

Engineering and Liberal Education

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Ian Baker, Sherman Fairchild Professor of Engineering, Senior Associate Dean, Academic Affairs, Dartmouth College

Andrew Guswa, Associate Professor of Engineering, Smith College

J. Douglass Klein, Dean of Interdisciplinary Studies, Professor of Economics, Union College

John Krupczak, Professor of Engineering, Hope College

Jenn Stroud Rossmann, Assistant Professor of Mechanical Engineering, Lafayette College

Cherrice Traver, Dean of Engineering, David Falk & Elynor Rudnick-Falk Professor of Computer Engineering, Union College

Hello, my name is Doug Klein, and I am the Dean of Interdisciplinary Studies at Union College. Welcome to what I think will be a very interesting discussion on the relationship between engineering education and liberal education. I am joined by colleagues from Union and three other Colleges, each of whom will describe different pieces of the puzzle of integrating engineering and liberal arts. The panelists are Dru Guswa from Smith College, John Krupczak from Hope College, Jenn Rossmann from Lafayette College, and Cherrice Traver from Union. Ian Baker from Dartmouth is unfortunately unable to join us today.

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This panel had its roots in two Symposia hosted by Union College in 2008 and 2009 on the same subject of Engineering and Liberal Education (please note that the proceedings of both Symposia are available at the web link on the screen – <http://www.union.edu/integration>; I have a few copies if you would like to browse them after the session. Printed copies may also be obtained by emailing me at kleind@union.edu).

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The Symposium brings together academic leaders to discuss, essentially, expanding the definition of a liberal education to include engineering and technology. I should mention that the call for participation in the 2010 Symposium to be held this June, is also posted at the web link.

Neither the benefits of - nor even the possibility of - integrating engineering education and liberal education were always clear.

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In the 1940s, Union President DIXON RYAN FOX addressed the problem and declared it unsolvable:

We have come to realize that the philosophy that governs one kind of education is almost entirely different from that which governs the other. The engineering courses ... train man as specialist, and the liberal arts courses educate man as man.... these two points of view are irreconcilable (*Encyclopedia of the History of Union College*)

[Recall that Union was not yet coed yet.]

Beyond different educational philosophies, in 1959 Charles Percy Snow addressed the breakdown in basic communication across disciplines in his lecture on “The Two Cultures.” Snow lamented the evolving specialization in disciplines which rendered adherents in the humanities and the sciences increasingly unable to understand one another. If Snow’s recognition of the problem was on the mark, his solution (the supremacy of science) was perhaps a bit self-centered. Snow was a physicist, and he certainly didn’t win over the “literary intellectuals,” as he called them, with his less-than-flattering characterization of them and their scholarship.

Of course, the issue of striking the proper balance between theory and application, between education and training, between generalist and specialist, is an old one. I hope that it will not take too much convincing that this is now, and perhaps always should have been, a false dichotomy. For example, one of Union’s most esteemed presidents from the 19th Century, Eliphalet Nott (who, incidentally, served a record-setting 62 years in office), was both a patent-holding inventor, and an ordained minister.

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The rationale for integrating engineering education and liberal education can be summed in the urgent need to prepare our graduates in all fields, to successfully deal with a fragile and increasingly technologically complex world. The technological complexity has of course been growing for centuries, but the fragility is daily becoming more apparent.

We should also nurture the opportunities for innovation that flourish at intellectual intersections. In his book, *The Medici Effect*, Frans Johansson reviews the idea that the Italian Renaissance was due in no small part to the mixing of cultures and ideas taking place in northern Italy at the time, and advocates for more intersectional thinking today.

And the National Academy of Engineering, in its report on *The Engineer of 2020* states:

...[G]iven the growing scope of the challenges ahead and the complexity and diversity of the technologies of the 21st century, creativity will grow in importance. The creativity requisite for engineering will change only in the sense that the problems to be solved may require synthesis of a broader range of interdisciplinary knowledge and a greater focus on systemic constructs and outcomes.

That is, engineers need to engineer in a broader context.

In attempting to integrate engineering education and liberal education, we should seek common ground, and not allow one side or the other to claim a monopoly on the truth.

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As a brief starting point to finding that common ground, I recommend two sets of student learning outcomes; one developed by AAC&U members under the title of LEAP – Liberal Education and America’s Promise (www.aacu.org/leap), and the other, Criteria 2000, developed by ABET, the national accreditation organization for engineering and technology programs (www.abet.org).

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As I put the lists side-by-side, I note substantial overlap. Time does not permit me to walk you through the two lists line by line, but the red arrows are my attempt at a cross-walk, and I find that most outcomes are present on both lists, and those of you not familiar with ABET may be surprised to see how many liberal education outcomes that list contains. To be sure, the level of stress placed on each element may vary widely between engineering and liberal arts programs, but the key point is that both place increasing value on broad, holistic approaches to education and problem solving.

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Today, our panel consists of participants from four schools which share the common attribute of supporting both undergraduate engineering and liberal arts programs. We are convinced that the whole will be more than the sum of its parts, and that one gains new insight into one's own specialty by seeing it from someone else's perspective.

The panelists will describe some of the integrative efforts underway at their respective institutions and beyond.

John Krupczak, Hope – has been a leader in developing Models of Technological Literacy courses which can be widely replicated

Jenn Stroud Rossmann, Lafayette – will discuss her experience in interdisciplinary Team taught courses; and will describe the BA Engineering programs at Lafayette and Dartmouth

Cherrice Traver, Union – will talk about the role of engineering in General Education courses; will describe interdisciplinary paired courses; international projects

Drew Guswa, Smith – Educational Approaches which facilitate the integration, including: Advising, Assessment, & Capstone Experiences

[Presentations by the other panelists.]

Wrap-up:

Thanks; we have plenty of time for discussion; we would love to hear your reactions to the whole idea of integrating engineering and liberal education, questions for any of the panelists, and also for any examples of integrative efforts you may have to report from your institutions.

The floor is open.