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## Review on Innovation and Entrepreneurship Education in Chinese Universities during 2010-2015

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### ABSTRACT

With a distinct change in the main task of improving education quality, China's higher education has carried out a series of reform programs with innovation and entrepreneurship education, which has promoted wider change of higher education. This paper reviews the basic situation of innovation and entrepreneurship education during the year of 2010-2015 in Chinese universities, including laboratory construction, practice base construction and scientific training, and reflects on the shortcomings of the current innovation and entrepreneurship education. On this basis, the paper puts forward some suggestions.

**Keywords:** higher education, quality of education, innovation and entrepreneurship education

### INTRODUCTION

Innovation and entrepreneurship education is fundamentally an educational project. The importance of innovation and entrepreneurship to society has been identified and discussed since at least the fifteenth century (Schumpeter, 1912), and that discussion remains topical (Kirchhoff et al., 2013; Grichnik & Harms, 2007).

Innovative education and professional education development are inseparable in any university. On the one hand, innovation not only promotes continuous improvement of professional and technical education method but also the pace of professional and technical education reform and development. Professional and technical education are skill and professional knowledge oriented, which emphasizes on students' practical ability, knowledge and skill level to meet the needs of the emerging industrial upgrading and social-cum economic development. With the development of series of reform programs on innovation and entrepreneurship, innovation and entrepreneurship education have mushroomed, and it is developing into a kind of professional education in many developed countries which have achieved good educational achievements (A. Fayolle, & B. Gailly, 2015; E. G. Carayannis, E. T. Samara, & Y. L. Bakouros, 2015). In particular, the history of innovation and entrepreneurship education in the United States has been more than 50 years. The university carrying on innovation and entrepreneurship education earliest was Harvard University in 1947. Stanford University started the innovation and entrepreneurship education in 1949.

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### State of the literature

- A group of scholars and research institutions make great efforts to study innovation and entrepreneurship education. Aljohani (2015) analyzed the importance of innovation and entrepreneurship in modern education and societies. The definition and content standards of innovation and entrepreneurship education were presented. Some scholars (Zhang, 2014; Gao Zheng et al., 2017) argued that advanced experience in running colleges and universities is an important way to promote the development of higher education. Jin (2009) introduced the experience of the innovation and entrepreneurship education in Silicon Valley in the United States.
- Chinese Association of Higher Education convoked the symposium of the innovation and entrepreneurship to gain a better view of innovation and entrepreneurship education in 2007 (Cao & Gao, 2007). Wang (2015) proposed the systematic framework of the “university-wide” innovation and entrepreneurship education which was divided into four types and include: general-knowledge type, embedded type, professional type, and vocational type. Some scholars (Yang, M. & Alex, R. 2014) believe that several contradictions exist in entrepreneurship education in China. For example, the discipline position of college or university innovation and entrepreneurship education is illegibility and wildly, the course content system is not perfect, many schools lack professional teachers and other issues (Bao & Tang, 2010; Liu Qiang et al., 2010). Jiang & Pan (2017) analyzed the main problems which is separate from professional education in the process of implementing the innovation and entrepreneurship education in colleges and universities.
- Some scholars research the methods of innovation entrepreneurship education. Wahid et al. (2015) appealed that it was necessary to engage teaching method in entrepreneurship education field. Li & Ding (2016) researched an exploratory practice linking innovative entrepreneurship education teaching goal and methods. Harkema & Schout (2008) introduced a learner-centred approach in innovation and entrepreneurship education, in which student is the driver of his learning process. Huang & Ding (2010) established a mode of innovation and entrepreneurship education suitable for college students in China. Cao & Shi (2016) emphasized on the update of innovation and entrepreneurship education ideas, to construct scientific and reasonable course system, to enhance infiltration and integration of professional education and to establish effective evaluation system of teaching quality.

### Contribution of this paper to the literature

- It can be seen that scholars follow the basic logic of asking questions, analyzing problems, and solving problems concerning innovation and entrepreneurship education in China. They seem to have found the answers which are that all the colleges and universities of higher learning should: (1) set up a platform for carrying out innovation and entrepreneurship education; (2) carry out innovation and entrepreneurship education by combining the local economic current situation. As a matter of fact, few people really grasp the situation of innovation, entrepreneurship and education resources in Chinese colleges and universities.
- Through this thesis, we would like to introduce China’s innovation and entrepreneurship reform during 2010-2015, and expect to provide the basis for subsequent studies. The purpose of this paper is to help relevant countries and regions draw lessons from China’s innovation and entrepreneurship education and learn from the basic principles of China’s innovation and entrepreneurship system.

The cultivation of innovative thinking should be emphasized in the process of technical education. Technology entrepreneurship education is not only about the transfer of knowledge, but also the facilitation of the creation of knowledge; and it is not just about cognitive knowledge of a scientific field, but also the ability to find new opportunities and venture creation process, and also stimulate entrepreneurial passion. Innovation and entrepreneurship education is largely due to the fact that business schools and administrative department, as well as higher education institutions overall. Higher education institutions should apply innovative ideas in conducting professional and technical education based on the characteristics and technological innovation system that have software and hardware conditions, and build the link between innovation and professional education.

Innovation and entrepreneurship education is in the middle of “transformative changes” both at the conceptual (new models of entrepreneurship education) and technological levels (e-learning, mobile devices, learning networks, entrepreneurship networks). This has been spurred by upheavals globally, socially, politically, and technologically (Welsh & Dragusin, 2011, 2013). Innovation and entrepreneurship education in colleges have

matured in some developed countries, but until Chinese premier Li Keqiang highlighted innovation and entrepreneurship as a key growth driver for China in 2014, the innovation and entrepreneurship education reform is on the agenda.

It is just suitable, urgent and realistic to carry on the innovation and entrepreneurship education reform in China. It is aiming at improving the quality of China's higher education, enhancing innovative ability of undergraduates and improving their employ ability and quality of employment. There is also an increasing tendency for government policy to promote entrepreneurship for its apparent economic and social benefit. Therefore, Chinese government has introduced a series of policies and measures to strengthen the cultivation of undergraduates' innovative consciousness and enhance their practical and innovative abilities, thus effectively promoting the comprehensive teaching reform in universities and improving the quality of higher education. Chinese Medium and Long Term Youth Development Program (2016-2025) which fully took off in 2017, emphasized on the establishment and perfection of the system of innovation and entrepreneurship education, combination of teaching with practice, and requirement of integration of innovative entrepreneurship education and professional education. This program also requires the construction of related education platform in Chinese tertiary institutions.

China's innovation and entrepreneurship education has been carried out in full swing in the higher education system. Through this paper, we review and summary from the following seven aspects:

- University laboratory construction;
- Base of practice;
- Undergraduates' scientific research training;
- Entrepreneurship education for university;
- Guidance on employment and entrepreneurship;
- The credit system reform;
- Education platform in and out of university.

## BASIC CONDITIONS OF INNOVATION AND ENTREPRENEURSHIP EDUCATION IN UNIVERSITIES DURING 2010-2015

### **Construction of Laboratories in Universities**

Laboratory in universities is an important support for university in regards to innovation and entrepreneurship education. From 2010-2015, the reform of experiment teaching in University is promoted through implementing government repair and purchase plan and the national teaching demonstration center construction plan etc. It provided a strong guarantee for undergraduates to support their innovation and entrepreneurship. Under the guidance of the government, the institutions of higher education actively had constructed the national experimental demonstration center. Nearly RMB 8 billion Yuan were invested by municipalities, which greatly improved the experimental teaching conditions in universities. The special construction and operation costs are as follows:

- The first item is laboratory space. In 2010, 28,156 labs are distributed in China's universities. Laboratory area is 27,856,700 square meters, and the average laboratory area per student is 1.79 square meters. From 2010 to 2013, the number of laboratories was 29,964, and the laboratory area was 31,022,600 square meters. The average laboratory area per students was 1.76 square meters. The number of laboratories has increased by 6.4%, and the laboratory area has increased by 11.4% for 3 years.
- The second item is experimental teaching team. In 2010 year, the total number of laboratory teams in the national undergraduate universities was 195,000 and it was 208,300 in 2013, which has increased by 6.8%. The proportion of full-time and part-time staff was close to 1:1. Full time laboratory personnel include teachers, laboratory technicians and other auxiliary personnel. According to

**Table 1.** Teaching experiment setting up in 2012-2013

Category doctoral	Quantity	Percentage (%)	Average growth rate in the past 7 years (%)
Master	3,400	0.28	2.60
Degree	22,500	1.86	2.45
Undergraduate	1,074,300	88.75	5.96
Junior college students	106,800	8.83	-1.74
Other	3,400	0.28	-5.72

Data sources: Wu Xiaofeng, Gao Xiaojie (2014). Report on the construction and development of University Laboratory (2014). Beijing: Tsinghua University press,11.

academic structure analysis, Doctor accounted for 16.04% in full-time personnel, Master for 40.83%, Bachelor accounted for 29.74%, and other education accounted for 13.39%.

- The third item is experimental equipment value. In 2009, 13,955,100 pieces of teaching and research equipment more than RMB 800 Yuan has been put into the university, it was worth 153,579 million Yuan, and 9,890.58 Yuan per capita value equipment. In 2012, these data as above change to 17,924,700 pieces, 221,465 million Yuan, the average value of 12,561.73 Yuan of equipment. It can be seen that the equipment number increased 28.4%, the total amount of growth of 44.2%, the average value equipment increased by 27%.
- The fourth item is laboratory loading capacity. National experimental teaching adds 44,000 experimental projects, which could support 61 thousand undergraduate innovative experiment project, support for 1 million 170 thousand undergraduates to participate in all kinds of undergraduate competitions, the number of award projects has reached 100,000. And then, China’s university laboratory experiment project added to 1,210,400, the experimental project for undergraduates is 1,070,000, accounting for the total project number 88.75% in 2012. (see [Table 1](#))

### Practice Base for University

Practice base is an important support for universities to carry out innovation and entrepreneurship education. In 2012, Chinese Ministry of Education issued a work notice named “*The Construction of External-campus Practice Bases Project*”. A series of guiding opinions were put forward to in it. The content coverage the organization management system, practice teaching mode, part-time practice team construction, and sharing resources in practice, protect the interests of undergraduates etc. After that, Chinese Ministry of Education has promulgated few relevant documents to further clarify the requirements of the construction of practice base. From 2011 to 2013, Chinese Ministry of Education made a list which included 833 external-campus bases. And then, a series of policies and measurements have been introduced to strengthen the construction of external-campus practice bases and the practice process management.

- The first one is practical teaching. According to the teaching status database from 486 undergraduate universities in 2014, there are 58169 practice teaching bases, and about 2,660,000 undergraduates can be accepted each year. In fact, 2,300,000 undergraduates were accepted in 2014. So, 36.82% of undergraduates have the opportunity to practice teaching into practice bases. (see [Table 2](#))
- The second one is practical teaching quantity. It shows by data from 494 universities in 2014 that National University Practice (Experiment) teaching credits accounted for 24.44%, basically reached the goal proposed by Chinese Ministry of Education— “the Bachelor of Humanities and social science majors are not less than the 15% of total credits, science and medicine majors of not less than 25%”. Among them, the percentage of the practical teaching in the newly established which reflects the application and practical characteristics of the University orientation. (see [Table 3](#))

- Third is undergraduate practical ability. Relying on a large number of practical education bases, the selected topic of graduation thesis of undergraduates is close to reality, and a large number of topics are closely related to practice. According to 489 undergraduate universities teaching state data in 2014, 1,485,410 comprehensives graduate training topics was selected, including 1,067,972 projects completed in experiment and practice, engineering training or social practice in, accounting for about 71.9% (see **Table 4**)

**Table 2.** Admission of undergraduates of practice bases in different types of university

University Type	Statistics Sample	Bases Number	Number of Undergraduates Admitted per Year (million)	Number of Undergraduates Admitted in the Year (million)	Ordinary Number of Undergraduates (million)	Percentage of Undergraduates in University (%)
985 Project University*	14	2,340	17.6	15	34.38	43.62
211Project University*	17	3,636	20.5	14.93	33.35	44.77
Old Undergraduate Institutions)	137	21,388	98.56	86.61	249	34.78
New Undergraduate Colleges	318	30,805	130.06	113.74	308.72	36.84
Total	486	58,169	266.72	230.27	625.46	36.82

Data source: basic state database of universities (2014)

**Table 3.** Acceptance of undergraduates in different types of university practice bases

University Type	Statistics Sample	Professional Number	Practice Credits			Proportion of Practice Credits to Total Credits (%)
			Group Practice	Experiment	Sub Total	
985 Project University	14	179	28	10	38	21.23
211Project University	17	172	24	10	34	19.77
Old Undergraduate Institutions	138	184	31	12	43	23.37
New Undergraduate Colleges	325	178	31	17	48	26.97
Total	494	180	30	14	44	24.44

Data source: database of basic teaching status of universities in China (2014)

**Table 4.** Sources of graduation training in different types of universities

University type	Statistics Samples	Comprehensive Training Subjects in Graduate	Graduation Experiments or Practice, Design, etc.	Practical Comprehensive Subjects Accounting for Graduation Training Number
985 Project University	14	77,794	53,991	69.40
211 Project University	16	73,239	53,901	73.60
Old Undergraduate Institutions	27	513,295	361,299	70.40
New Undergraduate Colleges	334	821,082	598,781	72.90
Total	489	1,485,410	1,067,972	71.90

Data source: database of basic teaching status of universities in China (2014)

**Table 5.** Chinese innovation and entrepreneurship training program for university in 2012 or 2013

Year	University Type	University Number	Undergraduates Number	Innovation Project Number	Venture Project Number	Project Funds (100 million Yuan)
2012	Subordinates University	90	46,724	11,403	1,581	2.57
	Local University	413	66,182	13,859	3,179	3.25
	Total	503	11,2906	25,262	4,760	5.82
2013	Subordinates University	115	33,477	8,109	1,112	1.89
	Local University	638	50,444	11,633	2,451	2.60
	Total	753	83,921	19,742	3,563	4.50
Two years total		1256	196,827	45,004	8,323	10.32

Data sources: The first batch of national University innovation and entrepreneurship training programs list (2012).  
The 2013 annual National University' innovation and entrepreneurship training programs list.

### University Participate in Scientific Research and Training

It is an important way for innovative training program of university to cultivate university students innovative practice ability. Chinese Ministry of Finance and Chinese Ministry of Education in 2008 set up the fundamental research funds for Universities Directly under the Ministry of Education which is used to support young teachers and full-time equivalence of strong research potential to carry out independent scientific research topic in these universities. In 2012, Chinese Ministry of Education and other seven ministries jointly issued regulations to further strengthening practice educating. Supporting undergraduates' inquiry learning, innovative experiment, business plans and business simulation activities has been achieved strong support from governments at all levels. Chinese Ministry of Education divided the creation and innovation of university into three training categories, such as innovation, entrepreneurial and practical. At the same time, China National Innovation and entrepreneurship training program expert working group was established.

During the period of 2010-2015, there are 827 universities to participate in the program, projects number is nearly 80,000, covering 12 disciplines, investment funds is nearly RMB 1,400 million Yuan, nearly 220,000 undergraduates participate in it. For example, undergraduates involved in the project are 196,827, innovative projects are 45004, entrepreneurial projects are 8,323 and investment is 10.32 million Yuan. (see [Table 5](#))

## INNOVATION AND ENTREPRENEURSHIP EDUCATION REFORM IN CHINA'S UNIVERSITIES DURING 2010-2015

### Credit System Reform

In December 2014 and May 2015, Chinese Ministry of Education released documents related to entrepreneurship. Firstly, university should implement flexible educational system such as establish an elastic learning system to allow undergraduates to drop out of University and start their own businesses. Secondly, allowing adjustment process to retain student status and course credit. Thirdly, universities should establish innovation and entrepreneurship scholarship system. The credit system reform in universities focuses on 2 aspects as following:

- Compress the total credits of the teaching program. According to data from 24 in 2013, it was showed that the total credits of the teaching program was 170, among them, the average total credits 985 Project University was 164, 211 Project University is 173.
- Increase elective credits to provide more choices for undergraduates. According to data from 24 universities in 2013, the average credits of elective courses were 40.93. Percentage of elective courses in total credits was 24.75%, but there were significant differences between different types of universities, 985 Project University is 27.68%, 211 Project University is 27.02%, General University is 19.55%.

## Personnel Training Program and Curriculum System Construction

Entrepreneurship education is an important channel to cultivate undergraduates' awareness of entrepreneurship and to improve their practical ability in innovation and entrepreneurship. In August 2012, Chinese Ministry of Education formulated the basic requirements for entrepreneurship education in universities. In 2015, Chinese State Council issued document on deepening the reform of higher education, which guide university to carry out innovation and entrepreneurship education from 9 aspects of improving the personnel training quality standard. With the impetus of the Chinese government series policy, innovation and entrepreneurship education in universities is developing all over the country.

- Entrepreneurship education into the curriculum system. "Entrepreneurship Foundation" course is a required course for undergraduate. Chinese Ministry of Education organized experts to write and revise a batch of excellent teaching materials for entrepreneurship education.
- Chinese Ministry of Education conducted a special training guide for more than 700 universities, and more than 2000 teachers were involved in the training project and entered a business study or experience.
- Selection and construction of the "Entrepreneurial Management", "Entrepreneurial Life" and a number of innovative entrepreneurship, tutorial video, open class and excellent resource sharing courses.

## Establish a Cooperative Education Mechanism both inside and outside the University

During the period of 2010-2015, Chinese government implemented the "Excellence Program", the combination of science and education and cooperative education action plan and other series of talent training plan, and actively introduced external quality resources, established cooperative education mechanism among enterprise and university, boosted innovation and entrepreneurship education of university.

- Implementing the cooperation plan of combining science with education. The plan was jointly implemented by Chinese Ministry of Education and the Chinese Academy of Sciences in 2012. The plan includes "Scholars Keyan Podium Plan", "Key Laboratory Project" etc. With the implementation of the scheme, nearly 350 University and 120 scientific research institutes have been signed, and 40 institutions of higher learning and 46 research institutes have signed formal plans for joint training of undergraduates. These participating units have introduced the high-quality resources of the Chinese Academy of sciences into the talents training of university, and promoted the deep integration of teaching and scientific research in institutions of higher learning and research institutes.
- Implementing "The Excellent Engineer Education Program". The program was jointly implemented by Chinese Ministry of Education and other ministries and commissions, with the aim of cultivating a large number of high-quality engineering and technical personnel with strong innovation ability and adapting to the needs of economic and social development. 208 universities are attracted by the plan, including Tongji University, Central South University, Shanghai Volkswagen, Sany, etc. 6,000 enterprises and 21 industry sectors and 7 industry associations, covering 1,257 undergraduates and 514 graduate level disciplines to participate in, accumulated nearly 250 thousand undergraduates participating. Promoting the construction of 626 practical education centers for government level projects in China. The special funds invested a total of about 2,200 million Yuan, contracted enterprises invested approximately 420 million Yuan, sent 11 thousand part-time teachers, participate in the course of more than 4,000, enterprises accept university teachers in-service learning of nearly 5,000 people, effectively promote the deep integration between universities and enterprises in the training aspects.
- Implementing "The Training Program for Outstanding Legal Talents". The plan is jointly implemented by Chinese Ministry of Education and the Central Commission for political science and law. It is the target of the formation of scientific and advanced, with Chinese legal education concept, form the system of legal personnel training, cultivate a group of high-quality legal talents after 10 years of efforts. 66 universities have built 58 applied and compound legal talents education occupation

training bases, 22 foreign-related legal talent training bases, 12 legal talent training bases on basic education in Western China. Higher education and legal practice department personnel to hire "Double 1000 Plan", 391 university teachers, 420 experts was selected from the legal departments, which has formatted the personnel training mechanism in college and the legal departments.

- Carrying out "The Training Program for Talent Education of Excellent Journalism and Communication". The plan is implemented by the Propaganda Department of the CPC Central Committee, Chinese Ministry of Education and some universities. The goal is aimed to train a large number of firm political stance and excellent quality of the style of journalism talents through cooperation with the media. Chinese Ministry of Education has selected the construction of 30 applied and complex talents of excellent journalism and communication education and 10 international education bases for news and communication talents. 31 local propaganda departments of CPC and 4 central news units, 39 universities signed an agreement to build a university of journalism, the implementation of mutual engagement of university teachers and media practitioners "Thousands of People Plan", employees are already more than 400 University backbone teachers and news organizations to enter this a plan to promote the industry and academia to cultivate talents.
- Implementing "The Plan for Educating Excellent Talents in Agriculture and Forestry". The plan will be jointly organized by Chinese Ministry of Education, the Ministry of agriculture and the Chinese government forestry bureau in 2014. 99 universities of excellence in agriculture, forestry and talent training program have been established. 140 projects have been implemented, covering about 90 thousand undergraduates. The program consists of 43 "Training Mode Reform of Top-notch Innovative Talents in Agriculture and Forestry" projects, 70 "The Agriculture and Forestry Compound Applied Talent Training Mode" reform projects, 27 "The Practical Skills of Agriculture and Forestry Talents Training Mode" reform projects.
- Implementing "The Excellent Doctor Education Program". The plan is jointly implemented by Chinese Ministry of Education and the Ministry of health. Chinese Ministry of Education has approved the first batch of 125 university to carry out the reform of 178 medical talents training models in 2012, covering more than 200 thousand undergraduates. Chinese promote the training of "5+3" integrated clinical medical personnel, and establish standardized and standardized training system for qualified doctors. Bureau of administration of traditional Chinese Medicine Combined Health Planning Commission, China government launched the medical orders directed rural undergraduates from Mid-Western Region of China free training work, 63 medical colleges approved 22 Mid-Western provinces to recruit undergraduate undergraduates free of more than 2.6 people, involved in clinical medicine, Chinese medicine, Mongolian medicine, Tibetan medicine and 5 dimensional medical disciplines.

## APPENDIX

- **Project 211** is the Chinese government's new endeavor aimed at strengthening about 100 institutions of higher education and key disciplinary areas as a national priority for the 21st century. There are 117 universities in Project 211.
- **Project 985** is a constructive project for founding world-class universities in the 21st century conducted by the government of the People's Republic of China. On May 4, 1998, Jiang Zemin declared that "China must have a number of first-rate universities of international advanced level", so Project 985 was launched. In the initial phase, 9 universities were included in the project. The second phase, launched in 2004, expanded the program until it has now reached 39 universities.

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