

Full Length Research Paper

Planning and implementation of entrepreneurship education - Taking the National Taipei University of Technology for an example

Jen-Chia Chang and Hsin-Ya Sung*

Associate Professor of Institute of Technological and Vocational Education,
National Taipei University of Technology, Taiwan.

Accepted 7 October, 2009

This paper discusses the planning and implementation of entrepreneurship education at the National Taipei University of Technology (NTUT) in Taiwan. First, related entrepreneurship education literature was reviewed. The implementation of entrepreneurship education in America and Taiwan was discussed and used for reference in planning the overall framework of entrepreneurship education. Panel discussion was held and entrepreneurship education courses of NTUT were planned. Finally, specific recommendations on improving entrepreneurship education were put forward based on the effects after two years of implementation.

Key words: Entrepreneurship, entrepreneurship education, entrepreneur, curriculum of entrepreneurship education.

INTRODUCTION

Globalized competition and development of knowledge economy are prevailing. Internet and network information is circulating at increasing speed. Technology life cycle and industry environment are changing rapidly. Industry development of Taiwan is confronted with severe challenges. In addition, the job market is being impacted the economic recession in the recent years. Higher education no longer equals to higher employment rate. The unemployment rate is constantly increasing, which is a serious problem. On the other hand, small and medium-sized enterprises (SMEs) account for 97.63% of all the enterprises in Taiwan and play a particularly important role in the whole industry (SMEA, 2008a). About 100,000 new enterprises are established in Taiwan every year. Their survival rate in sustainable operation not only influences the job market but also plays an important role in tax sources and economic development.

According to investigation, only 60% of the SMEs in Taiwan can survive for more than five years and about 40% of them are closed down within five years (SMEA, 2008b). It is now actually an important task to actively develop entrepreneurship education, offer complete entrepreneurship education courses which meet the requirements to foster entrepreneurial ability of the nationals, reduce entrepreneurs' ignorance about entrepreneurship and their exploration time and increase the survival rate of newly established enterprises.

Entrepreneurship spirit can invigorate the economy and promote employment. It also facilitates the stable development of national economy in recession environment. The popularization of entrepreneurship education plays an important part in promoting the development of entrepreneurial economy system. Therefore, it is particularly urgent to implement start-up business policies and entrepreneurship education scheme. According to the experience of such developed countries as America, Britain and Japan, starting up new business is an important factor maintaining vitality of national industry, an excellent counter-measure against uncertainty of economy (Lai,

*Corresponding author. E-mail: necosung@yahoo.com.tw. Tel: +886-922277922. Fax: +886-2-27812897.

2008) and an efficient method of solving social unemployment and poverty problems. In Taiwan, colleges and universities have started fostering entrepreneurship spirit of students in recent years. They usually offer entrepreneurship courses, hold entrepreneurship contests, build entrepreneurship education centers and promote cooperation between the industry and universities. Nevertheless, to sum up, it seems that no specific effects have been produced in entrepreneurial work of the graduates, which may be due to the fact that entrepreneurship education is scattered in keynote speeches, class lectures, general studies, etc., and there is no systematic course planning. In entrepreneurship contest, too much attention is often paid to originality instead of entrepreneurship. It will be a great challenge to implement originality and ideas in entrepreneurship contest in actual business.

Some scholars further point out that entrepreneurship education of Taiwan is imperfect in course structure, teaching contents, teaching resources, teaching methods and so on and lacks a complete structure (Chen and Lai, 2007). In consideration of the above situation, the present research aims at entrepreneurship education of colleges and universities in Taiwan. First, entrepreneurship education literature is reviewed to know about connotation of entrepreneurship education. Besides, entrepreneurship education implementation of America and Taiwan is discussed and used as reference for integrating and planning entrepreneurship education courses. Secondly, entrepreneurship education courses of NTUT are planned by holding Panel Discussion and specific recommendations about improving entrepreneurship education in the future are put forward based on the effects after two years of implementation. Of course, effects of entrepreneurship education can by no means be demonstrated within two years and it may take several years for entrepreneurship education to produce effect.

LITERATURE REVIEW

Entrepreneurship education

Entrepreneurship education has been recognized as one of the crucial factors in fostering entrepreneurial attitude (Kourilsky and Walstad, 1998), and it is widely accepted that many aspects of entrepreneurship can be taught (Garavan and O'Connell, 1994). Colin and Jack (2004) state that entrepreneurial education is the process of providing individuals with the ability to recognize commercial opportunities and the insight, self-esteem, knowledge and skills to act on them. It also includes instruction in traditional business disciplines such as management, marketing, information systems and finance. Simply speaking, entrepreneurship education is intended to cultivate students' core entrepreneurship ability, guide interested entrepreneurs in fostering entrepreneurship

spirit and ability of identifying business opportunities and impart necessary entrepreneurship knowledge and skills by means of systematic courses or training activities.

Entrepreneurship education at universities in America

American universities have been the pioneers in the field of Academic Entrepreneurship education. As early as 1947, Harvard Business School offered the first entrepreneurship course titled "Management of New Enterprise" (KATZ, 2003). In 1997, more than 400 business schools and universities offered at least one course in Entrepreneurship. At the end of 2002, more than 700 entrepreneurship programs were being offered at business schools and universities (Volkman, 2004). By now, more than 400 engineering schools offer some entrepreneurship and business courses (Luryi et al., 2007). What follows is a brief introduction to the entrepreneurship education at universities in America.

MIT (Massachusetts Institute of Technology): The "Sloan School of Management" in MIT School of Engineering offers a wide range of courses in launching, managing, and growing technology-based business available to engineering and science students. The course use a variety of teaching methods: case studies, internships, guest lectures, external reviews of student assignment by venture capitalists, and study projects. All courses involve teamwork and focus on presentation skills. Moreover, MIT Entrepreneurship Center was instituted in 1996, it provides an array of education programs, networking opportunities, technologies, and resources to help students, alumni, and faculty to start and sustain entrepreneurial activity (Luryi et al., 2007). The Center also conducts the "MIT \$100K Entrepreneurship Competition" that is open to students from all five schools at MIT (Sloan, Engineering, Science, Humanities, and Architecture) at the undergraduate and graduate levels. The Competition is designed to encourage students and researchers to act on their talent, ideas and energy to produce tomorrow's leading firms. Now in its 20th year, the competition has awarded hundreds of thousands of dollars in cash and business startup services to outstanding teams of student entrepreneurs (MIT, 2009).

Stanford University: The "Stanford Technology Ventures Program" (STVP) is hosted by Stanford School of Engineering (2009). One of the main tasks of STVP is to host international conferences on teaching entrepreneurship. In this program, students not only have to practice technical skills, but also need to know how to identify market opportunities and to take leadership roles in business. The program offers both introductory and advanced courses in the field of entrepreneurial marketing, finance, strategy, innovation and lecture series such as the "Entre-

preneurial Thought Leaders" (Luryi et al., 2007). To intensive, year-long programs such as the "Mayfield Fellows Program", courses, practices and experience sharing are utilized to enable students of engineering department to know about entrepreneurship process of hi-tech industry.

Stony Brook University: The Sensor Consortium is centered at the Electrical and Computer Engineering Department of the College of Engineering and Applied Sciences at Stony Brook University in June 2004. The Sensor Consortium's Education partners include Stony Brook University, Hofstra University, Farmingdale State College of Technology, and Suffolk Community College. Many of the faculty members are experts in the sensor systems for medical and security technologies. The main objective of the Consortium is to provide engineering and technical students of Long Island with entrepreneurial skills, with a focus on medical and security sensor systems. Entrepreneurship education activities at the Sensor Consortium include recruiting and selecting students for E-Teams, selection of projects, entrepreneurship course, and project competition. General topics such as creativity, project management, opportunities, and intellectual property are taught in the fall semester during the first year; business oriented topics such as developing a business plan and planning, financing, and launching a venture are taught in the spring. Students present their projects from both technical and entrepreneurial sides as working prototypes in the second year. The presentation was broken into two parts: technical industry-fair style and business plans presentation (Luryi, et al., 2007).

Pennsylvania State University: Entrepreneurial Leadership course of the College of Engineering at The Pennsylvania State University is project-based learning practice. Projects are assigned as means for concrete experience and active experimentation, during which each student assumes a leadership position at least once. Indeed, planned contributions of the course were identified as knowledge and skill development in the areas of leadership, motivation, innovation, communication skills, teamwork and writing business plans. Team assignments of projects include product vision, process definition, product dissection, product redesign, build and sell (Okudan and Rzasa, 2006). Out of the four team projects, the fourth one is the most challenging. It requires each student team to compete for seed money, and this competition is judged by two investors. Student teams, in this portion of the course, not only develop a business plan for a product but also build the intended product and sell it. A 10% portion of their final grade is dependent upon whether students make a profit. Okudan and Rzasa (2006) found that students are gaining the necessary skills required to be an entrepreneur. They felt that the class did impact their ability to be creative thinkers. Some students felt that they were better risk-takers. They be-

lieved that they could better understand and anticipate the challenges that arise in the path to entrepreneurship.

To sum up, the entrepreneurship education courses of the four famous universities of America have complete concept framework and system. The course contents and teaching methods are planned based on specific objectives. The course contents cover necessary entrepreneurship skills and knowledge. Many courses are taught by means of team cooperation and special subject discussion, or students are arranged to practice in the industry for applying the knowledge and skills having been acquired in class. Besides, entrepreneurship education of all these universities highly value close cooperation with the industry. Many courses are attended by personages of the industry or alumni, which is intended to facilitate establishment of interpersonal network and entrepreneurship network.

Entrepreneurship education at universities in Taiwan

Entrepreneurship education of Taiwan has started late. Since 1993, some universities have successively begun to offer entrepreneurship courses but now only less than ten universities offer special entrepreneurship courses. In comparison, entrepreneurship education of Taiwan is still in the stage of initiation and development (Chen and Lai, 2007). The current entrepreneurship education courses of Taiwan can be classified into two categories, namely, integrated entrepreneurship program and independent single discipline. In terms of course framework, course planning based on program is fairly systematic and complete so that the courses can be selected by students of different departments.

Take "Creativity and Entrepreneurship Program" offered by National Taiwan University in 2008 for example, the program was prepared by the Educational Administration Office and the Student Administration Office and run with the assistance of various departments and institutes. Fifty students were enrolled each year, with priority given to juniors and seniors who had learnt fundamental skills of major courses. The students must study the core courses carrying six credits, special subject and speech courses carrying three credits and select extension courses carrying at least twelve credits in order to obtain the program certificate. The program is intended to make students with professional knowledge study heterogeneous courses related to originality and entrepreneurship. Besides, "Originality and Entrepreneurship Demonstration and Exhibition" is held to provide a platform for applying originality and enhancing originality and innovating ability of students (National Taiwan University, 2008).

By further reviewing its course contents, the researcher has found that courses of the program focus on originality design field and the chances of acquiring practical experience are fairly limited. After researching National Taiwan University, the researcher firmly believes that en-

entrepreneurship education makes it necessary to more actively integrate the industry resources, offer major courses combining theories with practices and plan entrepreneurship program with a complete structure. Only in this way can entrepreneurship education of Taiwan develop and advance sustainably.

RESEARCH METHOD

Considering the importance of entrepreneurship education, in 2007, the Teaching Resources Center of the Educational Administration Office and the Management College of National Taipei University of Technology (NTUT) in Taiwan jointly planned "Cradle Education Program of Entrepreneurs" and offered "Innovation and Entrepreneurship Program" to foster the students so that they will become high quality talented people with innovation spirit and entrepreneurial ability. As for the planning method, the related entrepreneurship education literature of the past has been discussed to know about important concept framework of entrepreneurship education. Panel Discussion has been held four times by inviting professors of the Management College, experts and scholars of human resources field. The discussion subjects include course framework, course connotation, certification threshold, candidates of enterprise lecturers and so on. Altogether, 20 experts have participated in determining the overall entrepreneurship education framework of NTUT, the detailed implementation rules and course disciplines.

RESULTS AND DISCUSSION

The entrepreneurship education at NTUT

Entrepreneurship education at NTUT is divided into three parts (Figure 1), namely, "Innovation and Entrepreneurship Program", "Entrepreneurship Practices" and "Knowledge Management Platform of Innovation and Entrepreneurship" (Lin, 2007).

Courses of "Innovation and Entrepreneurship Program" (NTUT, 2008) began to be offered in 2007 (The course planning is shown in Table 1). The special compulsory subject is "Entrepreneurial Management". Besides, twelve special elective courses and three enterprises lecture courses are offered. The program aims at fostering innovation and entrepreneurship knowledge and skills of students so that student can apply them in entrepreneurship career and company management in the future and helping students transform passive employment concept into active entrepreneurship spirit.

"Entrepreneurship Practices" focuses on holding entrepreneurship contests and implements "System of Employing Industry Personages as Advisors". Nearly 200 professional managers with practical experience in enterprises have been invited to provide more practical methods and suggestions for the contesting teams, such as plan guide, technical guide, planning of new business, E-commerce and marketing. "Entrepreneurial Workshop" has been held during contest through interaction and communication among experts, scholars, successful entrepreneurs and contesting students. The contesting

teams have been assisted in writing business plan and finance plan, raising fund and conducting feasibility analysis of originality and entrepreneurship, etc. Holding related contests and activities provides students with the opportunity of applying what have been learnt and digesting the knowledge and skills they have acquired.

"Knowledge Management Platform of Innovation and Entrepreneurship" is an entrepreneurship information communicating website, which provides entrepreneurship information, enterprise cases as teaching materials, online consultancy services of entrepreneurship advisors, entrepreneurship know-how and other information. In addition, NTUT built "Innovation and Entrepreneurship Development Center" in 2008. On basis of its rich academic research and development resources, it combined the related service resources of governments and enterprises, brought in systemized tutorship mechanism and provided all faculty members and students with innovation and entrepreneurship tutorship, diagnosis and resources as well as technical intermediary service. The Innovation and Entrepreneurship Development Center invites upper-class EMBA students and alumni to serve as professional consultants and entrepreneurship advisors. They enter the Tutorship Office in turns to provide face-to-face or online entrepreneurship consultancy services.

The effects of the entrepreneurship education implementation at NTUT

Student satisfaction: Since it was offered in 2007, Innovation and Entrepreneurship Program has been studied by 501 students in total. According to a survey in 2009 (Table 2), more than 80% of the students are satisfied with the courses on the whole, believe the courses help broaden their field of vision and are willing to continue attending the courses and recommend such courses to their fellow students. In addition, 80% of the students think sharing experience of successful entrepreneurs significantly influences their entrepreneurship in the future and 60% of them think they haven't acquired entrepreneurship knowledge and ability.

Achievements of entrepreneurship contests: Students studying Innovation and Entrepreneurship Program must write entrepreneurship plan and must be organized into teams to attend National University Cup Entrepreneurship Contest. The grading standard covers social contribution, uniqueness of innovation, feasibility evaluation, planning of financial resources and skills of making presentations. Students of this program altogether have been organized into 110 teams to attend the contest and nine teams have entered the final contest. The first and the third places in 2008 as well as the first place in 2009 have all been taken by contesting teams of this program, which is a remarkable achievement of NTUT's entrepreneurship education. The entrepreneurship plans of the

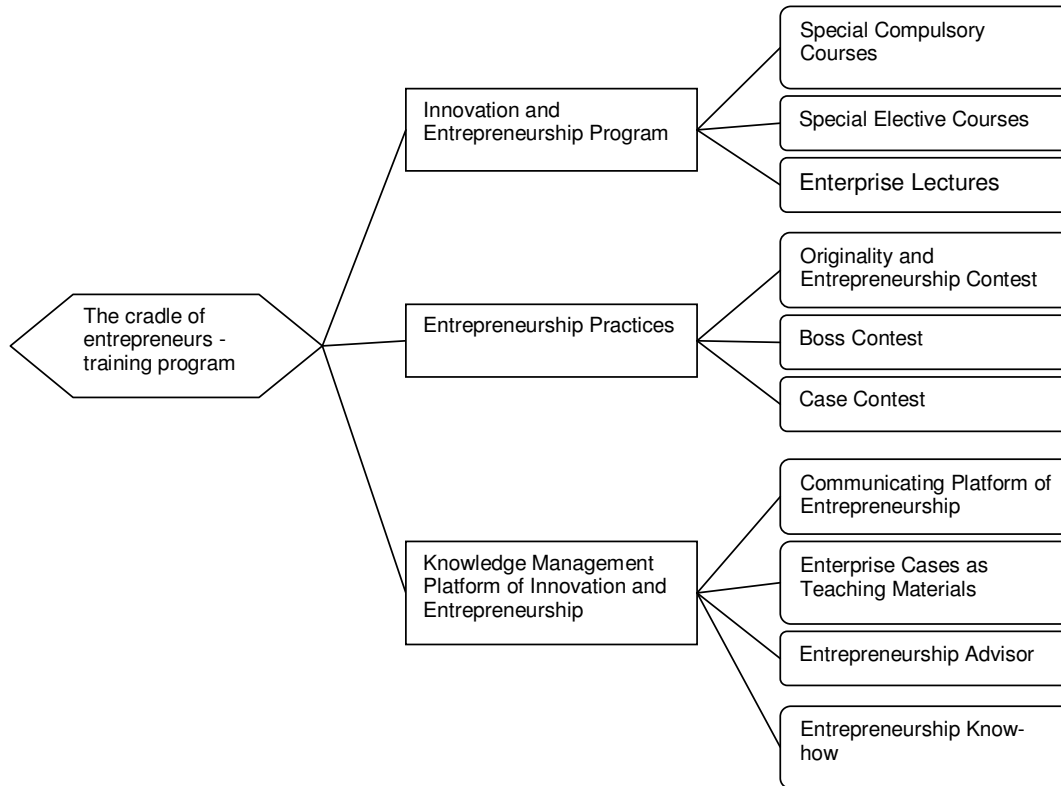


Figure 1. NTUT's Cradle Education Program of Entrepreneurs

Table 1. NTUT innovation and entrepreneurship program.

Course name	Credits / hours	Remarks
Special compulsory courses		
Entrepreneurial Management	3/3	i) At least 15 credits must be obtained from special elective courses.
Special elective courses		
Creativity Stimulation	2/2	ii) At least six credits are obtained from the special elective courses which are not offered by the student's own department.
Management	3/3	iii) At least 18 credits must be obtained from all the courses to receive the expertise certificate of innovation and entrepreneurship program.
Contemporary Management	2/2	
Marketing	3/3	
Financial Management	3/3	
Product Innovation Method	3/3	
Creative problem solving	3/3	
Project Investment Analysis	3/3	
Tourism Factory	1/1	
Feast for the global perspective	1/1	
How to implement innovation into realized enterprise	1/1	
Practices and applications of TRIZ innovative thinking	1/1	
Enterprise Lectures		
Innovative Lecture	1/1	
Model of Entrepreneurs	1/1	
Business Speech-Entrepreneur benchmarking	1/1	
Total	32/32	

Table 2. Satisfaction survey of innovation and entrepreneurship program Unit: %.

Items	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Satisfied with the courses on the whole	24	60	12	0	4
The courses help broaden the field of vision	24	70	4	0	2
Willing to continue attending Innovation and Entrepreneurship Program	26	52	20	0	2
Willing to recommend Innovation and Entrepreneurship Program to other students	24	62	12	0	2
Sharing experience of successful entrepreneur significantly influences entrepreneurship in the future	30	50	18	0	2
Think they have acquired entrepreneurship knowledge and ability	4	0	36	46	14

teams having won prize deal with energy conservation and environmental protection service companies, joyful village for senior citizens and western snack materials package company.

RECOMMENDATIONS

According to the above research results, the researcher puts forward the following suggestions about entrepreneurship education of NTUT:

Lowering certification threshold of the program

NTUT Innovation and Entrepreneurship Program altogether offers 16 courses, which carry 32 credits in total. The detailed implementation rules of this program specify that in order to acquire the program certificate, a student must obtain 18 credits at least and at least six credits are obtained from the special elective courses which are not courses offered by the student's own department. This program offers a few courses for students to select and specifies that special elective courses of other departments must be studied. It is suggested to offer more special elective courses, enhance integrity of the courses and lower certification threshold of the program so as to make this program more attractive towards the students.

Strengthening publicity and promotion of entrepreneurship spirit

The quintessence of entrepreneurship education lies in fostering entrepreneurship spirit instead by simply offering entrepreneurship courses. Entrepreneurship education of NTUT has developed a complete concept framework. For the follow-up entrepreneurship courses to produce effect in the future, it is necessary to arouse students' interest in entrepreneurship by publicity and promotion activities or environmental modification so that

they know about the importance of entrepreneurship spirit, entrepreneurship knowledge and skills and their learning motive is stimulated.

Seeking enterprises' sponsorship or participation in contest activities

Entrepreneurship contest emphasizes combination between knowledge and practices. Through it, students can get to know which elements and knowledge a complete entrepreneurship plan should include. It also provides students with a favorable opportunity of practical entrepreneurship operation. It is suggested to actively seek enterprises' sponsorship in software and hardware equipment or their provision of consultancy services when an entrepreneurship contest is held. The industry personages should be invited to serve as judges and should be allowed to visit the presentation of contesting works for the purposes of increasing interaction between students and the industry personages and helping students get the opportunity to practice in enterprises.

Diligently track effects of the program

The university shall continuously track the employment status of the graduates having studied this program and ask them whether the knowledge and skills they have acquired from studying this program have become a competitive edge in job seeking, employment or entrepreneurship to know whether this program can really foster core abilities and key traits of entrepreneurs. In the future, the program planning should be improved on basis of such track.

REFERENCES

- Chen YF, Lai MC (2007). The entrepreneurial curricula in Taiwan. *J. Entrepreneurship. Res.* 2(3): 117-147
- Colin J, Jack E (2004). A contemporary approach to entrepreneurship education. *Educ. Training* 46: 416-423.

- College of Engineering and Applied Sciences, SUNY Stony Brook (2004). Consortium for Security and Medical Sensor Systems. Retrieved September 14, 2009, from the World Wide Web: <http://www.ece.sunysb.edu/~sensorconsortium/>
- Garavan TN, O'Connell B (1994). Entrepreneurship education and training programmes: A review and evaluation – Part 1. *J. Eur. Ind. Train.* 18(8): 3-12.
- KATZ JA (2003). The Chronology and Intellectual Trajectory of American Entrepreneurship Education, 1876-1999. *J. Bus. Venturing*, 18(2): 282-300.
- Kourilsky ML, Walstad WB (1998). Entrepreneurship and female youth: Knowledge, attitudes, gender differences, and educational practices, *J. Bus. Venturing* 13(1): 77-88.
- Lai SQ. (2008). The innovation and entrepreneurship policies from global perspectives, *J. SME Dev.* 8: 161-176.
- Lin YH (2007). Innovation and Entrepreneurship Program. National Taipei University of Technology, *Teach. Learn. Excellence J.* Vol. 1
- Luryi S, Tang W, Lifshitz N, Wolf G, Doboli S, Betz JA, Maritato P, Shamash Y (2007). Entrepreneurship in engineering education. 37th ASEE/IEEE Frontiers in Education Conference. Milwaukee, Wisconsin.
- MIT (2009). MIT \$100K Entrepreneurship Competition. Retrieved September 14, from the World Wide Web: <http://www.mit100k.org/>
- National Taipei University of Technology (2008). Teaching & Learning Excellence-Innovation and Entrepreneurship Program. Retrieved September 14, 2009, from the World Wide Web: http://www.tle.ntut.edu.tw/icd/program_icd1.html
- National Taiwan University (2008). Creativity and Entrepreneurship Program. Retrieved September 14, 2009, from the World Wide Web: <http://www2.ee.ntu.edu.tw/~cep/index.html>
- Okudan GE, Rzasa SE (2006). A project-based approach to entrepreneurial leadership education. *Technovation* 26: 195-210.
- Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA). (2008a). September 17 White Paper on Small and Medium Enterprises in Taiwan. Retrieved September 14, 2009, from the World Wide Web: <http://www.moeasmea.gov.tw/ct.asp?xItem=7416&CtNode=513&mp=1>
- Small and Medium Enterprise Administration, Ministry of Economic Affairs (SMEA). (2008b). December 30 2008 Management Trend of SMEs in Taiwan. Retrieved September 14, 2009, from the World Wide Web: <http://www.moeasmea.gov.tw/content.asp?Cultem=7660>
- Stanford School of Engineering (2009). The Stanford Technology Ventures Program. Retrieved September 14, from the World Wide Web: <http://STVP.stanford.edu>
- Volkman C. (2004). Entrepreneurship studies- An ascending Academic discipline in the Twenty-First Century. *Higher Educ. Eur.* 29(2): 177-185.