I-Corps™ for Learning
Sustaining and Scaling STEM Education Innovations for Impact

ASEE/IEEE Frontiers in Education Conference – October 13, 2016 – T2B – 1:30 pm – 3:00 pm

Facilitated By

Rocio Chavela Guerra
American Society for Engineering Education

Karl A. Smith
Purdue University and University of Minnesota
# Agenda

<table>
<thead>
<tr>
<th>Section</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of Session and Facilitators</td>
<td>5 min</td>
</tr>
<tr>
<td>Brief introduction to the I-Corps™ for Learning Program</td>
<td>10 min</td>
</tr>
<tr>
<td>• History</td>
<td></td>
</tr>
<tr>
<td>• Goals</td>
<td></td>
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<tr>
<td>• Current Initiatives</td>
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<tr>
<td>Lean Start-Up Approach</td>
<td>25 min</td>
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<tr>
<td>• Business Model Canvas</td>
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<tr>
<td>• Customer Discovery Process</td>
<td></td>
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<tr>
<td>• Agile Engineering – Iterate &amp; Increment</td>
<td></td>
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<tr>
<td>Customer Segments (CS) and Value Proposition (VP) Exercise</td>
<td>30 min</td>
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<tr>
<td>• Identify an education innovation that you would like to see sustained and scaled</td>
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<tr>
<td>• Within that innovation identify one Value Proposition (VP) that you think is aligned with one Customer Segment (CS)</td>
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<tr>
<td>Summary and Feedback</td>
<td>10 min</td>
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</tbody>
</table>
7-week Program

Educational Innovation

Customer Discovery

Kick-off Workshop

5 Online Sessions

Lessons Learned Workshop

100 Interviews

Readiness for Sustaining & Scaling?

Product

Market

Fit
I-Corps™ for Learning History

- **June 2013 to June 2016**
  - **Pilot:** Jan-Feb 2014
  - **Cohort 1:** Jan-Feb 2014
  - **Cohort 2:** Jul-Aug 2015
  - **Cohort 3:** Jul-Aug 2016

- **Key Figures:**
  - 3 Cohorts + Pilot
  - 73 Teams
  - 234 Participants
  - 18 Instructors
  - 3 Evaluation Partners
Key Features of I-Corps™ for Learning

- **Curriculum**
  - Business Model Canvas
  - Customer Discovery
  - Agile Engineering

- **Course Specific Outcomes**

- **Assessment Instruments**

- **Syllabus Iterations**

- **Balanced Teaching Team**

- **Diverse Participant Segments**

- **Teams Composition**

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### Teaching Team Criteria for a ‘Go’ Decision

<table>
<thead>
<tr>
<th>Evidence of Criteria in Team’s BMC</th>
<th>None (1)</th>
<th>Poor (2)</th>
<th>Adequate (3)</th>
<th>Outstanding (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Value propositions align with customer segment</td>
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<tr>
<td>2. Evidence of champion (decision-maker) from at least one customer segment</td>
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<td>3. Specific and concrete definition of scale</td>
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<tr>
<td>4. Credible path towards scaling and sustaining identified</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Team Name</th>
<th>TEAM DECISION</th>
<th>Go</th>
<th>No Go, But Continue</th>
<th>No Go</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTREC</td>
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</tbody>
</table>
Participant/Alumni Segments

Current Profession Leaning (36%)

Entrepreneur Leaning (20%)

Both (44%)
ViTAL

Bringing inclusion and accessibility to the digital classroom through touch

The Team

Jenna Gorlewicz, PI
Assistant Professor
Saint Louis University

Corrine Mueller, EL
Graduate Assistant
Southern Illinois University Edwardsville

Dan Harres, M
CEO
Bitstream Technology

Our Technology
Leveraging commercially available tablets

Create
Engage
Learn
Collaborate

Automatically transform existing lessons into accessible content. Easily create and customize new teaching materials.
Real-time display in class promotes inclusion and peer-to-peer interactions with diverse learning styles.
Personalized content enhances learning through sight, sound, dictation, and touch: tactile graphics.
Integrate, share and sync with digital classroom tools (Google apps, LMS, and Apple for Education).

NSF
SBIR - STTR
America's Seed Fund

CENTER FOR TRANSLATION OF REHABILITATION ENGINEERING ADVANCES AND TECHNOLOGY
TAKING YOU FROM AN IDEA TO A BUSINESS (SUSTAINABLE SCALABILITY)

The Lean Startup In Three Steps
1. Frame Hypotheses
1. Frame Hypotheses

- Partners
- Activities
- Resources
- Product / Service
- Get/Keep/Grow
- Channel
- Customers
- Costs
- Revenue
2. Test Hypotheses

- Frame Hypotheses
- Test Hypotheses
2. Test Hypotheses

- Frame Hypotheses ➔ Business Model Canvas
- Test Hypotheses ➔ Customer Discovery
2. Build Incrementally & Iteratively

- Frame Hypotheses ➔ Business Model
- Test Hypotheses ➔ Customer Development
- Build the product incrementally & iteratively ➔ Agile Engineering
Activity: Choosing an Educational Innovation

- Individually,
  - Identify an educational innovation you would like to see scaled
  - Write 1-2 sentence(s) describing the innovation

- In small groups (2-3 people),
  - Share the innovations you identified and select one for the group
  - If needed, re-write 1-2 sentence(s) describing the innovation
Examples

**Team 66**

**Product Realization 2.0**

Nathaniel Stern  
Entrepreneurial Lead

Ilya Avdeev  
Academic Lead

Brian Thompson  
Mentor

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**Interviews**

<table>
<thead>
<tr>
<th></th>
<th>New</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>7</td>
<td>78</td>
</tr>
<tr>
<td>Video</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Phone</td>
<td>1</td>
<td>13</td>
</tr>
</tbody>
</table>

Total: 8

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We help engineering companies identify talent, and students get their first internship, through a sponsored experiential interview that demonstrates targeted skills.

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**The Ecosystem**

- Academic Leadership (7)
- Career Services Relations (6)
- Corp. Leaders (4)
- External Recruiter (6)
- HR (25)
- Engr. Mgr./Dir. (16)
- Engineers (13)
- Engineering Students (10)
- Perm. Office (5)
- Instructors (2)
- University (7)

(Total Interviews by type)
JUR Press

JUR is a journal for undergraduates, by undergraduates that engages students throughout the publication process, providing a place to publish their work as well as a single source for finding internships and research opportunities.
Lean Startup isn’t explicitly about starting a company...

It’s really about how to maximize the number of people you help and impact (i.e. the business model)
Scaling and Value

Scaling

100 students → 100,000 students → 1,000,000+ students

Who will pay for you to provide value to those 100,000 or 1,000,000+ students?
Examples

2012 Overall Expenses: $7.3M
• $5.1M just in salary expense

2012 Total Revenue: $15M
• Almost all from donations
• $500,000 fees for services

Non-profit doesn’t mean you shouldn't charge for the value you deliver!
In fact, it’s imperative that you do figure out what you can charge for and who will pay (other than students & teachers).
That’s why we start with these
## Customer Segments
*(Does Anyone Care?)*

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Value Propositions</th>
<th>Customer Relationships</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Who are your most important customers?</td>
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<td></td>
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<td></td>
<td></td>
<td>What job do they want to get done?</td>
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<tr>
<td>Key Resources</td>
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<table>
<thead>
<tr>
<th>Cost Structure</th>
<th>Revenue Streams</th>
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Value Propositions
(Why Do They Care?)

<table>
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<th>Key Partners</th>
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</table>

<table>
<thead>
<tr>
<th>Key Resources</th>
<th>Channels</th>
<th>Revenue Streams</th>
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</table>

What customer problems are you helping to solve?
What customer needs are you satisfying?
Mistake #1
Building Something Nobody Wants!
Value Propositions
(Why Do They Care?)
The Value Proposition

A value proposition is a promise of value to be delivered. It is a clear statement that:

• explains how your innovation solves customers’ problems or improves their situation (relevant),
• delivers specific benefits (descriptive, measurable),
• tells the user or buyer why they should use it or buy from you and not from the competition (unique).

http://conversionxl.com/value-proposition-examples-how-to-create/#.
<table>
<thead>
<tr>
<th>Features</th>
<th>Weak Value Propositions</th>
<th>Strong Value Propositions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fun &amp; Engaging</td>
<td>Faster, Cheaper, Better</td>
<td>Relevant, Significant &amp; Testable Product Benefits</td>
</tr>
<tr>
<td>Field-specific skill building</td>
<td>Getting students involved with an undergraduate publication</td>
<td>Increase number of good applicants for graduate schools</td>
</tr>
</tbody>
</table>
Customer Segments
(Does Anyone Care?)
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Not Customer Segments</strong></td>
<td>Buildings, Organizations</td>
<td>Very Specific Job Titles, Very Specific Archetypes/Personas</td>
</tr>
<tr>
<td><strong>Vague Customer Segments</strong></td>
<td>Broad Groups of People</td>
<td><strong>Clear Customer Segments</strong></td>
</tr>
<tr>
<td><strong>Clear Customer Segments</strong></td>
<td></td>
<td><strong>Newly Hired, Tenure-track Engineering Faculty</strong></td>
</tr>
<tr>
<td><strong>Colleges</strong></td>
<td>Faculty</td>
<td></td>
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<tr>
<td><strong>Faculty</strong></td>
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</table>
What makes for a compelling value proposition?

- What problem are you solving/need are you serving?
- How?
- For whom?
Customer Jobs: What do they have to do and how do they do it now?

Jobs
- Functional
- Social
- Emotional
- Supporting

Job’s contexts
Job’s importance
Customer Profile

Pains
- Undesired outcomes
- Obstacles
- Risks
- Difficulties

Severity

Customer Pains: What annoys your customers?
Customer Gains: What do they want?

Gains
• Functional
• Social
• Emotional
• Resourceful

Relevance
• Required
• Desired
• Expected
• Unexpected
Products & Services: What are you offering?

Products & Services
- Physical, tangible
- Intangible

Relevance
Gain Creators: How do you provide positive results and benefits?

Gains Creators
• Expectations
• Desires
• Utility
• Unexpected

Relevance
Pain Relievers
• Undesired outcomes
• Obstacles
• Risks
• Difficulties

Relevance

Pain Relievers: How do you alleviate customer pains?
Customer Segment: Which people? Be specific!

would “pay” to ______________________

Value Proposition: Solve this problem

in a way that _______________________________________

Verb (reduces, increases, etc.)

a specific Customer Pain or Gain

(unlike _______________________________)

Extra Credit: How is it different than the competition?
The Value Proposition Canvas

**VP:** Increase number of good applicants for graduate/professional schools

- Undergraduate-focused demographic
- International publication
- Peer reviewed undergraduate publication
- Registered with the Library of Congress
- Student run and self-sustaining
- College programs listed and exhibited
- Cost less than traditional ads
- Higher visibility: international undergrad audience

**CS:** University Department Chairs/Directors (Admissions)

- Increased total number of applicants
- Widespread knowledge of their program
- Visibility on an international platform
- Recruit students to their programs (grad & undergrad)
- Guide students through their degree
- Prepare students for employment or grad school
- Small advertising budgets
- Limited "local" reach
- Does not draw diverse student pools
- Lacking desired number of applicants
### Customer Segment and Value Proposition Alignment

#### Kick-off – Class 1

**STEM-Packs**

Introducing modular, standards-based, PreK-8 STEM learning into public library Summer Reading Club by connecting literature with STEM activities

<table>
<thead>
<tr>
<th>Value Proposition</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library survival/growth</td>
<td>PreK-8 SRC Children’s</td>
</tr>
<tr>
<td>School Districts - continuous STEM</td>
<td>Library Directors</td>
</tr>
<tr>
<td>‟STEM-Pack (all parts)</td>
<td>‟Educators</td>
</tr>
<tr>
<td></td>
<td>‟Family Members</td>
</tr>
</tbody>
</table>

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#### Wrap-up – Class 10

**Story Time STEM Packs**

Integrating science, math, and engineering activities with children’s literature

124 Interviews

<table>
<thead>
<tr>
<th>Value Proposition</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase SRC &amp; other library</td>
<td>Library Directors</td>
</tr>
<tr>
<td>Increase comfort level with</td>
<td>Librarians without</td>
</tr>
<tr>
<td>Assure standards-based</td>
<td>Librarians with Educators/STEM</td>
</tr>
<tr>
<td>Decrease activity</td>
<td>Part-time and small libraries</td>
</tr>
<tr>
<td>Increase entry into STEM</td>
<td>Library Donors/Decision</td>
</tr>
</tbody>
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**Value Propositions**

Decrease activity preparation time to 20 minutes or less

**Customer Segments**

Part-time and small library staff
Customer Segments (CS) and Value Propositions (VP) Exercise (~30 min)

- Participants work individually on:
  - Describing their innovation in 1-2 sentences (from previous example)
  - Identifying one VP that is aligned with one CS using the Value Proposition Canvas

- Participants work in pairs to provide feedback and revise their work

- Pairs share their work with the group
The Growing Network of I-Corps™ L
# New Courses

<table>
<thead>
<tr>
<th>Awareness Sessions</th>
<th>Introduction to I-Corps™ L</th>
<th>National Cohort</th>
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<tbody>
<tr>
<td>1-3 hours</td>
<td>2 weeks</td>
<td>7 weeks</td>
</tr>
<tr>
<td>Face-to-Face Online</td>
<td>Online Hybrid</td>
<td>Hybrid</td>
</tr>
<tr>
<td>• Introduction to core features of the Lean Startup Process</td>
<td></td>
<td>• Opportunity to determine innovation readiness for sustainable scalability</td>
</tr>
<tr>
<td>• Focus on the importance of sustainable scalability at the early stages of concept development</td>
<td></td>
<td>• Immersion in the Lean Startup Process</td>
</tr>
<tr>
<td>Frontiers in Education (FIE)</td>
<td>*ASEE Annual Conference</td>
<td></td>
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<tr>
<td>October 12-15, Erie, PA</td>
<td>June 25-28, Columbus, OH</td>
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<td>(traditionally Jul-Aug)</td>
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</table>
We acknowledge the National Science Foundation (NSF) for funding (NSF DUE-1355431, DUE-1451245, NSF DUE-1355391, and DUE-1450644).

We acknowledge the American Society for Engineering Education (ASEE) and IEEE Frontiers in Education Conference for hosting.
I-Corps™ for Learning

https://www.asee.org/i-corps-l/
Thank you!

An e-copy of this presentation will be posted to: www.asee.org/i-corps-l

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