ENTREPRENEURSHIP EDUCATION: A LOOK AT TWO UNIVERSITIES

Diana Pauna, Stockholm School of Economics, Riga, Latvia
Ellen J. Frank, Southern Connecticut State University

ABSTRACT

Reviews the contextual models used in designing university-wide entrepreneurship programs, and to explore some of the specific conditions that facilitate successful implementation of such programs across a campus. To do this, a case examination will be presented of the programs at the University of Michigan and the University of Kentucky. Both are land grant institutions that exemplify either the radiant or magnet approaches to successful entrepreneurship education.

INTRODUCTION

The working definition of entrepreneurship education being used for this paper is that it represents a set of curricular and co-curricular activities aimed at developing general business knowledge and providing an entrepreneurial mindset and skills to students across the university. However, an analysis of literature shows a range of designations for entrepreneurship education, with references made to "entrepreneurship education programs" (Streeter et al., 2004)," entrepreneurial learning" (Gibb, 2005), entrepreneurship education (Fayolle, 2009), "entrepreneurial development in teaching and learning" (Allison, 2013)," entrepreneurship education and training" (Valerio *et al,* 2014) and "internal entrepreneurship education ecosystem" (Brush, 2014). No matter the terminology, the common aim is to engage all students from all disciplines in learning opportunities that would include a set of entrepreneurial skills, attributes and competences.

MODELS OF ENTREPRENEURSHIP EDUCATION

The development of university-wide entrepreneurship education takes different pathways, depending on the regulatory framework, the mission of the university, its operational policies, and the available resources.

The first attempt to conceptualize university-wide entrepreneurship education was made by Streeter, Jaquette Jr. and Hovis (2004), based on the analysis of 38 ranked entrepreneurship programs in the United States. In their research, the university-wide programs were categorized into magnet and radiant, depending on the "the center of gravity" (ibid. p. 52) - the location, funding, faculty, students, curriculum, and administration.

The radiant model engages a decentralized approach, and the center of gravity is at each academic unit with an administrative unit that is located outside the academic units, whose role is to coordinate entrepreneurship education programs across the campus (ibid p. 54). Each academic unit provides for its funding, faculty, and administration of the entrepreneurship programs within

its unit. In the radiant model, academic units provide entrepreneurship education programs that are focused on the discipline-specific context: programs in law may embrace technology commercialization and legal aspects for start-ups; programs in communication could embrace the development of social media ventures; programs in arts usually focus on arts-oriented business, and similarly in other disciplines as discussed in a study by Antal et al (2014).

Thus, the advantages of the radiant model include discipline-specific entrepreneurship education for non-business students, while also calling for collaboration among faculty and students across academic units (ibid. p. 230).

The magnet model uses a highly-centralized approach with the center of gravity usually located in the business school; employing its funding, faculty members, and administration. If the center of gravity is a business school, the magnet model provides the business faculty opportunities for applying their entrepreneurship research (Antal, 2014). The magnet model may also allow several centers of gravity that Streeter, Jaquette Jr. and Hovis call "multiple magnets." Students from different academic units form diverse groups which adds an interdisciplinary focus to their studies of entrepreneurship.

An alternative model incorporating three options, and a template for entrepreneurial program development was presented by Gibb (2005):

1. "Optimum Fully Integrated Model" embraces university-wide application of entrepreneurship.
2. "Intermediate Model" provides a specialist center that is outside the university but still run by the university.
3. "External Business Services Support Model" refers to a specialist center that is owned by stakeholders, but features university participation (ibid. p.8).

Different from a traditional model of entrepreneurship education that focuses just on business plans and business management, these alternative models provide a new focus on entrepreneurship in relation to teaching, organizational design, and stakeholders. Further, by providing a template for entrepreneurial program development, universities and stakeholders have a more coherent understanding regarding the expected outcomes. The template can later serve as a self-assessment tool as well.

Viña and Flawn (2014) describe five models that may be developed by universities. These include degree programs and non-degree programs, centers, events, entrepreneurship ecosystems, international partners, and outreach. Some of these models overlap, and have similar features as the magnet and radiant models.

1. "Center Based Model" provides campus technology entrepreneurship programs based on the collaboration among business, engineering, and science schools.
2. "Entrepreneurship Eco-System Model" offers an innovative entrepreneurship curriculum, including mentoring, discussion groups, lab support and work with practicing entrepreneurs.
3. "Externally Based Model" focuses on technology commercialization, entrepreneurship education, and the launch of technology companies with most activity off campus.
4. "Comprehensive Model" is the most widely recognized, and it encompasses entrepreneurship education from degree programs to specific centers. This model was developed by Babson College.
5. "Global Model" focuses on joint entrepreneurship programs with overseas partners that typically are from countries with emerging markets.

The concept of an "entrepreneurship education ecosystem" is presented by Brush (2014). The entrepreneurship education ecosystem is composed of three domains: the curriculum, co-

curricular activities, and research. These domains are influenced by four dimensions: resources, culture, stakeholders, and infrastructure which are linked to the local community. Further, based on these domains and dimensions, a typology of school roles is developed, assigning four different roles: a broker, a coordinator or facilitator, a hub, and a developer. By this, the author sends a strong signal regarding each school's autonomy within the ecosystem, including the interpretation of entrepreneurship and entrepreneurship education (ibid. pp.34-35). Brush also provides a series of questions on the four dimensions and three domains that can be helpful when developing an entrepreneurship education ecosystem.

Given the various models proposed, there seems to be convergence when examining which models have been used in a research context. (OECD 2008, Antal *et al.* 2014, Fayolle *et al.* 2014, Morris *et al.* 2014). The preference seems to be to refer to the magnet and radiant models developed by Streeter *et al*. The two universities that will be discussed later are examples of each of the models.

CONTEXTUAL CHALLENGES TO PROGRAM IMPLEMENTATION

The specific contextual factors in a state influence the pathway of introducing these types of educational programs. More specifically, contextual factors explain why some state governments are more proactive than others in creating institutional frameworks for the implementation of university-wide entrepreneurship education.

According to Valerio *et al*. (2014), central to implementation of entrepreneurship education are contextual challenges within three categories: economic context, political context, and cultural context. The economic factors include local economic conditions, infrastructure, and regulatory and tax structures; the political factors include the local government support with specific policy actions, including partnerships with government agencies and local communities in financing entrepreneurship education interventions; and the cultural factors relate to local perceptions of entrepreneurship and "cultural attitudes toward failure, success, and the traditional roles of certain members of society" (pp. 40-42).

Similarly, Graham (2014) indicates successful universities have benefitted from contextual factors, specifically referring to a triad of university-industry-government collaboration. This is in line with the Triple Helix model indicating that university participation in what once was a dyad of industry and government involvement, enhances innovation and knowledge acquisition (Ranga and Etzkowitz, 2013). As such, the regulatory framework helps to create the basic structure, reduces uncertainty, and achieves coherent results nationwide.

Contrary to the classical model of the university with its focus on research and teaching, the modern university produces an economic and social impact through patents, licensing, academic spin-offs and startups that calls for partnerships with stakeholders, who need support structures and coherent mechanisms nationwide. (Fayolle *et al.* 2014)

Evidence from the literature reviewed (Graham 2014, Valerio *et al.* 2014, Fayolle *et al.* 2014) shows that both top-down and bottom-up campus implementation approaches are possible. While a top-down approach with governments leading the advancement of entrepreneurship education at universities can be seen as a national strategy, a bottom-up approach rests on individual regions or institutions taking the lead in integrating entrepreneurship education into higher education. These are often referred to as institutional or individual "champions" in entrepreneurship education.

ENTREPRENEURSHIP EDUCATION IN U.S.

In the United States, entrepreneurship education is driven by three groups: (1) academic institutions; (2) nonprofit and other private institutions and (3) federal, state, and local governments.

Universities are the dominant drivers of entrepreneurship education in the United States and thereby demonstrate different pathways to promoting entrepreneurship education. With entrepreneurship education having a long-established tradition in the country - Harvard Business School offered the nation's first entrepreneurship course in 1926, and the nation's first Small Business Management course was offered in 1927 at what is now the Ross School of Business at the University of Michigan - a number of universities can be listed as champions in attracting funding either through their alumni, foundations, or the local business community. These funds are used to support and to promote new approaches to teaching and learning entrepreneurship through a combination of classroom, co-curricular learning, and interdisciplinary learning across the campus involving non-business students**.**

The literature reviewed also clearly shows the dominant role of foundations in promoting entrepreneurship education in the United States, thereby following a bottom-up approach. Since there is no national coordination or oversight body of entrepreneurship education in the United States, nonprofit organizations and foundations are significant non-governmental players with the Coleman Foundation (CF) and the Kauffman Foundation (KF) being the largest and most significant in fostering entrepreneurship in higher education as a way of creating businesses and employment opportunities in the United States. The Kauffman Campuses Initiative was started in 2003, and the Coleman Foundation Entrepreneurship Education Impact Plan was launched in 2012. As a policy move, it is interesting to note that the Kauffman Campuses Initiative (KCI), has triggered a change in entrepreneurship education across the nation. In 2003 initially eight universities were awarded up to $5 million each with a three-to-one match. In 2006 ten more universities entered the KCI program, resulting in 18 universities in total (Hulsink in Fayolle et al, 2014). The Kauffman Panel on entrepreneurship curriculum in higher education has provided both "substantive rationales and concrete measures that universities can adopt" to make entrepreneurship fundamental in their activities and to create entrepreneurial campuses. (The Kauffman Foundation, 2008, p. 9)

A report by the Science and Technology Policy Institute (Peña *et al*. 2010) provides an overview of the current landscape in entrepreneurship education in order to assess opportunities for a more substantial involvement of the federal government by improving its strategic planning, financing, and operational roles. The current scheme with three agencies being involved - the U.S. Small Business Administration (SBA), the Minority Business Development Agency (within the Department of Commerce), and the U.S. Department of Agriculture (USDA) provides support either to entrepreneurs or to youth programs. However, no agencies or programs are aimed at specifically promoting entrepreneurship education in higher education.

Paradigm Shift

In the United States, the general landscape in entrepreneurial education has significantly changed since 2000 when universities received significant endowments for entrepreneurship education. As a result, the landscape of 250 entrepreneurship courses in 1985 has increased to more than 5,000 taken by more than 400,000 students a year taught by more than 9,000 faculty members at more than 1,300 colleges and universities (The Kauffman Foundation, 2015).

Moreover, a major shift (Solomon, 2014) has been observed from entrepreneurship courses being offered solely to business students, to extending them to all students across the campus in order to develop their entrepreneurial mindsets, complimented with entrepreneurship fundamentals.

Monitoring and Assessment

According to Forbes (Chen,L. 2014) the five most entrepreneurial universities are Stanford University, Massachusetts Institute of Technology, University of California, Berkeley, Cornell University, and University of California, Los Angeles. However, the actual metrics of measuring the outcomes of entrepreneurship education have been questioned by several researchers. Streeter et al (2011) argues that the current rankings are based on research income and startup effectiveness while "latent effects of entrepreneurial education" are ignored. This view is supported by Graham (2014) who refers to research commercialization metrics as unreliable indicators to assess sustainable entrepreneurship ecosystems in the long term. In a word, although entrepreneurship education has a long-established tradition in the United States, university-wide entrepreneurship education is still in the process of finding its evaluation metrics.

Overall, the assessment of the institutional framework in the United States clearly indicates a "bottom-up" development model of university-wide entrepreneurship education with universities being a driving force. State and local governments appear to be more motivated to support university led initiatives to boost economic development in the region. In addition, as mentioned earlier, non-profit foundations play a significant role in the development of university-wide entrepreneurship education, especially the Kauffman Campuses Initiative that has stimulated the development of the radiant model.

CASE STUDIES

The primary objective for these case studies is to explore in depth the highly regarded entrepreneurial education practices at two universities: University of Michigan, and University of Kentucky. They were also chosen since they each represent one of the entrepreneurship models – radiant and magnet. The criteria for the selection was designed to make the two subject institutions comparable as much as possible. These criteria were as follows: the nature of good practice and reputation, the legal status of the university, and the stage of implementing university-wide initiatives. The fieldwork[1] included observations, interviews, interpersonal interactions, as well as participation at university events linked to entrepreneurship education. The data consisted of field notes, including detailed descriptions and the context of the observations made. The fieldwork also included archival research - a detailed study of available to public university documents, reports, program descriptions, evaluations, and articles published about each university.

UNIVERSITY OF KENTUCKY

The University of Kentucky is a public higher education institution that was founded in 1865 as a land-grant university. At present, it is referred to as the state's flagship institution with 16 academic and professional colleges providing higher education to 21,441 undergraduate and 6,994 graduate students. The University's development has been recently guided by the Strategic Plan 2009 – 2014 that supports the university's mission and vision of aiming at becoming one of the 20 best public research universities nationwide. Within the context of the mission and the strategic plan, the structural units and their leadership have been encouraged to promote university-

wide interdisciplinary research and collaboration, and engaging in partnerships with local and international communities. Surprisingly, entrepreneurship nor entrepreneurship education is mentioned in the overall strategy, even though the mission refers to the economic development and improvement of people's lives in Kentucky**.**

Structure of Entrepreneurship Education

A significant figure that set an entrepreneurial agenda across the university was Lee T. Todd, the 11th President of the University of Kentucky. First, he instituted a new position of Vice President for Commercialization and Economic Development, and second, he supported the establishment of Von Allmen Center for Entrepreneurship in 2002. Nearly ten years later a new "bottom-up" initiative came from the Dean of the College of Communication and Information to start a university-wide undergraduate entrepreneurship education program. In a word, the entrepreneurial agenda at the University of Kentucky has been developing in strategic partnerships with local communities, hence stimulating economic development in Kentucky.

There are four structural units that form the University's entrepreneurship ecosystem: the Gatton College of Business and Economics, Von Allmen Center for Entrepreneurship, Innovation Network for Entrepreneurial Thinking (iNET), and the Advanced Science & Technology Commercialization Center. Exploring the development model of these structural units, the institutional framework of a land-grant university has had a significant impact on the 'bottom-up" approach (Graham, 2014) through local and state support. However, it is not a pure bottom-up process given the federal support through the Economic Development Administration's (EDA) "University Center Program," and the University's focus on research commercialization that imply signs of a "top-down" approach.

The Von Allmen Entrepreneurship Center with its two offices, one on the campus and the other downtown Lexington, serves as a magnet for commercialization of new ideas, technologies, products and services. The campus office of the Von Allmen Entrepreneurship Center is located in the same building as the Advanced Science & Technology Commercialization Center that serves as the university's business incubator, and a magnet for technology-based start-ups, emphasizing the link between innovation, research and entrepreneurship.

With funding, leadership, and administration provided by the College of Communication and Information, iNET has become a magnet offering interdisciplinary entrepreneurial education, both curricular and co-curricular, to non-business undergraduate students across the campus.

Current Entrepreneurship Offerings

Although the entrepreneurship activity is found at the Von Allman Center for Entrepreneurship in the Gatton School of Business, there is no major/minor in the discipline. However, there is an academic certificate program as well as a one semester participation certificate program for students from the Von Allman Center.

For the management major who would like to know a little more about entrepreneurship, but is not interested in heavy involvement, there is a course entitled, "Entrepreneurship and Venture Creation." It is an option in the seven-course list of electives where the student must choose three. There is also a choice of Small Business Management.

The one semester program conducted by the Von Allman Center is called, "Entrepreneurial Boot Camp." The program is designed to assess and validate the feasibility of a business concept,

create a business model, and provide hands-on experience with real world projects. Students may bring their own ideas or become part of an existing team. Teams have a three-person minimum. There are also once per week lectures over the 10 week program that are mandatory. Table1 lists the program schedule for Fall 2015. This program is open to any student, faculty and staff.

Table 1
BOOT CAMP SESSIONS

Session #1	Introduction Session & Sticky Note Challenge
Session #2	1-Minute Inventor Pitches & Team Formation
Session #3	Business Model Canvas & 1-Minute Elevator Pitch
Session #4	"Defining Your Customer" w/ Guest Panel
Session #5	Prototyping Resources w/ Guest Speakers
Session #6	1st Team Pitch (5-10 minutes) to Guest Panel
Session #7	Finances, Marketing, and Sales w/ Guest Speakers
Session #8	Intellectual Property w/ Guest Speaker
Session #9	2nd Team Pitch (10 - 15 minutes) to Guest Panel
Session #10	Bootcamp Two Day Pitch Event Finale

Participates are guided by mentors and students, called "Sharks." The Sharks are five individuals, mostly in graduate programs, who have had successful entrepreneurial projects. The mentor group is composed of 55 business people drawn from a diverse set of industries. The hands on portion of the semester is participating in the campus wide competitions, The main one, "University of Kentucky Venture Challenge" has the two winning ideas moving on to the State level competition. Students develop their ideas into new ventures, prepare a marketing video and a written proposal, and present their business concepts to judges from the local entrepreneurial community. Students are coached by members of the UK and local entrepreneurial community. The Venture Challenge judges provide feedback following the competition.

The Undergraduate Certificate in Innovation and Entrepreneurial Thinking is for students from any major. Students must complete four 3-hour courses -- two required and two elective courses. Students must have completed 60 credits to register for this program. Table 2 lists possible electives.

Table 2 **COURSE OPTIONS FOR CERTIFICATE PROGRAM***
The two required courses are:
Communication, Leadership and Entrepreneurial Thinking
Capstone Experience in Innovation and Entrepreneurial Thinking
Two electives chosen from the following list:
Arts Administration Communications
Marketing for the Arts
Arts Entrepreneurship: Art in Unlikely Places
Art Through Object: Theory and Practice for Engagement Strategies in the Museum
Creativity and Innovation (KIIS Paris 1, Summer 2015)
Information Technology Strategy (Enterprise Management)
Design Thinking in Education
Competitive Intelligence
Media Management and Entrepreneurship
Special Topics: Social Entrepreneurship
Introduction to Entrepreneurship
Business Management
Marketing Management
Music for Living
Creativity and Innovation in Rock Music: History and Sociology

The iNET Entreprenerial Studies Living Learning Program

The iNET Entrepreneurial Studies Living Learning Program is for students from all majors who want to gain entrepreneurial skills, experience and contacts. To insure students have contact with other students with their own entrepreneurial interests and start them networking, this program involves living together in a specific dorm section. Students are provided on-site programming and given the opportunity to discover their own entrepreneurial talents and interests as they learn team building, leadership, critical thinking, and innovative problem solving skills. Students engage in various exercises and activities to gain core entrepreneurial skills. Programs and mentoring are provided by the iNET Director, the Entrepreneur in Residence, and the on-campus and local entrepreneurial community.

Freshmen entering this program must take the courses shown in Table 3.

Table 3 **Freshmen Requirements for Entreprenerial Studies Living Learning Program***
Fall Semester (8 credits of connected courses):
Social Entrepreneurship (3 credits) Taught by the iNET Director
Entrepreneurial Thinking (1 credit): Co-Taught by the iNET Director and Entrepreneur in Residence
Academic Orientation (1 credit)
Composition and Communication I (3 credits):
Spring Semester (7 credits of connected courses):
iNET Elective Course (3 credits) Taught by iNET faculty member
Venture Challenge (1 credit) Co-Taught by iNET Director and Entrepreneur in Residence
Composition and Communication II (3 credits)

*https://ci.uky.edu/inet/page/inet-entrepreneurial-studies-living-learning-program

Future Entrepreneurship Program Growth

The development of the entrepreneurship ecosystem at the University of Kentucky as described above follows a mixed pattern with features of both a "top-down" and "bottom-up" approaches defined by the status of the university (public, land-grant, research university), engagement with stakeholders (local and state business communities), support by the university leadership, individual alumni, and faculty initiatives. While collaboration between the university and the local business community can be perceived as a success factor, the course offerings to non-business students might be perceived as insufficient for a campus with approximately 30,000 students. With the College of Communication and Information taking the lead, iNET has growth potential if it expands its cooperation with other colleges. There is already a mechanism in place for this through an Advisory Board which engages 50 members from different colleges across the campus, student representatives and other stakeholders representing the business community. The collaboration of the Innovation Network for Entrepreneurial Thinking as a university-wide education magnet, and with the Von Allmen Entrepreneurship Center as an entrepreneurship services and development magnet, form a multiple magnet model (Figure 1).

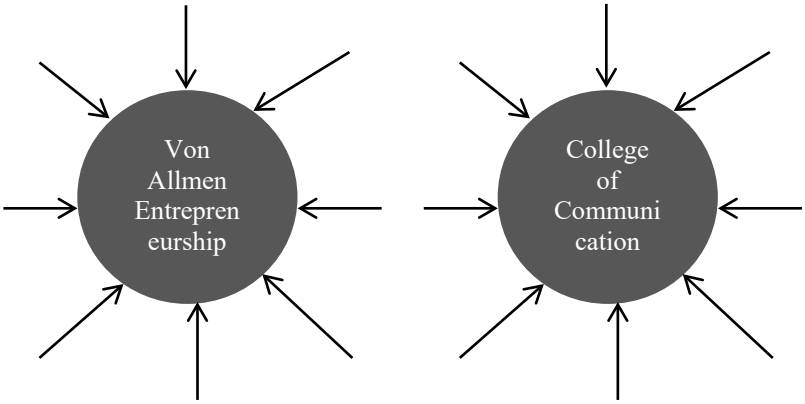

Figure 1

Program Analysis

The observations and analysis of university-wide education at the University of Kentucky indicate the following success factors and constraints:

Success Factors

Cooperation with the local and regional municipality and business community, resulting in strategic partnerships, and hence securing sustainable further development of university-wide entrepreneurship education.

A university-wide entrepreneurship program with a focus on entrepreneurial thinking that provides interdisciplinary entrepreneurial education both curricular and co-curricular to non-business undergraduate students across the campus.

A unique Entrepreneurial Studies Living Learning Program that makes efficient use of time and space to spur networking and interdisciplinary entrepreneurial learning.

A well-established structure of leadership by means of Advisory Boards that engage a variety of stakeholders to represent strategic partners, representatives from the university, and the local and regional entrepreneurial community.

Deficiencies

Limited number of course offerings to undergraduate non-business students, given the size of the university and potential activity.

No course offerings for undergraduate non-business students willing to continue after they have completed the Undergraduate Certificate in Innovation and Entrepreneurial Thinking.

Limited engagement of the business school faculty in providing support to further development of university-wide entrepreneurship education.

UNIVERSITY OF MICHIGAN

The University of Michigan is a public higher education institution that was founded in 1817. Today the University of Michigan is the only public university among 13 American universities in the top 25 universities in the QS World Rankings for 2014 with other 12 being private universities. (It is ranked 23rd in the world.) The University's 19 schools and colleges with its student body consisting of 28,395 undergraduates and 15,230 graduate and professional level students are governed by its mission to create, communicate, preserve and apply knowledge in order to serve the people of Michigan and the community at large. (U-M Enrolment Report, 2014) The University's goals described in the Vision Statement (ibid.) embrace ten objectives to be applied within all structural units across the university. Compared to other academic institutions in the United States, the University of Michigan is a highly decentralized institution, therefore its schools and colleges develop their own plans and initiatives in compliance with the University's mission and vision. The University's governance provides support through funding, infrastructure, and services consistent with the overall direction of the University's values. With reference to university-wide entrepreneurship education, two objectives attract attention: the interdisciplinary nature in teaching and research, and an entrepreneurial spirit to foster economic growth in the region and beyond.

Structure of Entrepreneurship Education

Historically, entrepreneurship has had a definite place at the University of Michigan since 1927 when the nation's first Small Business Management course was offered at what is now the Ross School of Business. Within the Ross School of Business, the Zell and Lurie Institute for Entrepreneurial Studies was launched in 1999 to create a focused entrepreneurship program and courses for business students. The push factor in starting the Institute was the endowment of $10 million provided by donors whose entrepreneurial careers began at the University of Michigan. Further, in response to the growing demand from students, faculty and the community, the Institute started providing course offerings in entrepreneurship basics to all students at all levels across the campus. It also served as the catalyst in launching entrepreneurship programs at the College of Engineering (2008), the School of Medicine (2008), and the Law School (2012). This development was fostered by the President of the university when he launched a multi-year program in 2007 to hire 100 new faculty members in innovation and entrepreneurship. In November 2013 the Provost established a policy to offer formal entrepreneurship education to all undergraduate students across the campus, and appointed a senior adviser to have the program implemented by fall 2014. As a result, the platform, "Innovate Blue" was created embracing entrepreneurship education and research. It serves a coordinating function between the more than 15 programs and centers in entrepreneur- ship and more than 30 entrepreneurial student organizations. In 2014 the College of Literature, Science and the Arts, the School of Information, and the School of Public Health started developing their entrepreneurship education programs.

Program Development

University-wide entrepreneurship education has a significant place within the university's entrepreneurship ecosystem. It has developed following the "bottom-up" model that is in line with the highly-decentralized university framework at the University of Michigan, and is rooted in the financial support provided by the alumni and the efforts coming from individual structural units. At the same time, these individual efforts have been recognized and fully supported by the university governance.

Having started as a magnet model with a center of gravity at the Ross School of Business with its Zell and Lurie Institute for Entrepreneurial Studies, the magnet model underwent transformation into a multiple magnet model anchored at the College of Engineering and the Law School (Figure 2). In response to even further perceived demand, other schools and colleges joined the program to provide entrepreneurship education to all students including those in art, communication, humanities, and science. As a result of this program growth, the radiant model of university-wide education can be attributed to the University of Michigan. This evolution is not surprising given the university's cultural structure. The step-by-step development from the magnet model into the radiant model can be perceived as a factor for the overall program's success because the initial experiences served as a knowledge base for the start-up of other entrepreneurship programs and centers, with their development of faculty and the curriculum, and designing the administrative structure.

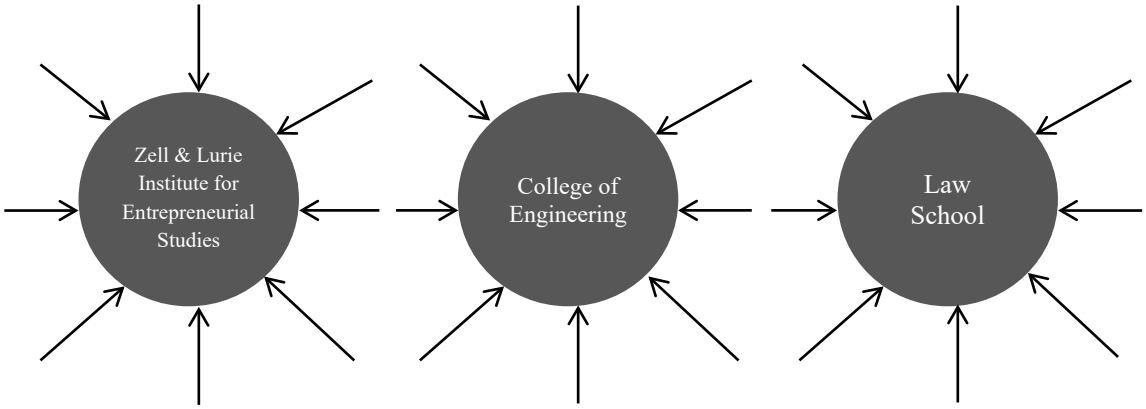

Figure 2

Current Program

University-wide entrepreneurship education at the University of Michigan encompasses 50 undergraduate and 60 graduate entrepreneurial courses and programs offered by educational partners including six schools - the Ross School of Business, the College of Engineering (serving also students from the School of Kinesiology and the School of Art and Design), the Law School, the College of Literature Science and the Arts, the School of Information, and the School of Public

Health – the Shapiro Undergraduate Library, the Barger Leadership Institute, and the TechArb that is a student accelerator. The entrepreneurship curriculum includes either a 15-credit Minor in Entrepreneurship, or a 9-credit elective Program in Entrepreneurship (PIE) both made available to students from any academic discipline. In addition to the entrepreneurship basics covered within the two core curriculum, each program includes electives and practicum that provides students with discipline-specific knowledge and experience. The necessary collaboration and communication, given the number of education partners and curricular classes combined with co-curricular activities, is provided by Innovate Blue, performing the functions of administration.

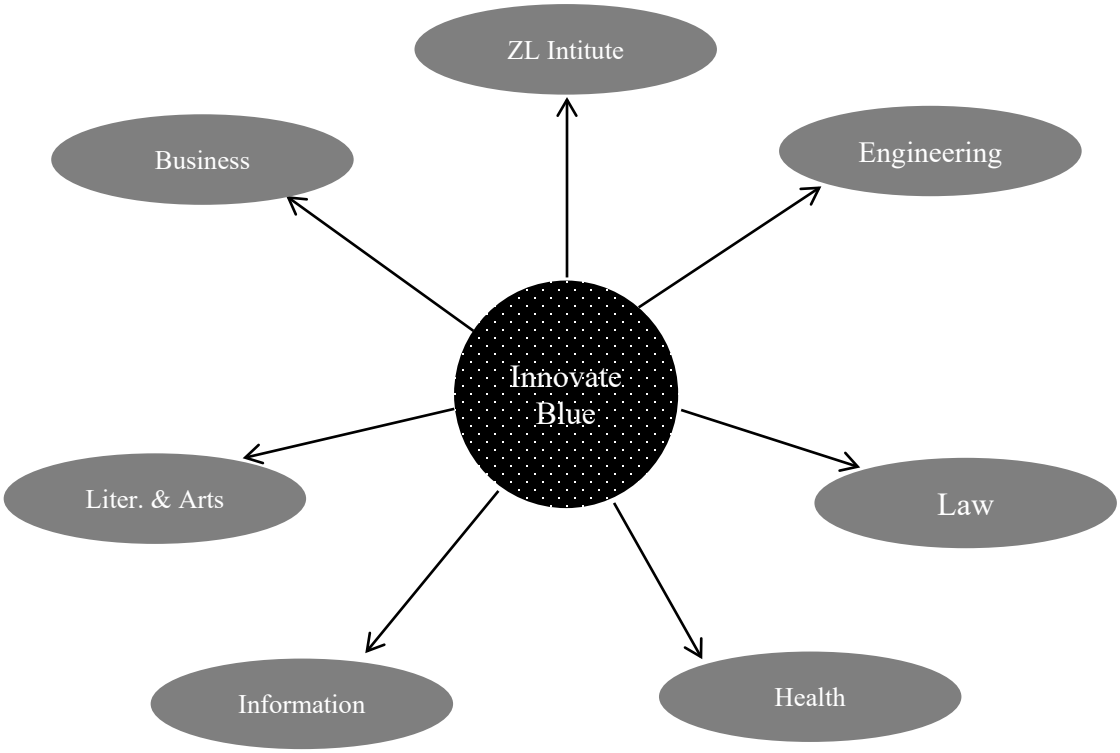

Figure 3

The following course list shows the variety of offerings that students can choose from based on their background and interest. (http://www.zli.bus.umich.edu/forms/ECourses_ Tracks_0809.pdf) The faculty members teaching these courses represent a mix of faculty members from different

schools, adjunct/practitioners and clinicians. Both programs, the minor and the PIE, have a strong focus on learning and experience with co-curricular activities being either required or recommended. In addition, there are entrepreneurship course offerings provided by Samuel Zell & Robert H. Lurie Institute for Entrepreneurial Studies, Ross School of Business, and School of Law.

Table 4
COURSE OFFERINGS

Entrepreneurial Focus	Course
Creation and Growth of Entrepreneurial Ventures	**Entrepreneurial Business Basics (core)** **Entrepreneurial Creativity (core)** Entrepreneurial Business Fundamentals Entrepreneurship Entrepreneurship Hour Entrepreneurship Hour Discussion Session Finding Your Venture Introduction to Entrepreneurship Entrepreneurship Management Entrepreneurial Marketing Family Business Managing the Growth of New Ventures
Entrepreneurial Finance	Entrepreneurial Finance Venture Business Development Introduction to Microfinance Financing Research Commercialization
Design, Innovation, and Technology	Creative Process Innovation and New Product Development Launching Design Practices Analytical Product Design Introduction to Design Process Design Prototyping CleanTech Entrepreneurship High Tech Entrepreneurship Working With Wood Working With Metal
ITC, Communications, and media	Digital Marketing Social Media and the Changing Nature of Business Communications Mobile App Development for Entrepreneurs Entrepreneurship in the Information Industry Busting Myths and Pursing Information Innovations with Mobile Apps Imagine, Innovate, Act
Environment and Community	Change by Design Leading Innovation Through Social Entrepreneurship Nonprofit Management, Community Engagement and Feminist Practice Urban Entrepreneurship Environmental Values in Public Policy Urban and Community Studies Organizing People, Power, and Social Change Theories and Practice for Community Action and Social Change Pedagogy of Empowerment: Activism in Race,

	Gender and Health Economics of Entrepreneurship
Application of Entrepreneurial Skills to Other Professional Careers	Business Entrepreneurship in Thought & Action Problem Solving, Troubleshooting, Entrepreneurship, Intrapreneurship, and Making the Transition to the Workplace Creativity at Work Startups and Upstarts: Psychology of Entrepreneur- ship and Intrapreneurship
Tools for Entrepreneurs	Patent Fundamentals for Engineers Patent Law Needs Assessment and Usability Evaluation Evaluation of Systems and Services Intellectual Property Law
Communication and Leadership Skills	Leadership and Collaboration Practicum in Leadership and Collaboration Psychology of Creativity Negotiations
Entrepreneurship in Performing Arts	Introduction to Stage Management Performing Arts Management Global Community Practicum

It should be noted that the University of Michigan also offers a one year Master's Degree in Entrepreneurship. This program is designed for graduates of their MsE program so they are "prepared to develop and launch disruptive, scalable ventures that address a societal need."

Considering that the faculty are affiliated with different academic units, coordination and communication are essential to ensure quality and the sustainability of programs and course offerings, as well as professional development of the engaged entrepreneurship faculty. The Advisory Board at each center or institute keeps an oversight of the quality of entrepreneurship education as a whole, provides a strategic direction, and maintains communication between different structural units to deploy synergies and avoid duplication.

Community Interface

The commercialization partners and community partners create a significant part of the entrepreneurship ecosystem at the University of Michigan that is essential and complimentary to university-wide entrepreneurship education. Evidence from experts confirms that such partnerships provide support in a form of infrastructure, human resources, financial resources and networks. For example, the Business Engagement Center, and the Center for Venture Capital and Private Equity Finance as commercialization partners assist with linking student business initiatives and startups with the business and financial community. The Office of Technology Transfer, and Fast Forward Medical Innovation assist in the commercialization of technological innovations and bring income to the university. Some student business ideas have developed into sustainable businesses in the form of student-led venture funds to support emerging businesses, notably the early-stage Wolverine Venture Fund, pre-seed Frankel Commercialization Fund, and the Social Venture Fund.

In addition to the communities located within schools, colleges, centers, and institutes across the campus, the faculty and students are engaged in cooperation with community partners

through Ann Arbor SPARK, and Michigan Economic Development Corporation (MEDC). Being part of these organizations, the University of Michigan maintains cooperation with the city of Ann Arbor and municipal stakeholders, other academic institutions, and the broader local entrepreneurial community. Students benefit from commercialization and community partnerships by gaining access to a range of internship placements, real-life projects, grants and professional networks that are useful in their co-curricular activities that include business plan and pitching competitions, conferences, innovation projects, and many other activities developing entrepreneurial skills and behaviors.

Program Analysis

The observations and analysis of university-wide education at the University of Michigan indicate to the following success factors and deficiencies:

Success Factors

A platform for university-wide entrepreneurship education Innovate Blue that serves as a unique site for communication and information across the campus and beyond; such a platform helps to avoid duplication and allows using resources more efficiently;

Cooperation with the local and regional municipality and business community both to foster the development of the entrepreneurship ecosystem at the university and to integrate students in the local and regional business community so that students are retained in the region after they graduate;

A well-developed network of the alumni who contribute in curricular and co-curricular activities as well as become most generous donors;

Well-integrated curricular and co-curricular activities with entrepreneurship programs embracing core courses coupled with a mandatory component of electives such as capstone projects, business plan competitions, pitching, etc.

At each school well-developed and strong Advisory Boards and leadership structures supported by the university governance.

Deficiencies

With six schools fully engaged as sites for entrepreneurship education (and two schools participating in cooperation with the College of Engineering), there are still 11 schools that have yet become educational partners;

Attracting financial support in the radiant model has the disadvantage of it being unclear how individual educational partners will succeed in attracting funding from their donors.

IMPLICATIONS FOR FURTHER RESEARCH

While based on a small sample of reviewing two universities, this study presents evidence that adds to our understanding of the dynamics of developing university-wide entrepreneurship education. It also highlights a few areas for further development and research, in particular such

areas as cooperation across the university, monitoring and assessment, and fostering multi-disciplinary teams of both students and faculty members.

Evidence from both case studies shows the importance of cooperation and communication across the university. Irrespective of the gravity center (Streeter et al., 2004) of entrepreneurship education within the university, or the type of school role within the entrepreneurship education ecosystem (Brush, 2014), there are boundaries between academic units, schools and centers. Therefore, there is a need for further research on the structural development within universities in creating the appropriate institutional environment for entrepreneurship. This concept of boundaries becomes significant when considering how faculty members form multidisciplinary teams, which generally is complicated within currently practiced academic structures. This points out to research needs into the mechanisms and approaches encouraging teaching and learning in a multidisciplinary environment not just for students, but also faculty.

Using the Gibb (2007) model, it would be useful to investigate the effect of the magnet's location. The three choices were on-campus run by the university, off-campus but university run, or off-campus run by other stakeholders. Which configuration brings in more alumni dollars? Which arrangement wins greater outside grant support?

Another variable that deserves some exploration is the location of the institution. Both of the universities studied were in cities where there was a vibrant business community with successful entrepreneurs. This provided local opportunities for internships, local speakers, and business planning feedback from people who had credibility. Schools that are in small towns, and far from major business centers, have fewer role models to interact with students first-hand. It may be harder for an institution to drum up campus enthusiasm for a university-wide entrepreneur program in this type of "isolated" environment. Examining the differences of rural vs urban institutions and their introduction of entrepreneurship education is an avenue to investigate
With the current paradigm shift making entrepreneurship education more available university-wide for both graduate and undergraduate students, research on its long-term effects on developing entrepreneurial members of society (Streeter et al. 2011, Brush 2014, Solomon 2014) can better inform the metrics used for university rankings.

A similar research agenda should follow-up on the various youth entrepreneurship training programs being offered. How many students who participated in these programs attend college and pursue studies that will lead to entrepreneurial careers upon graduation. Since entrepreneurship is a frame of mind or mindset, it would be interesting to note if when this perspective is instilled young, does it have significant impact on future behaviors and educational choices.

Future researchers might examine which of the two models, radiant or magnet, are perceived by students to best fit their future entrepreneurial ambitions. The magnet model encourages multi-disciplinary teams, while in the radiant model students study in their academic units and only may form multidisciplinary teams through co-curricular offerings. It is very possible, that programs coming from the radiant model are perceived by students to be more valid to their needs, and stimulate more excitement. Classes given within their own school, might have more face validity than an identical series of courses promoted solely through the school of business, for example.

From an educational design point of view, a study that defines the specific factors that help initially determine the appropriate depth and breadth of the entrepreneurship program an institution should initiate would be helpful. Programs can be nothing more than periodic presentations that are non-credit, extra-curricular activities to which students are invited. The next level up would

be a short series of courses that make up a certificate-type program. More involved, would be a recognized minor in the field, and finally a full major. Certainly, the size of the student body would be a large determinant. The faculty composition would be a factor. There is also the local business environment that might need to be considered. Identifying a list of factors that impacts the content and process of initiating a new program would be useful to institutions just beginning to consider adopting some sort of entrepreneurship program.

FINAL OBSERVATIONS

The two universities reviewed in this study have a range of entrepreneurship education activities and events that differ in the way they are organized and monitored. However, the case studies at both universities indicate the importance of a joint platform and communication across the university, so that entrepreneurship education is well-understood, and the communication channels are in place for all internal and external stakeholders involved.

Looking at the full picture at both universities, university-wide entrepreneurship education has a significant place within the university's entrepreneurship ecosystems, and it is supported by the university's governance, students, faculty, alumni, the regional and local municipalities, and the business community. Both universities started with establishing one magnet.

Today the University of Michigan has developed a radiant model with its administration center being outside schools and colleges. The radiant model offers the potential to grow beyond the six schools that are currently involved to the remaining thirteen schools and colleges that may join in the future. Within the radiant model, students who study discipline-specific entrepreneurship are also provided with opportunities to engage in interdisciplinary teams through co-curricular activities.

Students at the University of Kentucky are provided entrepreneurship basics by iNET at the College of Communication and Information, where they can study in multidisciplinary teams. iNet together with the Von Allmen Entrepreneurship Center create two magnets. However, it is the investigators' opinion that this is insufficient for such a large public, even though iNet has the potential to develop new programs. The Kauffman Campuses Initiative (Torrance, 2013) and the experience at the University of Michigan seem to demonstrate the advantages of the radiant model.

Overall, the observations made at both universities indicate a critical factor to successful programs is creating a leadership structure to coordinate all events and activities across the departments within a school or college both in the magnet and radiant models. (CEEPS Report, 2007) Creating such a leadership structure for its part requires support from the school's or university's governance.

While focused entrepreneurship education programs are fairly well developed at both universities, entrepreneurship course offerings for non-business students are unsystematic. It is unclear how students are informed about entrepreneurship course offerings across the university. Similarly, the faculty members teaching entrepreneurship courses do not have a common platform to work together and share experiences. Without a common platform, cooperation among the faculty members is hardly possible, especially when entrepreneurs and practitioners are engaging in teaching either in running a course or providing guest lectures that is practiced by the universities reviewed. So far, many initiatives are implemented based purely on the enthusiasm and the voluntary work by individual faculty members. Moreover, faculty members claim that there is little understanding in the way entrepreneurship education is perceived by colleagues from other faculties because entrepreneurship education is mainly perceived as an academic discipline within

social sciences. Similarly, a myth of entrepreneurship as a competence not possible to be taught has created certain skepticism that originates from the insufficient communication at all levels (The Kauffman Foundation 2008, Torrance 2013).

Entrepreneurship is a key driver of the U.S. economy. Wealth and a high majority of jobs are created by small businesses started by entrepreneurially minded individuals, many of whom go on to create big businesses. Entrepreneurs besides creating new businesses, add to the national income, create social change, and they also are active investors in community projects and provide financial support to local charities. This enables further development beyond their own ventures (Seth, n.d.).

According to Gallup (Clifton, 2015) the U.S. now ranks 12th among developed nations in terms of business startup activity. Countries such as Hungary, Denmark, Finland, New Zealand, Sweden, Israel and Italy all have higher startup rates than America does. Business startups outpaced business failures by about 100,000 per year until 2008. But in the past six years, that number suddenly has reversed, and the net number of U.S. startups versus closures is minus 70,000. But even more important to American's future economic growth is how we manage what has always been an American strong point -- Innovation. Innovation by itself does not lead to growth. Rather it is when the innovation becomes part of a business model developed by an entrepreneur and sold to customers does it really add strength to our economy.

The importance of educating the next generation of entrepreneurs in the necessary concepts and competencies is crucial to the United States' employment picture and its continued economic success. This study reinforces the fact that the institutions of higher education need to be the key players in this development.

ENDNOTES

1 Fulbright and Baltic-American Freedom Foundation grants have brought E. Frank to the Stockholm School of Economics in Riga and D. Pauna to University of Michigan and University of Kentucky.

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