Case Study: Innovative Initiative to Integrate Liberal Arts and Engineering

The goal of this project is to develop an engineering program where students could learn to think like engineers but also have a liberal arts education (music, history, writing, language, minor outside their field). If these students want to go into engineering, they can do so with their B.A. or they can go into other fields but still have an engineering perspective. Such a program might be more attractive to women, in particular because the curriculum would be less constrained and keep other options for careers open.

Why?

- Produce more creative, integrative thinkers
- Support the development of more holistic, well-rounded graduates who can come up with more holistic solutions
- Create better employees
- Help graduates to better integrate their personal value system with the value of the profession
- It adds value: asking engineers to “value” the liberal arts contribution to the curriculum – we need to construct this value-added proposition
- It “enriches” the engineering curriculum
- Currently ABET-engineering graduates can only take 6 courses outside the engineering curriculum which does not give them a broad perspective and may not produce global thinkers, this integrated curriculum would address this.
- Engineers who only know technology will solve every problem with a technology solution.
  Engineers with a liberal arts education may have different solutions and more importantly, they will have different ways of knowing and an appreciation for other perspectives and invite those different folks into their problem-solving teams.
- It addressed the problem that there are students who attend certain institutions do not have the option of a BA in engineering and no option for liberal arts education within engineering

Characteristics of the targeted institution:

- Large, public, state, institution (not a tech school)
- Comprehensive, PhD granting: ABET accredited
- May or may not be land-granting
- 1000 engineering students enrolled
- 120 faculty

Leverage Points:

- ABET could recommend/ require it
- Existing programs exist and have been successful (Smith College, University of Vermont, Melvin model in Australia, 3:2 program – dual degree with liberal arts and BS in engineering)
- Link to state needs
- Melvin model in Australia
- Less engineering courses to teach within the college of engineering (as they would also be taught in arts and sciences)
• Align with Engineering 2020 attributes (creativity, communication ability, problem-solving)

Strategies:
• Find “early adopters” to participate – how do we get the graduates to be who we want them to be and make these measurable outcomes
• Equalize salaries between engineering and liberal arts faculty to level the playing field
• Create a parallel engineering/liberal arts program (experimental) in addition to the typical engineering and standing arts and sciences (control) and see which give better outcomes and “survive”
• Partner with sociologist to help navigate conversations between disciplines
• Hire a market research firm and ask the firm to identify the symbols that are critical to the faculty, the staff, the administration and the alumni
• Identify scholarly articles and outcomes and opportunities for funding on integration of engineering and liberal arts
• Look to IGERT as a model for funding this type of work
• Can either just have engineering students take liberal arts classes or work with faculty in the liberal arts to create an integrated curriculum (this is a point of contention in group) – should we include the engineering faculty and liberal arts faculty in one curriculum meeting
• Lobby across departments
• Give innovative faculty who want to develop and implement this integrated curriculum big raises, PNT “credit”, and somehow reward interdisciplinary work generally
• Think of a continuum across engineering and liberal arts students and let the students organize their own information and chose where they want to lay on the spectrum and then study which of these students are the “most” innovative
• Do we want to replicate the diversity of institutions within a single institutions? Not all students have a choice of institutions and so we need to offer those students choice at the institutions they can attend

Barriers:
• Status structures and differences between engineering and liberal arts faculty
• Threat to existing programs
• Liberal arts may feel threatened
• Legislature for a state education system can dictate education landscape and what programs can be offered
• Land-grant institutions have a obligation to graduate “traditional” engineers
• Many engineering faculty believe they are already training engineering students to be creative problem-solvers through the traditional engineering curriculum
• Cultural barriers to change such as PNT reward system
• Faculty may see the liberal arts “engineering” courses and “watered down”
• Need to show faculty that there is a problem to be solved that a liberal arts approach can solve
• Current curricula are set up to organize content and deliver it in a systematic manner that is outdated
• Hard to compete with quick MS programs if a dual degree in engineering and liberal arts takes 5 years.
Metrics:

Graduate will be:
- “better” problem solvers
- “better” critical thinkers
- creative and integrative problem solver
- able to come up with new problem solving paradigms
- appreciate and understand different ways of knowing
- invite diverse perspectives into problem-solving teams

Faculty will:
- demonstrate enhanced scholarship in the integration area and places to publish these innovations
- get credit to teaching students outside their college/disciple