RESEARCHING THE ENTREPRENEURSHIP OF ENGINEERING STUDENTS IN DANANG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Ho Thi Kieu Oanh, Hoang Nguyen Dieu Trang, Pham Anh Duc

University of Science and Technology, The University of Danang
hothikieuoanh@dut.udn.vn, hndtrang@dut.udn.vn, paduc@dut.udn.vn

Abstract - In the global economy, engineering students should be equipped with entrepreneurship, which helps to lengthen the life of their technical ability and desires to innovate. However, entrepreneurship is generally quite strange to students in Danang University of Science and Technology (DUT) even though annually about 5% of graduate students become entrepreneurs through their natural entrepreneurial skills. From this situation, the study aims to discover the necessity of entrepreneurship in DUT engineering students. This necessity will be the rationale for the further step of recommending a proper curriculum for entrepreneurship education. The questionnaire survey investigates the entrepreneurship of the 4th-5th DUT students in two basic aspects: their awareness and their attention. Data from this survey was collected, and then analyzed by SPSS to exploit the relationship between students and entrepreneurship. The analytical results illustrate that engineering students are mostly attracted by entrepreneurship. Moreover, there are also differences between male and female engineering students in their attention to entrepreneurship. This result serves as reliable practical evidence to support the entrepreneurship education for engineering students. Furthermore, the implementation of this study is to design the curriculum of entrepreneurship courses to create and nurture the entrepreneurial behaviour and environment for engineering students.

Key words - entrepreneurship; engineering students; universities; entrepreneurs; entrepreneurial behaviour; entrepreneurial environment.

1. Introduction

Currently, the number of engineering entrepreneurs has been increasing notably in the world. It is impressive that entrepreneurs are not only businessmen but also engineers. This trend stimulates the consideration of engineering universities about how to increase the number and the quality of future engineering entrepreneurs through many related courses. To undertake this consideration, the course of engineering entrepreneurship has been offered in a large number of universities in different countries in the world. This course illustrates the focus of entrepreneurship in university education.

Entrepreneurship is an element of critical importance in driving economic growth because it is closely related to the processes of fostering innovation, running enterprises, undertaking self-employment and creating job opportunities [1, 2, 3]. Then, it is necessary for engineering students to identify opportunities via entrepreneurial skills to run their own businesses, which are also of great help to their science and technical skills.

Entrepreneurship has multi-definitions in different facets, but basically it is known to be the process of starting up a business or an organisation toward self-employment [3]. It means that there is the full responsibility of organisational success and failure. It involves basic skills to join in the business market as self-employers.

Every year, there is a considerable number of graduation students in engineering university who become the owners of their business. Similarly, 5% of graduation students in DUT are employers of start-up organisations. However, in the world, engineers gain the skills of entrepreneurship at university. This course generally supplies the knowledge and skills of business planning, strategic management of technology-driven issues, as well as skills of efficient business analysis in any early stage of the business initiation [4]. However, students in engineering universities in Vietnam, particularly in DUT, have not been equipped with any entrepreneurial skills. They actually run their businesses through their innateness without relevant knowledge. They lack the business skills to deal with problems for the enhancement of their own businesses. As a result, they often lose many opportunities to start their organisations. Therefore, the integration of entrepreneurship into education is very important since it opens the window of chances for engineering students to realise their business innovation.

Education is the prerequisite for the training of basic skills and ability. It also wakes up and nurtures the innateness of a person in effective and efficient ways. Many universities and colleges recognize the significance of teaching entrepreneurship in the engineering and science programs [5]. It helps to improve students' skills of accessing the business market and controlling their businesses.

Based on this global statement, there should be a study in entrepreneurship to find out the necessity of the entrepreneurial course for DUT non-business students and how to organise this course to meet the students' expectations. This study aims to contribute to the perfect skills for students to support themselves after they graduate and enter the work markets.

2. Aims, Objectives and Scope of the study

The study aims to test the attention of students to entrepreneurship and the essence of entrepreneurial education. Moreover, this study is also to find out a measure to design and teach this course properly if there is great attention paid to this issue. The aims and process of study are expressed in Figure 1.

There are three main steps in the research process but in this study, the focus is put on students' attention to the entrepreneurship which is quite strange to non-business students (at the dash-line box).

The first step is really important in this flow study because it is the rationale to carry out the following steps. The scope of this study will be in step 1, and other steps will be undertaken in the next study.

The aims of step 1 are to identify the attention of

engineering students and to evaluate their needs in this course as well as the differences between genders in their attention.

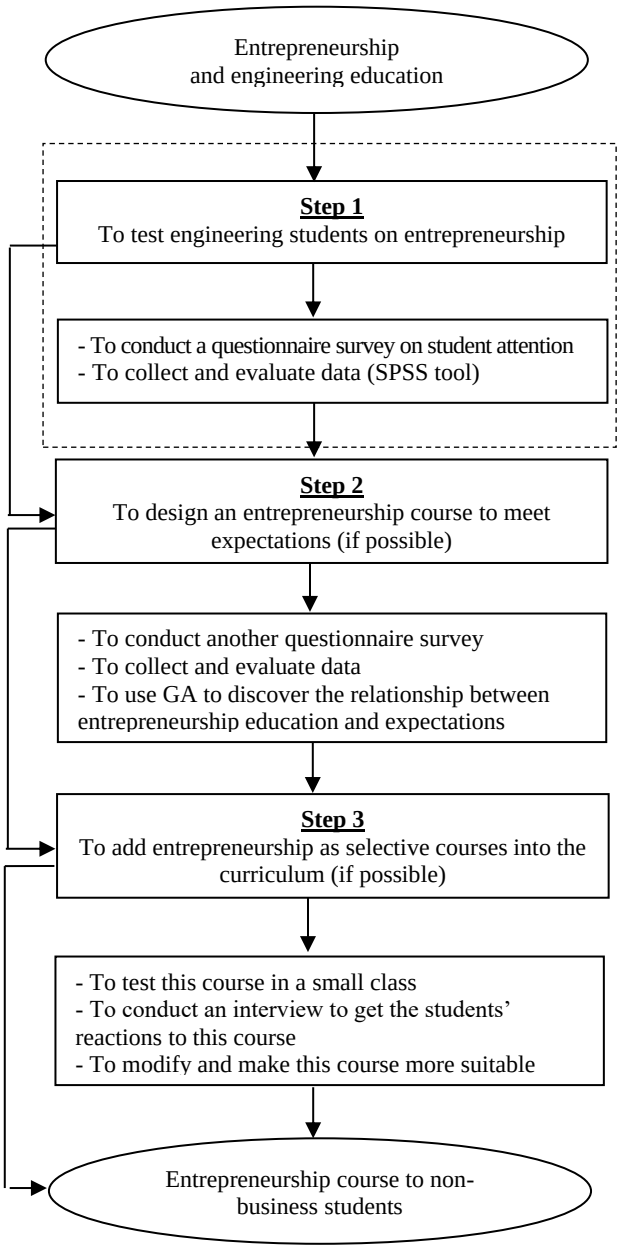

Figure 1. *The flowchart of research on entrepreneurship in engineering students*

3. Entrepreneurship and DUT students

3.1. Questionnaire collection and analyzis

This study presents the preliminary results of a questionnaire survey to understand the entrepreneurship of engineering students in DUT who have no experience in any courses on entrepreneurship. This course should be taught to the 4th and 5th undergraduate students because of their timeline of academic study. And this survey sets no limit to the level and gender of participants; only the number of papers is limited.

The samples are in total 86 respondents (out of 100 papers), divided into 4th undergraduate students (62.20%) and 5th undergraduate students (37.80%). Among the engineering students, males outnumber females: 69.05% are male and 30.95% are female (Figure 2).

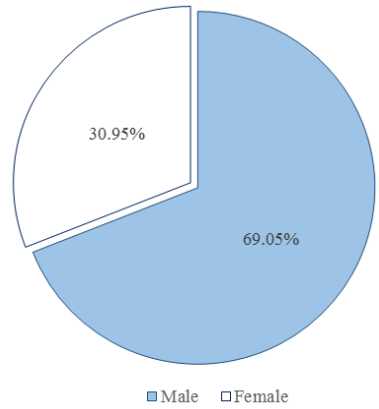

Figure 2. *The gender proportion in survey*

This study was compsed of two parts: entrepreneurial identification and students' attention. The first part begins with many questions on understanding or knowing entrepreneurship. 47.67% respondents admit knowing entrepreneurship while 52.33% respondents do not know about this. It means that entrepreneurship is still strange with a considerable number of students. Additionally, a high proportion of students believe that the entrepreneurship can be gained by innateness and education (60.74%) while just over a third of the respondent number agreed with the education role in entrepreneurial skills. Only 1.16% respondents got it from innateness.

In the second part, entrepreneurial contribution in education are serached for via five questions that focus on entrepreneurship and education in universities (from question 6 to question 10 in every questionnaire paper). In this part, 5 Likert scales were used to measure each respondent's satisfaction level to each question from *no like* to *strongly like* [6].

For *question 6*, most students showed a high expectation to be self-employment (33.72% and 38.37% for *strongly like* and *like*, respectively). There were only 4.65% respondents in the situation of *no like*. It meant that there was a high percentage of students who had the passion for being employers of themselves. With these responses to *question 6*, *question 7* had the same trend considerably. The figures of 40.70% and 38.37% of *strongly like* and *like* represented their willingness in studying entrepreneurship as an elective course in their study, in contrast with 1.16% and 3.49% of the students who chose *less like* or *did not like* to have this course. Through these two questions, there is a supportive signal of entrepreneurship in DUT with more than 70% of respondents whose had highly positive attention.

The *next question (question 8)* was "After studying entrepreneurship course, do you believe that their entrepreneurial skills will be developed notably?". Half of the respondents (45.88%) agreed with the role of this course in the improvement of their skills and 21.18% of the respondents went for *strongly like*, in contrast with 10.59% and 1.18% of respondents who rarely believed or did not believe in courses on entrepreneurial skills.

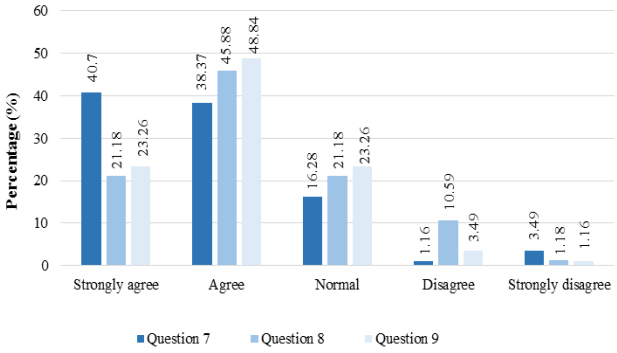

Figure 3. *The results of 3 questions (from Question 7 to question 9) in the part 2*

For *question 9*, when asked about the contribution of the entrepreneurship to students in their ownership, more than half of the respondents belieeved that they would run their own businesses properly (23.26% and 48.84% for *strongly like* and *like*). Only a low percentage of 3.49% and 1.16% respondents did not believe in the course contribution. Furthermore, in the last question in part 2, there was a great interest in enrolling in the entrepreneurship course. Two thirds of the students were willing to study this course if it would be included in the curriculum (40.70% and 38.37%, respectively). Also, a small number of students did not intend to study this course, 8.04% (7 out of 86 students) (see Figure 3). From all these numbers it can be concluded that students in DUT show great attention to entrepreneurship, and they agree that this course should become an elective one in their studying curriculum.

3.2. Evaluation and Discussion

With the aims of surveying students' attention to entrepreneurship, as mentioned above, the questionnaires were divided into two parts: part 1 for self-introduction and entrepreneurial definitions and part 2 for students' attention.

For part 2, to exploit how they reacted to entrepreneurship, the statistics tool as SPSS was used to evaluate these data by the numerical methodology. The 5-likert scales in words transfered to numbers from 1 to 5 with 1 as *no like* and 5 as *very like* in this order. For questions 6-10, via the use of the SPSS statistics program, the level of respondents could be illustrated by the numerical scale which would give evaluations more accurately (see Table 4).

From this table, all the questions had the responses in the mean at an approximate of 4.00. This number illustrated that most students were in *like level* to entrepreneurship. In these questions, question 7 got the highest mean at 4.12 (out of 5.00) about the enrollment in the entrepreneurial course if it could be one of the elective courses. This question showed that students in DUT had an inspiration to study this course even though there was nearly half of the respondents who know entrepreneurship or already had a glance recognition of this in the business market.

Table 4. *Statistics of questions in Part 2*

Questions		Q6	Q7	Q8	Q9	Q10
N	Valid	86	86	86	86	86
	Missing	0	0	0	0	0
Mean		3.94	4.12	3.73	3.89	4.05
Std. Error of Mean		.111	.104	.105	.091	.119
Median		4.00	4.00	4.00	4.00	4.00
Mode		4.00	5.00	4.00	4.00	5.00
Std. Deviation		1.03	.963	.975	.84	1.105
Variance		1.07	.927	.951	.707	1.221
Range		4.00	4.00	4.00	4.00	4.00
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		5.00	5.00	5.00	5.00	5.00

The next question with the second highest mean was question 10. This question supported question 7 notably when asking about adding the entrepreneurial course into the curriculum of engineering study. It means that this question emphasized the interest of engineering students in the entrepreneurship course when they liked to have it in their undergraduate study (at the level of 4.05/5.00)

In the last three questions (question 6, question 8, and question 9), there were closely similar mean numbers which focused on the implementation of entrepreneurship in students before and after taking this course. They believed that entrepreneurial skills as well as skills for running businesses by themselves would be increased if they had a chance to learn this course properly.

This study also checked the attention between female and male respondents to know the differences between them (Tables 5 and 6, below). As can be seen from these tables, the males was showed greater attention than the females even though female students had the higher inspiration to run their own businesses (question 6: 3.92 for female versus 4.00 for male). Most male respondents put high belief in the entrepreneurship that gave any benefits to their skills as well as their ambitions in their own businesses. Through question 8 (asking about undertaking businesses confidently after studying the entrepreneurship course in DUT), the males responded at the level of 3.77 (meaning between the level of *believe* and *normal but leaning to believe*) while the females' level was at 3.65. This meant that male students expected the course's benefits higher than female ones.

This statement was more significantly obvious through the answers to question 9 asking about the increase in the percentage of confidence while running businesses. Male students still admit the contribution of the entrepreneurship course in their confidence percentages. There were the levels of 3.93 and 3.81 (out of 5.00) for the males and females, respectively. These figures also showed the higher number of students who belong to the level of *believe* in the significance of the course.

Table 5. *Statistics of male respondents to Part 2*

Questions		Male Q6	Male Q7	Male Q8	Male Q9	Male Q10
N	Valid	60	60	60	60	60
	Missing	26	26	26	26	26
Mean		3.92	4.02	3.77	3.93	4.07
Std. Error of Mean		.139	.125	.124	.109	.146
Median		4.00	4.00	4.00	4.00	4.00
Mode		4.00[a]	4.00	4.00	4.00	5.00

Std. Deviation	1.078	.965	.963	.841	1.13
Variance	1.162	.932	.928	.707	1.28
Range	4.00	4.00	4.00	3.00	4.00
Minimum	1.00	1.00	1.00	2.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00

[a]. Multiple modes exist. The smallest value is shown

Table 6. *Statistics of female respondents to Part 2*

Questions		FM Q6	FM Q7	FM Q8	FM Q9	FM Q10
N	Valid	26	26	26	26	26
	Missing	60	60	60	60	60
Mean		4.00	4.35	3.65	3.81	4.00
Std. Error of Mean		.184	.183	.199	.167	.208
Median		4.00	5.00	4.00	4.00	4.00
Mode		4.00	5.00	4.00	4.00	4.00
Std. Deviation		.938	.936	1.018	.849	1.06
Variance		.880	.875	1.035	.722	1.12
Range		4.00	4.00	4.00	4.00	4.00
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		5.00	5.00	5.00	5.00	5.00

Based on this belief, the statistics of male respondents who represented their interest in having this course in the curriculum is more impressive than the female ones (at the level of 4.07 and 4.00, respectively).

From this analysis and evaluation, it can be seen that DUT engineering students show great attention on entrepreneurship, which is still really strange to them. This survey is the first step to give a general view of engineering students on the role of the entrepreneurship course in their future employment and their own businesses. There is also a higher evaluation of male respondents on the benefits of this course after studying compared to that of the females. This is one of the characteristics of engineering universities.

4. Conclusion

Entrepreneurship is a current tendency of many engineering colleges and universities in the world because of its benefits to students. It stimulates engineering students to have innovations in starting a business and to guide them how to start a business successfully. After studying this course, normally students can have opportunistic, creative thinking and become capable of doing business as well as confident in taking risks and to adapt to uncertainty for their profits in business.

With this significance, this study checks the attention of engineering students in DUT on entrepreneurship and how they react to this new course. After conducting the survey and analysing the collected data, it can be concluded that most respondents have great attention on entrepreneurship, with the male student responsents outnumbering the female ones. This reflects the impressive reactions to this entrepreneurship course.

For further development of entrepreneurship education, this study will conduct step 2 and step 3 in order to build up a suitable course to non-business students in DUT in the next time to increase the opportunities for students in using entrepreneurial skills and technical knowledge-bases to achieve success in the business market.

REFERENCES

[1] Duval-Couetil N., Reed-Rhoads T. & Haghighi S., 2011, "The Engineering Entrepreneurship survey: An Assessment Instrument to Examine Engineering Student Involvement in Entrepreneurship Education", *The Journal of Engineering Entrepreneurship*, Vol. 2 (No.2), pp.35-56.

[2] Doboli S., Tang W., Ramnath R., Impagliazzo J., VanEpps T., Agarwal A., Romero R. & Currie E.H., 2010, "Panel-Models of Entrepreneurship Education and its role in increasing creativity, Innovation", Leadership in computer science and engineering students, 40th ASEE/IEEE Frontiers in Education Conference, Session F1B.

[3] Hynes B., 1996, " Entrepreneurship education and training-introducing entrepreneurship into non-business disciplines*", Journal of European Industrial Training*, Vol.20, pp. 10-17.

[4] Hsiao A., 2013, "Developing an Entrepreneurial mindset in Engineering students", Canadian Engineering Education Association (CEEA 13) Conference.

[5] Emery A.K., Feland J., 2002, "The Educators Corrner: A response to Needs in Entrepreneurship Education", The 2002 American Society for Engineering Education Annual Conference & Exposition Copyright, American Society for Engineering Education.

[6] Robinson J.P., Shaver P.R., and Wrightsman L.S, 1991, "Measures of personality and social psychological attitudes", Academic Press, San Deigo, CA.

(The Board of Editors received the paper on 04/13/2015, its review was completed on 04/30/2015)