

# Study Choice: Galileo or Shakespeare

## The Problem

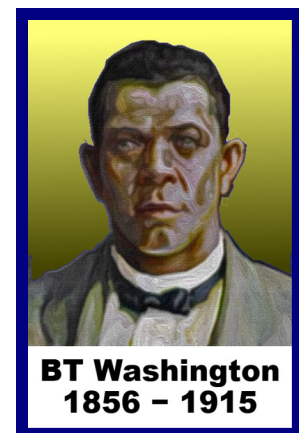
Awhile back someone observed that students graduating from English-speaking public schools knew more about Shakespeare (1564 – 1616) & his societal contributions (ref [1]) than that of Galileo (1564 – 1642). Galileo's scientific contributions (ref [2]) are orders of magnitude more important than Shakespeare's literary contributions. Galileo is Italian, not American & possibly US public schools want to concentrate on US contributors. Well, they can do both! Thomas Edison (ref [3]), the Wright brothers (ref [4]), Jonas Salk (ref [5]) are some of the many successful modern US Science / Technology / Engineering / Mathematics (STEM) professionals the grade schools can concentrate on.

I put forth Shakespeare because he was born in the same year as Galileo (ref [6]), Shakespeare is the "best" English Literature (Lit) has to offer (ref [7]) & Galileo is in the *stratosphere* compared to Shakespeare. Billions of people use technology directly descended from Galileo's ideas many times a day throughout the world. Only English-speaking countries benefit from Shakespeare. Sure, "Romeo & Juliet" references are common in English-speaking society, but am I better off because of the knowledge? The phrase may be worn out (ref [8]), but "Flip a light switch & thank Galileo!"

The author of this article (ref [9]), seems to think one needs literary contributions to spark scientific ideas. No! STEM Education is more important (ref [10]). With our society of vast knowledge & specialized professions, a person cannot "reinvent the wheel" & expect to compete at all! Talking to some hyperbolic Shaman may get one through the day, but one needs previous "good" technical ideas to spark his / her next "good" ideas. One has to be "Where the information is", make the effort to learn it, then contribute!

## Only Dead White Men to Choose from

Is this racist? Reaching back a few centuries for idols, both STEM & the Arts have only white male success stories. Booker T Washington (refs [11] & [12]) is a great example of a US minority STEM success story & covered in public schools now. Unfortunately, he lived a century and a half ago & provides historical context. There are minority STEM high achievers **today** @ CERN, JPL, NASA, whose accomplishments could be emphasized. Then, minority students can model their schooling & career paths after those modern individuals. However, when these STEM professionals observe the crippling "extreme envy" that's been directed @ certain STEM celebrities in social media, they become quite hesitant! The old maxim applies (ref [16]): "Neutron bombs & mustard gas, just because you *can* doesn't mean you *should*!"



## Too Little Hot Sauce ... Too Much Hot Sauce

If an educational system wants to produce careers weighted in STEM degrees as opposed to the Arts, then the educational system should teach the reality between the importance of Science verses the Arts. I attribute the glamour of Shakespeare, Kipling (ref [13]), Melville (ref [14]) & Hawthorne (ref [15]) to the excellent communication skills of English Lit teachers squaring off against the introverted nature of Science & Math teachers. What's needed is a basic understanding that the English Lit teachers (& textbooks) will tone down their authors / poets / artists & let the STEM teachers emphasize their scientists / mathematicians / engineers. Both the English Lit teachers & STEM teachers will still have their jobs as educators. As an added plus, we will have a better society & less drugs, crime, gangs, cashier jobs, prison warden jobs across the society.

## A Source of Funds

Our society is shooting ourselves in the proverbial foot literally. Given unfettered access to firearms, disillusioned males are graduating from US public high schools with cash-register punching careers before them, buying firearms & committing horrendous acts of violence. Emphasizing success stories of introverted STEM professionals will not eliminate all firearm violence, but it should have a significant impact. It's something **new** to try that should show promise! Masculinity has been lost to some of these high school graduates (ref [17]) & needs to be restored. Up until the 20<sup>th</sup> century, our technical advances have been built on **nothing but** the "good" ideas of men. Show these disenchanting male high school graduates the path to a pursuit of STEM knowledge.

As with any untried solution, implement pilot projects, get feedback, share data, modify as needed. A lot of \$\$\$ is spent on keeping / implementing the 2<sup>nd</sup> Amendment. Be Politicians!!! Wheel & Deal some of that \$\$\$ into STEM education in the public schools.

## What's Your STEM Major?

If the curious reader is Algebra enabled, I can describe historic scientific achievements @ my website using a brief [Energized Algebra](#) format. I also include many current internet references that back up my data & allow the reader to learn more if he / she desires.

Hopefully, these articles spark the reader's mind. Max Plank (1858 – 1947) (ref [18]), the "Father of Quantum Theory" produced his very successful (but non-intuitive) theory in his 40's (ref [6]). He was driven to assumptions of Quantum Mechanics (QM) in part based on curve-fit of experimental data, but he also proved an "Old Man" can learn much from Mother Nature.

**Some STEM Disciplines & Abbreviations:** Many of the articles @ this website discuss topics of Pure & Applied Physics. Pure Physics examines nature in a quest for knowledge with no immediate or apparent benefit. National Aeronautics & Space Administration (NASA) has demonstrated that pursuit of knowledge has produced

[Significant Payoff](#) through the decades. Applied Physics encompasses many Engineering disciplines that use principally Physics but [any technical discipline](#) (if required) to improve the human condition.

A traditional Engineering career should start with a Physics curiosity plus interest in mature technology implementation. A prospective Engineering major should cultivate an interest in related engineering hobbies and / or have a related work history.

- **Aerospace Engineer (AE)** – applied Physics that is “the development of aircraft & spacecraft ... aeronautical & astronautical engineering.” (ref [19]) An AE’s related hobbies include getting a pilot’s license, participation in model rocketry.
- **Civil Engineer (CE)** – applied Physics that is “the application of planning, designing, constructing, maintaining & operating infrastructure.” (ref [20]) A CE’s related hobbies include installing plumbing, working in housing construction.
- **Computer Science (CS)** – spans “algorithms, theory of computation & information theory ... the design & implementation of hardware & software.” (ref [21]) A CS’s related hobbies include computer coding, video games & drones.
- **Electrical Engineer (EE)** – applied Physics that is “the study, design & application of ... systems which use” electromagnetism (EM). (ref [22]) An EE’s related hobbies include wiring houses, coding computers, HAM radio.
- **Mathematics (Math)** – “includes the topics of numbers, formulas & related structures, shapes & the spaces in which they are contained.” (ref [23]) A mathematician’s related hobbies include coding with [numerical analyses](#).
- **Mechanical Engineer (ME)** – applied Physics that uses scientific “principles ... to design, analyze, manufacture & maintain mechanical systems.” (ref [24]) A ME’s related hobbies include repairing cars or A/C units, installing plumbing, robotics.
- **Physics** – “the study of matter, its fundamental constituents, its motion & behavior through space & time ... energy & force.” (ref [25]) A Physicist’s related hobbies include interests in environmentalism, optics, astronomy & telescopes.

**Other STEM Disciplines:** AE, CE, EE, ME are traditional Engineering degrees offered @ most Engineering Schools. These degrees are subsets of Applied Physics & other technical disciplines as required to fulfill a significant job market & specific societal need. Offered Engineering degrees differ from location to location. In the past, Textile Engineering was offered in the US cotton belt & is for the most part a subset of ME. Before the Chernobyl disaster (ref [26]), Nuclear Engineering was popular & is mostly another subset of ME. Check with your college of interest for a topic that motivates you to learn.

## Initial Fundamentals

At this website, STEM areas targeted in specific articles are listed by article in the [site index](#). The Physics based curriculum for AE, CE, EE, ME & Physics traditional introduce

the student to **basic** Physics courses through an initial text (ref [27]) with dual introductory Calculus during the 1<sup>st</sup> two years. In the United States (US), these requirements can be accomplished in virtually any local community college @ very low costs. The call has been made to promote STEM degrees in US society (ref [28]). The following suggestions should be noted for introductory Physics & Calculus courses:

- **Equal Physics:** Initial Math & Physics courses should be the same in applied & pure Physics. Engineers should learn the QM “unknowns” on which Classical Physics is based; Special Relativity (SR) is key in learning EM (ref [29]).
- **STEM Exposure:** These initial STEM courses introduce the word problem format to prospective students. Termed “weed out” courses, they introduce core STEM ideas & let students gauge their success in acquiring STEM knowledge (ref [30]).
- **Free Tuition:** STEM courses teach Nature on its terms. Students of these fields learn to “improve society” with modest compensation. These courses should be offered with free tuition to offset reduced schooling from the COVID pandemic.

**Feedback:** My proposed solutions are just that ... suggestions. From as many viewpoints as possible, proceed with consensus. Try different applications, obtain feedback, modify implementations & share successful solutions.

## References

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