Fostering the Entrepreneurial Mindset in the Engineering Classroom

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Introduction

- The global economy is evolving.
- Organizations are redefining formal qualifications and years of experience and more on attitude, motivation, learning capacity, and potential for collaboration.[1]
- Mid-1990s ABET (Accreditation Board for Engineering and Technology) revision of engineering post secondary education.

In response to these changing market needs, the Biomedical Engineering Department piloted a two-semester graduate level course during the 2007-2008 academic year, Graduate Biomedical Engineering Design Team (BiomedE599).

Course Purpose

- Develop adaptive learners through innovative design.
- Provide students with the necessary skill sets for success beyond the University environment.

Context

BiomedE 599 primarily focuses on the first three phases (Ideation, Product Selection, and Development) of the innovation value chain.

Learning Principles

Learning principles used were designed to:
1. Generate a culture that cultivates the highest probability of success for the students.
2. Encourage students to take ownership of their projects.

Fundamental Canons:
- Self-assembly promotes comfort amongst the team.
- Self-selection promotes buy-in and motivation.
- Self-awareness promotes more effective communication.

Team Experiences:
- Design Teams: Within the class, students divide into teams to pursue individual design projects.
- Class Team: Entire class instructed to work as a collective, similar to a technology incubator.
  - Students develop concept designs as a collective.
  - Students provide technical feedback to their peers on a weekly basis.

Results

Fall Semester: 18 students enrolled
Winter Semester: 18 students enrolled (2 new, 16 return)
- Students interested in joining the course for the winter terms were instructed to "apply" to the class and were hired by individual team members.

Five project teams were formed by the end of the fall semester.

Discussion

- The culture cultivated during the two semester pilot course, resulted in more than a simple academic experiential exercise.
- Students embraced an entrepreneurial mindset as evidenced by their performance outside of the classroom.

"Entrepreneurship is a particular type of mindset, a unique way of looking at the world….At the heart of entrepreneurship lies the desire to achieve, the passion to create, the yearning for freedom, the drive for independence, and the embodiment of entrepreneurial visions and dreams through tireless hard work, calculated risk-taking, continuous innovation, and undying perseverance.[2]"

Conclusion

Results suggest that learning principles that encourage students to take a more active role in their academic development in the context of real world problems help students develop critical entrepreneurial skills[3]:
- Leadership competencies
- Commitment and persistence
- Ability to mobilize
- Vision creation
- Mission/target setting
- Transformational competencies
"Problem definition
- Excellent communication skills
- Negotiation skills

References


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- Steven Bolling, MD
- Charles Boyd, MD, MBA
- Frank Anderson, MD, MPH
- William Roberts, MD
- Frank Pagan, MD, PhD

BME 599 2007-08 Students

- William Roberts, MD
- Charles Boyd, MD, MBA
- Richard Raymond, PhD
- Steven Bolling, MD
- Charles Boyd, MD, MBA
- Frank Anderson, MD, MPH
- William Roberts, MD
- Frank Pagan, MD, PhD