Developing a New Engineering Curriculum with a Focus on Entrepreneurship

The theme for the session is about how a vision gets shaped over time, and how it gets shaped through the different markets. In this case, it is how the vision of Olin College got shaped over time. What is the vision of your center? As the vision changes, is that necessarily a bad thing?

There were three phases:
1) Vision when they hired a leadership team,
2) Vision when the faculty got hired,
3) Vision when the students were a part of it.

Phase 1: Hiring the leadership team
- Started of as an idea of staring a “new engineering college”, a need for a new kind of undergraduate education, focused on entrepreneurship.
- Decision to start a “green-field” college, co-located with Babson College, which was known for entrepreneurship.
- Olin College is completely separate from Babson, but is continuous with Babson in terms of physical proximity.
- Babson was a business college, which conferred, BS, MBA and MS. There were 1700 undergraduates.
- Leadership team consisted of President Richard K. Miller (U of Iowa), Provost David V. Kerns, Jr. (from Vanderbilt), VP Innovation and Research Sherra E. Kerns (from Vanderbilt)
- Mission: to provide a superb engineering education at little or no cost to bright and enterprising students. (Students don’t pay tuition.) They would offer three degrees, BS in ECE, ME, Engineering/Applied Science.
- Have collaborative programs with Babson.

Phase II: Hiring faculty
- The start of the curriculum development began in 2000-2001
- Babson does not give tenure to faculty, and that attracted a broad range of people, ranging from those who are still young in their academic career to those who have been so successful, that tenure doesn’t mean much to them/
- Starting from a clean slate was difficult, everything was “new”. Anything you start to talk about, you need to start by deciding “how.”
After bringing in the faculty, who spent some time investigating the best practices, and discussing the curriculum vision. They developed the Olin “triangle” which consists of 1) Superb Engineering, 2) Creative Arts, 3) Entrepreneurship.

Much discussion about the importance of liberal arts, because of the presence of faculty who were world-class photographers and pianists, and the importance of those interests.

Some of the key Bold Goals that were highlighted were:
- Self-sufficient individual should be able to articulate and activate a vision to bring to fruition.
- Performance before an audience including experts.

Some of the additional curricular objectives, which were basically objectives that they couldn’t agree with, that were highlighted were
- Demonstrate significant creative artistic expression
- Significant work experience in a corporate culture
- Ability to apply basic business practices necessary to bring a product to the marketplace.

Phase III: The students

30 student “partners” arrive who were enrolled as first-year students in fall 2002. However, because the school year couldn’t take off, they were invited to help faculty and administration “invent” curriculum and student life. Students became part of the decision-making process.

Of the 30, only about 10 were absolutely enthusiastic about entrepreneurship.

Curriculum Goals after student involvement.

Superb Engineering
- Hands-on projects at all times
- Engineering design throughout
- Multidisciplinary approach
- Development of life-long learning skills

Accommodation of student interests and needs
- Significant, student-proposed sophomore project
- Free electives every year
- Passionate pursuits

Opportunities throughout the “Olin” Triangle
- Explore and do research into entrepreneurship, whether it should be part of the curriculum.
- Arts, Humanities and Social Sciences (AHS)
- Entrepreneurship experienced throughout 2nd projects.
- Every student will pass the FE exam, a standard that is recognized by the station.

The students arrive…
- 75 students who came in this fall. 20 faculty were hired. 3 Completed campus buildings – classroom building, campus center, residence Hall.
- They went through the normal admission cycle, but the last stage was a bit different. They brought in the 150 finalists onto campus for a weekend, sealed off the academic records, and put them through team games.
• 50% of them were women.
• No international students because of visa problems.

Olin/Babson partnership
• They “outsourced” first year liberal arts to Babson College.
• There are joint faculty appointments and joint curriculum development.
• Student interaction between the two schools, both with undergraduates and the MBA students.

College Curriculum
• Foundation Year 1 consisted mostly off Math, Physics and projects, and also AHS classes.
• Students are not allowed overload, but they can sign up for 3 non-degree credits, should they want to pursue something which they are passionate about.
• Foundation Year 2 includes business courses, a sophomore design project, and they start specializing.
• Year 3&4 – Proof of Concept. More specialization of their majors, but this will continue to evolve.
• After each exam period, they do a one-week assessment, to see if students are meeting the learning objectives, and also how the program is doing?
• Grading, C/NC for first semester, and ABCD for second semester.
• They will take in 75 students for the first couple of years. The steady state should be about 650 students.

How Olin fulfills the NSF Vision for Engineering Education

• John Bourne was one of the first faculty to be hired and wanted to share some of his experiences.
• Olin College should be providing a capstone to the work of the NSF in investigating improvements to engineering education.
• Olin College achieved all the teaching and learning method goals. Some of the ones that were highlighted are as follows:
  - Faculty acting as mentors, maintaining a 10 to 1 ratio.
  - Developing education materials.
  - Fewer lectures, stress active and collaborate learning
  - Integrate education and research roles
  - Provide learning experiences that meet the needs of students with different learning styles.
  - Integrate subject matter by showing relationships from the beginning of the students’ program
  - Life long learning
• Achieved all curricular content goals. The ones that are highlighted are:
  - devoting quite a lot of good time to math and science
  - teamwork is constantly emphasized
• Did not seem to be doing so well, in goals for constituencies and networks, but these weren’t Olin’s objectives in the first place. However, the ones that that they were effective in doing are as follows:
- Interaction with the industry, through bringing in people to work with the students.
- A lot of evaluation is being done.

**Topic: An example of Practicum Opportunity Assessment**

- Olin College worked with a company to teach the students opportunity assessment
- The students had to put together a case together with a company that involved both engineering and business aspects.
- The students had to use this to think about business ideas using the company information as the background.
- Through the five teams, they will compete and judged by a panel of entrepreneurs chosen from the Babson faculty. The 3 winning teams will then give presentations to the Dean.
- The reports will then be archived and used as references to students doing the same opportunity assessment project next year.
- They will work with different companies every year.