Strategies for Unleashing the Creative Potential of Students and Catalyzing Technology Startups on Campus

Presented by: Lucas Arzola, Ph.D.
Founding Director, Engineering Student Startup Center, UC Davis
President and Co-Founder, Betaversity, Inc.

University of Puerto Rico, Mayaguez
June 22, 2015

Workshop Goals

- To share experiences and insights related to creating campus spaces, programs, and curriculum that catalyze technology entrepreneurship

- To generate discussion on best practices for generating innovation programs within Puerto Rico academia

- To enable participants to generate actionable strategies for improving the innovation ecosystem of their own educational institutions

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Agenda

- **9:00 am** Welcome and Introductions
- **11:00 am** Discussion of Creativity and Entrepreneurship
- **12:00 pm** Networking Lunch
- **1:00 pm** Continue Discussion of Creativity and Entrepreneurship
- **2:30 pm** Discussion of Campus Makerspaces and Student Startup Incubators
- **5:30 pm** Adjourn

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INTRODUCTIONS

Brief Introductions

Who am I?

My Background

Lucas Arzola, PhD   *lucas@betaversity.com*

My Background

Co-Founder and CEO

inserogen

"insero" = to plant
"gen" = gene

Biotechnology startup commercializing UC Davis intellectual property surrounding the use of tobacco plants as rapid, cost-effective, and scalable biofactories of high-value proteins for rare diseases

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My Background

Biopharma Portfolio

More than 25 corporate engagements initiated or supported

My Background

University Innovation Fellow

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My Background

Co-Founder and President

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Education company making learning-by-doing and innovation accessible to everyone. Brought project-based learning and entrepreneurship opportunities to over 35 educational institutions in the United States.

University Makerspace Consulting

BetaBox Mobile Makerspace

Betaversity Software

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My Background

Founding Director
Creativity and Entrepreneurship Lecturer

Brief Introductions

Who are you?

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Hands–On Exercise

Creativity Warm-up

Introduce yourself to someone you do not know
Draw him/her

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Hands-On Exercise

Who are You?

Design your own identification experience
Be creative!

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My Innovation Course at UC Davis

ECH 98 - Creativity and Entrepreneurship for Engineers

- **1st innovation class offered by the UC Davis College of Engineering**
- Number of Units: 3
- Previous Quarters Offered: Spring 2014, Fall 2014, Winter 2015, Spring 2015
- Days and Times: Tuesdays and Thursdays, 1:40-3:00 pm
- Open to: Undergraduates from all majors and levels
- **Original class was full in less than 2 hours!**
- **Overall educational value for students: 4.2 (out of 5.0 = excellent)**

NEW ENTREPRENEURSHIP CLASS MAKES **WAVES** AT UC DAVIS

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WHAT TOPICS DO MY INNOVATION PROGRAMS/SPACES/COURSES EMPHASIZE?

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1. CREATIVITY

Creativity

What is creativity?

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Creativity

Tendency to generate or recognize ideas, alternatives or possibilities that may be useful in communicating with others, entertaining ourselves and others, and <u>solving problems</u>

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Hands-On Exercise

Exercise: Circle Challenge

3 minutes to customize circles by drawing.

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Creativity

The way a problem is framed impacts creativity!

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Creativity

How creative are you?

Creativity

Your creativity score is 69.78

You (69.78) / Typical (63.6)
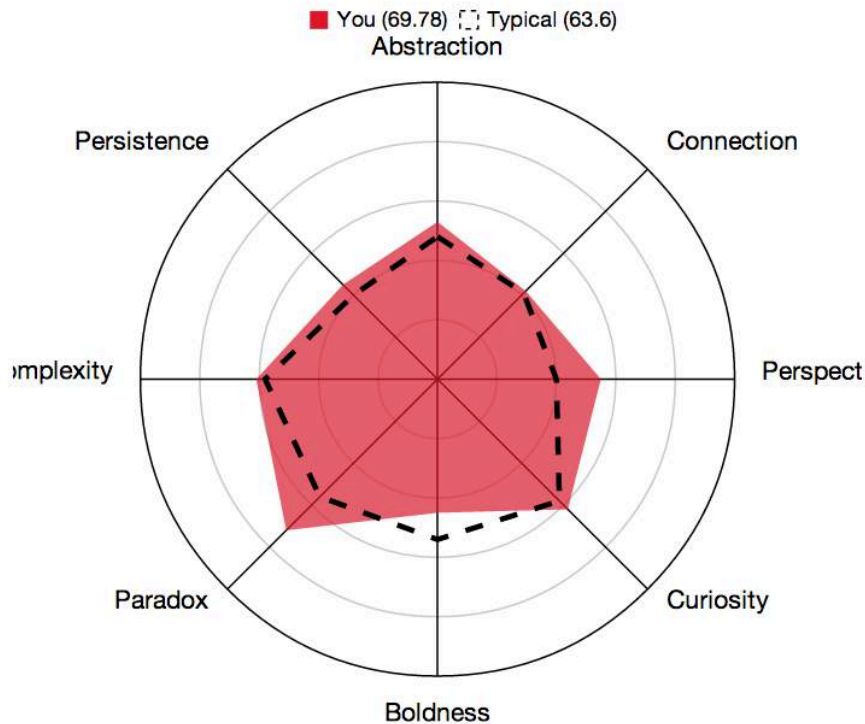
Explanation of different metrics

Abstraction The ability to abstract concepts from ideas

Connection The ability to make connections between things that don't initially have an apparent connection

Perspective The ability to shift ones perspective on a situation – in terms of space and time, and other people

Curiosity The desire to change or improve things that everyone else accepts as the norm

Boldness The confidence to push boundaries beyond accepted conventions. Also the ability to eliminate fear of what others think of you

Paradox The ability to simultaneously accept and work with statements that are contradictory

Complexity The ability to carry large quantities of information and be able to manipulate and manage the relationships between such information

Persistence The ability to force oneself to keep trying to derive more and stronger solutions even when good ones have already been generated

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Creativity

Are we born creative?

Where does creativity go?

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Creativity

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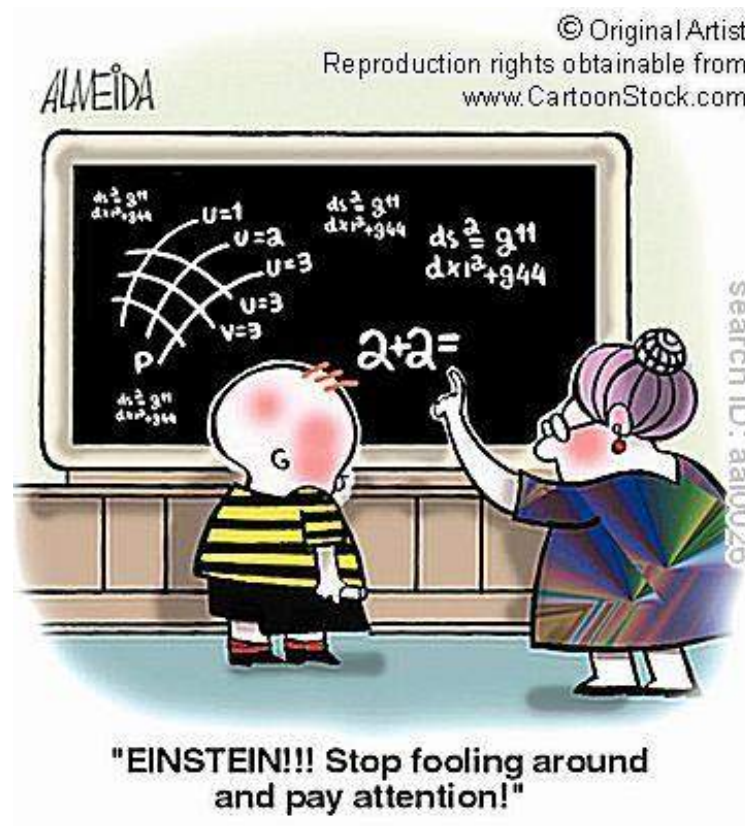
Creativity

Curve: Creativity and Skills vs. Time

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Creativity

What blocks creativity?

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Thoughts to Consider

- How creative are you?
- In what areas are you the most creative?
- What are the creative personalities of others?
- How can you practice/enhance your creativity?

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Why do you want to have creative confidence?

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What blocks creative confidence?

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Tina Seelig's Innovation Engine

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2. PROBLEM IDENTIFICATION

How can you identify a problem?

Searching online?

How can you identify a problem?

Searching online?
Observation?

How can you identify a problem?

EMPATHIZE

Searching online

Observation

Informational interviewing

Tips and techniques for informational interviewing

- Think like a traveler

Tips and techniques for informational interviewing

- Think like a traveler
- Listen! Ask questions and talk as little as possible.

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Tips and techniques for informational interviewing

- Think like a traveler
- Listen! Ask questions and talk as little as possible.
- What? How? Why?

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Tips and techniques for informational interviewing

- Think like a traveler
- Listen! Ask questions and talk as little as possible.
- What? How? Why?
- What if?

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Tips and techniques for informational interviewing

- Think like a traveler
- Listen! Ask questions and talk as little as possible.
- What? How? Why?
- What if?
- How might we rethink _____ ?

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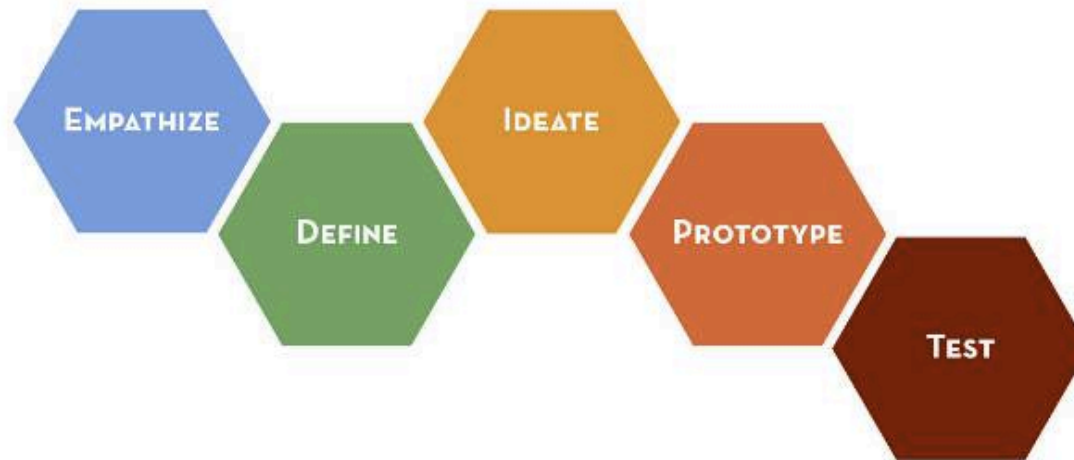betaversity
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Tips and techniques for informational interviewing

- Think like a traveler
- Listen! Ask questions and talk as little as possible.
- What? How? Why?
- What if?
- How might we rethink _____ ?
- On a typical day, you….

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3. DESIGN THINKING

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The Design Thinking Methodology

4. MINIMUM VIABLE PRODUCT

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Minimum Viable Product

What is a minimum viable product (MVP)?

Version of a new product that allows a startup to collect the maximum amount of validated learning about customers with the least effort.

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5. BUSINESS MODEL CANVAS

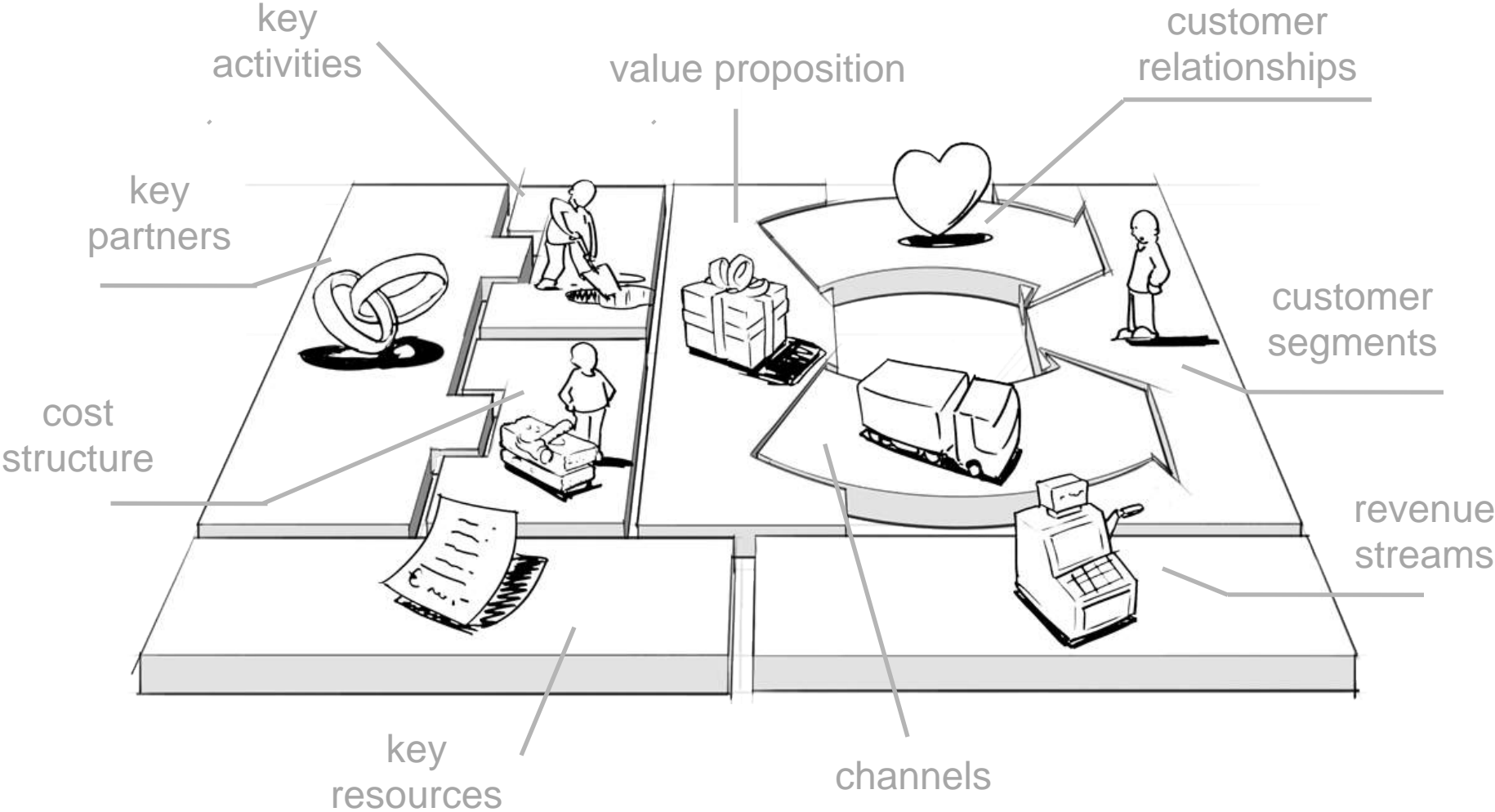*Lucas Arzola, PhD*　　*lucas@betaversity.com*

The Business Model Canvas

Describe, design, evaluate, and challenge business models in a systematic way

Business Model Canvas

Business Model Canvas will be covered by Keith McGreggor
Day 2 and Day 3 of the Workshop

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6. FAILURE

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Failure

Traditional Definition of Failure
Lack of success
Inability to perform a vital function

Failure

Failure in Silicon Valley
"Fail fast, fail often"
Experiencing (hopefully small) failures helps in figuring out the path to success

Hands–On Exercise

Pre-Mortem

Thought exercise that uncovers threats to a business/project, allows a team to take preventive actions to protect business/project

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Hands–On Exercise

Pre-Mortem

- Preparation
- Imagine a fiasco
- Generate reasons for failure
- Consolidate lists
- Revisit the plan

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Failure

"Failure is simply the opportunity to begin again, this time more intelligently."
- Henry Ford

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Failure

"Failure is instructive. The person who really thinks learns quite as much from his failures as from his successes."
- John Dewey

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Failure

"Success consists of going from failure to failure without loss of enthusiasm."
- Winston Churchill

Failure

"Sometimes what we call <u>failure</u> is really just that necessary struggle called <u>learning.</u>"
- Unknown

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CAMPUS MAKERSPACES

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What is the

?

Maker Movement

- Emerging trend in which individuals create and commercialize products using do-it-yourself (DIY) techniques and limited manufacturing resources

- Enabled by decreasing cost of prototyping equipment/resources and increasing accessibility to relevant information

Maker Movement

- Characterized by inclusive and informal nature
- Inclination to open source
- Community based, caters to hobbyists
- **Clash with academia**

THE MAKER MOVEMENT

AN EXTENSION OF DIY CULTURE WITH AN EMPHASIS ON **TECHNOLOGY, ENGINEERING** AND **FABRICATION**. MAKERS USE A COMBINATION OF HOME TOOLS, EQUIPMENT AT LOCAL HACKERSPACES, AND **ONLINE FABRICATION SERVICES** TO **BUILD, PROTOTYPE, MAKE** AND **MANUFACTURE** ALL KINDS OF THINGS. THE MAKER MOVEMENT VALUES **COMMUNITY** & **COLLABORATION**, OPEN SOURCE MODELS, AND A SPIRIT OF *experimentation*.

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What is a makerspace?

What is a Makerspace?

- A **makerspace** is a physical space where people gather to design, create, and collaborate on projects

- **Also known as:** hackerspace, design kitchen, innovation space, Fab Lab, design studio, among other names

- **Emerging trend**: Universities (and even schools) have started implementing makerspaces at their locations to engage students in learning-by-doing and innovation

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There are important considerations for implementing a campus makerspace
What are some of them?

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Makerspaces

Makerspaces can have many uses on campus
What are some of them?

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The Challenges with Campus Makerspaces

Campus makerspaces and their associated innovation programs and culture are difficult to implement, support, and sustain.

- Limited knowledge of best practices
- Underuse of space and resources by students
- Difficulty in establishing a culture of innovation on campus
- Lack of data that measures demand and impact
- Existing spaces and programs remain siloed
- Student projects have no scale

Challenges with university outreach, recruitment and retention

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The Challenges with Campus Makerspaces

University outreach, recruitment and retention
Nationally, 50% of engineering students that start their major do not finish

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How can we successfully establish a campus makerspace?

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Field of Dreams Philosophy NOT Enough

How do you get students to come, stay, engage, and buy into your program?

Involve the Students On Your Campus!

IF YOU **LET THEM** BUILD IT, THEY **WILL** LEARN!
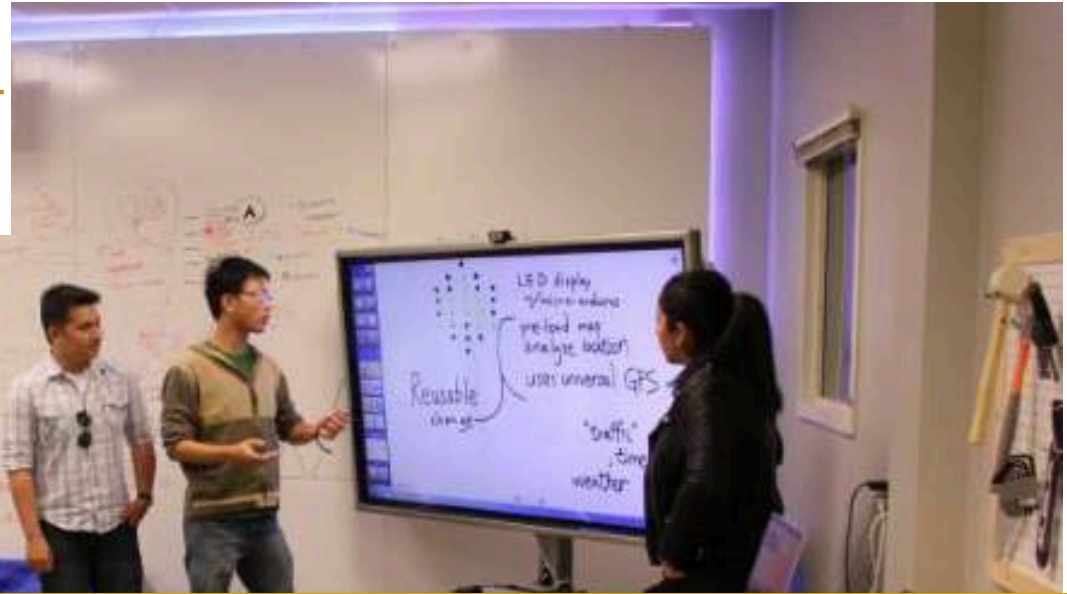
Laura Fleming

- Align the **student** community with the **professors**, **administrators**, and **external stakeholders** that are designing, creating, implementing, and operating the campus makerspace

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A dedicated on campus space for students to prototype ideas and collaborate on technology ventures

Director: Lucas Arzola, Ph.D.
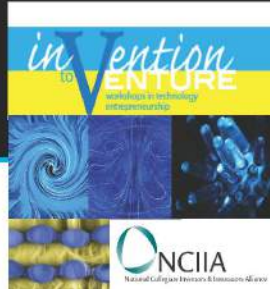
Year 2012– Tipping Point for the College

Integrating entrepreneurship into engineering education is part of the vision for the College's success for the next 50 years.

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Originated in 2012 from Student Grassroots Effort

switch it on.

learn how to turn your **technology** **idea** into a commercial opportunity.

When: October 29, 2012
Where: Kemper Hall 1065
Cost: $10 students, $20 faculty & staff, $30 others
Contact: Lucas Arzola, larzola@ucdavis.edu
www.invention2venture.org/ucdavis

Engineering and Technology Entrepreneurship Club (E-TEC)

engineering student organization for technology innovation

Invention to Venture Symposium

organized in collaboration with College of Engineering, VentureWell and Epicenter

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ESSC Impact

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ESSC Microgrants Program

- Competitive grant award from VentureWell
- **Funding:** $38,500 over 3 years
- **Goal:** Provide seed funding and structured mentoring for ESSC student startups
- **Launch Date**: Spring 2015

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Student Startups in 2015 Microgrants Cohort

16 UC Davis student startups supported through structured mentoring sessions and 1:1 meetings with Dr. Lucas Arzola

Student Startup Awardees	Concept
Advent X Technologies	Drones as agricultural aids to survey crops and gather data
Archer	Intuitive gesture interface software for TV
Benji	Mobile app that connects tutors with students
Billafy	Software that streamlines recurring payments for subscriptions
Broster	Portable heating exchange units for rapid beverage cooling
Chow	Mobile app that ensures viewing of fast food coupons
Davis Dynamics	Bicycle dynamo for power generation
Dewdrop	Mobile app that provides recommendations for activities
Heimdall	Positioning system for virtual reality applications
Lark Industries devAlpha	Portable tablet PC with infrared laser projection keyboard
ProFacts	Mobile app that helps users know what proteins are in their food
Reddin	Direct-to consumer designer eyewear
TekBubble	Mobile smartphone game chronicling the software developer experience
Times.up	Mobile app to organize food purchases and reduce waste
Student Startup Affiliates	
Caravan	Mobile app that enables car drivers to share music and navigation routes
Thryft	Mobile app that provides marketplace for buying and selling used goods

ESSC Impact

ESSC By the Numbers	
Student Members	754
Ideation & Prototyping Workshops	5
Student Organizations and Campus Units Hosted	15
Students in ECH 98 Course	99
Student Startups Supported	16

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First Major Gift for ESSC

Mr. David Kappos '83
UC Davis Engineering alumnus
and former director of United States
Patent and Trademark Office

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Stay Connected!

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- **Website:** http://engineering.ucdavis.edu/essc
- **Email:** essc@ucdavis.edu
- Or, just drop by Academic Surge 2060 during **open hours**!

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Makerspace Design and Implementation Services

- **Custom collaborative prototyping spaces for universities and schools**

- Latest design methodologies and prototyping resources

- Emphasis on sparking student engagement and the innovation culture of your campus

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Providers of a Mobile Makerspace for Education

- **BetaBox™** is a mobile creativity and prototyping lab for any organization

- For classes, events, and community outreach

- Available for rent, average rental is 4 days

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Launching Project Sharing Software for Makers

- **Students and educators create, connect, and collaborate via 'maker portfolios'**

- Young makers and entrepreneurs can document projects and showcase them to potential team members, employers, and the community

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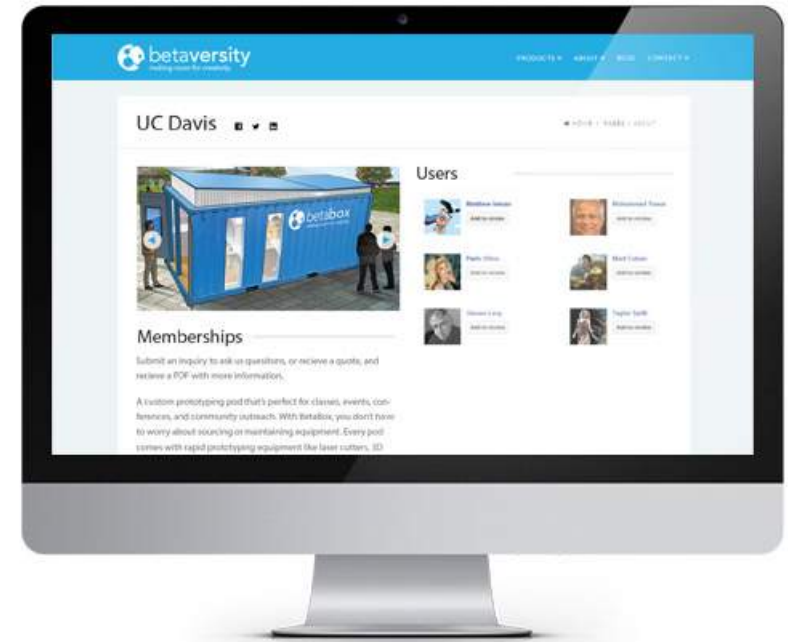
Traction

Over 35 clients served in 18 months

Sample BetaBox Customers and Makerspace Design Clients

Sample Sponsors & Partners

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We'd Love to Hear How We Can Meet Your Needs

How might we enhance the education and innovation ecosystem in Puerto Rico?

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Let's make room for creativity together!

Watch BetaBox in action at:
www.betaversity.com/betabox

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WRAPPING UP

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Hands-On Exercise

What is your creative idea to improve the innovation program/space/curriculum/ecosystem at your university?

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Q&A SESSION

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