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Description	

Japanese Policy and Programs for the Fostering of Global Entrepreneurs

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Abstract

Knowledge plays a more important role in promoting entrepreneurship in the current information-led society than it did during the age of industrialization. Many recent studies found that entrepreneurship stimulates and generates innovation and economic growth. In response to the issues of long-term low growth, the Japanese government implemented several policies to encourage universities initiate entrepreneurial activities. This paper examines Japanese policies since 2014 that support universities in providing various programs for developing global entrepreneurs. Thirteen academic institutes were beneficiaries of three-year funding since the fiscal year of 2014. Each university designed its own educational programs according to their own contexts, built various forms of innovation ecosystems with domestic as well as international partner organizations, and offered entrepreneurship training courses or innovation workshops for companies to sustain its programs through broadening their funding bases. Due to the interdisciplinary nature and short history in operating the programs so far, it is difficult to evaluate the effectiveness of the programs. However, each participating university accumulated knowledge and experience while carrying out their various programs, suggesting important new directions for policymakers and education program designers in facilitating entrepreneurship and innovation.

Keywords

entrepreneurship education, global entrepreneurs, Japanese policy on entrepreneurship, national innovation system

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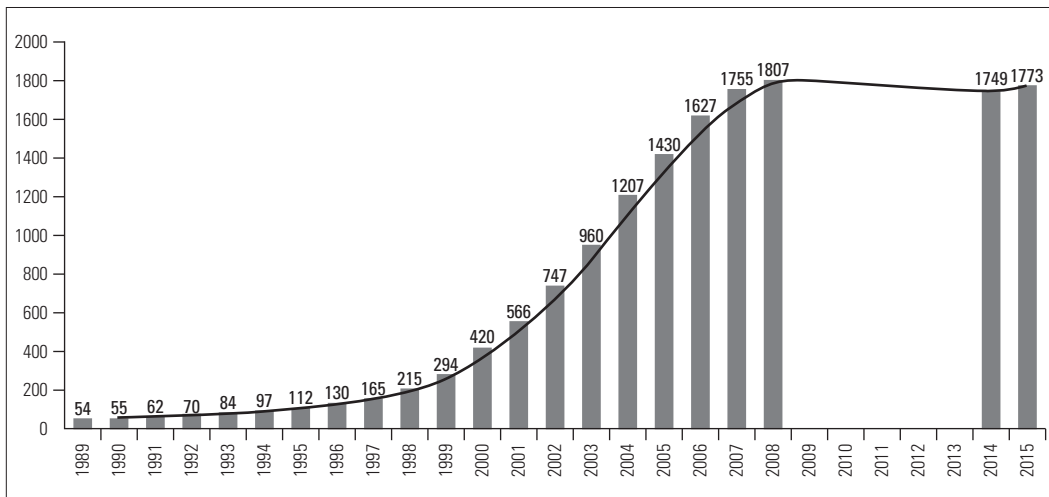
1. INTRODUCTION

1.1. Background

Despite their tremendous contribution to technological or theoretical innovation, academic institutions have been criticized for being slow to respond to rapid changes in the marketplace. There were numerous attempts to shift the focus of academic institutes from the ivory tower to entrepreneurship. Facing long-term low growth, the United States government enacted the Bayh-Dole Act in 1980 to provide incentives for universities to increase patenting. Shane (2004) studied the effectiveness of the Bayh-Dole Act, concluding that regardless the controversies on its effect on university patenting, the Bayh-Dole Act successfully encouraged universities to take an important role in the national innovation system of the United States.

Japan also experienced long-term economic stagnation since the end of the bubble era of the 1990s. In response, the Japanese government implemented a number of policies supporting university-led innovations since the late 1990s. The Act on the Promotion of Technology Transfer from Universities to Private Industry (the TLO Act) of 1998 and the Act on Special Measures for Industrial Revitalization of 1999 were enacted to apply the US model of the Bayh-Dole Act to Japan. In 2001, Minister Takeo Hiranuma of the Ministry of Economy, Trade and Industry (METI) announced the Hiranuma Plan to create 1,000 university-originated ventures within three years, focusing on four sectors: information technology, environment, biotechnology, and nanotechnology (Lynskey & Yonekura, 2003). METI budgeted ¥47.6 billion in 2002, ¥47.4 billion in 2003, and ¥61.7 billion in 2004 for the Hiranuma Plan (Walsh, Baba, Goto, & Yasaki, 2008). As results, the Hiranuma

FIGURE 1. Number of University Ventures (1989-2015)



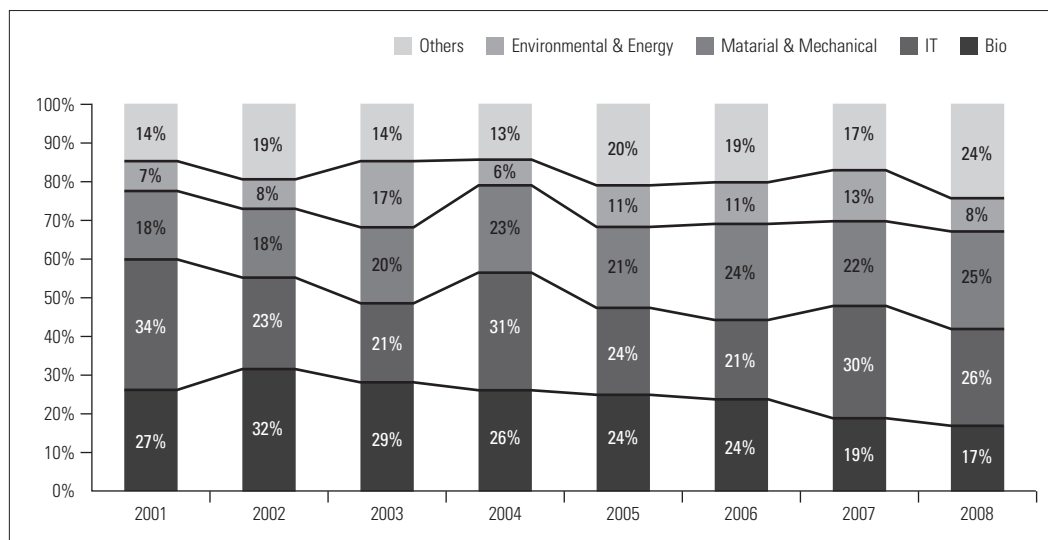
Source: Nomura Research Institute (2015; 2016)

Note: 2009-2013 data is not available in the source because the report did not specify the year of 723 ventures that closed its business during those 5 years, while the numbers of newly established ventures are specified as follows: 59 in 2009; 72 in 2010; 84 in 2011; 86 in 2012; 64 in 2013.

Plan successfully achieved its goal (Figure 1). Since the enactment of the Hiranuma plan in 2001, universities encouraged the commercialization of their research results. Although it contributed to building an ecosystem of university-industry collaboration, the sustainability of these start-ups remain controversial. After the government decreased its support for university ventures, the number of established businesses declined significantly, and at the same time, many university ventures went bankrupt as a result of this cut-off in governmental subsidies.

In addition, the policy marginalized disciplines outside of the four main sectors of information technology, environmental technology, nanotechnology and biotechnology (Figure 2). Also, the policy was criticized for encouraging university professors to establish ventures that may lead to the neglect of academic duties. The commercialization and licensing of research results could contradict the primary mission of academic institutions, which is to create and disseminate knowledge through research and teaching (Shane, 2004).

FIGURE 2. Sectoral Classification of the University Ventures after the Enactment of the Hiranuma Plan



Source: Working paper on the university-led venture, Ministry of Economy, Trade and Industry, 2009
Available at the website <http://www.jst.go.jp/startevent/20121022/kt02.pdf>

Therefore, a different approach is required to support the role of academic institutes in the nation's innovation system. In this era of knowledge-based economies, universities play an important role in initiating innovations. Clark (1998) proposed the concept of the entrepreneurial university: "pushed and pulled by enlarging, interacting streams of demand, universities are pressured to change their curricula, alter their faculties, and modernize their increasingly expensive physical plant and equipment—and to do so more rapidly than ever" (p. xiii). Especially in the engineering school, Felder, Woods, Stice, and Rugarcia (2000) noted that traditional instructional methods are not adequate for

equipping engineering graduates with the knowledge, skills, and attitudes required of them in the coming decades. In response to those criticisms and social needs, a number of research centers and departments during the last decades were established that focused on innovation or entrepreneurship for social change.

Compared to European and North American countries, few studies exist on entrepreneurship education for national economic growth or creating entrepreneurial mindsets in Asian countries. The Japanese government presented many policies regarding university-led innovations, and this paper reviews one of the most recent policies, which is the three-year program “Enhancing Development of Global Entrepreneur” conducted from 2014 to 2016.

1.2. Theoretical Foundation

While the importance of entrepreneurship and innovation dramatically increased in recent years, linking entrepreneurship to innovation and growth is not an easy task because entrepreneurship itself is a multifaceted, complex social and economic phenomenon (Audretsch, 2004). To understand how to encourage entrepreneurship to promote innovation, this subsection examines the definitions of innovation and entrepreneurship and reviews previous studies of entrepreneurship policies and entrepreneurship education.

1.2.1. Entrepreneurship and Innovation

There are various definitions of innovation. In early studies, Schumpeter (1934) defined innovation as new combinations of existing resources, which are economically more viable than the traditional way of doing things. As an economist, he emphasized the commercialization role of innovation which differentiating it from invention. However, innovation is not limited to markets. Brown (2008) suggested the concept of human-centered innovation, which is powered by a thorough understanding and the direct observation of what people need in their lives. Baregheh, Rowley, and Sambrook (2009) collected sixty definitions of innovation from literature in various disciplines.¹ They analyzed the frequency of words which appeared in each set of definitions and found that the “new” has been repeated seventy-six times where there are only sixty definitions of innovation. Davenport (1993) defined innovation as the introduction of something new. Similarly, Tidd and Bessant (2013) defined innovation as a process of turning opportunity into new ideas and of putting these into widely-used practices.

Despite its importance, innovation is difficult to accomplish, and entrepreneurship is needed to facilitate the innovation process. According to Schumpeter (1947), entrepreneurs are the very

¹ Eighteen definitions from business and management (1966 to 2007); nine definitions from economics (1934 to 2004); six definitions from organization studies (1953 to 2008); nine definitions innovation and entrepreneurship (from 1953 to 2007); thirteen definitions from technology, science and engineering (1969 to 2005); three definitions from knowledge management (1999 to 2007); and two definitions from marketing (1994 to 2004).

agents of innovation, and they are not necessarily motivated by profit but regard it as a standard for measuring achievement or success. Kao (1993) defined entrepreneurship as the process of doing something new and something different for the purpose of creating wealth for the individual and adding value to society. Audretsch and Thurik (2001) noted that entrepreneurship generates growth because it serves as a vehicle for innovation and change. In the globalization regime, more and more enterprises are broadening their business worldwide, and entrepreneurs cross borders to be competitive and to discover new opportunities (Isenberg, 2008).

1.2.2. Entrepreneurship Policies for Education

Public policies must promote entrepreneurial activities for economic growth. Entrepreneurship policy stimulate entrepreneurship, aiming at the pre-start, startup and post-startup phases of the entrepreneurial process, designed and delivered to address the areas of motivation, opportunity, and skills, with the primary objective of encouraging more people to start their own businesses (Lundström & Stevenson, 2001). To promote entrepreneurship policies, entrepreneurship education is necessary. Alberti, Sciascia, and Poli (2004) defined entrepreneurship education as the structured and formal conveyance of entrepreneurial competencies such as the skills, concepts and awareness used by individuals during the process of starting and developing growth-oriented ventures.

There are several studies demonstrating entrepreneurship education's enhancing of students' entrepreneurial self-efficacy (Zhao, Seibert, & Hills, 2005), entrepreneurship career intention (Krueger & Brazeal, 1994; Tkachev & Kolvereid, 1999), and entrepreneurial abilities and skills (Gibb, 2002; Kuratko, 2005). Peterman and Kennedy (2003) demonstrated positive relationships between exposure to entrepreneurship education and the desirability and feasibility of starting a business, as well as changes in perceptions. However, Oosterbeek, Van Praag, and Ijsselstein (2010) found a negative impact of entrepreneurship education on the students' intention to become an entrepreneur.

Stimulating entrepreneurship is difficult because entrepreneurship policy and entrepreneurial education are still in the relatively immature stages. However, while entrepreneurship gained interest and research attention in the last couple of decades, it is not a new concept. Notably, the origin of entrepreneurship education can be found in Japan. McMullan and Long (1987) assert that Professor Shigeru Fuji of Kobe University in Japan pioneered the applied education in entrepreneurship in 1938 for the first time in the world. However, while many western countries increased and developed entrepreneurship education since the 1960s, Asian countries have generally neglected to research entrepreneurship education in the academic world.

According to Hofer and Potter (2010), twenty-three OECD member countries have thirteen years of research or teaching experiences in entrepreneurship education on average. More and more universities developed entrepreneurship education to support start-ups, but almost all published studies on entrepreneurship education are based on experiences in Europe and the US. Thus, there is a strong need for a study on entrepreneurship education in Asian countries. This paper examines one of the most recent entrepreneurship policies in Japan that supports entrepreneurial education at the university level.

1.3. Research Objectives

This study focuses on how educational programs are designed to foster entrepreneurial development through policies enacted by the government and led by universities. Specifically, this study aims to do the following:

First, it reviews major educational programs led by the thirteen universities under the Enhancing Development of Global Entrepreneur (EDGE) program planned by the Ministry of Education, Culture, Sports, Science and Technology. It also describes how these programs are designed and the progress and performances of these programs. As a result, this study builds towards a knowledge base for developing educational programs for fostering entrepreneurs. It describes the details and current statuses of the programs lead by universities, examining their significant results and the structures of the programs. In addition, it explains how these programs contributed to shaping the innovation ecosystem in Japan. Finally, this study provides implications for academic institutions as well as policymakers for promoting innovation and fostering entrepreneurs.

2. OVERVIEW ON THE PROGRAM OF ENHANCING THE DEVELOPMENT OF GLOBAL ENTREPRENEURS IN JAPAN

With the transition from traditional to new economies, innovation has become a key driver for national growth. In response, the Japanese government has enacted several policies to foster innovations, such as the Promotions of Technology Transfer from Universities to Private Business Operators Act and the Small and Medium-size business Innovation Research System Act in 1998, and the Special Measures for Industrial Revitalization Act, the new Small and Medium Enterprise Basic Law, and the Law for Facilitating the Creation of New Business in 1999.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) enacted and launched a number of policies for building infrastructure for innovations in Japan. The beneficiaries of these policies range from those wishing to be future scientists (such as junior high school students) to those who are currently working in the science and technology research field (Table 1).

TABLE 1. The MEXT Projects for Fostering Leaders in Science and Technology (2014-2016)

Beneficiaries	Project Title	Details	Budget (mil. JPY)		
			'14	'15	'16
Post-doctoral researchers, Doctoral students	Fostering top leaders who will contribute to the growth of Japan	Establishing systems for excellent researchers	-	-	1,000
		Building consortiums for fostering leaders in science and technology	1,027	1,327	1,327
		Increasing of tenure-track faculties for hiring young scholars	3,419	2,084	1,225
	Consolidating the conditions for independent research of excellent young researchers	Program for fostering project managers(PM)	-	100	140
		Research fellowship for special researchers (including foreigners)	17,183	16,770	16,319

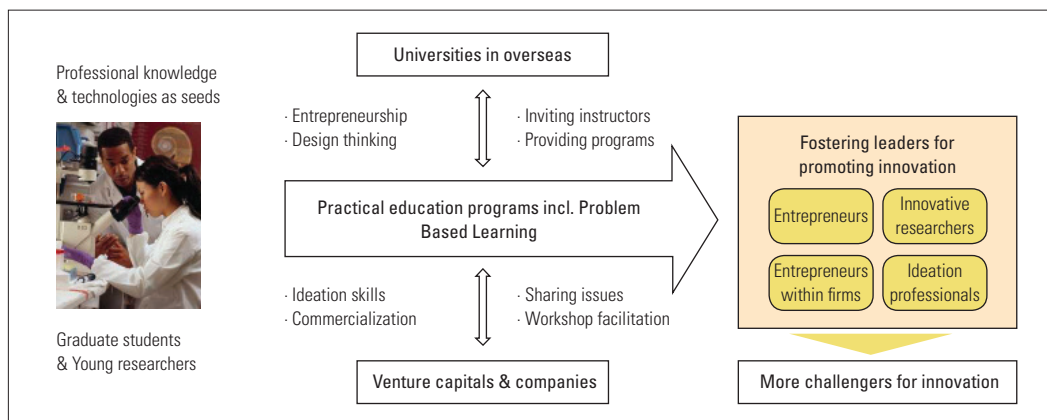
	Enhancing research ethics	Educating guidelines for research ethics	55	118	114
Women researchers	Initiative for the diversity of research circumstances	Supporting women researchers' work-and-life balance for childcare and maternity leave	984	1,088	1,088
	Restart Postdoctoral Fellowship	For those who suspended research for maternity leave	652	760	869
Graduate & Undergraduate students	Enhancing Development of Global Entrepreneurs	Fostering innovators by providing diverse educational programs	907	865	705
High school & junior high school	Super Science High School	Science contest for high school and junior high school students	3,200	2,962	2,155
		Global science campus		580	625
	Support for female students wishing to become scientists	Advising female students in high school and junior high school to choose science and technology majors	15	15	30

Source: MEXT (2015; 2016)

Among these policies, this paper covers a three-year (2014-2016) program called Enhancing Development of Global Entrepreneur (EDGE), which aims to encourage entrepreneurship, promote skills, and knowledge for commercialization, and inspire students and young researchers to find innovative solutions for diverse issues. This program supports universities in designing and implementing education programs that encourage students to take a global view on issues and integrate interdisciplinary knowledge. The universities foster leaders who are able to identify issues on their own, find solutions through approaches that integrate the liberal arts, sciences, and technologies, and realize the results of research through the collaboration of students from diverse backgrounds. In addition, people who have experience in industries as researchers or managers take active roles as advisors or coordinators of various projects.

MEXT budgeted ¥907 million in 2014, ¥865 million in 2015, and ¥702 million in 2016 to support these educational programs as well as to build human and organizational networks through collaboration with venture-related institutions, overseas institutions, and private companies, for shaping a sustainable innovation ecosystem (Figure 3).

FIGURE 3. Overview of the EDGE Program



Source: MEXT (2014)

Out of fifty-five proposals, the project proposals of thirteen academic institutes were accepted as beneficiaries of three-year funding since the fiscal year of 2014. Each university designed its own educational programs and has run them since 2014 (Table 2).

TABLE 2. The List of 13 Universities Selected for the EDGE Program

University	Project title	Proposed by
The University of Tokyo	Fostering leaders for global innovation	The i.school program at the Center for Knowledge Structuring
Tokyo University of Agriculture and Technology	Fostering innovative leaders by implementing in industries	The Innovation Advancement Organization
Tokyo Institute of Technology	Cross Boarder Entrepreneur Cultivating Program	Global entrepreneur office, Department of Industrial Engineering & Management, Graduate School of Decision Science and Technology
Shiga University of Medical Science	The iKODE global entrepreneurship program	Biomedical Innovation Center
Kyoto University	Global technology entrepreneurship program	Graduate School of Management
Osaka University	World Tekijuku* Groundbreakers	Office for University-Industry Collaboration
Nara Institute of Science and Technology	Global Entrepreneurs in Internet Of Things	Graduate School of Information Science
Hiroshima University	Hiroshima Entrepreneurship program	Center for Collaborative Research & Community Cooperation
Kyushu University	Shaping the ecosystem for global innovative leaders	Robert T. Huang Entrepreneurship Center (QREC), in collaboration with Faculty of Design; Faculty of Medical Sciences; University Hospital; Center for Advanced Medical Innovation; Business School; Faculty of Information Science and Electrical Engineering
Osaka Prefecture University	Community-based sustainable innovation ecosystem	The Industry-University Cooperative Center of Advanced Education at the Research Organization for 21st Century
Keio University	Global Innovator Acceleration Program	The Graduate School of System Design and Management
Waseda University	Co-creation for building an innovation ecosystem	Faculty of Science and Engineering; Faculty of Commerce
Ritsumeikan University	Program for the Cultivation of Innovation Architect	EDGE+R Program Office

Note *: Tekijuku was a "place of learning" established by the doctor OGATA Koan in the 19th century, a school where many ambitious young people from all over Japan gathered to learn with the spirit of "responsible ethics, concern for people, for society"

Source: The EDGE Program, Ministry of Education, Culture, Sports, Science and Technology, Japan

In addition, the thirteen selected schools share the knowledge and networks that form their individual foundations while independently polishing the content and quality of their distinctive educational programs, and in doing so aim to enhance the quality of innovation education and entrepreneurship education and create an innovation ecosystem in Japan.

3. CASE STUDIES ON THE PROGRAMS DESIGNED BY EACH UNIVERSITY

3.1. Data Collection

Carrying out the research objectives stated in the previous section, this study is a case study that collects basic information and knowledge through reviewing the major activities of each university, holding workshops, and interviewing educational program designers. Supported by government policies on enhancing the development of global entrepreneurs, the thirteen participating universities provide various types of programs according to their own contexts. More detailed information on the programs is provided in the Appendix.

3.1.1. The University of Tokyo: Educational Programs for Human-Centered Innovation

Prior to launching the EDGE program, the Center for Knowledge Structuring at the University of Tokyo established the i.school program in 2009 with the aim of fostering innovative leaders. It provides innovation workshops using its own workshop design methods. “Innovation” in this case means not only conventional conceptions of technology-driven innovation but also the creation of any kind of new values: the adding of value through introducing new ideas, methods, directions, opportunities, and solutions that meet new requirements through more effective products, processes, services, and technologies that are readily available to users. Major beneficiaries of the educational programs offered by i.school are undergraduate students and students in masters programs. In addition to this, EDGE program in the University of Tokyo expanded its beneficiaries to young researchers and faculty members of universities.

To cope with recent changes in academia such as fewer academic positions compared to the increasing number of PhD candidates, researchers in PhD programs or postdoctoral positions need to promote their skill sets and mindset for becoming global entrepreneurs. The EDGE programs of the University of Tokyo by encouraging researchers to create new knowledge in interdisciplinary fields aim to foster young researchers who are specialized and knowledgeable in their research fields, but also open-minded and flexible enough to collaborate with industry researchers. Forty-three researchers participated the workshop in the fiscal year of 2015.

In addition, the program includes a facilitator program provided twice a year since 2015 educating faculty in universities to become innovative educators and to disseminate the i.school innovation workshop programs to other academic institutes. About twenty faculty members from all over the country participated in each workshop and developed the workshop design processes according to their contexts.

Also, as a leader of all thirteen participating universities, the University of Tokyo organizes collaborative projects such as EDGE Innovation Challenge Competition and EDGE Symposium.

3.1.2. Tokyo University of Agriculture and Technology: Innovation Leader with Entrepreneurship

The Tokyo University of Agriculture and Technology established the Innovation Advancement Organization in 2010 to foster innovative leaders who have the professional knowledge to propose solutions to agricultural issues in the twenty-first century, such as food, water, environment, population, and infectious diseases. Since being selected as an EDGE community member, it provides pragmatic educational programs to foster innovative entrepreneurs who can develop business plans based on their research results. It built an innovation ecosystem with over twenty universities in Japan, venture capitalists, manufacturing industries, distribution industries, think-tanks, and top overseas talent. For example, it built a team of professionals from industry and doctoral students enrolled in the EDGE program. Through this network, student researchers could meet investors who were interested in their business plans, and researchers from the companies could improve the students' project while benefiting from the new ideas from students.

Students are expected to create proposals that go beyond existing standard of values, and propose and realize new values to society through collaborative works with professionals in businesses and specialists, local communities, and overseas organizations. To fulfill this expectation, various educational programs are provided as shown in the Appendix.

3.1.3. Tokyo Institute of Technology: Teamwork-Oriented Entrepreneurship

The Tokyo Institute of Technology established the Global entrepreneur office in collaboration with the Department of Industrial Engineering and Management, and the Graduate School of Decision Science and Technology. In addition, it launched the techno-entrepreneur course in the Career Advancement Professional School to recruit participants with diverse backgrounds such as industries, business schools, and engineering schools. The project is titled "Cross Boarder Entrepreneur Cultivating Program" and it provides a one-year course based on design thinking, PBL (problem-based learning), theoretical and practical entrepreneurship classes, seminars, and "start-up weekend" events that motivate students to become global entrepreneurs.

The "start-up weekend" provided every year focuses on technology driven startups. Eighty people participated in the first year, while thirty people participated in the second year due to the capacity of venue. The participants ranged from fourteen-years-old middle school students to entrepreneurs. It presented cutting-edge technologies such as an acoustic pressure level calculator, new material that changes its color according to the level of oxygen, an ERF micro-actuator, osmotic pressure electricity generation, a CO2 generator, a force sensation device, and paint that changes color according to exposure to ultra-violet lights.

3.1.4. Shiga University of Medical Science: Design Thinking for Medical and Engineering Collaboration

The Shiga University of Medical Science established the Biomedical Innovation Center in 2006 to promote research results from the medical school. Since the launch of the EDGE program, the school has offered practical courses for fostering global entrepreneurs specialized in medical engi-

neering through design thinking that links consumer perspective to products and services development, and regulatory science which refers to safety evaluation concerning medicines and medical equipment as well as pharmaceutical regulations. Its EDGE program is titled “iKODE global entrepreneurship program,” with “iKODE” standing for “igaku, kougaku, design,” which means faculty of medicine, engineering and design in Japanese.

Through a two-day “healthcare hackathon,” students develop innovative ideas that could solve social issues caused from dementia. For example, one team suggested a “sound service for nursing” that entertains patients and their families.

3.1.5. Kyoto University: Next Generation University-Originated New Business Creation Platform

The Graduate School of Management at Kyoto University established its Global Technology Entrepreneurship Program (GTEP) for students and young researchers’ expertise in technologies to encourage them to create businesses by training skillsets and mindsets. The courses are designed to cover basic knowledge acquisition through lectures to practical entrepreneurship education and coaching for creating a business by students themselves. To encourage students to create a new business with global perspective, it cooperates with researchers with diverse backgrounds, specialists from industries, and venture capitalists.

In its annual performance assessment session, students have to demonstrate their business plans as a group presentation. In 2015, four business plans were presented: a prototype of a robot that can play as a sub-session for those who enjoy playing guitar alone, but want to perform as a band; a mobile application that can improve colonic issues for women in their 20s, 30s and 40s; devices that can adjust the level of alcohol and scent of beverage for those who want to drink customized alcohol according to their tastes; and a prototype of website that introduces the Kimono, the Japanese traditional dress. After the demonstration, two teams were selected as the winning teams and were offered intensive training for starting their business.

3.1.6. Osaka University: Social Implementation of Research Results

Osaka University established the Office for University-Industry Collaboration in 2008 to promote collaborative research with industries. It titled its project for the EDGE program as “World Tekijuku Groundbreakers,” because the origin of Osaka University is the private school called “Tekijuku” founded in 1838 that contributed a great deal to the modernization of Japan. To rehabilitate the “Tekijuku,” it built an industry-university ecosystem that supports the contribution of the research results of the university to society. Fifty mentors or advisers from thirty companies including venture capitals participated, and more than 300 interactive meetings were carried out between students and potential stakeholders. Various programs are provided to motivate entrepreneur candidates, and train them with the fundamental knowledge and practical skills for creating a business.

3.1.7. Nara Institute of Science and Technology: Internet of Things

The Graduate School of Information Science and the Center for Industry-Government-Academia Collaboration at the Nara Institute of Science and Technology established the Global Entrepreneurs

in Internet of Things Program in collaboration with the Advanced Telecommunications Research Institute International (ART), Osaka Innovation Hub, and the Osaka Urban Industry Promotion Center. To foster entrepreneurs in the field of IoT (Internet of Things), it aims to encourage students to design and realize products or services in IoT, and create businesses with international perspectives by learning advanced complex technologies such as software, robotics, networks, and multimedia, and by giving them opportunities to experience entrepreneurial activities. More than half of the masters students who took the one-year EDGE program decided to go on to the doctoral program for further study in starting their own business based on their research results. The EDGE program influences them to be entrepreneurs through offering opportunities for meeting with professionals and researchers.

3.1.8. Hiroshima University: An Interdisciplinary Environment

The Center for Collaborative Research and Community Cooperation at Hiroshima University aims to foster innovative entrepreneurs who aspire for peace, which is the founding philosophy of Hiroshima University, and contribute to the improvement of the people's quality of life based on their research results. The program focuses on encouraging students to be competent in the seven abilities: tenacity, decisiveness, problem-solving and finding, challenging themselves, interdisciplinary skills, communication skills, and risk management. To fulfill its goal, it provides its Entrepreneurial Ability Development Class, Entrepreneurship Training Class, Practical Entrepreneur Training Class, interactive workshops and internships in an interdisciplinary environment. After taking a one-year course, a couple of students attracted investment to start their own businesses.

3.1.9. Kyushu University: Design-Thinking and Global Entrepreneurship

The Robert T. Huang Entrepreneurship Center (QREC) was established in 2010 to encourage students to challenge themselves to create new values through entrepreneurship education. Since launching the EDGE program, it was developed into a regional and global innovation ecosystem for fostering global entrepreneurs by expansion into the entire university. Specifically, nine education programs were developed by the eight participating university departments: the Robert T. Huang Entrepreneurship Center (QREC); Faculty of Design; Faculty of Medical Sciences; University Hospital; Center for Advanced Medical Innovation; Business School; and Faculty of Information Science and Electrical Engineering.

In one session, the IDEO Tokyo office conducted workshops in 2014 with thirty-eight students of various backgrounds including full-time workers on the theme of “designing a business for the XX × YY of Fukuoka.” The students were divided into six groups with the subthemes of “senior citizens × life,” “local communities × disaster management,” “women × work,” “local brand × growth,” “children × learning,” and “tourists × walking around town.” The Fukuoka City government, Dogan Investments, Toyota Kyushu, and IDEO judged the final presentation sessions.

3.1.10. Osaka Prefecture University: Regional Collaboration and Ideation Workshops

In 2006, Osaka Prefecture University established the Research Organization for the Twenty-First Century to enhance educational and research activities on campus. In line with this, the Industry-

University Cooperative Center of Advanced Education was launched to fulfill the needs of the local community and foster an innovative model for educating highly qualified researchers. To encourage researchers to overview the complicated social system in a panoramic view, it adopted an educational tool of “Koto-zukuri” developed by the Graduate Courses for System-inspired Leaders in Material Science. In Japanese, the term “koto” is equivalent to “thing,” but here it refers to the inclusive concept of the invisible and abstract, in contrast to “mono,” which refers to the tangible and concrete (Yoshida, 2008). Since its launch, the EDGE program through building an innovation ecosystem provides entrepreneurship education for graduate students or doctoral researchers in initiating their own start-ups.

It designed a one-year curriculum for doctoral researchers called “TEC (Technology-based Entrepreneurship Course)” to foster leaders in industry and the local economy. In 2015, six students out of those who completed the course were selected as final presenters in the annual performance presentation.

3.1.11. Keio University: Innovative Thinking Mindset and Tool Sets

The Graduate School of System Design and Management (SDM) of Keio University established its EDGE Program to motivate student to create value rather than necessarily become entrepreneurs. Here, “value” has broad meaning such as adding benefit to people’s life, joy, satisfaction, pain relief, help, excitement, or peace of mind. It provides various programs to encourage students to create values. It also established the KEIO EDGE LAB, equipped with a wide range of tools and equipment to prototype: CAD, a 3D printer, a textile printer, an electronic circuit printer and a laser cutter for tangible product prototyping, applications for business simulation, video and music creation for business prototyping, 65-inch display monitors, and discussion space for service prototyping. They conducted the KEIO Innovative Thinking Workshops at the universities in Asian countries such as India, Malaysia, Indonesia, and Thailand, where students were selected to be invited to the KEIO EDGE 2016 course held in Japan.

3.1.12. Waseda University: Social Design Workshop “Kyoso-Kan”

Waseda University established a virtual space called “Kyoso-kan” meaning a center for value co-creation, to provide entrepreneurship education, social design workshops, and ultimately to create new businesses through the development ideas generated by those educational programs. It built an innovation ecosystem with twenty companies including Hitachi, four leading universities such as Stanford University, and venture capitalists. It aims to foster global entrepreneurs knowledgeable enough to start a business based on technologies that meet the current or future social needs from a global perspective. To realize its goal, the program provides practical education programs such as a competition event called “Demo Day” in which students present their business proposals to judges from industries in order to attract investment. In 2015, ten teams developed business model ideas based on their research results, and the team that proposed the business idea of a “healthy skincare device for pets” won the first prize.

3.1.13. Ritsumeikan University: Innovation Architect

Ritsumeikan University titled its EDGE program “Innovation Architect Development” where “innovation architects” mean people in interdisciplinary perspectives who create value for a globalized and diversified society. To foster innovation architects, it built a proliferating innovation ecosystem that brings a chain reaction of innovation by providing a full year extracurricular programs consisting of hands-on seminars and overseas training through People-Based-Learning. Sponsored by GE Healthcare Japan, the program conducts workshops for a month to create ideas such as healthcare for pets and baby care services based on the devices provided by GE Healthcare. During the program, two students were selected for the two-week internship program in Silicon Valley in 2014.

3.2. Summary of Comparative Analysis

Entrepreneurship education is a discipline still in the early stage of development. Many early studies simply describes courses or trends (Harfst, 2010; Peterman & Kennedy, 2003), discussing the academic issues for developing educational processes (Alberti et al., 2004; Fiet, 2001), or evaluating courses by comparing the performances of those who completed the course with those who did not take the course (Chrisman, 1997). To support the educational program with a theoretical background, Souitaris, Zerbinati, and Al-Laham (2007) classifies the benefits of the entrepreneurship education programs into three types: learning, inspiration, and incubation resources, demonstrating that inspiration is the most important predictor for motivating students in becoming entrepreneurs.

Herrmann (2008) proposed a framework strategy of entrepreneurship education within a university based on the experts’ guiding principles, which are 1) institutional environment; 2) the engagement of key stakeholders within and outside the institution; and 3) the development of entrepreneurial pedagogic approaches in teaching, learning and support practices. The institutional environment means universities can provide the appropriate environment for inspiring and motivating individuals to find opportunities, acquire resources, and take action in a variety of contexts that have relevance to their lives or aspirations. The engagement of key stakeholders within and outside the institution means that the stakeholders provide learning opportunities and facilitate the creation and exchange of tacit knowledge. The development of entrepreneurial pedagogic approaches in teaching, learning and supporting practices means that educators review what needs to be taught and learnt and how the appropriate learning environments and approaches can be created in order to deliver the desired entrepreneurial outcomes. Implementing Herrmann (2008)’s framework, the programs provided by the thirteen universities can be mapped according to each guiding principles of the framework as shown in Table 3.

TABLE 3. Mapping of the Programs by Herrmann (2008)'s Framework

Institutional environment		The engagement of key stakeholders	Development of pedagogic approaches
Inspiration	Learning		
1. The University of Tokyo			
The i.school program for young researchers		Symposium	
EDGE innovation challenge competition			The facilitator program for faculty Innovation education conference
2. Tokyo University of Agriculture and Technology			
Entrepreneurial mindset program	International business education	Ecosystem forum	
	Investment negotiation & business development program	Custom-made program for industry demands	
	Intensive workshops in Steinbeis University, Germany		
3. Tokyo Institute of Technology			
Competition	Techno-entrepreneur course	Start-up weekend	Symposium and seminars
	Lean Launchpad Program		Innovation education conference
4. Shiga University of Medical Science			
Hackathon for the healthcare sector	Special lecture series	Symposium of medical engineering	
Workshops	Traineeship in the University of Ottawa, Canada		
5. Kyoto University			
Intensive seminars	Educational program for launching business	Overseas training program for entrepreneurship	
	Educational program for launching business in healthcare industry	Entrepreneurs platform for prototyping and human networks	
6. Osaka University			
SRI Five Disciplines of innovation workshop	Project Based Learning in undergraduate program		
	Lean Launchpad program		
	Business oriented research design		
	Exchange program to UC San Diego, USA		
	Global Technology Entrepreneurship and Commercialization Program		
7. Nara Institute of Science and Technology			
Competition	Global entrepreneurship program	Traineeship	
	IoT prototyping	GEIOT Symposium	
	Intensive seminars		
8. Hiroshima University			
Entrepreneurial abilities development courses	Entrepreneurship Training Class	Internship program in collaboration with the Global Career Design Center	
Leadership training	Practical Entrepreneurial Training Courses		
Phoenix Entrepreneur Competition			

9. Kyushu University			
Collaborative practical design thinking training program with IDEO Tokyo			Innovation education conference
Overseas students business plan competition promotion	Collaborative innovation education program with Fukuoka City		
	Social business education program for emerging markets in Base of the Pyramid		
	Collaborative joint PBL training program with Aalto University (Finland)		
	Medical innovation talent development program		
	Collaborative online Fab Academy program with MIT		
	Science & Business School collaborative education for commercializing technology	Industry-academia collaborative PBL innovation talent development program	
10. Osaka Prefecture University			
Innovation Forum	Pragmatic PBL exercise course based on corporate consortiums		
Koto-zukuri thinking / Design thinking courses		Internships	
Distance learning courses			
Advanced courses			
11. Keio University			
Global innovator forum	Intensive workshops	Global innovator forum	
	Project work with Graduate School of System Design and Management	ASIA tour	Innovation education conference
	Project work in Shonan Fujisawa Campus		
12. Waseda University			
Value co-creation workshop	Business communication workshop in Stanford, USA		Symposium and seminars
	Entrepreneurship education	Career design conference	
	Validating a business model		
13. Ritsumeikan University			
EDGE + R Seminar			
Ideation workshops			
Symposium –“Beats by Innovators”		Internships	

* Author's configuration based on Herrmann (2008)'s framework

According to the result of this mapping, it is found that the contents of programs focus on both learning within their university contexts and engaging stakeholders outside the institutions. To fulfill the goal of fostering entrepreneurs in a global context, various forms of innovation ecosystems are established including the actors both within and outside universities, with domestic as well as international partner organizations. To sustain its programs, many universities offer entrepreneurship training courses or innovation workshops to companies in dynamic ways, which broaden their funding bases and expand linkages between research and commercialization.

However, they have limitations in that little attention is allotted to the development of entrepreneurial pedagogic approaches in teaching, learning, and support practices, which enhances faculty members' competence and skills that would improve the entrepreneurship education. In addition, in order to encourage students to be involved in value creation as entrepreneurs, more attention must be paid to enhancing the environment of inspiration by providing educational programs rather than teaching knowledge or skill-sets.

4. CONCLUSION

There is little guidance in understanding entrepreneurship education for policymakers, lecturers, researchers, and curriculum developers, because entrepreneurship education varies depending on the contexts or circumstances of the societies. During the last couple of decades, the Japanese government has been characterized by a series of policy initiatives designed to promote university–industry linkages and the commercialization of academic research. Still, universities need considerable changes that are being called for by the government to create value in the global context by utilizing their resources. This paper reviews how universities are responding to these challenges in Japan. To promote entrepreneurship, they designed many educational programs including various types of extracurricular programs in collaboration with their stakeholders or outside professionals.

This study has limitations because it is difficult to evaluate the effectiveness of entrepreneurship education programs, which is measured by variables such as the number of established startups and job creation by students who completed the courses, students' satisfaction on the provided courses and their performances during the classes, improvement in the aspiration, knowledge, and skills to become an entrepreneur, and contributions to local societies (Mwasalwiba, 2010). It is hard to find the numerical data that indicates the performance of EDGE program because it is currently an ongoing project. To conclude the actual effectiveness of the educational programs or their outputs, further study is needed based on long-term monitoring as well as cross-case analyses.

Though the EDGE program has been in place for a relatively short period of time, it still has significant implications for innovation policymakers and professors who want to design curriculums for entrepreneurship education or innovation education. Each participating university accumulated knowledge and experience while carrying out various activities, and all of them shaped cultural and institutional environments for supporting innovations in sustainable ways. The best learning cases can be described based on this study, which enable us to gain insight into designing entrepreneurship educational programs. This could be used as important asset for developing the educational content for enhancing global entrepreneurship supported by public policies and led by universities through building an innovation ecosystem.

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APPENDIX. The Programs Provided by Thirteen Universities

Programs Provided by the University of Tokyo (http://ischool.t.u-tokyo.ac.jp/)	
The EDGE Facilitator Program for faculty	Provides a two-day workshop twice a year. The main beneficiaries are current faculties in universities who want to design their own innovation workshop program.
The i.school program for young researchers	Provides two-day workshops six times a year (five basic workshops and one advanced workshop). The main beneficiaries are young researchers in graduate school, or post-doctoral positions, lecturers, or corporate engineers and researchers.
EDGE Innovation Challenge Competition	Open competition for solving the social issues based on the understanding of human behaviors or technology. For example, the topic of the competition in 2015 was "to improve communication between working mothers and their children."
Symposium and Conferences	Topics related to entrepreneurship education are discussed.
Programs Provided by Tokyo University of Agriculture and Technology (https://innovation.office.tuat.ac.jp/program/index.html#innovation)	
Entrepreneurial Mind-set Program	To encourage students to become global leaders who create value and realize it in the society. Courses focusing on three abilities of ideation; human relation management; ethics.
Ecosystem forum	Professionals from the related industries and researchers of overseas universities assess feasibility and novelty of business plans proposed by a team of students.
International business education	Conducts workshops and fieldwork on international business issues in overseas partnership universities, e.g. National Chiao Tung University, Taiwan, and Cornell University, USA with students and industry experts.
Investment negotiation & business development program	Training program for writing business plans for investment negotiation provided by the innovative institutes including the SRI International and world-class universities.
Intensive workshops in Steinbeis University, Germany	PhD candidates can take courses in the Master of Business & Engineering (MBE) program at Steinbeis University, Germany.
Custom-made program for industry demands	Customized entrepreneurship programs based on the clients' needs and availabilities. The PhD candidates or postdoctoral researchers will give lectures after the discussion regarding the specific goal of the projects.
Programs Provided by Tokyo Institute of Technology (http://www.eng.titech.ac.jp/~cbe/index.html)	
Techno-entrepreneur course	MBA Related Subjects: teaching knowledge, such as leadership theory, finance, intellectual property, product design, and development as well as marketing. Entrepreneurship Theory: teaching how to create specific business plans, with lectures on specific cases by venture entrepreneurs and venture capitalists, along with business startup coaching by mentors, collaborative lectures with Martin Trust Center for MIT Entrepreneurship
Start-up weekend	A 54-hour marathon event, motivating participants to pitch new ideas, team building, product development, customer development, and business planning. On the final day, judges from various industries review the presented concepts and products.
Lean Launchpad Program	An innovation/business development-training program originally developed by Steven Blank, an entrepreneur in Silicon Valley, USA, now widely accepted in Stanford Univ., Technology Venture Program at Columbia Univ., US Berkeley and Princeton University. Based on this program, Tokyo Tech customized the educational contents for their students to enable them to have unique experience through six workshops during a semester to understand what are the true meaning of Innovation, Business, Entrepreneurship, and Leadership through execution of customer development, not as just knowledge.

Symposium and Seminars	A symposium: sharing current trends in entrepreneurship education in leading universities Special Seminar: Educational approaches in design, innovation, and entrepreneurship in the Royal College of Art, UK
Competition	All the participating seventy students formed ten teams to join the competition for solving social issues such as "Design a joyful life for blind people." The winning team will be sent to the international competition, SLUSH.

Programs Provided by Shiga University of Medical Science (<http://ikode-sums.com/>)

Special lecture series	Guest lecturers from universities share their experiences for innovations in bio-medical industry and give lectures in various topics of business management.
Hackathon for Healthcare business	The professional facilitators expertized in innovative thinking, medical devices, and nursing provide intensive workshops for the special topics including "a community for dementia," and "proposing the diagnosis methods through wearable devices and big data technologies."
Symposium of medical engineering	Special lectures presented their recent research results in collaborative research with industrial professionals in medical devices.
Workshops	Guest lecturers conducted a series of workshops on the topic of design thinking and innovation education. Participants carried out interviews and observation to obtain insights. In the ideation workshop, participants generated solutions for dementia issues and proposed business models through role playing and prototyping.
Traineeship in the University of Ottawa, Canada	It provides opportunities to learn advanced skills through the course and co-projects offered by the Centre for Research in Biopharmaceuticals and Biotechnology at the University of Ottawa, Canada, especially focusing on Brain and Mind Sciences, Cardiovascular Science as well as Medical Pedagogy.

Programs Provided by Kyoto University (<http://www.gsm.kyoto-u.ac.jp/gtep/>)

Intensive seminars	Students learn basic knowledge on the topics such as leadership, open innovation and entrepreneurship.
Overseas training program for entrepreneurship	To build an international entrepreneurship ecosystem, this program provides workshops with researchers and people from venture capitals and start-ups at universities overseas.
Educational program for launching business	A practical course for students who want to learn the comprehensive processes of creating a business, e.g., creating a vision, technological trends in ventures, validation of business models, client management, prototyping, partnership, and fundraising.
Educational program for launching business in health care industry	A hands-on educational program specialized in business creation in the field of medical devices, and development of business models through professionals in industries.
Entrepreneurs Platform for prototyping and human network	Provides coaching such as building an entrepreneurship ecosystem, assessment of business ideas, feasibility study on market and technology, business planning, and fundraising.

Programs Provided by Osaka University (<http://www.uic.osaka-u.ac.jp/EDGE/>)

Project Based Learning in undergraduate program	The Teaching and Learning Support Center (TLSC) and Science Technology Entrepreneurship Laboratory provide a practical problem based learning course in collaboration with industries.
Business Oriented Research Design	The Leading Graduate School Program is provided to teach practical skills for writing the project proposals to create a business that generate social values in collaboration with companies.
SRI Five Disciplines of Innovation workshop	Provides the customized five disciplines of Innovation workshop to motivate students to become an entrepreneur based on their research results.

Programs Provided by Osaka University (http://www.uic.osaka-u.ac.jp/EDGE/)	
Global Technology Entrepreneurship and Commercialization (G-TEC) Program	Hosted by the University Network for Innovation and Technology Transfer (UNITT) and Osaka University Office for University-Industry Collaboration, and sponsored by the Bridgebook Global, LLC, this program is carried out by the special instructor from the Strategy and Innovation Department in Boston University. The course provides a rigorous study of intellectual property, licensing, the assessment of promising new technologies and technology-based entrepreneurship. Cross-disciplinary teams of thirty students are formed to evaluate real technologies. About four to five technologies being developed by students were assessed through G-TEC's technology assessment and venture assessment projects, the results of which were used to generate commercialization strategies for these technologies.
Exchange program to UC San Diego, USA	Fifty students selected as the beneficiaries of the exchange program in the von Liebig Entrepreneurism Center, at the University of California, San Diego that teaches the importance of customer input early in the technology development process as well as the importance of the ability to "fail fast," iterate fast and to develop better solutions that fit the market.
Lean Launchpad program	In collaboration with the Learning Entrepreneur's Lab, provides workshops to find customers and validate the business plan using the methods such as Minimum Viable Product (MVP), Proof Of Concept (POC), and Prototyping.
Public events	Public events such as Innovation Challenge Salon, Creative session, World Tekijyuku Ground Breakers Forum are organized.
Programs Provided by Nara Institute of Science and Technology (http://geiot.jp/)	
Global entrepreneurship program	Aims to educate entrepreneurship for generating innovation by the Internet of Things through commercializing research results, discovering issues, problem solving. It provides ideation workshops, encouraging students to create "1" from "0." In addition, lectures, such as "how to write a business plan," "business strategy for successful start-ups," financing strategies, marketing, and "decision-making processes in start-ups" are provided to promote start-ups. In final presentation session, students have detail feedbacks from lawyers, venture capitalists, and entrepreneurs. Based on these feedbacks, students make prototypes.
IoT Prototyping	<ul style="list-style-type: none"> • Type A: Students learn a basic software development using the Raspberry Pi, then, creating a system like BOT which tweets itself by reading the data from a sensor that is connected to the Raspberry Pi. • Type B: Students learn software architecture "publish-subscribe" system that uploads sensor data by MQTT protocols to the clouds such as Sango, then, visualizing data using Tableau or DataSpider. • Type C: Students learn software development to control the camera for image capturing using Raspberry Pi, and image processing using Open CV on Raspberry Pi. • Type D: Students learn basic sketching and modeling using 3D CAD, and detail modeling, composing parts, and creating 3D prototype using 3D printer.
Intensive Seminars	Students who completed the Global Entrepreneurship Program joins a boot camp for three days. <ul style="list-style-type: none"> • Day 1: Writing the business plan • Day 2: Learning the presentation skills for a five-minute elevator pitch • Day 3: Creating the video contents for attracting investment
Traineeship	Students select one of the technologies that plays important roles in the Internet of Things (Software, Network, Security, Robotics, Multimedia Processing, Ubiquitous Computing), and visit one the cutting-edge laboratories to learn those technologies in innovative perspectives.
Competition	Students form a team to participate open competitions to improve presentation skills. This will help them to create a business in near future.
GEIOT Symposium	Lectures from the successful entrepreneurs, and discussion with professors and alumni on the topic of "What I learned from GEIOT"

Programs Provided by Hiroshima University (http://www.hirodai-edge.jp/en/)	
Entrepreneurial Ability Development Courses	Motivates students to start their own business, it supports group studies and give lectures on the “Seven abilities: Tenacity, Decisiveness, Problem-solving and finding, Challenging themselves, Interdisciplinary skills, Communication skills, and Risk management.”
Entrepreneurship Training Class	Through group learning, students learn skills for starting their own business. Lectures are given to learn management strategy theory, finance theory, and marketing theory, as well as simulation games that assimilate business operation risk management and BCM (business continuity management). In practice session, students experience the actual processes for establishing their own businesses.
Leadership Training	A boot camp is conducted to motivate students to have visions by training them new ways of thinking for becoming a leader.
Practical Entrepreneurial Training Courses	Innovation workshops are conducted with groups of five students to create a business plan that solves the issues of future society. To define the issues and discover the ideas for solutions, fieldworks and internships are carried out in laboratories and companies in Japan or overseas.
Internship program in collaboration with the Global Career Design Center	Utilizing international partnerships with corporations and institutes, it provides exchange programs focusing on entrepreneurship.
Phoenix Entrepreneur Competition	To complete the program, all students participate in the competition, and the winner is hired as “Phoenix Entrepreneur” at Organization for Outreach and Partnership Promotion of Hiroshima University, and entrepreneurial activities are supported for business incubation.

Programs Provided by Kyushu University (http://qrec.kyushu-u.ac.jp/edge/)	
Collaborative joint-PBL training program with Aalto University (Finland)	A joint program between QREC & the Faculty of Design at Kyushu University and the Media Lab at Aalto University. The director of Media Lab provides a class on the topic “Redesign of Society for 2040” in Kyushu University. Two final presentations are held at Aalto University.
Medical innovation talent development program	To foster global entrepreneurs in the healthcare industry, it provides collaborative educational programs with Battelle Memorial Institute and 360iP, USA.
Collaborative online Fab Academy program with MIT	As an outreach project from MIT’s Center for Bits and Atoms (CBA), the Fab Academy provides instruction and supervises the investigation of mechanisms, applications, and implications of digital fabrication. As a partner program, it provides a nineteen-week course that enables students to create anything through fabrication, programming, CAD, 3D printing.
Industry-academia collaborative PBL innovation talent development program	Aims to create a concrete product using design thinking. In 2014, the topic was “mobility × health.” Ten Kyushu University students and five Toyota Kyushu employees (sales planners and engineers) divided into three groups to join the workshops and engage in fieldwork. The generated solutions were app development for a health promotion for white-collar workers; peace-of-mind for mothers with small children; and linking travelers with local residents.
Science students and Business School collaborative education program for commercializing technology	Students from science and technology majors, and business-related majors form a team to learn how to create business from the technology seeds in collaboration with venture capitalists, and industries.
Collaborative innovation education program with Fukuoka City	Fukuoka has been designated as Japan’s National Strategic Special Zone for Global Startups and Job Creation. To enhance the partnership with local government, Kyushu University provides educational programs to support entrepreneurs with an initiative called “Startup City Fukuoka”
Social business education program for emerging markets in Base of the Pyramid (BOP)	Lectures presented by three guest instructors from Bangladesh on the topic Entrepreneur Education in Bangladesh, Entrepreneur Training in Bangladesh, and the efforts of the Grameen Group with regard to social business and education. A panel discussion was conducted on the theme of How to Nurture Global Entrepreneurs in Order to Promote Global Innovation.

Programs Provided by Kyushu University (http://qrec.kyushu-u.ac.jp/edge/)	
Collaborative practical design thinking training program with IDEO Tokyo	Workshops conducted by the guest instructors from IDEO. In 2014, thirty-eight students of various backgrounds, including full-time workers participated in the workshop on the theme of "designing a business for the XX × YY of Fukuoka." The students were divided into six groups with the subthemes of "senior citizens × life," "local communities × disaster management," "women × work," "local brand × growth," "children × learning," and "tourists × walking around town" to carry out the project. The Fukuoka City government, Dogan Investments, Toyota Kyushu, and IDEO judged the final presentation session.
Overseas students business plan competition promotion program; Offered as a student project	Provides opportunities for students to compete with students in world-class universities and gives them experience in the process of turning their ideas into tangible goods and practical services. Chances for students to apply to take part in overseas business plan competitions and hackathons, and provides mentorship and financial aid for air fare.
Programs Provided by Osaka Prefecture University (http://www.csies.21c.osakafu-u.ac.jp/)	
Pragmatic PBL exercise course based on corporate consortiums	Provides basic courses for entrepreneurs as well as pragmatic exercises in collaboration with manufactures, local businesses, government offices, and Technology Research Institute of Osaka Prefecture through discussions and presentation of the business proposals.
Koto-zukuri thinking / Design thinking courses	Through the koto-zukuri (system thinking), students have an overall perspective to utilize research results to social innovations or for creating value. The courses are consist of design thinking exercises, business planning exercises, management exercises.
Technology-based Entrepreneurship Course I, II, III	Provides curriculum for doctoral researchers to be leaders in industry and local economy.
Advanced course	Provides practical courses that utilize research results of students through practical exercises of Management of Technology (MOT) Consulting, technology policy making, venture business theories, financial plans, and internship.
Internship academy in the Supporting Technology Transfer and Catalyzing Economic Development at the University of New Mexico	An intensive five-day program designed for students aiming to understand the role of a technology transfer, and to foster an entrepreneurial mindset. This program is offered by STC's experienced professional staff, as well as accomplished entrepreneurs and business professionals in the community collaborate with the Innovation Academy at the University of New Mexico.
Distance learning courses	Provides remoted class from successful entrepreneurs in Silicon Valley, USA, or South East Asian countries.
Innovation Forum	Supports the community of alumni for discussions and ideation for creating innovations.
Programs Provided by Keio University (http://edge.keio.ac.jp/)	
Intensive Workshop	Provides a five consecutive day workshop to promote skill-sets, then, four days later, students have one-day session for prototyping. Having an incubation process for a week, it provides a two-day business design session.
Global Innovator Forum	Six guest speakers were invited from Thailand, Malaysia, India and Indonesia. All the speakers are engaged in entrepreneurial education and/or innovation/innovator development education. Speakers shared insights on the topic of how to nurture "innovatorship."
Project Work with Graduate School of System Design and Management (SDM)	A new value proposing business design project conducted by teams of four to five people. The teams will pursue a new value proposition and its implementation and growth with strong support and mentoring from the SDM faculty members who are engineers, designers, and business experts. Graduate School of Science and Technology faculty also mentor the teams with technical aspects.
Project Work in Shona Fujisawa Campus (SFC)	A project conducted by an individual with a close relationship with SFC faculty member and project coordinator from off-campus. The project will focus on the continuous transition of product design, systems design, and business creation. Field work in overseas related to the project is mandatory.

ASIA Tour	It conducted the KEIO Innovative Thinking Workshops at the universities in Asian countries (India, Malaysia, Indonesia, Thailand), a couple of students are selected and invited to the KEIO EDGE 2016 course held in Japan.
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Programs Provided by Waseda University (<http://waseda-edge.jp>)

Entrepreneurship education	Special lectures for startups: Basic knowledge and ways of thinking for starting a company and a new business creation Global communication: interactive communication / presentation skills
Value co-creation workshop	Future creation design thinking workshops: a practical course that teaches thinking skills and methodologies for revitalizing an organization and discovering future-oriented ideas quickly, creatively and systematically. Thinking skills for creating innovations: It teaches new ways of thinking or creation techniques that enable discovery and creation of new needs and matching those with seeds, so that one can play an active role in the global fields.
Business communication workshop in Stanford, USA	Teaches how to communicate with ease and confidence in a casual business interaction, and how to communicate a clear and compelling message in a professional presentation.
Validating a Business Model	A pragmatic course based on new standard theories such as "the lean launch pad" for new business startups, prototyping methods for business models. This program trains students to create one from zero in a short period of time. It teaches not only how to make business plans, but also how to realize plans into reality.
Conferences, Symposium and Seminars	Career design conference: matching event for graduate students to find a job in industries Symposium and seminars: Guest speakers from industry and academia share their experiences and knowledge for creating innovations and entrepreneurship education. In "Demo Day," students present their business proposal in front of the judges from industries to obtain the opportunity for attracting investment.

Programs Provided by Ritsumeikan University (http://www.ritsumeik.ac.jp/ru_gr/edge/)

EDGE + R Seminar	It provides the lecture series "A Crevice of Innovation" twelve times a year. The invited speakers are from global ventures, industries, or domestic ventures. It also supports students' team projects through mentorship and traineeship.
Ideation workshops	Sponsored by GE Healthcare Japan, it conducted workshops for one month to create ideas, e.g. pets' healthcare, and baby care services based on the devices provided by GE Healthcare.
Symposium –'Beats by innovators'	Guest speakers from startups and public sector give lectures and feedbacks on students' final presentation.
Internship	In 2014, two students were selected for the two-week internship program in Silicon Valley.