

Enabling Innovation Ecosystems: The iCorps Experience

Case Study – Innovation in STEM Education

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Abstract

Funded by the National Science Foundation (NSF), a program known as the Innovation Corps (I-Corps), aiming at setting up innovation ecosystems within universities for science and technology commercialization, began at the University of California, Berkeley, and followed by several funded sites and nodes around the country. One of these sites was funded by NSF at the University of Central Florida (UCF) with the objective of enhancing technology commercialization to develop a world-class innovation ecosystem. The UCF’s I-Corps began in January 2015 with eight inaugural cohort teams including our team entitled *The Technical eBook Platform Team*. Each selected team was required to participate in a ten-week course, meeting once a week for four hours. Unlike traditional lecture based courses, the I-Corps course was a flipped, practical, hands-on learning lab, helping the eight teams live and engage the entrepreneurial experience, by following systematic process through structured activities, with all of the pressures and demands of the real world environment in an early stage startup. Over a ten-week period, each team talked to customers, partners, and competitors, as it encounters the chaos and uncertainty of how a startup actually works. In short the course was a simulation of what startups and entrepreneurship are like in the real world: chaos, uncertainty, impossible deadlines in insufficient time, conflicting input. UCF’s I-Corps today, has served more than 120 cohort teams with different directions in terms of engaging in creating a start-up.

This paper reviews the need for entrepreneurial training and discusses the scope of iCorp and its main components. It reviews the outcome of all cohort teams and also presents a case study about an Interactive and Integrated Technical eBook proposal that adopted this course for its business development. And finally the conclusion summarizes the paper and lessons learned.

I. Introduction:

Technology is an important aspect of our day to day lives. Laptops, driverless cars, the internet of things, etc. help us connect with the world and acts as a portal of vast amounts of knowledge which can be accessed with ease (Singh, 2015). There are many examples of entrepreneurial technologies. In this research, a few transformative technologies are addressed: Internet of Things, 3D printers, self-driving cars, and technological innovations in education.

(over all introduction on academic and institutional technological innovation, give examples of disruptive technologies like IoT, 3D printing,...etc. Then make the case for innovation in the education space, like in STEMS)

II. Technological Innovations in Education:

(Most of the sections bellow go to the introduction)

Technology has had a great impact on education. In the medieval times, the only available resources individuals had access to were books—some individuals did not own a piece of paper or writing utensil. In fact, in 1330 about only 5% of the population was literate. In these times, it was only the sons of merchants or rich men that attended school (Spartacus Educational, 2016). Now, with technology along with a change in society's views, access to education has expanded. Through the Internet, individuals have access to whatever resources they need like books, videos, images, etc. Additionally, technology and the Internet has increased access to online educational programs like Khan Academy, Florida Virtual School, or Blackboard(Purdue University, 2018). Now, the population's literacy rate is about 83% (Roser & Ortiz-Ospina). Today, people across the world have access to education; it is literally at people's fingertips, even for people in entrepreneurial trainings.

A few technological innovations include platforms such as Banner, Pearson, and eBooks. Banner is considered an ERP system (Enterprise Resource Planning system). An ERP is a system that connect multiple departments such as accounting, finance, human resources, etc. to a central database enabling the flow of data between these departments. Banner is the world's leading higher education ERP. This system is meant to improve business processes, empower users, reduce costs, improve accountability, and strengthen decisions (Ellucian, 2018).

Pearson Labs is an interactive educational tool that enables students from all over the world to access their homework and assignments. Pearson Labs offers many resources and various learning lab platforms to students. These platforms include: a mobile app, simulations, videos, interactive assignments, and more (Pearson Lab and Mastering, 2018).

eBooks is not a new concept to most of the population. For definition purposes, an eBook is an electronic version of an already printed document, visible on the platform it was designed for. eBooks allow many features similar to regular books: highlighting, bookmarking, leaving comments. However, an eBook also has added features such as: it can accommodate videos, the text can come with an audio file, multiple pictures can be present on one page, and it allows for interactive images (Elm Hill Books,).

As an example, the Technical eBook Platform Team at UCF designed a new Tech eBook that offer students unlimited combinations and opportunities to experiment innumerable solutions under different parameter values. This eBook will shift the current eBook delivery to a more advanced and all-encompassing format.

These platforms listed above, along with various other technological innovations, increase the value of education for everyone. Many of these technological innovations are included in high school education, college education, and even entrepreneurial education

2.1 The need for Entrepreneurial Education and Training

Entrepreneurial education is the foundation to creating successful businesses. Programs that teach the basics of entrepreneurship allows participants to build their knowledge of the industry. According to Wang and Chugh, entrepreneurs learn by doing, trial-and-error, participation, and the experience of others (Wang & Chugh, 2014). Different entrepreneurship programs allow the cooperation between individuals by submersing them in group work, such as the Entrepreneur's Boot Camp or the iCorps program. Furthermore, these programs allow future entrepreneurs to soak in all the prior experience of mentors or teachers, such as in the Emerging Minority Business Leaders program.

Per Faycal Boukamcha, entrepreneurial training is important due to the possibility of influencing trainee's cognitions and enhance their willingness to create their own venture. The purpose of these programs is to change the views of the participants towards venture creation. Entrepreneurial learning admits an adaptive role through which the trainee can adjust to his/her environment and his/her learning experience and, as a result, change their behavior. Boukamcha states that entrepreneurial programs help trainees gain greater awareness about their industry along with additional knowledge on how to deal with any situation (Fayçal Boukamcha, 2015).

Pulitzer prize winner Thomas Friedman believes high school students should leave school "innovation ready"(Rodov & Truong, 2015). The entrepreneurial programs listed in this article enhance student's collaboration skills and helps them invent their path to reach their career goals. Students need to learn how to identify problems or needs before they learn problem solving skills and these trainings assist in teaching this (Barber, 2014). Soft skills are also an important asset that is highly valued by employers and employees (Brandi & Iannone, 2016). Sherry Robinson and Hans Stubberud emphasize that skills such as creative thinking, critical thinking, and working well in teams are highly important to entrepreneurs (Robinson & Stubberud, 2014). Furthermore, they state that soft skills are just as important to learn as hard skills. Companies emphasize the importance of soft skills, more importantly the belief in one's ability to perform entrepreneurial engagements (Baggen, Lans, Biemans, Kampen, & Mulder, 2016). Soft skills are defined as a collection of people management skills, important to many professions and job positions (Matteson, Anderson, & Boyden, 2016).

Entrepreneurship education also teaches students to think outside of the box and nurtures unconventional talents and skills. Also, it creates opportunity, ensures social justice, instills confidence, and stimulates the economy (Rodov & Truong, 2015). Education of entrepreneurship has also motivated minorities such as women and immigrants to create a better life for themselves (Rodov & Truong, 2015). Not only does entrepreneurship training provide these advantages, it also promotes an increase in technology skills between college and the industry itself (Faoite, Henry, Johnston, & Peter van, 2003).

Entrepreneurial training has also proven to help promote creativity and innovation within business creation. Petridou states that scholars emphasize the importance of creativity and innovation within an economy. Entrepreneurship creativity and innovation is viewed as the "creation of the future" (Sarri, Bakouros, & Petridou, 2010). Petridou, along with colleagues, decided to test the assumption about the importance of creativity and innovation in entrepreneurship and how postgraduates feel about entrepreneurial trainings. Postgraduates believe that innovation and creativity is important to learn for their improvement in their organization and that training in these areas are important as well. According to Rae and Carswell, there is

a close relationship between learning and entrepreneurial achievement in which learning is the process that enables entrepreneurial behavior to be enacted (Rae & Carswell, 2000).

2.2 Examples of Entrepreneurial Trainings Programs:

This paper reviews some of the entrepreneurial trainings offered in the USA as shown in Table 1.

Table 1: Examples of Entrepreneurial Trainings Programs in the US

Program Name	Eligibility	Funding Amount	Duration	Program Objectives	Teaching Methods
ICorps UCF	Anyone with a team and an idea is eligible. Team must be approved by a panel	\$300,000	5-week program	Help young entrepreneurs to achieve the development of their technology	Self-study books and videos, in class presentations, 10 interviews per week, and online system to log progress
Emerging Minority Business Leaders Program	Candidates must be considered a minority. There are some considerations	\$600,000	2-week program	Participants learn the process of developing a company and work together in teams	Must do research, put together business plans, anticipate pitfalls, at the end 1 team wins out of 10.
Emerging Young Entrepreneurs Program	Minority college student (junior-graduate) or a minority individual age 19-35 w/ a business idea	Unknown	1 year	Advance business opportunities for minority businesses and help connect them to corporate world	Hands on training, expertise from business owners, practical application
NEWPATH	Students in IT related areas are admitted to the program	\$600,000	5-year program	Help students understand issues, concepts, and ideas related to starting successful IT ventures	Students learn how to plan, acquire funding, and the stages of launching a business. Internships are available.

Entrepreneur's Boot Camp at Babson College	Anyone with a business idea or an existing business	Program costs \$4,300-\$4,800 to participate	5-day program	Help people learn to grow new businesses and reinvigorate existing businesses	Consists of lectures, group work, and action learning. Participants work in groups and individually
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Below are comments made by students that are a part of the programs listed in this paper. These comments are about how these trainings influenced the student's skills and their abilities to create a successful business.

1. Brandon Naids, one of the innovators of Talon Simulations, described the iCorps program at the University of Central Florida as being "a priceless opportunity which I can attribute a lot of my team's success to." Additionally, Naids states that the program provided him with the resources, knowledge, and confidence to take his idea and turn it into a marketable product (*I-corps UCF.2018*).

2. Jonatan Lustgarten, who is a student that participated in the Entrepreneur's boot camp at Babson College, expressed "I was very pleased to know that I could directly apply the lessons I learned at Babson to my work managing the HNM team" (*Jonatan lustgarten.2018*).

III. The I-CORPS Program;

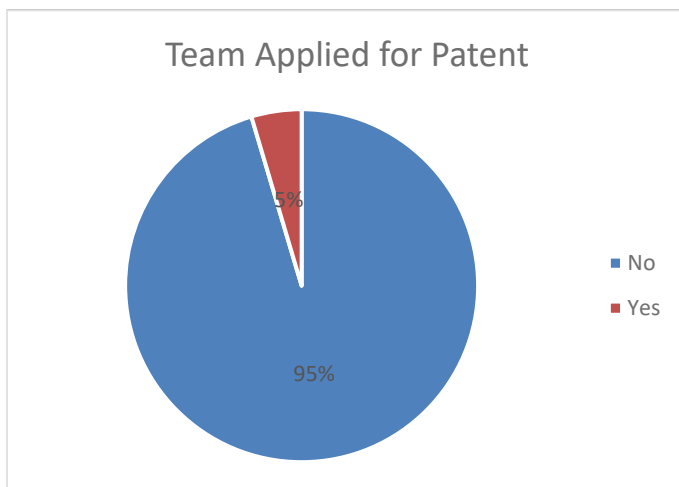
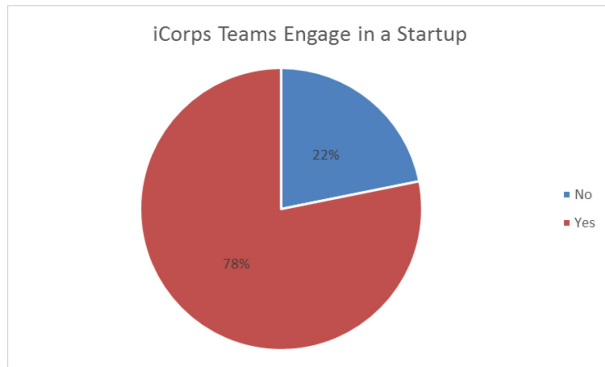
(Introduction)

3.1 How iCorps Work: Program Scope (Tom)

Program Components: The Business Model Canvas (Tom)

Analysis of I-corps Site Survey (Serina)

More text/analysis needs to be added



IV. Case Study: The ebook platform (Issa/Serina):

Our team consisting of a faculty member, two students and an industry mentor aimed at developing highly interactive, adaptive and integrated technical ebook platform for science and engineering education courses. This first-of-its-kind the Tech-e-Book with a broadly flexible format is designed to offer students unlimited combinations and opportunities to experiment innumerable solutions under different parameter values, which is a paradigm shift in content delivery. The team explored the commercial feasibility of the new educational platform tools and gage the educational interest of students majoring in STEM disciplines

Our team practiced evidence-based entrepreneurship as we learned how to use a business model canvas to brainstorm each part of a company and customer development to get out of the classroom to see whether anyone other than our team members would want to use our ebook platform. The course activities centered around highly systemized model known as the Business Model Canvas covering relevant topics that include Customer Discovery, Value Proposition, Customer Segments and Channels, Customer Relationships, Revenue Streams Partners. Each team spent significant

amount of time outside the course talked to at least 10 customers, focusing on a specific part of the Business Model Canvas. Unlike a traditional classroom with presented lecture material, lectures are made online at Udacity.com prior to weekly meeting, and the class room is a flipped classroom type.

During the course, we learned how startups communicate in a dramatically different style from the university culture most of us are familiar with. We learned that startups and small companies are not small versions of large companies. The role of course instructors was unlike what is practiced in a university environment, praise in public and criticize in private, where receiving critiques in front of peers considered abrupt and brusque, and embarrassing. We were in a true cultural shift, not to be taken personal, as it was done by design as part of the course to emulate the pace, uncertainty, and pressures of a startup. The experience simply pushed us out of comfort zone as faculty members and students. This paper will present the team's experience as a case-study that resulted in a paradigm shift in how students and faculty foresee technology transfer and commercialization, in the process changing the academic commercialization culture.

Our team was able to have an excellent customer discovery and validate our technical value propositions. The team now understand that there are great challenges to fully develop integrated science and engineering textbooks and also developing partial and incremental solutions is not an option. It might be that the time has arrived to take-on full platform for STEM education.

4.1 Lessons arned

V. Conclusion

Training students in entrepreneurship has a great impact on the business world and from an economic standpoint. Additionally, it has a strong impact on the participants of these programs. It helps students gain the resources, knowledge, confidence, and skills to enter an industry and make their creative ideas into something tangible. Training also teaches students more about the entrepreneurship industry and helps them ascertain the skills to create successful businesses and, in turn, stimulate the economy.