Promoting Innovation and Entrepreneurship Within a College Setting

Jonathan Spiegel

Mechanical Engineering

Faculty Mentors: Maria-Isabel Carnasciali, Ph.D. and Judi Randi, Ed.D.

Abstract:

Many colleges are developing innovation centers to promote entrepreneurial ideas and products that contribute to societal change. University-
design and problem solving courses, provide resources and space, and sponsor events to promote awareness of the
-based innovation centers that were established to promote innovation and entrepreneurship among the university community and its partners. This case study focuses on two university-based innovation communities: Yale Center for Engineering Innovation and Design (CEID) and the innovation ecosystem at Rensselaer Polytechnic Institute (RPI). Data was collected from observations, document analysis, and interviews with organizational leaders. Common themes that emerged from the data included diversity, educational purposes and methods, community building, and the innovation process itself. Cross case analysis revealed similarities as well as distinct differences in purpose and views about innovation and the design process. The ultimate goal of this research was to develop a stronger innovative and entrepreneurial ecosystem at the University of New Haven.

Introduction:

The nationwid   is a means of uniting people who are interested in creation, fabricatio

them and thus contributed to their economic growth and progress.

According to Drucker (1985), innovations are tools of entrepreneurs who capitalize on the need for change to develop new products, businesses, and services. Thus, innovation begins with the analysis of opportunities. Drucker advised entrepreneurs not to sit er, Drucker explained, successful entrepreneurs go to work

make a contribution (p. 34).

In *Creating Innovators*, Wagner (2012) offers his views on how young people should be brought up in order to become successful innovators. He gives examples of young, and successful innovators who had mentors in their lives who fostered their creativity and encouraged them to use their imagination. These adult figures also helped the younger individuals learn from their mistakes and to never give up. Wagner then describes how the education system can develop young innovators by developing innovative curriculum that revolves around collaboration, multidisciplinary problem solving and motivation.

The next section reviews the literature on academic makerspaces designed to establish the kind of educational environment Wagner described.

Academic makerspaces

The characteristics and specific purposes of these university makerspaces vary widely across universities. Barrett et al. (2015) conducted a review of university makerspaces. The researchers collected information about 35 American colleges that had established one or more makerspaces and identified whether or not the spaces were on or off campus, and whether or not the spaces were designated only for engineering students, for students of all disciplines, or open to the community. These researchers also investigated how the spaces were managed and what resources they offered. This research was conducted through an internet search and, therefore, can   -   description of the makerspaces and the impact they have on the university innovation ecosystems.

In an ASEE conference paper, Wilczynski (2015) reviewed academic maker spaces established on seven college campuses: Arizona State University, Georgia Institute of Technology, Massachusetts Institute of Technology, Northwestern University, Rice University, Stanford University, and Yale University. The data collection methods were not described but the stated purpose of the review was to characterize the unique attributes of each maker space, rather than describe the equipment, programs, or policies. The seven centers represented the wide variety of maker space models that exist. Drawing examples from these models, the author

the success of makerspaces:

The mission of the academic makerspace must be clearly defined from the onset
Successful academic makerspaces ensure that the facility is properly staffed
Establish open environments promote collaboration
Align access times with student work schedules promotes usage
Provide user training
Establish maker space as one component of the campus community

The author called for more reviews of academic maker spaces practices, including training, programming, financing, and staffing models so that best practices can be shared and accelerate the impact of the academic makerspace movement.

It is also useful to review research on academic makerspaces in pre-collegiate settings. Colleges have begun to adopt many educational practices that long been implemented in secondary schools, such as collaborative learning problem-based learning, and other pedagogies of engagement (Koh, xxxx). Kurti, Kurti, and Flemming (2014) described the practical implications of a makerspace in a school library setting. Drawing on the research base for engaged learning, the authors emphasized

her colleagues (1996) called for further research on these organizational features across a variety of organizational settings. The advent of the maker movement provides an ideal opportunity for studying the organizational features

How each university promoted innovation and entrepreneurship was revealed through its mission, its approach to community-building, its attitude toward diversity, its strategies for providing learning opportunities, and its perception of innovation.

Yale's approach to innovation and entrepreneurship

Consistent with its mission, the Yale CEID promoted the interdisciplinary use of the center, as revealed in the following data:

different disciplines can quite literally come together

CEID interview)
There was an interdisciplinary project on one of the workbenches: project on display on one of the workbenches in the center of the studio area: a music-physics interdisciplinary project generated in one of
-based courses
offered in the CEID space. This particular course, team-taught by music and physics professors, culminated in a student project in which students created one instrument from each of the five instrument families. (Observation notes)
The tour guide described the electronics station as
Electronics station
likened it to user-friendly technologies and interfaces

include non engineering students, such as Divinity students (Observation Notes)

The Yale CEID apparently deliberately established a collaborative learning community:

walk through the space and you see students working hard, working late or laughing or having a good time, all of those are the types of things that I want to see

The Center hosted a party at beginning of year (Observation notes)
So when a member refers)

think that is a really big success in my mind.
 (interview)

Community and collaboration were valued at the RPI Innovation Hub, where students were encouraged to make connections and develop a sense of student ownership in the space. Collaboration and ownership promote innovation. RPI established a collaborative community that encouraged networking in a number of ways:

rs are alumni from RPI who have graduated and have recently created a new venture and need assistants with growing it. And then the other third of the folks are from the general business community, entrepreneurs that live here within the capital region that want assistants with the   (RPI EVE Interview).

EVE client companies are invited to networking opportunities within the local business and academic community to expand professional networks and increase exposure to decision makers. Also, local companies and their employees will be part of the Rensselaer community. In that regard, the companies will also be invited to participate in campus events and workshops as they occur (RPI EVE website http://rpihub.org/eve-services/).

hen people work together, they are certainly in a design environment and everybody talks about diversity and ideas but on the other side of design, there is an interest of getting something done and   (RPI Design Lab interview).

We show students what it means to be an engineer and how engineers help people and contribute to   (The Design Lab Document website http://eng.rpi.edu/mdl-about).

Mentoring is
Numerous examples of mentoring were found in the data:

We are constantly coaching our entrepreneurs to stay on top of the latest trends in the industry and in the marketplace they are operating in. And always to be future thinking about their intellectual property strategies, which involves constantly turning out new innovations to stay on top of the game   (RPI EVE Interview).

e do a lot of mentor matches between the alumni and undergrad entrepreneurs, as well as the graduate/post-grad entrepreneurs .(RPI EVE Interview).

Another strategy for promoting innovation and
One
very important one for us is that this a learning lab. This is an academic laboratory where students come in and

they learn about design and they practice engineering skills. So one definitio   (RPI Design Lab Interview). There was a distinct career focus advertised on the website:

The ways in which Yale and RPI promote

centers. Case study research is useful