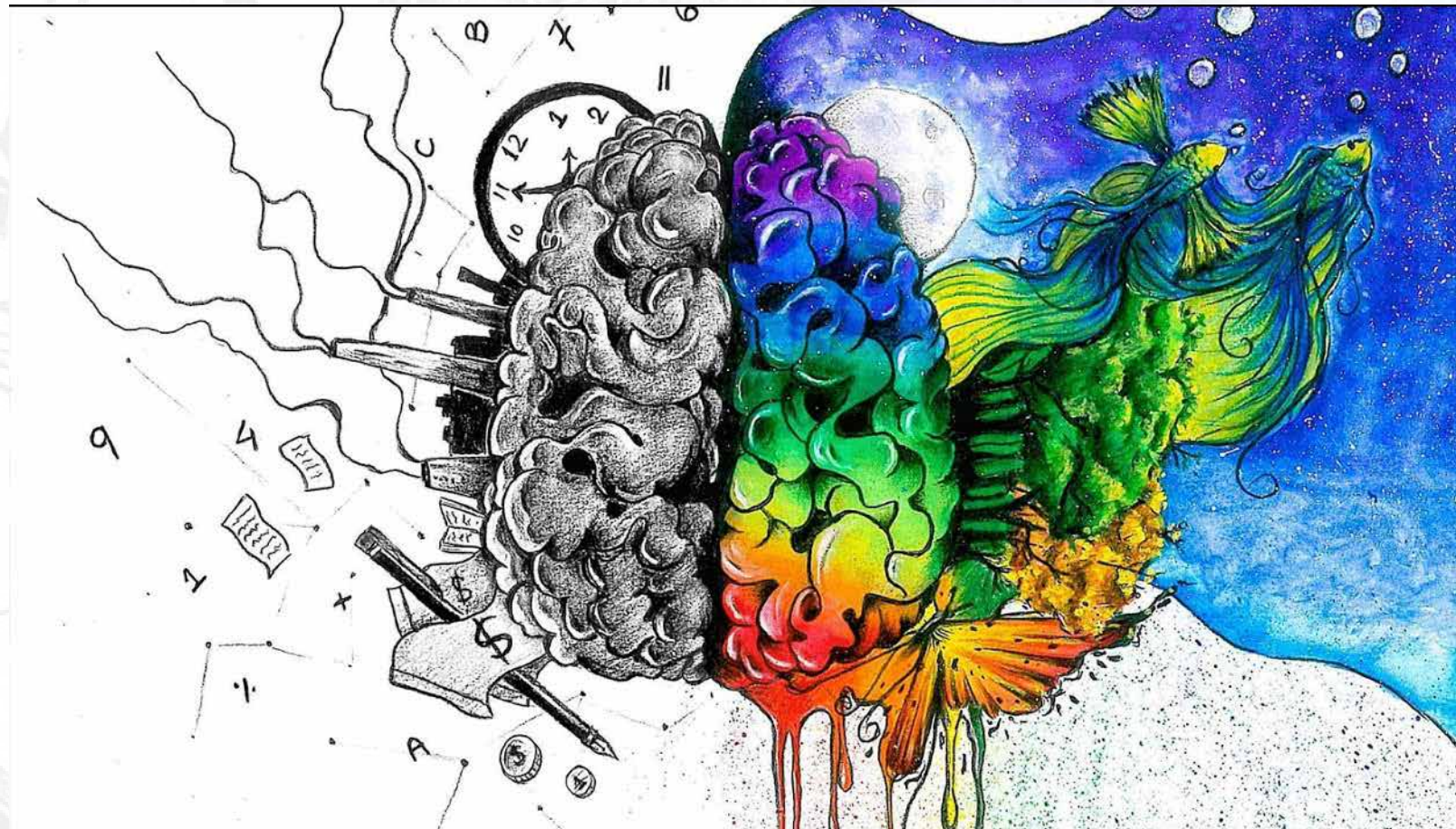
Oak Ridge National Laboratory is marking three quarters of a century as a research institution in 2018. A few areas at the Department of Energy national laboratory still look like they did in 1943, particularly the Graphite Reactor Museum, where visitors can roam where physicist Enrico Fermi worked with other scientists and technicians in spartan, hastily constructed conditions, cloaked in secrecy.

In recognition of the 75th anniversary of Oak Ridge National Laboratory's founding as a world leader in innovative research and technology, STEM Magazine will be including a monthly video highlighting some of ORNL's amazing history.



Left or Right: Science or *Art*

by Maya Chande
Atlanta, Ga.



A large, stylized white letter 'A' on a blue background.

Are you **left-brained** or
right-brained?

You are exemplary at math, exceptional at science, but lack in artistic and creative thinking skills. So, of course, you're left brained. Well, it's not quite that simple.

Arts and sciences have traditionally been considered mutually exclusive. You are either talented at art or science: one or the other. However, this popular perspective is a severe misconception as there are plenty of individuals who excel in both arts and sciences. In fact, art has, in several occasions, served as the muse for scientific and mathematical discovery.

For instance, Dr. Catherine Murphy explores the brilliant colors of nanoparticles, microscopic particles at the scale of one billionth of a meter, at her chemistry lab at the University of Illinois. Her objective is to devise methods to manipulate the size and shape of gold nanoparticles which can, in turn, affect the wavelength of light scattered by the nanoparticle.

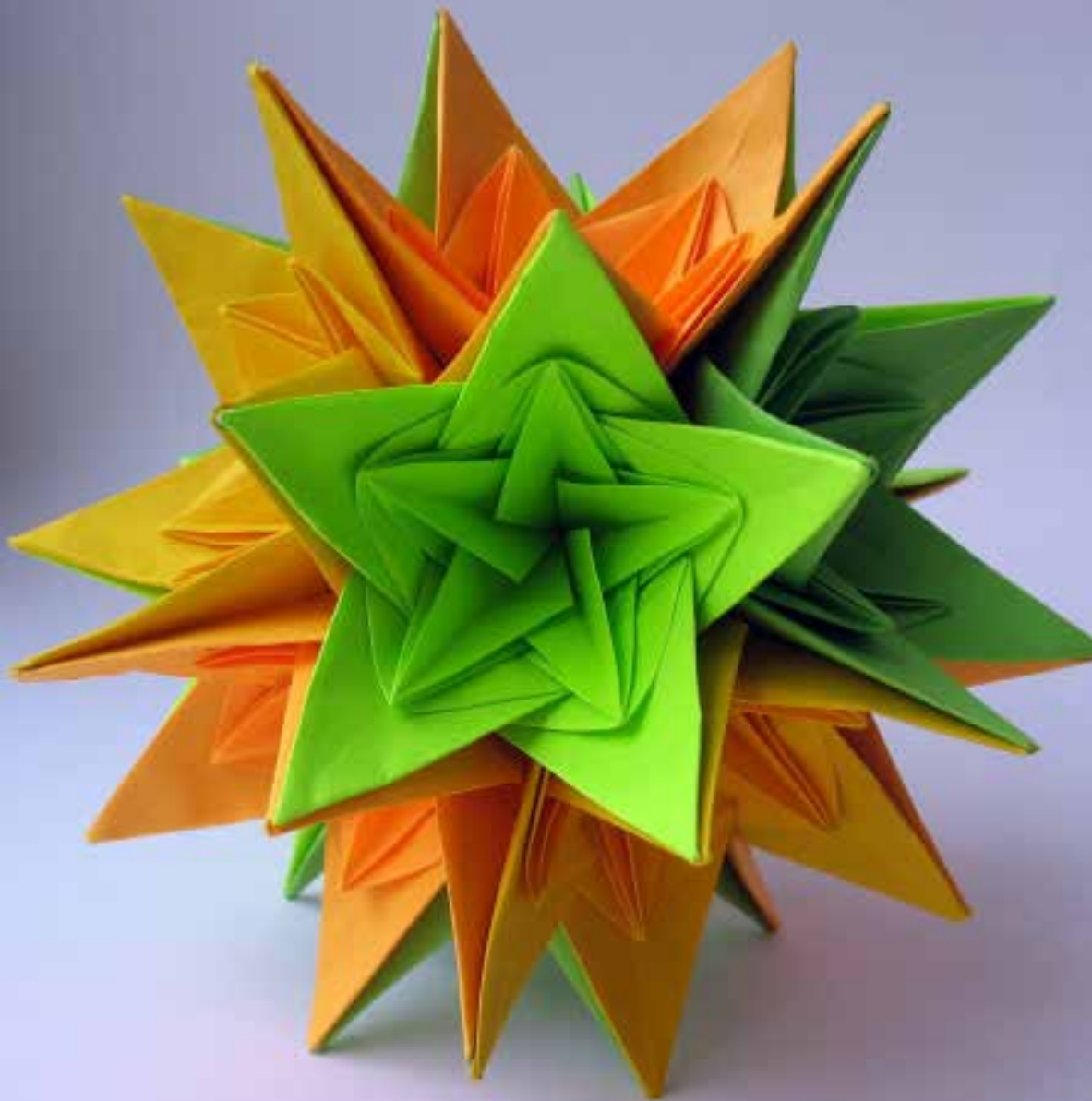
These modifications alter the particle's hue which makes for a remarkable display. The artistic implications of Dr. Murphy's work extend past merely vivid colors. The element of photography is also an essential aspect of her work as she uses imaging to capture the remarkable configurations of nanoparticles in a scientifically and aesthetically meaningful way.

While Murphy works on cellular nanosensors, extremely small detectors for disease diagnosis, students from University of Illinois' arts school make their own discoveries at her lab. These students interpret Murphy's chemistry through an artistic lens. "I'm always happy to see these intersections you don't normally see," Murphy said of the art-science collaboration. "That's how good ideas happen."

The Baroque artistic master, Jan Vermeer, with his paintbrushes, and Dr. Murphy, with her microscope, both experiment with light and work to uncover the hidden truths of the universe.

Like chemistry, engineering is concerned with the design of objects, which has an inherently artistic foundation. Researchers at Purdue University have exploited this connection to art in their development of the field of robotics called kintogami.

Inspired by the traditional Japanese art of paper folding, kinetogami uses the principles of origami to create reconfiguring robots (think Transformers).



o·ri·ga·mi

/ôrə'gämē

noun

noun: origami

- the Japanese art of folding paper

Similar to Legos, building blocks called Folding Basic Structural Units (BSUs) are combined into complex systems that can carry out various configuration changes. These changes in shape can exponentiate the number of functions that a single object can have; thus, kinetogami has great potential in biological design, mathematical research, and expanding the locomotive capacity of robots.

“Scientists and engineers are often motivated by the beauty of artistic representations while artists and architectural designers want to harness concepts from science, technology, engineering and mathematics,” says Karthik Ramani, a professor at Purdue University’s School of Mechanical Engineering who helped pioneer kinetogami. Through his and others’ research, Ramani seeks to bridge the gap between art and science through his elegantly folded structures.

Some individuals are gifted with the ability to elegantly describe such structures in terms of both art and mathematics. Maryam Mirzakhani was one of them. She was a theoretical mathematician and professor at Stanford University who studied the shapes of surfaces, but, in contrary to expectation, she dreamed of being a writer all of her life.

Her passion for storytelling begged her to express her talent, her insight on the world as a writer. However, her math teacher in Iran begged her to express her talent, her insight on the world as a mathematician. Well aware that she could better describe her world numerically than verbally, she chose the more artistic of the two: mathematics.



Maryam Mirzakhani
Born 1977 - Died 2017

From that point on, Mirzakhani was practically unstoppable. She earned two gold medals in 1994 and 1995 on Iran's International Math Olympiad team.

After graduating college in Iran, Mirzakhani headed to Harvard University to pursue her graduate studies. There she produced an astounding paper that gained great acclaim in top mathematics journals. Captivated by her early success, Benson Farb, a fellow mathematician, claimed, *"The majority of mathematicians will never produce something as good, and that's what she did in her thesis."*

Her work focused on hyperbolic geometry, a field described by Scientific American as describing "surfaces that are curved like a Pringles potato chip or the curly ends of a leaf of kale. Unlike chips or vegetables, however, these surfaces close up like donuts, usually with multiple holes." Her studies were abstract and challenged the bounds of human thought, but Mirzakhani could conquer any challenge with the power of her mind and her doodling.

Like the drip painting of Jackson Pollock, Mirzakhani's doodles grew along the lengths of a white sheet of paper sprawled across the floor. Her formulas and figures assembled in an elegant matrix of thought that Mirzakhani's daughter liked to refer to as "painting". Mirzakhani's artistic inspirations are hard to ignore; even her passion for writing never entirely left her.

She described her mathematics like writing a novel. She explained to Quanta Magazine, *"There are different characters, and you are getting to know them better. Things evolve, and then you look back at a character, and it's completely different from your first impression."*

Her diverse interests and unique perspective allowed Mirzakhani to discover entirely new fields of mathematics earning her the prestigious Fields Medal in 2014 as the only female to ever win the award. In a little more than four decades, Mirzakhani managed to narrow the gap between geometry and artistic design, but, on July 14th, 2017, breast cancer took this incredible mathematician and artist from the world.

From chemistry to engineering to mathematics, it is clear to see the common analytic thread that weaves together the fields of science and art. Both products of human curiosity, the two fields are inextricably linked; combining them in a meaningful way may be the key to unlocking the mysteries of the universe.

In the end, it is not about being left-brained or right-brained. Rather, it is about how we connect these incredible aspects of our mind into the magnificent tapestry of human knowledge.



Potential molecule (drug) for
osteoarthritis



The **STEM** of “boring” Airline food

It may look delicious, but why does it taste so blaaaaa?

The specific airline meal makes a world of difference of course. The photo above is a first class meal on Korean Airlines, noted as one of the worlds best traveling experiences.

Photos of other meals on other airlines were too scary to include.

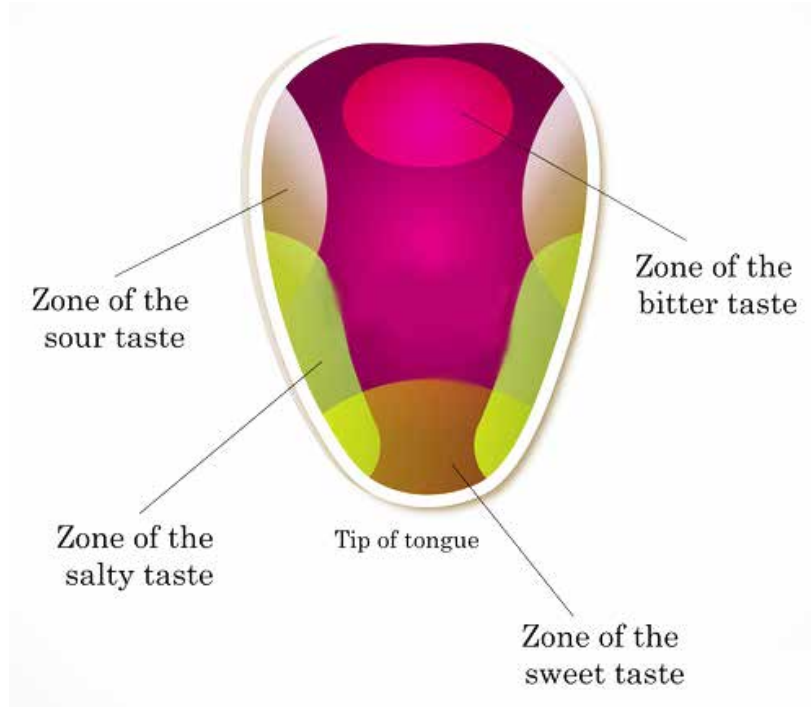
If you've flown or know someone who does, the quality of airline food, as with some school menus, the topic of food desirability may come up. Airline food does have a good excuse if it happens to taste boring, bad or without much taste at all.

Airline's spend massive amounts of money to research, evaluate, experiment and chase the edibility of food served in flight. This is a STEM culinary career opportunity by the way. Interesting, most of the challenges with airline food revolve around the STEM of flight. Understanding this doesn't make the food taste better, but it will open your eyes as to why this is a challenging area of customer service during your trip.

As quiet as aircraft cabins are, there is still flight noise caused by both the engines and air moving across the frame of the aircraft, usually at speeds in excess of 400 miles per hour. These constant sounds prevent you from tasting sweets effectively. Noise of any kind in the range of 85 decibels, (a measurement of sound) the in cabin sound range of most airline engines, reduce the ability of taste buds in your mouth to identify and enjoy sweets.

The recycled cabin air that is vented in for your pleasure is very dry with low humidity, reducing your ability to smell things which of course is an important part of tasting. Studies prove that the ideal relative humidity for the human body is in the range of 20%-60%.

Basic tastes



After less than one hour's flight the air resembles that of a desert climate. In First Class air humidity can get below 5% RH (relative humidity). This is because outside-air mixing replenishes the cabin air constantly.

Replenishment assures that the re-circulated portion does not endlessly re-circulate but is rapidly diluted and replaced with outside air. The outside air is drawn in at the same rate that cabin air is exhausted out of the airplane.



When approximately half of the air at cruising altitude is coming from outside via the engines where the air is extremely dry, the blended cabin air will get VERY dry. In addition, as your plane climbs to travel altitude, the air pressure drops also affecting your senses. The cabin pressure is of course compensated for mechanically, but you still feel your ears pop as the pressure changes.

According to NBC, Dr. Tom Finger, Professor at the University of Colorado School of Medicine and co-director of the Rocky Mountain Taste and Smell Center, claims that:

“Dry air doesn’t help our sense of smell, either. Typically, odorants are transported to olfactory receptors in the nose via the mucus lining. When the nasal cavity is dried out, the efficiency at which odorants are detected by the brain is reduced.”

When you “lose the olfactory component,” explains Finger, “you lose much of the flavor component of food.”

It is medically proven that extremely low RH levels make the human body functions abnormally being more sensitive due to dehydration and human senses, such as taste, are very different. Even short time exposure to extremely dry air affects the nose and mouth. In fact, up to 80% of what we consider taste is actually derived from smell. The taste is built up around many very complex co-existing factors.

- Dry air changes the taste in the mouth
- Dry air alters the viscosity (resistance to flow) of the saliva
- Dry air result in swelling of the mucous membranes

- Dry air modifies the ability to vaporize (break up molecules) into the nose
- Dry air de-hydrates nasal cavity affecting the sense of smell
- Dry air decreases volatility (potency) of odor molecules

The **science** of this topic by definition is the accumulation of knowledge regarding the effects of humidity changes on the human body as well as potential changes to food preparation to combat the physical effects and make food taste better.

The **engineering**, by definition, is a problem solving and decision making process reflected in the previous comments under “technology”.

The **math** is clearly used in the research of the problem, defining the humidity percentages, human reaction probabilities, production costs and much more as it relates to the entire airline food industry.

Career opportunities are available with airlines and contracted companies who design, prepare and deliver food to be consumed by passengers.



The **technology**, by definition, is the practical application of science. So taking what we've learned about the science of “interrupted” taste, is used by airline cooks, scientists and researchers to find a better way to prepare, store and serve in-flight food.

Working Smarter – **Not** Harder

by Pat Kozyra

Author of Tips and Tidbits For Parents and Teachers

After spending 50 years of teaching in the classroom, I wrote this book to share what I thought could help and guide both parents and teachers in educating the children of the future – never forgetting the ultimate goal of making them productive contributors to society someday.

One of the most important chapters in my book includes information on how we can actually teach and train students to prepare better for testing and to achieve higher grade scores. Readers may find some of these suggestions more suitable for intermediate and senior students than junior and vice versa.

Students must be taught to take ownership of the subject matter. That means, re-working it, simplifying it and putting it into their own words to have their own system of understanding. Most importantly, they must be able to summarize effectively so that on a later review, be it in a week or six months, it can come back to them readily and be used in its expanded form - e.g. What is the main idea?

What does the paragraph really want us to know? What is it really about?

Consider effective summarizing as the ingredients in a ready-to-make cake mix. It is dehydrated and condensed in a box. That box or mix used six months later by just adding water, produces a fine cake. A student who has the confidence in his or her summations, would be readily able to add the water filler at exam time or whenever needed.

A second benefit of effective summarization for study and revision purposes is the optimal use of limited time that the condensed material (assuming it has been effectively condensed in the first place) can provide. The ten, twenty or even thirty hours that it would take to read copious lecture notes once or twice could be avoided with effective summarization, thus leaving time for other subjects or repeated review to consolidate the same information. Only then, has the student really taken ownership of the material.

Fresh Brain Versus Sleepy Tired Head:

One of the most effective yet easiest tips to apply, is that of switching an hour or two of late night ineffective study for an earlier one hour morning start. A quiet hour like five to six in the morning can result in two to three times the amount of useful production contrasted with the two to three hours of semi-exhausted “burning the midnight oil” and beyond – like beating your head against a wall where nothing seems to be “going in”, when frustration and even panic can set in.

They can practice by “teaching” the summarized content to someone else. This can be done orally or in writing. Even try singing it - you would be surprised what the brain remembers and hangs onto with music or silly rhyme. That’s why rappers are so famous! To be able to understand the questions, and then successfully answer them on tests, quizzes and especially on essay exams, it is crucial that essential vocabulary is understood.

Students must become familiar with key words and phrases in order to get an advantage for high marks. Here are some of these key question words, especially for older students that **MUST** be learned.

[analyze, apply, argue, assess, categorize, cause, cite evidence, classify, compare, construct, contrast, convince, create, criticize, define, demonstrate, describe, develop, diagram, differentiate, discuss, distinguish, draw conclusions, effect, enumerate, estimate, evaluate, explain, formulate, generate, generalize, give an example of, identify, illustrate, interpret, justify, list, mention, organize, paraphrase, point out, predict, propose, prove, provide, rank, react, reason, recall, recommend, relate, relationship, select, show how significance, solve, specify, state, suggest, summarize, support, survey, tell, trace, utilize]



Other words often found in tests which the student should know are listed below. Teachers could use these words for spelling lessons, or students could even make creative games using the words and/or their meanings.

key words and re-reading instructions to be sure they have understood properly.

In fact, they should be on the lookout for certain words called “important modifiers” that can affect or change what they



One thing I have noticed as problematic, is how many children skip reading the directions or instructions because they either do not feel comfortable reading them, or they feel they already know what to do or can easily guess what they are supposed to do. I always insisted on key words underlined or highlighted and have encouraged even my primary students to read some instructions two times.

Learning to read directions properly in the early years will prevent the loss of marks in the upper grades. Students should get into the HABIT of underlining

thought the question was asking and thereby change their results significantly. Some of these key words are:

[all, never, seldom, most, few, usually, worst, bad, equal, best, good, many, sometimes, invariably, none, more, NOT, often]

I also encourage students to put something into a blank space on a test rather than leave the question unanswered - in other words, GUESS unless the teacher is deducting marks for wrong answers from right.

Aiming for good study habits happens both at school and at home. Here are some suggestions from students themselves:

1. I pay attention when someone is speaking.
2. I think before I answer questions.
3. I am learning to use the dictionary and the encyclopedia (modern search engines on the computer).
4. I try to keep my desk neat and organized.
5. I make sure I have sharp pencils, paper and other tools I need to work.
6. I don't act silly bothering other children.
7. I do my work carefully.
8. I try to finish my work on time.
9. I read to find out about many things.
10. I ask questions when I don't understand something.
11. I enjoy working with and sharing ideas with my friends.
12. I copy the homework assignment carefully.
13. If I don't understand the assignment I ask the teacher to explain it.

14. I remember to bring home the books I need.

15. I have a special place set aside to study and work at home.

Ten Tips for Getting that "A" on an Assignment

I once spotted these ten suggestions and feel they are important to remember just before handing in a written assignment.

- A. Show – don't tell.
- B. Use complete, articulate sentences.
- C. Use correct spelling and punctuation – spell check!
- D. Each piece should have an introduction and a conclusion.
- E. Begin each sentence with a different word to avoid repetition.
- F. Focus your work.
- G. Take risks! Try something new or creative.
- H. Edit and revise your work – read it over at least once.
- I. Come to class prepared.
- J. Use your time productively.

Laboratory Safety

James A. Kaufman, Ph.D.

The Laboratory Safety Institute (LSI)

One of the most exciting parts of chemistry class, biology or physics is the participation in experimentation. The hands-on experience of making chemical reactions and noting the results is fascinating...but also dangerous. The following are simple but necessary precautions to have in place in every lab from elementary school through a career field.

#1. HAVE A WRITTEN SAFETY POLICY

This is the cornerstone of a good safety program. It's a statement endorsed and supported by the administration that speaks to the fundamental responsibilities for health and safety in the academic institution or company.

Your department may want to draft a sample policy statement for recommendation to your administration or board of education. It is virtually impossible to have an excellent safety program without their support. Your written safety policy will provide the foundation of your safety program. Policy statements of this type need to be signed by the highest ranking official of the organization, dated, laminated, and mounted in the entrance of every building.

When I was EH&S coordinator at Curry College, I got our president to sign a policy statement not unlike the one



above. I made up seven framed copies. I took them with a hammer and nails to the offices of the president and his direct reports. I ask them where they wanted the colleges new EH&S policy statement (not if ... where). I hung them prominently so both the senior administrator and his/her visitors could see it every day.

#2. ORGANIZE A SAFETY COMMITTEE

Your department should have a safety committee. Academic institutions and companies should all have safety committees.

The committees should consist of employees, supervisors, faculty, staff, administration, and students.

The committees should meet regularly to discuss safety, health and environmental concerns/problems and to seek solutions to them. The committee should help to see that the safety policy is implemented. The committee can help to promote an interest and concern for health and safety issues.

They might be the group responsible for conducting regular inspections, reviewing accident reports, and developing recommended safety procedures.

Better is to be a coordinating group that engages all the other employees in the organization in these activities.

#3. DEVELOP A SAFETY ORIENTATION PROGRAM

All new employees, students, faculty, and staff should receive a specially designed indoctrination to your safety program.

This orientation should cover the philosophy, policies, and procedures. It should explain how to deal with emergencies and how to handle emergency equipment. The new person should receive a set of rules or operating manual for the academic institution or company and be expected to sign a statement (rules agreement) indicating that they have read, understand, agree to follow, and realize the failure to do so can result in termination.

When I started working for the Dow Chemical Company, my orientation took eight hours. I learned more about health and safety on that first day at Dow than I had in my prior 25 years in school.

I've asked over 50,000 scientists and science educators whether they received a New Employee Safety Orientation from their immediate supervisor on day one, only five percent say: "yes".

I believe that pound for pound and dollar for dollar, the new employee safety orientation is one of the most important components in a safety program.

And, you can't argue that it costs too much ... no purchase order or requisition required.



If you are involved in lab safety practices, consider asking students the following question:

"What is there in your background that suggests that you are both concerned and knowledgeable about issues of laboratory safety?"

#4. ENCOURAGE CARING ABOUT ONE'S HEALTH AND SAFETY

Employees, faculty, staff, and students need to be encouraged to develop a genuine concern about their own health and safety. It's too easy to care less and become careless.

One of the most important ways to do this is through education into the nature and seriousness of particular hazards and their potential consequences. I read of a hypothetical case where someone placed a rattlesnake in someone's mailbox.

If asked if it were dangerous to reach into his mailbox, the owner would say, “of course not.” Others who knew of the snakes presence might think differently.

A good way to make your point is through the use of examples where others have in fact been seriously injured or killed doing exactly the same activity. This is why it's so very important for us to share our knowledge of these experiences.

Another good way to encourage others to care about their health and safety is to enforce the rules. If EH&S is going to be truly important in your organization, the rules need to be enforced. Otherwise, they are just lip service.

As a final example of a way to get others to care ... lead by example. People pay a hundred times more attention to what you do than to what you say. Set the gold standard. Be the poster child for best safety practices.

As a teacher or supervisor, when you show a genuine concern for the health and safety of those that you supervise or teach, it encourages the development of their own concern. My first supervisor at Dow, Don Dix, was particularly effective in this respect and that contributed significantly to increasing my concern and interest in health and safety.

#5. INVOLVE EVERY STAFF MEMBER IN SOME ASPECT OF THE SAFETY PROGRAM AND GIVE EACH SPECIFIC RESPONSIBILITIES

You really need to find ways to get people involved. Students are people too, so don't forget them.

Dr. James Kaufman is President of the Laboratory Safety Institute, President of Kaufman & Associates and former Professor of Chemistry at Curry College. He received his bachelor degree in chemistry from Tufts University and his doctorate in organic chemistry from Worcester Polytechnic Institute.

Dr. Kaufman is the founder and president of The Laboratory Safety Institute, a national, non-profit center for safety in science and science education. LSI's lectures and training programs, AV lending library, and publications help academic institutions throughout the world. LSI is supported by grants from individuals, foundations, companies and professional societies.

MIX it Up



Don't you get tired walking into the same classroom day after day....everything identical? How am I supposed to get excited or inspired about anything?

Think back to kindergarten and the

unexpected chaos of what was to come..... chairs moved, tables with new activities on them, my work from last week stuck to the ceiling, music playing and the smiling teacher just as excited to see me as I was to be there.

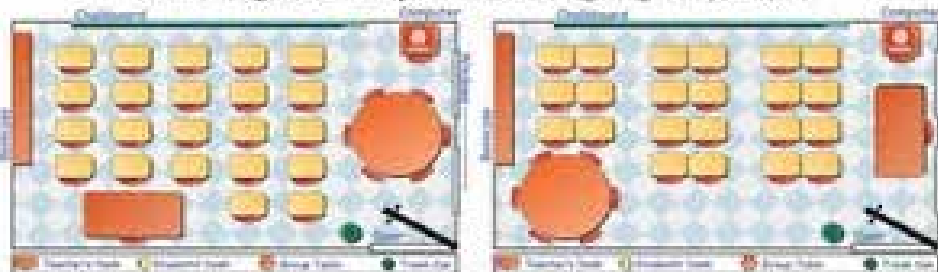
Change the class environment once a week and mix things up. Anything unexpected will cause the student brain to say, "Hey.....what's going on here?". Just that much curiosity can start a few new gears turning.

Change the pattern of how the desks are arranged.....curricular, square, facing a different direction.....get crazy. Change seating assignments. Move all the desks to the side of the room and sit on the floor.

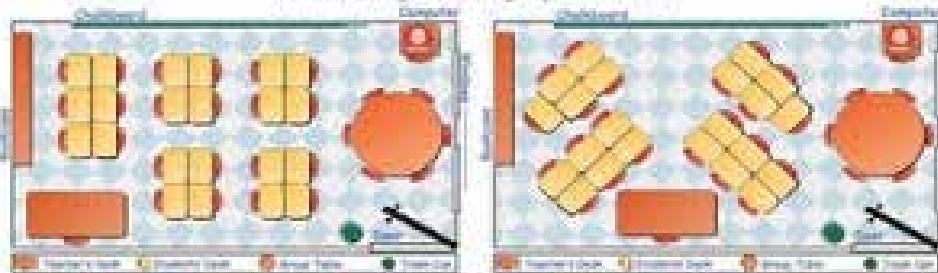
Don't think of it as disruptive (if it's done in advance) but rather an attention grabber and VERY unexpected. It will also be good for you to get outside the box once in awhile.

concept. Use it in EVERY elementary grade.
Try it

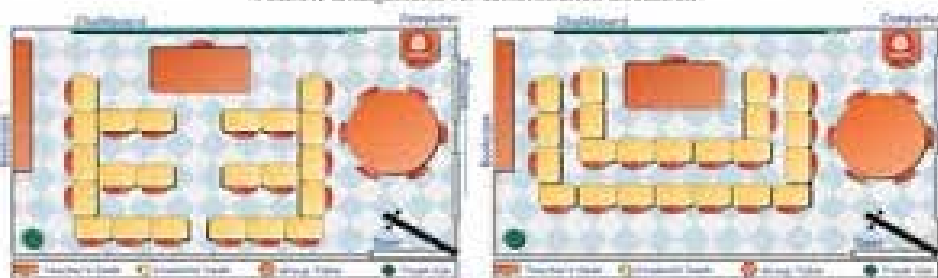
Possible arrangements for independent work/ tests- beginning of the year layout



Possible arrangements for group work/stations



Possible arrangements for demonstration/discussion



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