Careers in Science and Technology

We don't need more STEM majors. We need more STEM majors with liberal arts training.

Anthony Tarantino, PhD
Six Sigma Master Black Belt
CPM, CPIM, Certified Scrum Master

Senior Advisor to Atollogy
Adjunct Professor, Santa Clara University

Sources:

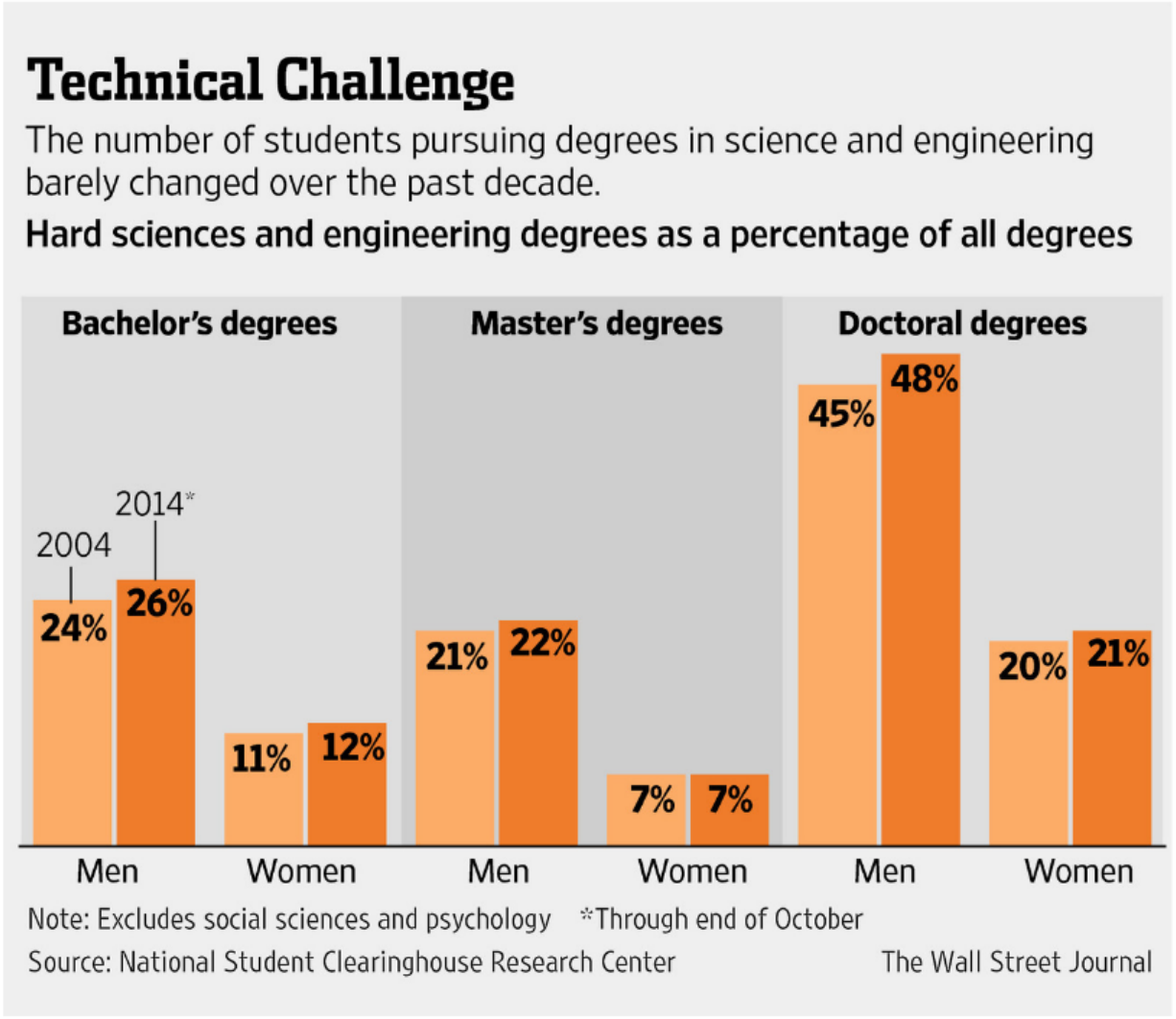
Loretta Jackson-Hayes, “We don’t need more STEM majors. We need more STEM majors with liberal arts training.” Washington Post, 2/18/2015
Article Link

Tim Stephens, “Study highlights the importance of writing skills for science students,“ UCSU Currents On Line, 2005
Article Link

Alexandar Ossola, “How Scientists Are Learning to Write,” The Atlantic, Dec 12, 2014
Article Link

Anthony Tarantino, PhD
agtarantino@hotmail.com

The proportion of STEM Majors is not Increasing as hoped, but still accounts for about one fourth of all undergraduate s



Notice that the under representation of women in STEM remains a major issue.

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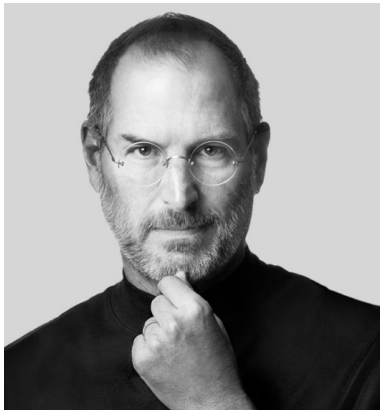
Science education can not be divorced from the liberal arts.

- **In order for American STEM grads to lead the world in innovation, then their science education cannot be divorced from the liberal arts** ***Two famous examples:***

- **Leonardo De Vinci** - Leonardo's curiosity and passion for painting, writing, engineering and biology helped him triumph in both art and science; his study of anatomy and dissections of corpses enabled his incredible drawings of the human figure.

- **Steve Jobs -** When introducing the iPad 2, Jobs, who dropped out of college but continued to audit calligraphy classes, declared: "It's in Apple's DNA that technology alone is not enough — it's technology married with liberal arts, married with the humanities, that yields us the result that makes our heart sing."



Anthony Tarantino, PD
agtarantino@hotmail.com

A scientist or engineer trained in the liberal arts has a huge advantage: writing ability.

- The study of writing and analyses of texts equip STEM students to communicate their findings as professionals in the field.
- STEM students with strong writing skills will be more likely to publish papers and present them at conferences as well as winning grants, attracting investors, etc.
- Scientists are often unable to communicate effectively because, as Cornell University president David J. Skorton points out, "**many of us never received the education in the humanities or social sciences that would allow us to explain to nonscientists what we do and why it is important.**"

Anthony Tarantino, PhD
agtarantino@hotmail.com

Kristin Sainani, PhD, Health Policy Professor, Stanford University, teaches both undergraduate and online courses about writing in the sciences.

- Even though most of their efforts may seem to be concentrated in the lab, scientists spend a lot of time writing.
- "Scientists need to know how to write to get their work published and get grants—**it's an important skill that people assume they already have [once they reach a certain level], so no one ever teaches them how to write well in these specific formats.**
- In science, research is king, and it's important," she said, but over the past decade universities have started to pay more attention to the "soft skills" that scientists also need."

Anthony Tarantino, PhD
agtarantino@hotmail.com

Dr. Loretta Jackson-Hayes, associate professor of chemistry, Rhodes College

- To innovate is to introduce change. While STEM workers can certainly drive innovation through science alone, imagine how much more innovative students and employees could be if the pool of knowledge from which they draw is wider and deeper. That occurs as the result of a liberal arts education.
- Many in government and business publicly question the value of such an education. **Yet employers in every sector continue to scoop up my students because of their ability to apply cross-disciplinary thinking to an incredibly complex world.**
- They like my chemistry grads because not only can they find their way around a laboratory, but they're also **nimble thinkers who know how to consider chemistry's impact on society and the environment.**

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Survey of UCSC STEM Majors in 2005

By Tim Stephens

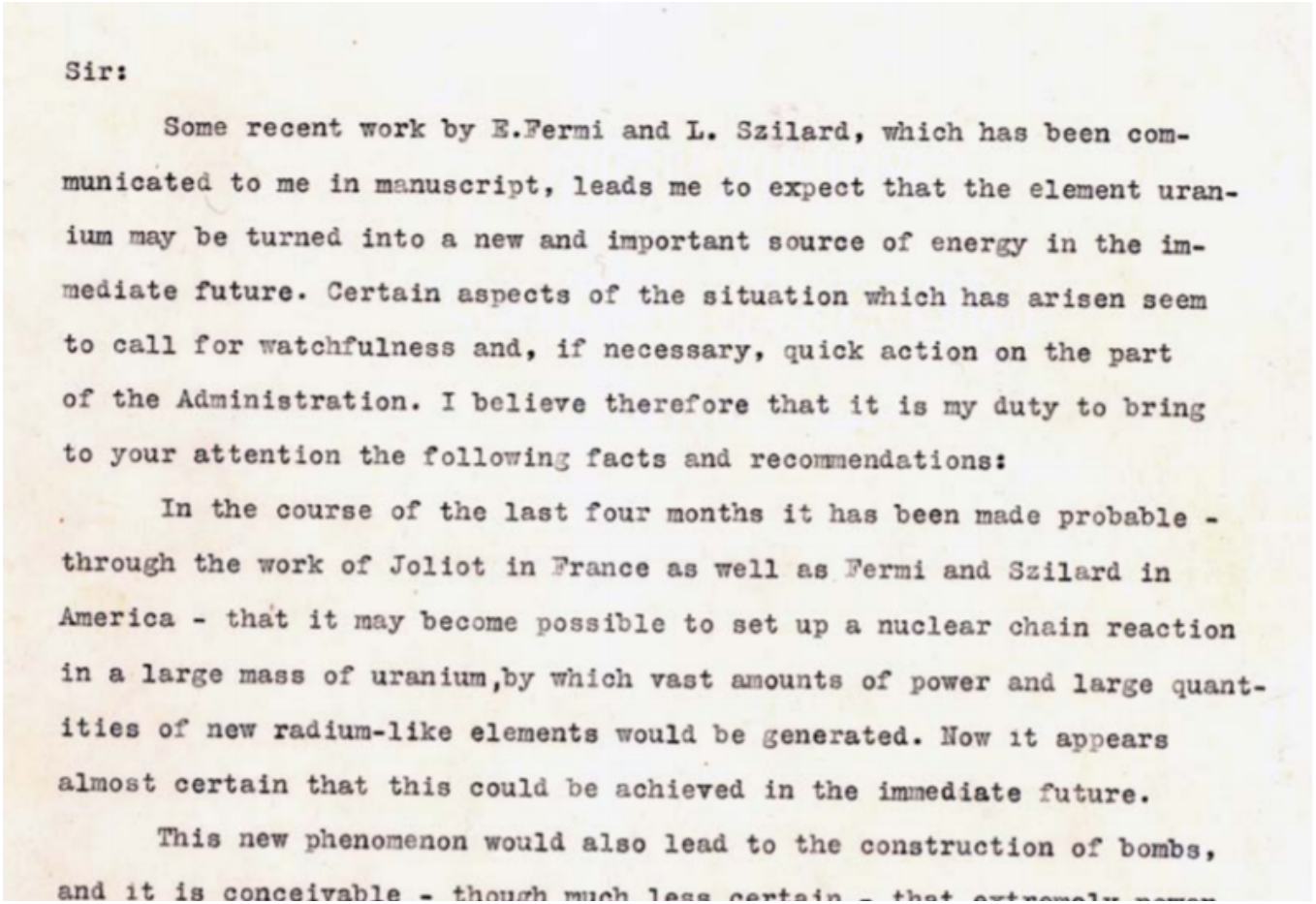
UC SANTA CRUZ currents online

- A survey by a group of UCSC researchers on the role of writing in undergraduate education in the sciences has turned up some interesting findings, which the researchers hope will prompt a serious and imaginative discussion of the importance of writing in the science curriculum.

- From interviews conducted with UCSC science faculty and students involved in senior research projects, the researchers found that both groups consider **writing skills to be essential for success as a scientist. Yet explicit instruction in writing, including writing as a tool to help develop critical thinking, is mostly absent from the courses typically taken by science majors.**

- **"Most students we interviewed said they learn to write about science by inference, and there is a real need for more explicit instruction in writing,"** said Nancy Cox-Konopelski, director of UCSC's Academic Excellence Program (ACE) and one of the principal investigators in the study.

STEM Communication skills that changed the world forever
Communicating the Very Technical to a Non Technical Audience



Sir:

Some recent work by E.Fermi and L. Szilard, which has been communicated to me in manuscript, leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future. Certain aspects of the situation which has arisen seem to call for watchfulness and, if necessary, quick action on the part of the Administration. I believe therefore that it is my duty to bring to your attention the following facts and recommendations:

In the course of the last four months it has been made probable - through the work of Joliot in France as well as Fermi and Szilard in America - that it may become possible to set up a nuclear chain reaction in a large mass of uranium,by which vast amounts of power and large quantities of new radium-like elements would be generated. Now it appears almost certain that this could be achieved in the immediate future.

This new phenomenon would also lead to the construction of bombs, and it is conceivable - though much less certain - that extremely power

Arguably the most important letter ever written.

Hint – 1939 explanation of atomic energy

Anthony Tarantino, PhD
agtarantino@hotmail.com

STEM Communication skills that changed the world forever
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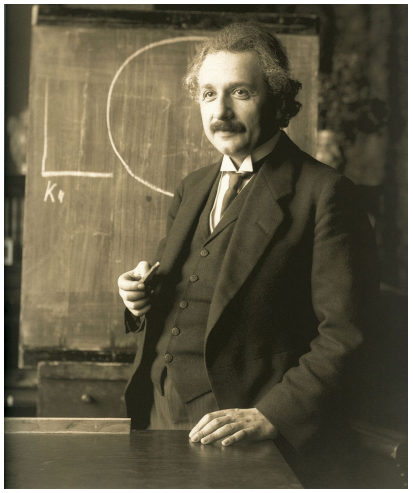
Albert Einstein
Old Grove Rd.
Nassau Point
Peconic, Long Island

August 2nd, 1939

F.D. Roosevelt,
President of the United States,
White House
Washington, D.C.

Sir:



I understand that Germany has actually stopped the sale of uranium from the Czechoslovakian mines which she has taken over. That she should have taken such early action might perhaps be understood on the ground that the son of the German Under-Secretary of State, von Weizsäcker, is attached to the Kaiser-Wilhelm-Institut in Berlin where some of the American work on uranium is now being repeated.

Yours very truly,
A. Einstein
(Albert Einstein)

Anthony Tarantino, PhD
agtarantino@hotmail.com

Poor Communication skills can have catastrophic results

- An Infamous example of a STEM major who failed to effectively communicate plans for bio enginnering.

Einstein or Frankenstein

Core Class May Make the Difference