Entrepreneurship Education and Learning Systems: Developing a Holistic Approach to Entrepreneurial Universities and their Ecosystems

Professor Jay Mitra
Essex Business School
University of Essex, United Kingdom

Dr. Su-Hyun Berg
Independent Business Consultant
Flensburg, Germany

Abstract
This paper explores critically the phenomenon of campus entrepreneurship ecosystems of higher education institutions and their impact on entrepreneurship education and learning. The paper draws on empirical evidence to propose a conceptual model for the effective evaluation of the capacity and capabilities for creating an institutional, internal ecosystem to support an innovative, multidisciplinary form of entrepreneurship education and creative learning. Following Miller and Acs (2017), the paper first employs the Turnerian trinity (Turner, 2008) model of available assets, liberty and diversity to formulate a capacity approach to an understanding of the ecosystem. The authors then draw on Amartya Sen’s capabilities approach (Sen, 1989; 1984) to augment Turner’s thesis and connect the substance and meaning of entrepreneurship education and learning systems to the entrepreneurial ecosystem in the context of two research universities in two very different economic and social environments: 1) Hanyang University in South Korea, and 2) University of Essex in the UK. The paper examines five propositions and address two conceptual challenges: a) understanding higher education institutions as entrepreneurial campus ecosystems (internal ecosystem) and b) taking entrepreneurship to mean more than new business creation, helping to develop creative new mind sets for effecting change and innovation in learning and practice for dissemination and interaction in the wider environment (external ecosystem).

Keywords: Entrepreneurship education, campus entrepreneurship ecosystems, capacity, capabilities

Introduction
Both entrepreneurial activity and entrepreneurship education are seen by researchers, policy makers, and the media as two important societal necessities which are indispensable to economic growth and development, social cohesion, job creation and increased standards of living in the knowledge economy. While commentators, thinkers and practitioners have weighed in on these two fields in growing numbers, policies intended to spur entrepreneurship and improve higher education output continue to be difficult to validate (Miller and Acs, 2017). In many of the studies, the agents (entrepreneurs) and their interactions with institutions and other agents are keys to the successful functioning of the ecosystem in which they operate. These agents can be found in both entrepreneurial campuses and outside. Together they form part of an ecosystem. Numerous studies (Stam, 2015; Mason and Brown, 2014; Isenberg, 2014; Audretsch and Thurik, 2000) have made clear arguments about entrepreneurial ecosystems forming a crucial line of inquiry given that we live in an entrepreneurial economy, but less is known of the dynamics of the internal university campus ecosystem that enable institutions to evolve as entrepreneurial campuses in a wider entrepreneurial ecosystem.

What would be the purpose of an entrepreneurial campus? And what entrepreneurial activities can be deemed legitimate in these campuses? We contend that in exploring entrepreneurial activity in an entrepreneurial campus, adopting an ecosystem approach could be useful because the ways in which the university interacts with different stakeholders to advance learning and knowledge creation could have implications for the entrepreneurial activities of the university. Making
links with external stakeholders requires universities to have the capacity for such connections and also the capability in terms of knowledge creation, sharing and absorption. Given the diversity of the academic and intellectual base of the university and the historical trajectory of developing knowledge in specific arenas of knowledge, institutions have also developed their own internal ecosystems. Exploring how these internal ecosystems are used and managed as part of an entrepreneurial campus and how they connect with the wider, external ecosystems could be important for answering the two questions raised above.

The capacity for ecosystem-based entrepreneurial activity in universities means the assets, the liberal culture and diversity of the institution (Miller and Acs, 2017). The term capabilities refers to the fulfilment of aspirations for knowledge acquisition, knowledge creation and self-fulfillment of individuals (student and staff) by means of cross-departmental and cross-curricula entrepreneurship research, education and other extra-curricular programmes in institutions of higher education. In this paper the focus is on how these capabilities and capacities obtain within the internal ecosystem of campus entrepreneurship in higher education institutions.

The findings show that the entrepreneurial ecosystem is dependent on the Turnerian trinity of available assets, liberty and diversity (Turner, 2008). These characteristics provide the basis of governance of the campus as an entrepreneurial ecosystem and the necessary capacity for the output produced by that campus ecosystem. It is also noted that using the capacity to create capabilities is possible when the decentralized governance structures underpin organic developments in the campus. The entrepreneurial campus ecosystem fosters opportunities for the creation of new ventures together with a higher education platform for mind-set change, critical thinking, problem solving. Indeed, the compendium of capabilities vital for entrepreneurial value creation in different environments.

Mixing available assets, diversity and liberty with stakeholder engagement and economic, social, cultural and personal value creation, allows universities to foster opportunity development for both regional and global impact. The paper argues that while enabling socialization with external agents can be useful for student entrepreneurs, the establishment of an internal ecosystem which fosters liberty, diversity and makes available the institutions assets is critical for the campus to foster entrepreneurial capability. This internal aspect of the ecosystem of an institution has largely been ignored in the literature.

While entrepreneurship research, education, training and enterprise creation activities proliferate across universities worldwide, neither their utilitarian value (new ventures, new product, service, new forms of organization or job creation) nor their intrinsic education value (mind set change, new content creation or pedagogic experimentation, embedded entrepreneurial learning across the curriculum or value creation) find necessary purchase in the development of an entrepreneurial ecosystem at the level of a region or any other external unit of ecosystem assessment. Equally, a ritualistic engagement with the non-campus world does not necessarily create an entrepreneurial university (Mitra, 2017). Systematic support for organic, decentralized and novel combinations of resources and capabilities can be considered to be a better option. Such support can yield entrepreneurial people who can either start new ventures or manage innovative organisations in private and public spheres, and contribute to society and the wider environment as entrepreneurial citizens. The university’s emergence or evolution as an entrepreneurial campus is, therefore, a function of its capacity to generate entrepreneurial capabilities across the board. In other words an entrepreneurial campus is not simply an aggregate of multiple spin-offs, student enterprise, knowledge transfer, and other new, self-sufficient initiatives. Rather, and in keeping with a Humboldtian vision of higher education, it is in its ability to use its capacity to realise the different capabilities of individuals and the cross-fertilisation of knowledge to generate new opportunities, appropriate to its context, that a university can lay claim to being an entrepreneurial campus.

By campus entrepreneurs reference is made to all students or staff engaged in creative ways to develop new ideas and implement them in the form of new venture creation by mobilising resources in novel ways. This interpretation stretches the meaning of campus entrepreneurship to beyond starting up new ventures (utilitarian value creation) to include the entrepreneurial education experience (intrinsic education value creation). Frederick Jackson Turner’s “Frontier Thesis of the United States” (Turner, 2008) model of available assets, liberty and diversity is used to construct a framework for understanding the university campus as an entrepreneurial ecosystem. The paper identifies commonalities and distinctive features of the two different campuses of Hanyang and Essex universities in South Korea and the UK without necessarily trying to construct an ideal model based on a simplistic comparison of the two institutions. These empirical reference points are used to develop our conceptual framework for an ecosystem approach to entrepreneurship education in entrepreneurial campuses.
Drawing on the capabilities approach developed by Amartya Sen, 1989; 1984; and others (Nussbaum, 2011') enables augmentation of Turner’s frontier thesis to develop a replicative framework for obtaining insights into the setting of multiple objectives for campus-based opportunity development, entrepreneurship and innovation.

The rest of the paper provides an overview of the literature on ecosystems, Turner’s frontier thesis and the capabilities approach to present a conceptual model for understanding campus ecosystems. The review of the literature is used to develop five propositions that are the building blocks for the conceptual model. This is followed by a brief explanation of the secondary material and case study methods used for the study before proceeding to the findings. The paper ends with an analysis of the findings and a discussion including some observations for future research and policy development.

Overview of the Literature and Propositions

Entrepreneurial Ecosystems

James Moore’s (1993) influential article in Harvard Business Review claimed that businesses do not evolve in a ‘vacuum’ but that the relationally and socially embedded nature of firms imply interactions with suppliers, customers and financiers. Since then numerous writers have drawn our attention to the idea of ‘entrepreneurial ecosystems’ (Zacharakis et al., 2003; Isenberg, 2010 Napier and Hansen, 2011; Malecki, 2011; Kantis and Federico, 2012; Feld, 2012). Ecosystems are born out of the mix of localized cultural outlooks, social networks, investment capital, universities, and focused economic policies that create environments supportive of entrepreneurial ventures. Their various guises are found within and shaped by the academic literature (Acs et al., 2014; Feldman et al., 2005), policy outlines (Isenberg, 2010; World Economic Forum, 2013), and also the popular business literature (Feld, 2012; Hwang and Horowitt, 2012). It is argued that in dynamic ecosystems new firms have better opportunities to grow, and create employment, compared with firms created in other locations (Rosted, 2012).

Stam (2015) states, that at its most basic, an entrepreneurial ecosystem is an independent set of actors that is governed in such a way that it enables entrepreneurial action (p. 1). Feld (2012) and others go much deeper in developing these concepts, but at its core, an entrepreneurial ecosystem and its output relies on a core of large established businesses, (including some that have been entrepreneur-led);* entrepreneurial recycling*(which involves previously successful entrepreneurs reinvesting their money, acumen and time in promoting new entrepreneurial activity); an information-rich environment in which this information is relatively easily accessible and shared within the community, culture and institutions for absorptive capacity for innovation and new firm creation, start-up and growth finance, universities and service providers (Mason and Brown, 2014). There is a reliance on a variety of voluntary relationships among independent agents with some form of agreed upon and acceptable but implicit (therefore, potentially dysfunctional) governance structure.

The entrepreneurial ecosystem approach supports Schumpeter’s (1942) claim that entrepreneurs are change-makers in capitalist economies, and that their actions and ability to create new combinations of economic assets are what lead to improved standards of living.

External and Internal Ecosystems

There remain critical analytical problems with ecosystem models especially in terms of their application to campus entrepreneurship and entrepreneurship education. There is the problem of governance of the ecosystem. Ecosystems are evolutionary, complex, self-directed, loose systems where each organisation carves out its own rules of conduct. Entrepreneurial universities with their global reach in terms of research, education and outreach activities are not entirely dependent on these localized systems even though they could use them for specific purposes. This raises the question of there being the need to recognize a firm/organizational level ecosystem which provides a basis for absorbing externalities of regional ecosystem and the wider global environment.

While ecosystem studies have proliferated, insufficient attention has been paid to the idea of different ecosystems that need sustaining at both the macro level of the environment (the ecosystem) and at the micro level of the organization (the internal ecosystem). In much the same way that that relationships between markets and firms thrive on their mutual interdependence, the wider network of the ‘external ecosystem’ made up of multiple organisations is dependent on the effectiveness of the ‘internal ecosystem of each of those organisations. This is especially significant when we reflect on the role of the larger stakeholding organisations of the ecosystem. While larger firms can replicate market behaviour and
structures within the firm, there are differences in those very structures and behaviours as organisations seek levels of efficiency and consolidation of economic activity not available in the market. The differences can be accounted for in terms of permeability and openness. While markets are ‘open’ for any player they are not permeable in relation to individual organizational interests. The internal ecosystem of an organization compensates for this opaqueness in the market place by creating its own environment. These arguments here lead to a consideration of two propositions (P1 and P2).

P1: Entrepreneurial ecosystems are social, networking systems achieving entrepreneurial outcomes for different types of organisations and the wider economy.

P2: Entrepreneurial ecosystems consist of interrelated external and internal ecosystems, at the level of the wider economy and at the level of the organization.

The University Campus and its Internal Ecosystem

A basic assumption in an effective ecosystem is the incorporation of the idea of diversity. Such diversity is expressed in terms of the race, class and gender of actors, the multiple institutional agencies, the cross-section of sectors or value chain agglomeration, and key inputs of talent and technologies (Miller and Acs, 2017). These, taken together with the human capital of institutions (its staff and students) constitute a range of assets that complement the physical ones of property and finance. The “spontaneous order” in which this diverse set of assets are brought together evokes Hayek’s (2010) idea of liberty as much as it does Turner’s (2008) capture of this essential value of freedom uncalled by path-dependent systems and institutional antecedents. A combination of these features of diversity, assets and freedom of spontaneous liberty create a capacity for institutions and networks to be part of an effective ecosystem.

Turner’s Frontier Attributes

Turner argued that the United States of America’s past and especially its 400 years of frontier experience (till 1890) had an outsized impact on developing American democracy, culture and economy, and as a place of change and renewal, with a dynamic, hybridized, innovating people creating a new kind of nation with a new kind of citizen, breaking away from Europe (Miller and Acs, 2017). This frontier was marked first by considerable economic opportunities and available assets (fertile lands, rivers, timber, fur and mineral resources). The second enabling factor, liberty that is associated with distance from establishment institutions, values and culture coupled with a desire to question those establishment principles. This sometimes meant adaptation and adoption of the old set of values to create hybridized institutions. (Turner, 1894; 1920) The third critical attribute is the diversity of people who settled in the American frontier. This diversity which was a function of large scale but varied immigration, helped create a unique national identity, supported the development of hybrid institutions and enabled an evolving political and economic structure that deviated from European norms (Miller and Acs, 2017). The distinctive flow of immigration over the centuries has led now to the territorial uniqueness of innovation and enterprise in numerous parts of the country, although much was achieved via the brutalization of indigenous people and the egregiousness of slavery.

Miller and Acs (2017) have shown how the innovative American frontier that closed at the end of the twentieth century has reemerged in the entrepreneurial economy on the U.S. campus. The characteristics of Turner’s frontier: assets, liberty and diversity can now be found in the tangible and intangible assets in the campus, liberty which is the cornerstone of university research and education, and the diversity of its people. They are the ‘frontier’ catalysts for creating opportunity, and fostering entrepreneurship and innovation. Their appropriate mix and the linkages between them create the campus ecosystem. Their deployment and utilisation have created campuses which are asset-rich environments: students with disposable cash (often from loans, scholarships, and grants), advanced research and technologies, talented people (academic staff, alumni, etc.), and extensive extracurricular and co-curricular options. Given the growing interest in entrepreneurship as a subject of study in universities across the world, is it possible to find entrepreneurial ecosystems with these critical features of assets, liberty and diversity in different ecosystems? The frontier model is adapted for the purpose of analyzing two institutions outside the USA to examine how the frontier model can apply in different contexts.

The internal ecosystem of the campus is of particular significance because of the tendency of academic departments to operate in subject or discipline-based silos. So even if sociologists explore social relations in an entrepreneurial context, economists make the case for optimizing resource allocation among entrepreneurs, psychologists discover different characteristics or behavioural patterns, technologists test algorithms for forecasting entrepreneurial deal-making, and business schools are busy domain hopping, they do so in silos. The incorporation of courses modules and electives in non-
business departments tend to be items gathered from Business School shelves for cursory deployment in various academic departments. However, when attention is given to activities such as research collaborations, public lectures, art galleries and museums, student and staff exchanges and transfers, recognition can be given to universities as open institutions (Miller and Acs, 2017). This internal ecosystem interacts with the wider, non-campus ecosystem stakeholders but the differences are noted in the boundaries within and around the campus. As Figure 1 below shows, the filled lines of the non-campus represent the lack of permeability and openness in off-campus institutions in the region or the city in which those universities are located.

*Insert Figure 1 here*

Crucially, while the idea or the reality of an ecosystem is mooted, limited attention is paid to how best can the institution obtain value from ecosystem membership. Equally, absent from discussions of entrepreneurial campuses and entrepreneurial ecosystems is the consideration of the capabilities necessary for both the institution and its students and staff to realise their different aspirations, which may or may not have purchase in local ecosystems.

**Entrepreneurship and the Capabilities Approach Complementing Frontier Assets.**

The capabilities approach can be traced back to, among others, Aristotle, Adam Smith, and Karl Marx but its most prominent, modern form has been pioneered by the economist and philosopher Amartya Sen (1984, 1989, 1999), followed by some significant development of the ideas by the philosopher Martha Nussbaum (2011) and others such as Deneluiin and Shahani (2009). Although it has been tested in a wide range of fields, in particular in development studies, welfare economics, social policy and political philosophy, it has by and large been ignored in the innovation and entrepreneurship literature.

Sen’s capabilities approach deals with well-being issues as ‘functionings’ at the wider economic and societal levels (Sen, 1999, 1989, 1984; Robeyns, 2005). The argument in this paper is that ‘functionings’, such as autonomy, environmental mastery, personal growth, self-acceptance, creativity, freedom to grow, training and development, are what people (both student and staff) want to achieve in their universities. When people are able to select from an option of functions they acquire “achieved functionings”. A set of ‘functionings’ constitutes entrepreneurial well-being; with people being able to choose their functionings based on their own understanding of well-being.

Allowing for the necessary freedoms individuals can have to pursue their own learning, improve their self-efficacy and sharpen their perceptions about what they could achieve, would be important considerations for entrepreneurs, managers of organisations, and an informed citizenry. The focus here is less on personal utility, the acquisition of specific assets, reputation or wealth, overcoming restrictions to rights, and more on the capability to function or the turning of capability to “functionings. The distinction between functionings and capabilities is between “the realised and the effectively possible; in other words, between achievements on the one hand, and freedoms or valuable options from which one can choose on the other”. Figure 2 below provides a diagrammatic interpretation of Sen’s Capability Approach model.

*Insert Figure 2 here*

One of the entrepreneur’s ‘functioning’ is being entrepreneurial (to start a new venture) (Gries and Naude, 2011; Naude, 2013; Naude et al, 2008; Baumol, 1990) and having the means to do so. The other ‘functionings’ referred to above are also regarded as characteristics of entrepreneurs. These other ‘functionings’ when realized are also the basis for informing innovative organizational activities through entrepreneurial managers, and creative citizens.

The modern entrepreneurial environment is characterised by capabilities for collaboration, engagement, discovery-driven learning and integrative decision making. They help to achieve both individual and organisational ‘functionings’. The development of an entrepreneurial campus which responds to societal and organisational change is made possible by the application of the frontier assets of the institution. In the entrepreneurial campus, ensuring that students and staff can have the space to choose to function innovatively is critical to entrepreneurial outcomes. Supporting innovative people in their effective opportunities to undertake the actions and activities that they want to engage in, and be whom they want to be on an entrepreneurial platform, need to be factored into institutional policy and practice. Removing barriers in their work so that they have more freedom to function creatively to deploy their skills, to generate new ideas and to fulfil objectives (their own and those of the university) so that they have a reason to value what they do and can do, is part of the evaluation process. The end objective of an innovation outcome and the recycling of the innovation process have intrinsic importance.
In reality ends and means may blur because some ends are simultaneously also means to other ends (for example the capability of being technologically savvy could be an end in itself but it may also be a means to achieve the capability for innovation practice) (Mitra, 2017). The freedom to choose what 'functionings' they wish to achieve indicates that they have the 'capability' (Sen, 2008; Robeyns, 2005). This also means that they have access to the assets, and the liberty to enhance their human capital; and agency (Sen, 1999; Robeyns, 2005), in a diverse environment.

The breaking down of silos and collaborative learning and doing through a variety of entrepreneurial learning projects help to develop capabilities among students and staff to achieve their aspirations or what Sen refers to as 'functionings'. The creative combination of capacity and capability within an institution helps to establish an internal campus ecosystem, which suggests a third proposition (P3) stated below.

**P3: The creative combination of a capacity for entrepreneurial activity with the capabilities for achieving aspirations for entrepreneurial individual and organizational outcomes, helps to establish an internal, entrepreneurial campus ecosystem.**

The entrepreneurial campus is not simply a spawning ground for start-ups. Many are called to the idea of entrepreneurship but only a few actually become the high impact entrepreneurs of modern folk lore. What is germane to the entrepreneurial ecosystem is the “collective effervescence” (Durkheim, 1912) of a range of entrepreneurial activities, from boot camps to business plan competitions, crowd funding and investments, short electives courses on business and social enterprise, to fully-fledged education and doctoral programmes on entrepreneurship.

There is as much entrepreneurship in the creation of new business or social ventures, as in serious research, and cross-disciplinary programmes of study designed to help students achieve entrepreneurial capabilities and mind set change. There is entrepreneurial endeavour in new forms of pedagogy development combining multidisciplinary experiential learning, the mobilization of resources for social change and outreach community engagement. Crucially, there is entrepreneurship in the ability of graduates emerging from universities as engaged employees or entrepreneurs and as citizens who can make a contribution to social change. The entrepreneurial ecosystem evolves through this holistic approach to entrepreneurship which fosters learning for achieving capabilities.

The assets at disposal in the campus, the liberty enshrined in free thinking, and the diversity of the varied user-producer groups, have ecosystem purchase only when the capabilities represent the set of aspirations that have desired outcomes for the nodes of individuals in the ecosystem. Not all outcomes are guaranteed but the systematic practice of innovation through a focus on capabilities in universities can at least provide pathways for desired ends. All students can, therefore, have a go at working towards achieving entrepreneurial well-being, a view that supports the fourth proposition (P4):

**P4: Entrepreneurial universities provide for frontier assets, liberty and diversity to enable multiple entrepreneurial outcomes for its students, including new firm formation, entrepreneurial career development and entrepreneurial citizenship.**

The use of the Capability lens in conjunction with the Turnerian themes enables the exploration of the entrepreneurial campus beyond what human capital and institutional theories allow. A reliance on Human capital theory may limit insights to formal and informal forms of learning and the trade offs between nurturing them locally or as a public good. Dynamic capabilities (Teece, 2012) emerging from an interplay of routines in and entrepreneurial action by an organisation, are essentially acquired attributes of the organisation. The capability approach recognizes the agency function of the individuals in the organization in terms of their ability to use and benefit from the capacity of the organization.

This mix of frontier characteristics with the approach to capability development plays out well in the making of a research university campus’s entrepreneurial ecosystem, as Figure 2 below shows. It also allows for a consideration of a fifth proposition (P5):

**P5: Achieving the capability for being entrepreneurial in a variety of environments is a function of the use of assets, liberty and diversity in the campus.**

Figure 3 below encapsulates the use of the capacity and capability concepts as part of a conceptual model for our arguments.

*Insert Figure 3 here*
Methods

The paper is conceptual in scope but has empirical reference points in the form of two case studies. Although reference is made to secondary empirical data, the paper is conceptual in scope and purpose. The case studies provide illustrative material but, in this paper no attempt is made to validate or triangulate any data through other empirical devices generally associated with case studies. The objective was to find illustrative reference points for the building of a conceptual approach to the study of entrepreneurial campuses and entrepreneurship education.

Frederick Jackson Turner’s “Frontier Thesis of the United States” (Turner, 2008) is used to construct a framework for understanding the university campus as an entrepreneurial ecosystem particularly at Hanyang but also at Essex. Both commonalities and distinctive features of the two different campuses are identified before drawing on the capabilities approach (Nussbaum, 2011; Sen, 1989; 1984) theory to augment Turner’s thesis in the context of research universities. The five propositions above are examined through the two case studies to address the two conceptual challenges referred to above. Secondary material is used to sketch the entrepreneurial university ecosystems of the two universities.

Epistemologically, the approach is constructivist in that use is made of inductive reasoning to build the analytical models for studying entrepreneurial campuses. In doing so qualitative research is carried out following Yin’s (2009) rationale for using case studies to understand complex, social but bounded phenomena (Gerring, 2004) or the application of new social constructs in unfamiliar settings. This helps to identify characteristics and patterns of evolving phenomenon that yield ideas, data, and interpretation with which to elucidate features of potentially a larger unit of similar phenomenon.

The entrepreneurial campus of the two universities constitutes the primary unit of analysis so that various features of this contemporary experience may be explored (Miller and Acs, 2016). The selection of the two universities is based on the specific excellence in experiential entrepreneurial knowledge creation (South Korea) and the social science driven excellence (Essex) in developing an entrepreneurship curriculum. The locations of the 2 institutions are markedly, different. Hanyang boasts of a thriving urban presence in the heart of Seoul, the capital of South Korea, a city known for its bustling economic prowess, while Essex is located in primarily rural environment in the east of England, not known for its entrepreneurial excellence. Essex has a diverse, internationally-oriented people-profile, while Hanyang’s essential Korean identity defines its organization. These differences provide for different capacities and capabilities. We account for both the commonalities and the differences but do not evaluate them against a common set of pre-ordained metrics to determine any possible hierarchy of entrepreneurial campus capacity or capability. Rather we offer them as illustrations to develop an analytical, internal ecosystem model with which to examine critically, different types of entrepreneurial campuses.

The Two National Contexts

South Korea

In the early 1960s, Korea pushed ahead with export oriented economic development plans. US support may have helped with the formulation of economic policy and exchange of know-how and strategy, but the growth of the Chaebols and the focus on technological advancement in Korea, are, essentially, part of the country’s own endeavours in economic advancement. We have a different formulation of assets, the granting of liberty and diversity, which is primarily locally driven. The focus on export-oriented policies led to the sharp growth of the Korean economy from the early 1960s to the late 1980s. Gross Domestic Product (GDP) increased by an average of more than eight per cent per year, from US$2.7 billion in 1962 to US$230 billion in 1989. Per capita GDP increased from US$103.88 to US$5,438.24 in the same period. This rapid growth of the Korean economy led to the country being called one of the ‘Asian Tigers’, along with Taiwan, Singapore and Hong Kong (KCIS, 2015). At present, the country has a number of industries that boast solid international competitiveness, such as shipbuilding, iron/steel and chemical industries. Hanyang University played an important role in the economic development of Korea by educating engineers focusing on technological innovation and technology transfer (Cho, 1994; Jones and II, 1980). Moreover, it was the first university in Korea to establish the Industry-University Cooperation Foundation, an organized program for cooperative research with industrial partners, in 2003. The foundation has built up a one-stop total incubating system from education, training, networking, incubating and investment, and research and cooperation to provide comprehensive and systematic support for startups. Figure 4 below shows the different components of the Foundation’s activities.

*Insert Figure 4 here*
The United Kingdom

Europe, and in particular, the United Kingdom, cannot boast of a similar frontier evolution to that of the USA. However, the exact opposite can be found in Great Britain’s ‘Britannia’ experience in the colonies. In moving out to the colonies, the English forged new identities through that experience even when the values of the establishment hierarchy carved out a position of enforced superiority over the colonized in Africa, Asia, the Caribbean and the Americas. Assets were plundered and looted, but access to land, spices, fabrics, minerals, gold and commodities, enabled creative combinations and economic opportunity development. None of this development could have occurred without the experience of the diversity of people, the environment, and the different sources of knowledge and technology that was obtained in the colonies. The UK’s unique experience has attracted in return the flow of talented migrants and creative organisations which dominate the landscape today. Britain’s academic entrepreneurial endeavours have been less spectacular with notable exceptions such as the Durham University spin-out, Applied Graphene Materials, Circassia Enterprise from Imperial College, and Fermavir, in Cardiff the company set up to commercialise the laboratory’s work on shingles treatment. Here too can be found an alternative formulation of assets, diversity and liberty, forged by a sustained effort at maintaining global connectivity, even if part of that involved egregious empire building and appropriation of the assets of others.

Illustrative Case Studies

A Sketch of the Entrepreneurial Ecosystem at Hanyang University, South Korea

Capacity Building

Hanyang University is a private research university in South Korea (hereafter Korea). The university began as ‘Donga Engineering Institute’, which was founded by Kim Lyun Joon in 1939, whose intention was to produce science and technology experts for the nation. The Institute expanded and was later renamed ‘Hanyang Engineering College’ in 1948, with the objective of contributing toward rebuilding the nation through practical education and technological expertise. The College continued to develop and was transformed into ‘Hanyang University’ in 1959, offering comprehensive education and training in various fields. Its main campus is in Seoul, and the second one, the Education Research Industry Cluster at Ansan (ERICA) campus, is located in Ansan, lies about 30 km southwest of Seoul. As of the end of 2017 32,065 students - 24,536 undergraduate and 8,529 graduate students in 2017- are registered under 24 colleges and 105 departments in two campuses. In 2015, it was ranked 1st for the number of CEO alumni of venture companies1 and it won the 'Best Practice Prize' in start-up support2 in 2016. In 2017, QS ranked Hanyang University 155th in ‘2017 QS World University Rankings’.

Entrepreneurial Capacity

Since Hanyang Industry-University Cooperation Foundation introduced major in entrepreneurship in 2015, its subject offering spread to twenty one practice focused start-up lectures, as described in Annex 1, and seven compulsory tech-major startup courses particularly organized for engineering college students. In addition, it organizes Hanyang Start-up Academy, Hanyang Tech Ventures, and Venture Business CEO Academy once a year. The education of Hanyang is designed to instill students’ startup drive and cultivate their competence by running a practical program such as start-up competitions, entrepreneurship camp, 3D printing education, idea realization and business development support, start-up festivals and company visits that students can participate in directly. Moreover, the university regularly offers networking and mentoring opportunities with successful entrepreneurs and the experts of diverse industries. It organizes every quarter Entrepreneur Forums, Mentoring Café and Alumni-Students Mentorship Program. The institute also provides venturing space for startup preparation and incubation which is sponsored by alumni and open to venture companies, startup clubs, and student entrepreneurs. Exchange and joint program with the entrepreneurship centers at home and abroad4 is also arranged to foster research and development of practice entrepreneurship. In sum, Hanyang University supports the students by offering practice based incubating system, regardless of their major. This practice oriented approach consisting of five elements - education, training, networking, incubating and investment, and research and cooperation - has enabled students to access a broad pool of innovation and entrepreneurship programs across diverse disciplines in line with a

2 Dong-A Daily http://news.donga.com/3/all/20160711/79125298/1 (July/12/2016)
3 QS World University Rankings https://www.topuniversities.comqs-world-university-rankings (Dec/13/2017)
holistic approach to entrepreneurship education (Mitra, 2013: 216), expanding assets, together with the freedom to pursue those assets.

The university established an open platform “Hanyang Startup Lounge” which provides easy access to shared information about startup support education, related programs, and mentor-mentee connection in 2009. In addition, it also provides business start-up support which is comprised of Global Entrepreneur Center, Entrepreneurial Lab and Technology Holdings Company.

The Global Entrepreneurship center has been established in 2009 by initiative of the alumni entrepreneurs and government support. The center aims at fostering not only prospective entrepreneurs, but also supporting established and students. In particular, the center provides Hanyang Tech Venture Program (HTVP) which directly support the entire cycle of startup, from the development to the commercialization of a new business model that combines the university technologies of next generation growth engine and unused ideas of large companies, as shown in figure 5 below.

Insert Figure 5 here

By doing so, it contributes to stable business development, securing intellectual property rights for startup items and enables startups to create a new business model combining university-owned technology and the unused ideas of large companies. Furthermore, startups have free access to entrepreneurial lab in where they can develop university-industry collaboration through technology commercialization. Furthermore, Hanyang holds seven Technology Holdings Companies in the field of Nano biotechnology, material components, software, semiconductor, Information and communications, energy and education, involved more than 30 % of the capital investment of the holding companies. It allows technology holding companies to commercialize the university’s technology and research, and to facilitate the formation of spinouts. Superb technology thus can be commercialized through the Technology Holdings Companies and direct investment.

Capability Development

Overall, Hanyang enjoys its urban settings in two campuses and strong alumni ties with financial supports on startup support systems. Their technology-oriented support systems and commitment to lecture freedoms promote wide-ranging entrepreneurship to students and entrepreneurs of early startups, and foster ‘prepared technical startup entrepreneurs’ trained with the live on-site experiences and practical insight of entrepreneurs.

Although Hanyang University has established diverse centers and organizational bodies to excavate alumni entrepreneurs and nurture the university’s entrepreneurial ecosystem, its capability (Sen, 2008; Robeyns, 2005) can be characterized as a top-down approach embedded in Korean industrial culture. To understand this point we first need to acknowledge the Korean Chaebol (large, family-owned Korean conglomerates) system which has had a certain influence on capability by investment especially in the assets and diversity of institutions. For instance, Chung Mong Koo (Chairman of Hyundai Motor Group, Graduated Industrial Engineering in 1967) is an alumnus of Hanyang University, and he invested 14 million USD and established “Chung Mong-Koo Automotive Research Center” in 2015. A basic idea is that ‘investment in universities → Securing source technology for future industry development → securing excellent manpower in basic technology research’. The research center is expected to be used as a space for cultivating technical experts who can design technology for future cars such as green cars and smart cars. However, the research center mainly supports selected startups in the field of mechanical engineering, electrical and electronics and IT software sectors. Second, the organization of Center for Global Entrepreneurship acts as the “control tower” for specific types of startup support operating as a closed control mechanism rather than as an open organization enabling different types of startups to emerge organically. Third, the Center for Global Entrepreneurship provides pre-defined goals and visions. For instance, the center aims to foster 30,000 startups generating 15 percent of GDP by 2030, without considering changes in external factors such as consumer demand, market trends and regulations.

A Sketch of the Entrepreneurial Ecosystem at the University of Essex, UK

Capacity Building

The paper’s second short case study is about a relatively small university in the UK. Established in 1963 as a public research university, the University of Essex received its Royal Charter in 1965. Its location at Wivenhoe, near Colchester in the county of Essex – a small urban oasis in a predominantly rural setting- does not reflect a presence in an environment of dynamic, innovative organisations (its smaller Southend campus is, however, is in an urban environment). The
The University of Essex has a strong entrepreneurial antecedent, with its roots in the 1960s and 1970s. The university’s entrepreneurial antecedents can be found in other forms of innovative and creative endeavour. Its international and diverse identity was forged in the smithy of radical thought and action in the 1960s as exemplified in the work of leading academic intellectuals in the fields of politics, economics, sociology and the diverse body of the student community. Together they created a rich, research-led resource environment of knowledge creation with a particular, but not exclusive, focus on the social sciences, and a dynamic action-oriented presence wedded to the values of diversity, freedom of thought and internationalization.

The 1970s saw the development of larger departments and relationships with local businesses, allowing it to attract substantial research grants which eventually led to the location of the British Household Panel Survey headquarters at the University in the 1990s and the Data Archive of the Economic and Social Research Council of the United Kingdom. The University is considered to be one of the top 2% of universities in the world by Times Higher Education World University Rankings with a particular track record as a provider of excellent research and teaching for over fifty years (THE, 2017). The University of Essex was rated in the top 20 in the UK in the Research Excellence Framework (REF 2014).

Entrepreneurial Capacity

The University established its first School of Entrepreneurship and Business (SEB) at its new Southend campus in 2004-5, with its first Professor of Business Enterprise and Innovation, marking another radical departure from tradition in higher education in the UK. The idea of an entire new school dedicated to entrepreneurship and innovation in business was a novel concept in the country, made possible by the prevailing vision of the university leadership for contributing directly to the region and the local community while establishing international links. A range of different programmes were developed to address a range of issues about entrepreneurship in different contexts, working as it were towards creating a new discipline.

The primary objective was to establish programmes which were thematically and sectorally focused and functionally oriented. The programmes reflected the messages obtained from market intelligence about the topics and themes. For example, 2005-6 was a critical point at which the creative industries were gaining ground in the UK economy. Similarly, international business activities were marked by highly entrepreneurial developments in the orientation, strategies and methods of operation of externally focused businesses with the rapid spread of globalization. This compendium of courses was offered to local and international students for the first time at Essex in the academic year 2005-6. Their key learning features included the critical resolution of organisational and environmental problems, coupled with resolution of personal development issues, with particular reference to new venture opportunities. Students could complete the programmes with either a research-based business plan for an organisation or a traditional dissertation. Underpinning the content, the processes, pedagogies and the assessment structures are three distinctive drivers. These drivers are the interpretation of entrepreneurship as value creation, the systemic or holistic approach to entrepreneurship education based on the idea that it is for all who sup at the table of creativity, endeavor and newness, and the mix of different pedagogies and tools with which to impart entrepreneurship education (Mitra, 2017).

Starting with three postgraduate Masters programmes on theories and practice of entrepreneurship and innovation, entrepreneurship in the public sector and creative industry innovation, the portfolio developed rapidly to cover diverse areas such as Marketing, International Business, Human Resources, Social Ventures and Small Business Management, all with an entrepreneurial twist. The SEB established the first PhD in Entrepreneurship Programme in 2005-6. Innovations continued with the creation of the University’s first ever Centre for Entrepreneurship Research in the same year, which has mutated into the Venture Academy, with its focus on applied R&D and action-research oriented projects with local and international ventures. The Centre attracted the first ever investment from a major Chinese medical devices company to explore innovative market entry strategies for Europe. The direct involvement of graduate students in these projects ensured the embedding of some of the project-based learning components in the academic programmes.

An early proliferation of programmes led over time to their inevitable consolidation coinciding with the merger of the SEB with the School for Accounting, Finance and Management in 2008 to form the new Essex Business School. The idea was to avoid possible duplication and redundant provision especially where content and methods could be integrated. The MSc programmes for the Creative Industry and Small Businesses were subsumed in the overarching MSc in Entrepreneurship and Innovation, together with the MSc in Entrepreneurship and Regional Development. What was lost in breadth was more than compensated by the reworking and the new richness of key programmes. Furthermore, new routes were explored with the introduction of entrepreneurship and innovation modules in the MBA programme leading to the its revision as an
Entrepreneurial MBA in 2013-14 highlighting the importance of the topic to modern day managers along with sustainability and internationalization.

**Capability Development**

While consolidation at the departmental level met departmental organizational priorities, proliferation of entrepreneurship education and extra-curricular activities has marked the University's motivation to support students and staff with alternative opportunities. These opportunities enable students to articulate and crystallize their learning gain through business plan competitions, participation in boot camps, counselling sessions, organized by the Employability Office. They sit alongside an entrepreneurship concentration through a Postgraduate Certificate programme in ‘Creating and Growing a New Venture' for all graduates of the University, offered by the Business School. Bio and Computing Science Masters students are able to opt for an elective on a similar but technologically biased course that allows them to develop entrepreneurial capabilities to complement their technological prowess. A separate initiative based on crowd sourcing and crowd funding enables any student to mobilise resources to develop and implement entrepreneurial projects of their choice and complement their graduate studies. The establishment of a new Innovation Centre together with an Incubation Centre enables the presence of new firms by students, staff and entrepreneurs from outside the University.

What we see emerging here is a new entrepreneurial ecosystem in the campus. Underpinning this development is the progressive integration of assets, freedom and diversity with the emerging capabilities of the students. A growing number of faculties (approximately 8) across the campuses are complemented by entrepreneurial colleagues from other departments and support staff from professional services. An increase in the involvement of guest lectures and visits is contributing to the forming of the necessary building blocks to help facilitate the achievement of capabilities. The holistic approach to entrepreneurship education in an entrepreneurial campus is summarized below in Figure 6.

*Insert Figure 6 here*

**Analysis and Discussion**

It may not be possible to generalise from the case studies but they offer insights into the types of agents, institutions, cultures, and resources that are contained in an entrepreneurial ecosystem, thus confirming the value of Proposition 1 (P1). More specifically they provide an understanding of what it takes to develop an ‘internal ecosystem’ that utilizes the capacity for entrepreneurial endeavor by developing capabilities for their realization, which suggests that Proposition 2 (P2) could be used for further critical examination of entrepreneurial campus ecosystems.

The assets are made up of the infrastructure, the people, the courses and the projects, but it also includes diverse governance structures enabling entrepreneurship to develop across the campus in different forms. The liberty and freedom is characterized in the openness, and decentralization of activities that have played a role in supporting entrepreneurial learning (multiple courses, concentrations, electives) and a strong sense of entrepreneurial value creation (entrepreneurial outcomes. They complement capabilities for research and teaching excellence) across the curricula and through sustainable resource mobilisation opportunities (dedicated institutional start-up funding at Hanyang and a crowd funding platform for entrepreneurial activities beyond business start-ups at Essex), enabling the realization of aspirations for entrepreneurial thought and action. Proposition 3 (P3) is, therefore, a viable consideration for developing entrepreneurial campus ecosystems.

Crucially, using this ecosystem approach helps with the realization of two very distinctive insights. First, the combination of capacity and capabilities help generate a range of activities across the campus, thus reinforcing the point about entrepreneurial campuses being defined by a clear entrepreneurial focus. Second, the ecosystem approach, allows us for the consideration of a holistic approach to entrepreneurship education which derives its meaning from multiple forms of provision enabling the realization of different sets of aspirations of its students and staff. The utilization of this ecosystem approach does, however, vary with the context.

In both institutions there has been a rapid escalation of entrepreneurial initiatives both organically as a direct manifestation of interest in entrepreneurship. In Hanyang in particular, the school’s leadership capitalized on a national start-up agenda to bolster its strong engineering and technology base, thus enabling a clear focus on technology –based entrepreneurship. The direction of travel for entrepreneurship here was to meet specific targets of the nation and the institution. To do that it
developed its capacity in terms of infrastructure, courses, funding, alumni support and pronounced government support to help their students to fulfill their aspirations for becoming technology entrepreneurs.

The case of Hanyang University offers insights into the types of agents, institutions, programs, and (internal and external) resources that are contained in an entrepreneurial ecosystem, thus confirming the value of Proposition 1 (P1). In addition to, it enhances an understanding of the ‘internal ecosystem’ by illustrating how Hanyang Industry-University Cooperation Foundation coordinates startup supports programs with the help of critical assets and the setting up of diverse agents across internal and external ecosystems, which is framed as Proposition 2 (P2). While technology-based entrepreneurship is a strategic choice of the university, the openness and range of entrepreneurial support measures centred round technology commercialization, bears testimony to a sense of liberty with key Korean characteristics. It is a form of functional liberty informed by the national economic agenda which is striving to redirect Korean’s economic future towards high technology entrepreneurship through start-ups from its previous reliance on Chaebol largesse and protection. The “functionings” of students and staff are moderated by this functional approach. Where, there is a correspondence between the technology and start-up -oriented “functionings” of individuals and the directed policy agenda for start-ups, there are significant opportunities for “achieved functionings” or capabilities. We could, therefore, argue that the Korean case does not fully support Proposition 3 (P3).

Hanyang University established a Korean-type of entrepreneurship education system, starting from startup practice courses, incubation, attracting investment, entering the global market and launched own education systems in Silicon Valley, New York, Shanghai, Beijing and Hanoi. In addition, it set up a Department Business Incubation and Integration in undergraduate and graduate school aiming at providing customized education particularly for the engineering college. Together with alumni entrepreneurs and government support, Hanyang university proactively supports entrepreneurs both inside and outside of campuses by offering them a wide range of opportunities to identify and achieve their ‘functionings’. Hence, the Hanyang case well demonstrates the potential value of Propositions 4 (P4) and 5 (P5) as it applies in a specific context.

Essex’s entrepreneurial campus development has a more organic trajectory. Its predominantly social science driven research and education profile raises questions about what entrepreneurship means and how it works from a critical perspective. However, the concentration of entrepreneurship education and knowledge exchange programmes in the Business School and in the computing and Bio Science departments have also provided for platforms with a more practical agenda. The mix probably, contains more of the hues of critical social science thinking with students learning about the extensive range of possibilities that lie in pursuing entrepreneurship as a subject of study. To be able to do this alongside typical social science majors, or as part of more traditional business subjects and science education, opens up opportunities for realizing a diverse set of “functionings”. Unlike Hanyang, Essex is not driven directly by a national policy agenda for start-ups. The encouragement for entrepreneurial activities remains a secondary objective finding articulation in the form of various policy exhortations about knowledge exchange, impact drawn from research (limited to the influence of research on practice but not the generation of practice from research).

It remains to be seen how the university ‘internal ecosystem’ evolves over time and space, and interacts with ‘external ecosystem’. Political regulation changes should be also considered in Korea, as the Moon Jae-In administration recognizes the importance of the roles of universities, relaxing some regulations and introducing new initiatives aimed at university startups (Forbes 2017).

Essex has a relatively low base of physical assets compared to Hanyang, but its asset base is wide with “soft” connotations in that attempts have been made to introduce entrepreneurship programmes and electives for non-business students. Its “soft” asset base is also diverse in that it has allowed for an approach to entrepreneurship which is as much about business start-ups and growth or technology- centred incubation, as it is about the creation of new ventures to address social ventures, the development of new pedagogies based on entrepreneurial outcomes to enhance learning, and entrepreneurial social projects that complement the study of traditional social science subjects. The entrepreneurial outcome is manifest in the development of new creative mind sets through the range of innovative, integrative, problem-solving, analytical, learning, and adaptive skills sets.

Hanyang and Essex are of course very different institutions as noted above. Their regional and national contexts and the systems of higher education are all relatively important to the making of entrepreneurial ecosystems. Hanyang’s well-established engineering and technology focused internal ecosystem owes its success to many years of engagement with
state policies and economic agendas, coupled with significant levels of involvement with the business and alumni community. It has carved out a unique regional national position in entrepreneurial campus history in Korea. It appears to have established a balanced portfolio of excellence in teaching and outreach (start-up building) supported by applied research, acknowledging the importance of entrepreneurship as both a systemic necessity and a form of institutional achievement. By combining different sub-disciplinary and stakeholder interests oriented around the making and selling of high technology products and services the entrepreneurship ecosystem, has benefited students and staff in creating new combinations of capacity and capability specific to its needs. Essex is carving out its approach to creating its own ecosystem as a much younger institution through staged developments. Starting first with the success of its academic programmes in entrepreneurship it is now expanding both its capacity and its capabilities for a unique campus, entrepreneurial ecosystem. It faces challenges in the enforced national structures of the Research Excellence Framework (REF) and the putative Teaching Excellence Framework (TEF) which do not recognize the varied outcomes afforded by an entrepreneurial ecosystem.

A summary of the findings from the analysis above is provided in Table 2 below:

Insert Table 2 here

Concluding Observations

The holistic approach for the creation of a fountain head for entrepreneurial learning prevails at different levels and various contexts in both institutions. This is made possible through strategies for developing internal ecosystems. In doing so both universities have addressed the two challenges posed at the beginning of this paper: a) an understanding the higher education campus as an entrepreneurial campus ecosystem (an internal ecosystem) within which entrepreneurial activities, find their role; and b) taking entrepreneurship to mean more than new business creation, helping to develop new mind sets for effecting change in work and as citizens. In providing for the key assets, encouraging liberty of thought and expression and promoting diversity of people, ideas and practice, both universities enable capabilities for economic, social, cultural and personal value creation. Figure 7 below attempts to capture diagrammatically the essence of our arguments about the links between capacity and capabilities for the development of a conceptual framework for ecosystems based entrepreneurial campus.

Insert Figure 7 here

What differentiates the two institutions is the focus on Hanyang’s contribution as an incubator for Korea’s start-up agenda, or a policy driven agenda to create a distinctive entrepreneurial campus, and the organic evolution of entrepreneurship education and learning contributing to a particular type of entrepreneurial campus, at Essex. While the former harnesses technological capacity to generate entrepreneurial capabilities, Essex, enables potential mind set change using its learning capacity to create entrepreneurial possibilities.

The model for an internal ecosystem closely linked to an external ecosystem should be useful for universities to determine how entrepreneurial thinking and action can help create entrepreneurial campuses. Rather than an exclusive focus on new business creation through specific, and often isolated instruments, the idea is to examine the whole campus as an entrepreneurial unit of analysis. Such a holistic approach to entrepreneurship breaks down silos of research, teaching and knowledge exchange by augmenting it with the equally strong outcome of entrepreneurial endeavor. This could also support university management in creating new pathways to the enterprise of learning, decentralized administrative structures and openness to capacity and capability building. The application of this approach could accommodate the harnesing of very specific capabilities such as those for technology-based start-ups, as in Hanyang, or an organic, mind set development approach leading to many different manifestations of entrepreneurship in society.

Researchers could use the five propositions in this paper to test empirically new combinations that create entrepreneurial campuses through capacity and capability building identifying what is relevant and appropriate in different contexts. The paper opens up possibilities for further research on entrepreneurial universities and their impact on learning, institutional change and opportunity development. A direct contribution is made in this paper by way of the augmentation of entrepreneurship education and development in the campus through the advocacy of an internal ecosystem approach to both campus development and entrepreneurship education with a close, symbiotic link between the two.
Finally, both education and economic policy could provide for better solutions to growth and development through the use of the ecosystem framework and the novel approach to campus entrepreneurship. Rather than be hamstrung with notions of increased capital and revenue spending for greater impact with shrinking resources, and limited appreciation of accelerating changes to the ways we learn and think in the digital age, policy makers could open up opportunities for universities to redefine themselves in terms of both the Humboldtian vision of all around education together with experiential learning, fostering the diversity of knowledge assets with which to make a real impact on the wider economy.

References:


[22] Miller, D.J. and Z.J. Acs (2017) ‘The Campus as Entrepreneurial Ecosystem: the University of Chicago, George Mason University, Fairfax, Virginia; March


[34] Sen, A. (1999), ’Development as Freedom’, New York, Knopf


Annex 1. Tables

Table 1: Start up Lectures

<table>
<thead>
<tr>
<th>Subject Name</th>
<th>Unit Credit</th>
<th>Pracicum Hours</th>
<th>Category</th>
<th>Year (Recommended)</th>
<th>Offered Semester</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Center for Global Entrepreneurship</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Core Foundation</td>
<td>All years</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Startup Talk Concert</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Core Foundation</td>
<td>All years</td>
<td>All semesters</td>
</tr>
<tr>
<td>Startup Basic: Understanding and utilizing of 3D Printing</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Core Foundation /Major Intensive</td>
<td>Second year</td>
<td>All semesters</td>
</tr>
<tr>
<td>Startup Basic: Understanding of Culture and Art Industry</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Core Foundation /Major Intensive</td>
<td>Second year</td>
<td>All semesters</td>
</tr>
<tr>
<td>Course</td>
<td>Credits</td>
<td>CI/CR</td>
<td>Requirement Type</td>
<td>Year</td>
<td>Semester</td>
<td>Center</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>------------------</td>
<td>------</td>
<td>------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Startup Basic: Startup and Center for Global Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Advanced Practice: Actual Startup Workshops</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Practice 2</td>
<td>3</td>
<td>0</td>
<td>Core Foundation/Major Intensive</td>
<td>Second</td>
<td>Semester 2</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Advanced Startup: Global Startup Seminar</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Intensive</td>
<td>Third</td>
<td>All semesters</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Advanced Startup: Startup A to Z</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Intensive</td>
<td>Third</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Practice: Strategy of Financing and Investment</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Third</td>
<td>All semesters</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Techno-Business Administration (Startup Capstone Design)</td>
<td>3</td>
<td>3</td>
<td>Required Foundation</td>
<td>Second, Third</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Basic: Design Thinking</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Advanced Startup: Finance and Law for Startups</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Third</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Advanced Startup: Patents and Creative Business Strategy</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Third</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Practice: Campus CEO</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Intensive</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Practice 1</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Intensive</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Practice: Capstone Design</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Requirement</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Startup Basic: Business Strategies of Successful Korean Entrepreneurs</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major Intensive</td>
<td>Second</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
<tr>
<td>Advanced Startup: Cooperatives and Startup</td>
<td>3</td>
<td>3</td>
<td>Core Foundation/Major</td>
<td>Third</td>
<td>Semester 1</td>
<td>Center for Global Entrepreneurship</td>
</tr>
</tbody>
</table>
Students who have not applied for major in Center for Global Entrepreneurship can also take classes as their core courses.

Table 2: Comparison of Internal Ecosystems of Hanyang and Essex Universities

<table>
<thead>
<tr>
<th>Ecosystem Constituents</th>
<th>Essex</th>
<th>Hanyang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>Social Science base; Research base</td>
<td>Technology &amp; Engineering base;</td>
</tr>
<tr>
<td></td>
<td>with new knowledge exchange base; Technology &amp; Engineering base;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experiential knowledge baseline;</td>
<td>Experiential knowledge baseline;</td>
</tr>
<tr>
<td></td>
<td>technology infrastructure; start up courses; strong government &amp; alumni support</td>
<td>technology infrastructure; start up courses; strong government &amp; alumni support</td>
</tr>
<tr>
<td>Liberty</td>
<td>Entrepreneurship as Social Science; Research driven agenda; dispersed decision making</td>
<td>Entrepreneurship as experiential knowledge; Centralised with functional branches</td>
</tr>
<tr>
<td>Diversity</td>
<td>International Community; large race &amp; gender diversity</td>
<td>Largely local &amp; aimed at local start-up capability; gender diversity</td>
</tr>
<tr>
<td>Capabilities as Achieved Functionings</td>
<td>Entrepreneurship as embedded in social learning system; open ended</td>
<td>Entrepreneurship as start up capability; policy impetus</td>
</tr>
</tbody>
</table>

Annex 2: Figures

Figure 1: The Entrepreneurial Ecosystem of Research Universities: The Internal and External Ecosystem Interface:
Source: partly adapted from Miller (2016) cited in Miller and Acs (2017)
Figure 2: The Capability Approach: An Interpretation

Adapting Sen’s Capabilities Approach

Capabilities

An Evaluative Space

Agency function is transformational

Achieved Functionings

Choice within defined constraints

The External Ecosystems

Available Assets

Courses, extracurricular and cocurricular options, peers, faculty, alumni, networks, research labs, libraries

Liberty

Dispersed decision making, freedom of research and field of study, extracurricular choices, part-time/full time executive options, transfer systems

Diversity

Ethnicity, race, class, place of birth, age, education levels, political ideologies, regenerating youthful population, visiting scholars, adjuncts

Unachieved Functionings

Negative emotions and Mental Health Problems (stress, anxiety and depression)

Source: Authors

Figure 3: The Frontier Campus and its Internal, Entrepreneurial Ecosystem

Functionings and Capabilities

Entrepreneurs

Entrepreneurial Support service Providers

Entrepreneurial Policy Makers

Entrepreneurial Researchers and Acedemics

Entrepreneurial Citizens

Source Authors
Figure 4: The Industry-University Cooperation Foundation and its linked Activities.

Source: Authors

Figure 5: Business start-up support, Hanyang University: One Stop Incubation System

Source: Authors
Figure 6: A Holistic Framework for Developing an Entrepreneurial Campus through Entrepreneurship Education

Source: Mitra (2017)

Figure 7: Towards a Conceptual Model of an Ecosystem Model for the Entrepreneurial Campus

Source: Authors