

Abstract

Recently, entrepreneurship has gained significant attention in engineering education. Evolving from traditional business fields, engineering entrepreneurship education has transformed from traditional approaches disseminating business content to more practice-oriented approaches targeting students' professional development. Particularly, entrepreneurship training has been included in undergraduate education to instill non-technical skills needed in future engineering graduates to meet the demands of competitive global market. In addition to technical knowledge, engineering students should also demonstrate the ability to identify new venture opportunities, commercialize technologies, and exhibit an understanding of market operations. Entrepreneurship education focuses on instilling these skills by exposing students to business content and entrepreneurial practice through engagement in project-based courses, pitch competitions and providing opportunities to interact with practicing entrepreneurs.

Objectives

- This paradigm shift in the conceptualization of entrepreneurship from an innate characteristic to developable skillset, has led to creation of several entrepreneurship education programs in multiple institutions to impart entrepreneurial knowledge, instill entrepreneurial skills, and develop entrepreneurial mindset in students.
- Lean LaunchPad utilizes experiential learning to immerse students in projects that allow them to hypothesize and test their business models outside the classroom.
- The curriculum uses Business Model Canvas (BMC) to teach important concepts related to venture creation and guide students in their venture creation projects.

Methods

- Study was conducted in a senior-level entrepreneurship course at a large research university in the US. The total enrollment for the three-credit course was 57.
- Pre/Post research design was used in this work in which the students responded to open-ended survey in the first and last week of the class.
- The response rates were 79% and 65% for the pre and post survey respectively.
- The questions aimed at assessing students' knowledge in regard with the key concepts emphasized in the course: customer discovery, feasibility of product, and adaptability to customer segment.

Results

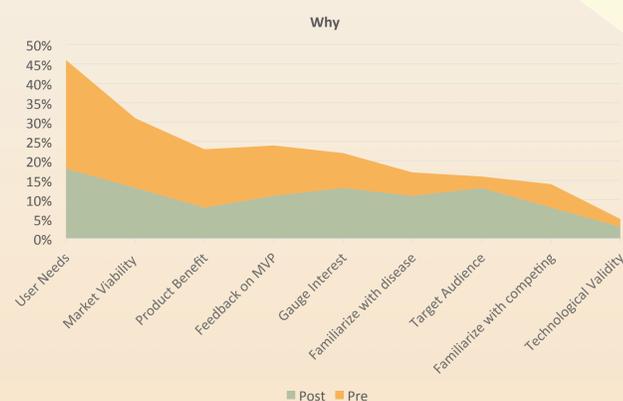
Question: Your company has a new idea for a cellphone app to help people manage their diabetes. You have been tasked with evaluating whether or not this app should be brought to market by the company. Describe who you would speak to, why you want to speak to these people, and how you would make contact with them.

Who

Category	Pre	Post
Diabetics	37 (55%)	29 (50%)
Doctors/Physicians	12 (18%)	8 (14%)
Business Experts /Consultant/Marketing	7(10%)	5 (8%)
Healthcare providers	3 (5%)	3 (5%)
Technology Developers	3(5%)	5(8%)
Other (Mentor/Organizations/Phone Users)	5(7%)	9(15%)

- “Who would you talk to” targets the area of customer discovery
- Patients and doctors/physicians were the most frequently reported answer in both the pre and the post responses (73% and 64% respectively)
- The post students took into consideration a broader group of stake holders and key partners and their relationship with their targeted consumer segment to evaluate their business plan

Why



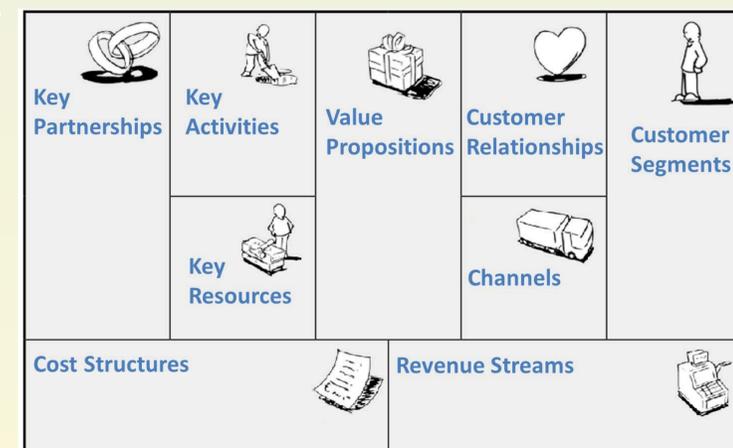
- “Determining user needs” was the most commonly reported reason in both pre and post (28% and 18% respectively)
- While 69% of pre responses were distributed in the first three categories, the total percentage of the post responses in these categories was 39%
- The post responses were more evenly spread out across the 9 categories than were the pre as seen in the graph
- These results show that students awareness of factors that they need to gather more information about while conducting pre-customer discovery increased
- This responses are connected to the “who would you talk to” question as a more diverse group of stakeholders leads to a more broad set of information that should be gathered from such groups

How

Category	Pre	Post
Through doctors/physicians	16 (36%)	9 (36%)
Email, Phone Call	9 (21%)	3 (12%)
Personal Networks	3 (7%)	1 (4%)
In-Person Meeting	5 (11%)	2 (8%)
Survey	5 (11%)	5 (20%)
Social Media	2 (5%)	2 (8%)
Focus Groups	1 (2%)	1 (4%)
Database	0 (0%)	1 (4%)
Advertising	3 (7%)	1 (4%)

- Majority of students reported that they would contact them through doctors/ physicians in both pre and post (36% in both)
- The percentage of responses allocated to “email/ phone call”, “personal network”, and “in-person meetings” declined in the post survey
- The percentage of responses for “survey”, “focus groups” and “database” increased
- This shows that students in the post survey gravitated towards a more formal form of data collection needed to evaluate their business plan

Business Model Canvas



Conclusions

- Overall, the students' survey responses showed learning gains and demonstrated that students were able to internalize and understand the concepts of BMC that were taught in an experiential project-based learning environment.
- In the area of customer discovery, students' understanding expanded to include a wider range of key stakeholders, consider their relationships with the targeted customer segment, and include relevant factors pertaining to these relationships when evaluating an entrepreneurial idea.
- For determining the feasibility of the product, students' post responses showed increase in students' preferences to follow a more iterative approach to refine the product as per customer needs.
- Responding to customer discovery results, students' answers noted a change from following a conventional approach involving modification of product in the pre-survey, to willingness to accept infeasibility of the entrepreneurial idea and making decision to not move forward with the business plan.
- The findings show that entrepreneurship education has moved from traditional business and finance skills, to seek out relevant information about the problem they want to solve as an entrepreneurial

Acknowledgments

This project is funded by the U.S. National Science Foundation through grant number 1504257. We are thankful to Laura Hirschfield for her help on the project.