The Power of Partnership and Pairings: Why STEM and Liberal Arts are better together

by D. Rosowsky

The last decade has seen considerable energy and enthusiasm for mash-ups between the STEM disciplines and the Liberal Arts disciplines, with motivations ranging from practical to political, obvious to opportunistic, and sensible to silly. Many colleges and universities, government agencies, and professional societies have set in motion substantial discourse around this fruitful topic. I have had the privilege and opportunity to weigh-in on the value of new pedagogies and degree programs, and to offer opinions – informed through my experience as a faculty member, department head, dean, and provost – on trends in higher education more broadly. Here, I offer some observations and personal commentary on some of the discussions surrounding STEM and the Liberal Arts.

The Rhetoric: an Array of Acronyms

Full disclosure, as a former Dean of Engineering at a private technological research university and now a Provost at a comprehensive public research university, I have not always been an early adopter (or believer) of many "big fads" that have been bred by or levied upon higher education. My patience, critical thought, and even skepticism have (most times) paid off. I was vocal among my professional colleagues (engineering deans and others) that MOOC's, for example, would not replace or even substantially alter how we educate most university students. Rather, I posited, we would settle into a sensible and compelling role for online and other non-traditional modes of pedagogy to augment and enhance campus-based education. As another example, I have never been compelled by the "STEAM" acronym, forcing the arts to somehow exist between engineering and mathematics – an awkward bridge (however clever an acronym) that raises more questions than it answers and diminishes (however unintentionally) the importance and relevance of the Arts. To me, it appeared a clumsy attempt to say, "Hey, STEM is getting all the attention… we are the Arts… we matter too… let's plug ourselves in here."

My undergraduate education included breadth in the liberal arts, even as I was pursuing my engineering degree, fostering my interests (beyond engineering) in music, the performing arts, human behavior, organizational psychology, design and visual rhetoric. I have traveled extensively, studied and worked abroad, and learned other languages. I studied Mozart and Beethoven when I was in college, and have played violin and viola since I was a young boy. I learned about the connections between music and math – an understanding solidified when I read *Gödel, Escher, Bach: an Eternal Golden Braid* (by Douglas Hofstadter, 1979) in a philosophy class with Professor Daniel C. Dennett at Tufts University. Coupled with my career pathway that has taken me to a provost role at a comprehensive research university, I feel qualified and comfortable in asserting my (somewhat unpopular) position on STEAM. I understand well the synergies between and dualities of design and innovation, the functional and the aesthetic, and the creative and the practical.

The Sensible: Persuasive Partnerships

I am on record, even when I was a dean at a technological research university, saying that the future of engineering education does not lie in the polytechnic institutions, but rather in the comprehensive universities. Today's engineers, are being called upon to lead teams of diverse discipline professionals to solve great and complex challenges[1]. It only makes sense, therefore, that we must *prepare* engineers to do so. This includes broad and relevant topics throughout the university, in liberal arts, business, education, policy, and more. And those we prepare to take on global challenges, and indeed to live and work around the globe, must be culturally sensitive and competent. The necessary communications skills required now reach far beyond writing and speaking to include the digital, the cultural, the sustainable, and the socially responsible[2]. So the case, at least for me, is clear that we must not only make room for engineering students to take course in the liberal arts and beyond, we must make it *an expectation* and we must help them make *smart choices* when selecting courses, given the limited room in the engineering curricula.

But we can arrive at the same conclusion coming from the other direction. Those who graduate with a degree in Liberal Arts – who also will be called upon to forge solutions to the grand challenges of our time, whether through the lens of their discipline or as members of interdisciplinary teams – will live and work in a world that requires a degree of literacy and competency in mathematics, life sciences, physical sciences, finance, computer science and coding. These skills are every bit as important as social skills, communication skills, cultural competency, and critical thinking skills. We do our college graduates (and those they will influence throughout the course of their lives) a disservice by failing to ensure they are equipped to thrive and to succeed in our world. Those seeking degrees in humanities, social sciences, and the arts – as well as those in non-STEM professional disciplines such as education and business – should be encouraged, expected, and enabled to take an appropriate suite of classes in the STEM disciplines. Many colleges and universities have distribution requirements, but do their students understand *why* they are taking those courses? Are they forging and exploring the connections between their STEM courses (for example) and humanities or social sciences courses?

Smart selections of courses could result in *program pairings* between a disciplinary major and a complementary certificate, minor, second major, or post-graduate degree. We should encourage students to pursue these enabling program pairs, while discouraging them from simpler paths (e.g., a random selection of introductory courses to satisfy elective requirements, or a minor or second major that is very close to the original major). Universities and their faculty should be thoughtful about designing program pairs, clearly articulating (and demonstrating) their value, and promoting them as part of the institution's commitment to their students' success.

This does not require that we create a mash-up or a clever acronym. It does, however, compel us to think carefully about how best to serve our students and prepare them for success. We should be purposeful and strategic in empowering our students to make good choices in rounding out their

[1] Preparing (for) the New Engineer, July 2012, D. Rosowsky
[2] Seeking Global Impact and Raising Social Awareness - the New Engineering Graduate, May 2012, D. Rosowsky

curricula, realizing the fullest value of their higher education, and leveraging all that the university offers during their years here.

The power lies in the *partnership* between STEM and Liberal Arts. Each enhances the other, and the combination is potent indeed. Just look around at the innovators, the leaders, and those making their mark as global citizens. They are not monochromatic or uni-dimensional. They are broad and integrative thinkers who are as skilled within their discipline as they are moving across disciplines. It is not enough to build teams of disciplinary experts to solve interdisciplinary challenges, our graduates must be skilled disciplinary integrators with common language and common understanding. And this goes in both directions.

So perhaps we should stop the "either-or" rhetoric and *co-exist* – as is the best destiny of these highly complementary collections of disciplines – for the betterment of our students and our society. Let's work together to create sensible, relevant, and important curricula and program pairings. Hofstadter called it "an eternal golden braid." STEM and Liberal Arts. Full 'steam' ahead.

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