



University of Utah

Teaching Innovation and Entrepreneurship: A multidisciplinary approach

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Disruptive Innovations

Ether anesthesia (1842)



Aseptic techniques

Electrocautery (1926)

Antibiotics (1941)

Dialysis (1946)



Mechanical ventilation (1950s)

Cardiopulmonary bypass (1953)

Laparoscopy & Endoscopy



Pulse Oximetry



UNIVERSITY OF UTAH
HEALTH CARE





Innovation Complexities

Intellectual property protection

Regulatory processes

Design requirements

Clinical trials

Reimbursement strategies

Market Analysis

Stakeholder analysis

Revenue models and Strategy

Funding

1 Year Fellowship in Medical Technology Innovation & Entrepreneurship

TEAM approach provides synergistic
learning

Global Innovation Education

- ▶ Engineering
- ▶ Medicine
- ▶ Business/Entrepreneurship
- ▶ Business & Patent Law
- ▶ Design





Center for Medical Innovation

Ideation

Development

Collaboration

Prototyping

Intellectual property

Regulation

Funding

Commercialization



Masters Degree in Bioengineering

BiInnovation track

Core Courses

- ▶ Biomedical Device Innovation I & II
- ▶ Clinical Problem Solving Through Strategic Analysis I & II

Elective Courses

- ▶ Business Entrepreneurship
- ▶ Business Law
- ▶ Intellectual Property Law
- ▶ Venture Capital
- ▶ Marketing
- ▶ Entrepreneurship
- ▶ Bioengineering



BIOEN 6181 and 6182

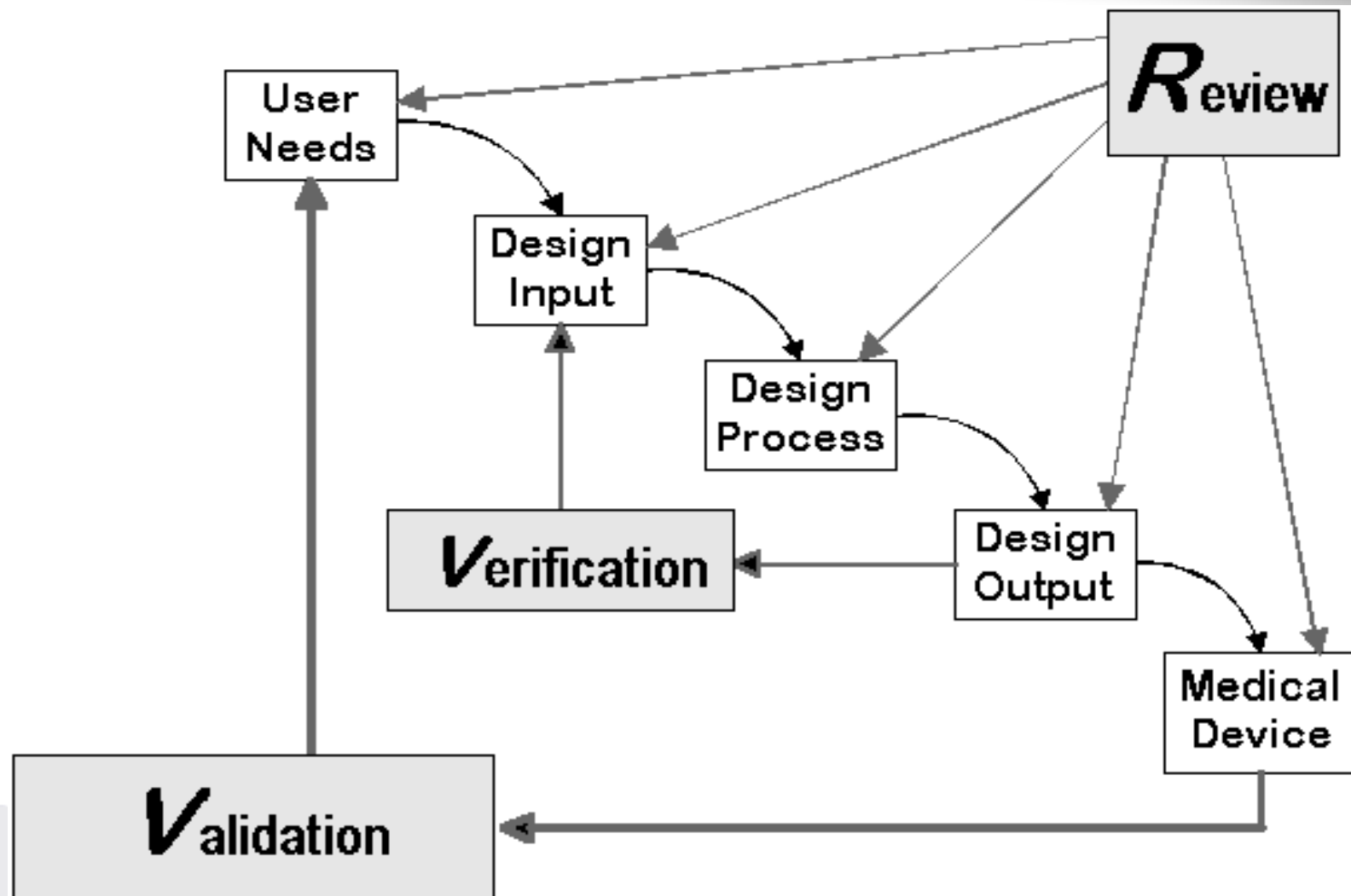
Clinical needs finding
Concept Generation and screening
Market analysis and IP searching
Business planning
Quality and process management
Venture Funding
Marketing and stakeholder strategies
IP Law ,Licensing, Valuation & Strategy
Term sheet negotiation



BIOEN 6801 and 6802

Project conception/evaluation/design
FDA regulatory Processes
Intellectual property
Soft ware and design tools
Design Specs/prototyping and testing
Commercialization/marketing/financing
Risk management and ethics
Design validation and clinical trials





The BioInnovation Process

- Clinical Immersion



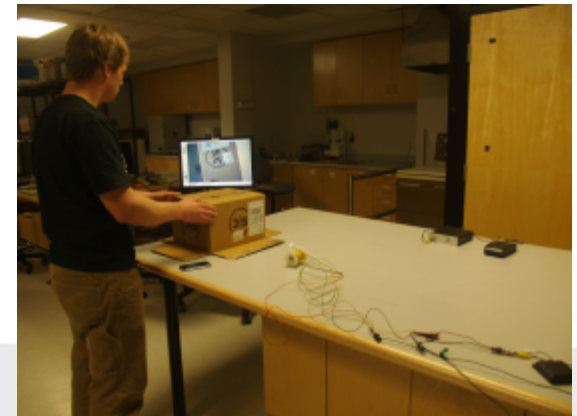
The BioInnovation Process

- Prototyping

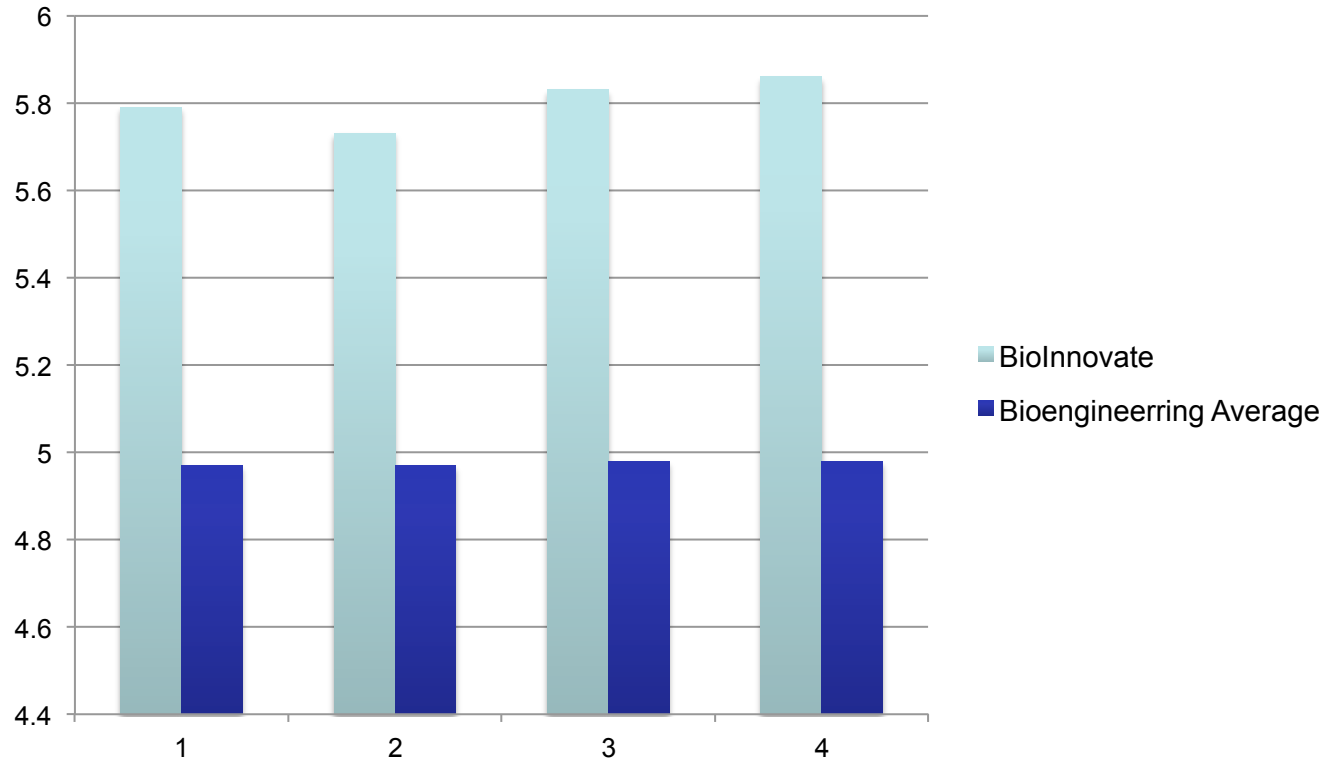


The BioInnovation Process

- Verification Testing

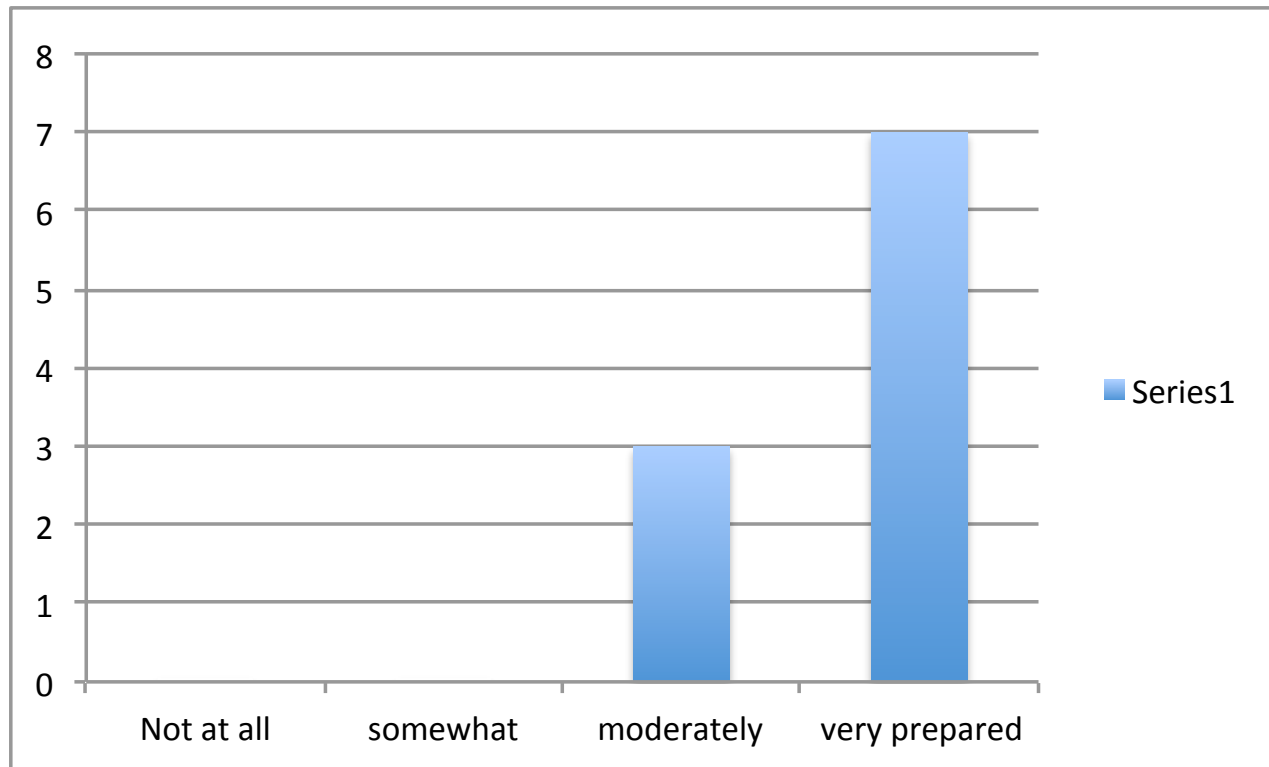


STUDENT PERCEPTIONS



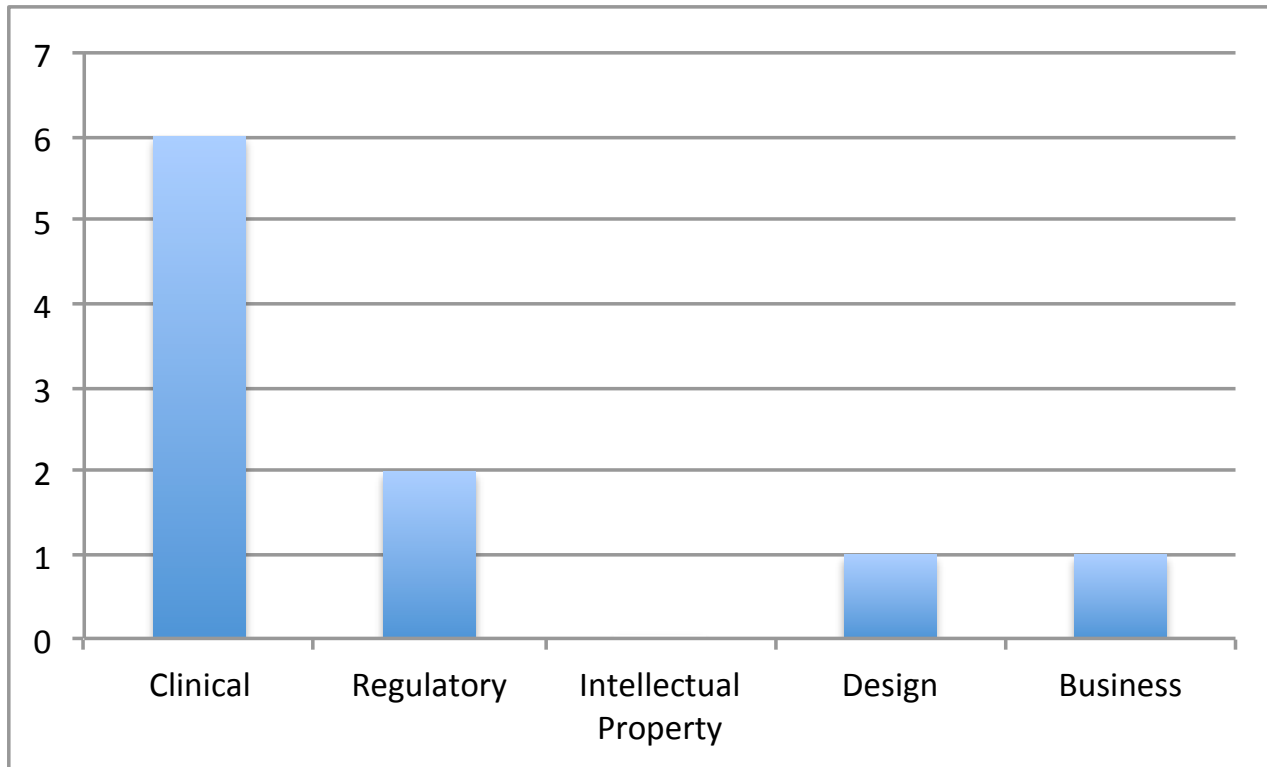
Overall Value of Educational Experience

Lessons Learned



How Prepared do you feel to successfully start a new medical device company?

LESSONS LEARNED



What part of the course added the most value to your education?

LESSONS LEARNED

What was the most difficult part of the program?

Working in a team

Dealing with personalities!

Some people didn't pull their weight

Uncomfortable to go to OR first few times

Difficult to find a doable solution



LESSONS LEARNED

What would you change about the program?

Let us pick our own teams

Start the prototyping sooner

I get the IP and FDA concepts but the real world application is complicated



LESSONS LEARNED

Artificial Urinary Sphincter

Team disbanded:

MD-Surgeon

Bioeng PhD-Industry Position

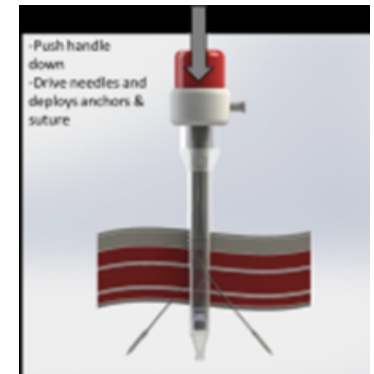
Bioeng MS-Industry Position

MS/MBA-Started separate new venture

First Year Teams?

LESSONS LEARNED

Self-Closing Surgical Trocar



Team: Started 6-S Medical LLC

Two removed from team (MD&MS)

Won medical device competition

Raised \$100,000 1st year (3 grants)

Commercial design complete

Beginning regulatory submission

First Year Teams?

LESSONS LEARNED

Mobile Laparoscope



Team: Started Xenocor LLC

Three removed from team (MD, MD, MBA)

Raised >\$225,000 (3 grants)

Won two new venture competitions

Commercial design complete

Entering non-regulated OUS market

Preparing for 510(k)

First Year Teams?



IMAGINATION+COLLABORATION=

**CENTER FOR
MEDICAL
INNOVATION**