Applying Competency based Approach for Entrepreneurship education

Farnaz Mojab *1, Reza Zaefarian 2, Abdol Hadi Dazian Azizi3

1 Science in Entrepreneurship Management at Tehran University, Iran
2 Assistant professor at Entrepreneurship Faculty of University of Tehran
3 Assistant professor at Shahid Chamran University

Abstract

Today great attention is paid to competency based education and application of this method in entrepreneurship education at academic level as well as other educational environments (Izquierdo, 2008). Current business education programs are strongly criticized for not being in accordance with the requirements of changing business environment. One general criticism is that business education has become too task-oriented and does not emphasize on multi-dimensional complexities of issues (Tarabishy & Soloman, 2005). University professors in different course agreed that academic programs should be compatible with the needs of society (Mulder et al., 2009). In some cases a clear gap between knowledge and skill levels of students can be observed (for instance in cases where their expertise in academic knowledge and skill is not adequate) (Woollacott, 2009).

Therefore the goal of this study is to examine the importance of entrepreneurial competencies to identify entrepreneurship education headlines using a competency based approach for IT students. The study is done on two samples on the population; the first sample is comprised of entrepreneurs who are active in the field of Information Technology and Information Technology students in B. A. level. The second sample is made of experts (including academic experts in the field of entrepreneurship Education and entrepreneurship professors). The research methodology is mixed (quantitative and qualitative). In qualitative part, data is gathered using interviews and in the quantitative part questionnaires are applied. Data analysis is done using coding methodology. Also, in order to interpret quantitative data, SPSS software has been used. The results are indicative of the most important entrepreneurial competencies that should be considered in designing entrepreneurship curriculum with competencies approach for IT students.

Keywords: education, headlines, competencies approach, IT students

* Corresponding author. Tel.: +989177736365; fax: +98-771-5564074
E-mail address: f_mojab@ut.ac.ir.
1. Introduction

The traditional approach for entrepreneurship education has been designed to train people who intend to start a new venture in the future (Rasmussen & Sorheim, 2006). Current business education programs are strongly criticized for not being in accordance with the requirements of the business environment. One general criticism is that business education has become too task-oriented and does not emphasize on multi-dimensional complexities of issues (Tarabishy & Solomon, 2005). Considering this challenge in the primary education of entrepreneurship and continuous learning, recognition of entrepreneurship competencies as impetus for entrepreneurial behaviour in labour market should be considered as a part of the general and professional business education (Onstenk, 2003).

University professors in different courses are agreed that academic programs should be compatible with the needs of society (Mulder et al., 2009). In some cases a clear gap between knowledge and skill levels of students can be observed (for instance in cases where their expertise in academic knowledge and skill is not adequate) (Woollacott, 2009). Many scholars affirm of the need to narrate engineering and economic and managerial skills in order to face the difficulties of creating and running a company in its totality. They emphasize that engineers' need social and interpersonal skills to function in the organizational environments effectively. In such an environment, students not only need the information about entrepreneurial activity, but also they require a great understanding of the mutual action between technology and economy. Entrepreneurship education can perform the role of improving entrepreneurial and managerial skills, in order to harmonize engineers' competencies with the necessities of emerging knowledge-based economy (Papayannkiz et al., 2008). Thus the goal of competency based education must be to shape balanced, useful and ethical graduates to serve the society (Mulder et al., 2009).

Moreover, if entrepreneurship education is supposed to train the founders of enterprises who are able to create and develop wealth, the challenge for education authorities should then be to formulate programs, courses and fields that both respond to academic needs and result in realistic attention and entrepreneurship atmosphere in experimental learning environment (Solomon and Tarabishi, 2005). Thus new contents focus on key entrepreneurship skills and entrepreneurial competencies. An important goal of new contents and professional education methods is to develop key competencies (Onstenk, 2003).

Therefore the goal of this study is to examine the importance of entrepreneurial competencies to identify entrepreneurship education headlines using a competency based approach for IT students. In the next section we will review the literature on entrepreneurial competencies and entrepreneurial education, then we will discuss our research methodology and in the final section of the paper the result will be discussed.

2. Literature Review

- Defining the Concept of Competency

Competency can be conceptually defined to include three types of features: characteristics, skills and knowledge. These terms are related and are used interchangeably in literature. On the other hand, competencies' definitions range from general definitions to extremely detailed ones. However, in all cases, competencies are defined as a cluster of related knowledge, characteristics, attitudes and skills which have a great impact on individual's job, have correlation with individual's performance at work, can be evaluated by the accepted standards and are improved through training.
and development (Sanchez, 2010). Competencies can be designed in general or specialized level. When designing competencies in academic education, too much generalization or too much specialization must be avoided (Mulder et al., 2009). Haunt (1998) believes that competency's behavior is the result of various factors including personal motivation, personal characteristics, self-concept, knowledge and skill, and there might be no wonder that the extent and relationship among these terms are not defined completely (Mtechalmore & Rowley, 2010). Passow (2007) defines competency as below:

"the knowledge, skills, abilities, attitudes, and other characteristics that enable a person to perform skillfully (i.e., to make sound decisions and take effective action) in complex and uncertain situations such as professional work [emphasis added], civic engagement, and personal life" (Woollacot, 2009)

- **Entrepreneurial Competencies:**

Nowadays, competency has become a multi-purpose term which is used with different meanings in various scientific fields (Descy & Tessaring, 2001). Previous studies (e.g., Mitton, 1989) had a process looking towards entrepreneurial competencies and emphasized on behaviour as competency's reflection. Interest in entrepreneurial competencies stems from the assumed relationship between competencies and emergence, existence and growth of venture capitalizations. Therefore, entrepreneurial competencies are seen as important factors in growth and success, and proper understanding of the nature and role of these competencies can have significant impact in practice. Despite the assumed importance of entrepreneurial competencies, the debate on competencies is taking its initial steps in entrepreneurship literature, since the term "competency" has been defined from different aspects and so there are several definitions for it (Sanchez, 2010).

Entrepreneurial competency is the aggregation of all entrepreneurs' essential traits for sustainable success and entrepreneurship, including: attitudes, values, beliefs, knowledge, skills, abilities, characteristic, wisdom, expertise (social, technical, managerial) and mental and behavioural tendencies. Intellect is seen as a specific competency. The main intellect for a successful entrepreneur is one that contains balanced analytic, creative and operational abilities (Wen Wu, 2009). Interest in entrepreneurial competencies is derived from the assumed relationship between competencies and starting a business, existence and growth of an investment (Mtechalmore & Rowley, 2010).

According to the International Consortium for Entrepreneurship Education (ICEE) the following competencies can be defined for entrepreneurs:

- the ability to recognize and analyse market opportunities
- the ability to communicate, identify mentally, persuade and discuss with customers, clients, suppliers, competitors, service providers and other stakeholders in the business environment
- The ability to establish linkages with other business persons and other stakeholders for mutual learning, collaborative undertakings and other joint activities, aimed at achieving common objectives.
- Ability to deal with the life world of entrepreneurship. Entrepreneurs must be able to live with daily insecurity and even enjoy that situation
- A further series of competencies is connected to the development of entrepreneurial and learning organizations, management of business developmental processes and of networks of stakeholders, and a
Employment and Training Administration of the United States Department of Labor (www.doleta.gov) provides the model for entrepreneurship competencies (Fig.1). The model is described in a diagram composed of nine tiers. The order of tiers' organization has formed a pyramid in which competencies are placed in a higher level than skills.

**Academic Competencies**

| Reading | Writing | Mathematics | Science & Technology | Communication: Listening & Speaking | Critical & Analytical Thinking |
|---------|---------|-------------|----------------------|------------------------------------|-------------------------------|

**Personal Effectiveness Competencies**

| Interpersonal skills & team working | Initiative | Ambition | Adaptability & Flexibility | Take risks | Willingness to learn | Integrity | Professionalism | Ethics | Dependability & Reliability |
|-------------------------------------|------------|----------|----------------------------|------------|----------------------|----------|------------------|--------|-----------------------------|

- **Emphasized competencies in entrepreneurship education**

Fundamental competencies in initial stages of learners' entrepreneurship growth should include business opportunities' definition and evaluation. Many other competencies are also important in business success. To identify those entrepreneurial competencies that can be named in entrepreneurship education in B. A. level, Boyatzis model provides a framework based on which the type and level of competencies can be determined. Moreover, the model links activities contributing to educational interference with proper levels of competencies for learners. Since Boyatzis model includes different levels of competencies, some of them change easier than others. Interference can be designed based on time limits necessary for proficiency. Therefore, the concept of competency provides new ways for interference according to entrepreneurship selection and education.

The assumption of focusing on education in order to develop entrepreneurship is based on the idea that entrepreneurial competencies are changeable and can be learnt in a short period of time. In other words, the main link in studying entrepreneurship is especially those that are related to knowledge, skills and attitudes. On the other hand, in motivations and characteristics level, competencies are individuals' internal traits. Thus, they are based on individuals' character and are difficult to change in a short run. This means that teaching some competencies are more difficult than others, especially those that are internal in individuals and are less observable.

Different levels of competencies include individuals' characteristics and these levels are not completely separated. It means competencies always include a single goal that is motivation power or characteristics that cause moving on and achieving the result (Izquirdo, 2008).

- **Competency approach in entrepreneurship education**

Today, competency-based education and the using of this method in academic level and other educational settings have drawn a great deal of attention. Researchers stress on the importance of learners' preparation to act in a new, uncertain and changing environment. In this regard, individuals' need for entrepreneurial competencies development
has been considered as one of the main priorities in entrepreneurship education and teaching. Based on the environment in which individuals develop their activities, they must acquire their specific competencies (Izquirdo, 2008) There is a consensus among university professors in different subjects that academic programs must be consistent with society needs, but these programs must be designed more clearly and explicitly in validating processes. In some cases, learning components in work place should also be considered in educational program. A comparable approach for relating academic program to social needs can be found in England Research Council’s joint statement of educational requirements for students of research department. Another approach in creating competency profiles can be seen in biology programs in Netherlands. In these programs, competencies are divided into knowledge competencies, skill competencies, and attitude competencies. The goal of competency-based education must be balanced, useful and ethical training of graduates to serve the society (Mulder et. al. 2009)

- Entrepreneurial competencies levels:
Entrepreneurial competencies consist different levels which include motivations and characteristics, social role and self-concept, knowledge and skills. The levels of entrepreneurial competencies are demonstrated by those who start a business or make some changes in the status quo of organizations or those who add value by identifying current opportunities in the society. (Izquirdo, 2008)

Banner (1984) provides the levels through which students must pass to become a specialist expert according to Competencies Model (table 1). The keynote to use the model effectively is that skilful performance is not only a measure to evaluate the result or a simple and superficial behaviour, but also includes the method by which a person processes information before, and acts accordingly to achieve the desired outcomes. In this study, this method is used to determine the levels in order to identify training levels which needed for every entrepreneurial competency. (Gillies & Howard 2003)

| Level | Title           | Description                                                                 |
|-------|-----------------|------------------------------------------------------------------------------|
| 1     | Novice          | The person does not have any experience in this field or just has a little experience. So s/he can only perform it under direct training and guidance. |
| 2     | Learner         | The person has some experience in this field and is able to perform it under the minimum daily supervision, but still needs training or guidance in case of encountering new situations. |
| 3     | Competent       | The person performs regularly in this field and is able to act effectively without daily supervision, but may temporarily need training or support in case of encountering unusual situations. |
| 4     | Skillful        | The person possesses skill or experience in this field and can only act under the manager's supervision. The person is also able to teach how to work to others. |
| 5     | Expert (Specialist) | The person is absolutely skillful and has a several-year experience in this field. s/he possess intuitive understanding and does not need a supervisor. s/he can act as a guide (mentor) or |
Teaching entrepreneurial competencies in engineering field

Technical entrepreneurship course (CHEE 410) is a course being offered in the fourth year by chemical engineering department in Queen University. The course was offered for the first time in educational years 1994-1995 and has undergone many changes during the past decade. CHEE 410, like many engineering entrepreneurship programs, was designed to make students familiar with the aspects of innovation and entrepreneurship process by using real examples. Students in small groups are required to perform pre-commercialization researches on technology-based innovations provided by Queen University researchers. The process exposes students to innovation and entrepreneurship nature and forms their entrepreneurial competencies in project management, financial analysis, customers' relations, industry and market research, and intellectual rights. CHEE 410 educational program is in accordance with "Renaissance Engineer" vision of Queen University. A "Renaissance Engineer" should possess a wide and deep range of technical knowledge, creativity, excellent communication skills, sense of aesthetics, ability to work in multi-disciplinary groups, interest in life-long learning, concern for environment and sensitivity towards social, cultural and individual differences. The program of "Renaissance Engineer" also stresses on the ability to combine ideas and information from various sources (Adamson et. al., 2006).

The vision proposed by NAE (National Academy of Engineering) for the engineer of 2020 includes a wide range of competencies beyond technical fields. Basically, these competencies are mostly about communication skills with people, personal creativity, attitudes and experiences and are less related to technical knowledge increase. This may worry some members of engineering faculty, since these new competencies seem to have less accordance with subjects traditionally considered in engineering courses (and hence have less accordance with competencies of most faculty members) (Miller, 2007). Olin College has a special program in this field. The goal of this college is to train the graduates to be prepared enough for skills proposed in NAE report about the engineer of 2020. Team work, communication, creativity and design, entrepreneurial thinking, quick learning skills, self-directing and competency in technical fields constitute the college's goals. Olin College’s goal, like many engineering colleges with competitive targets, is to train engineers to be able to compete in the new and global economy. Olin currently offers three B. A. certificates accredited by ABET (electronic engineering, mechanic engineering and computer engineering). Every student in Olin College is expected to provide evidence of nine competencies. These competencies are: (1) quantified analysis, (2) qualified analysis, (3) team work, (4) communication, (5) life-long learning, (6) background and structure, (7) design, (8) recognition, and (9) opportunity evaluation. These evidences are collected during four years of education and are distributed among all subjects and projects (Miller, 2007).

3. Research Method:

In order to examine the importance of entrepreneurial competencies, we have reviewed the opinions of the entrepreneurs active in Information Technology industry and Information Technology students in B. A. level. First merit list based on the model of Employment and Training Administration United States Department of Labour,
reviewed and approved. Secondly we were interested in validating the competencies proposed by the competency model of Employment and Training Administration United States Department of Labour among entrepreneurs in the Information Technology context and Information Technology students in B. A. level. Then, we sought to confront the two parties’ opinions with the aim of exploring possible differences. Finally according to the Employment and Training Administration United States Department of Labour competency model the interview questions with experts are composed. The goal of this part of research is to identify entrepreneurship education subject headings with competencies approach for Information Technology students in B. A. level.

- **Research Design:**

The framework for this study consists of four stages:

**Stage One:** Identifying entrepreneurial competencies and competency models:

A list of entrepreneurial competencies and competency models is developed based on literature and finally the competency model of the Employment and Training Administration United States Department of Labour is selected as a basis by experts (by interview). (fig.1)

**Stage two:** Validity of relevant entrepreneurs’ competencies:

Based on the first and second level of competency model of the Employment and Training Administration United States Department of Labour, a list of competencies for entrepreneurship was developed. This list was presented to 50 entrepreneurs’ active in IT industry and 100 Information Technology students in B. A. level, with the purpose of contrasting their opinions. Responses from 27 entrepreneurs and 65 students we have received, yielding a response rate of 54% and 65% respectively.

Review of entrepreneurs’ and students’ opinions respondents were asked to rate the importance of each of the entrepreneurial competencies from the list provided in the survey instrument. Based on the data given by respondents, we chose the number of answers rated with high importance. Next, we ordered the competencies according to the frequencies of high importance answers. Finally, we performed the Chi-square test to find evidence of significant differences between the low and high importance answers. (Table 2)

**Stage three:** Selecting competencies according to both parties’ opinions

In this stage of the study, we sought to confront the opinions of both groups of respondents in order to select the most relevant competencies according to the entrepreneurs’ and students’ perspectives. From the results of performing the Chi-square test among each group of competencies and the t-test among respondents, we selected those competencies that demonstrated significant differences. Moreover, we highlighted those that showed differences among respondents. Finally, we built a new list of competencies by selecting only those that were significant and common in both groups. (Table 3)

| n=27 Entrepreneurs |

**Stage four:** Identifying entrepreneurship education subject headings with competencies approach for Information Technology students in B. A. level.
Competencies presented in the first and second level of the Employment and Training Administration United States Department of Labour are provided to 15 academic experts in the field of entrepreneurship education (using interview method). The goal of this was to identify entrepreneurship education subject headings according to entrepreneurial competencies provided in this model. (Table 4)

**Stage five: Identifying training levels which required by banner table for each competencies**

In this stage the survey of entrepreneurs active in the field of IT and IT students an appropriate level for each competency training to be identified (to the questionnaire)(Table 4)

- **Research data collection:**
  Through literature review, two categories of competencies (individual effective competencies and academic competencies) were selected. For individual effective competencies category, 10 competencies were recognized, for which 11 corresponding rubrics had been determined (table 4). For academic competencies category, 6 competencies were determined for which 16 corresponding rubrics had been recognized and finally, the most appropriate level of learning for rubrics were determined from entrepreneurs and IT students viewpoint represent in table 4

- **Research Data Analysis:**
  The survey of entrepreneurs activity in field of information technology and the importance of entrepreneurs and IT students each marked merit and mean values were calculated ,and more according to the topics proposed educational levels required for each competency was determined .

4. Finding:

Results indicate relative differences in responses among entrepreneurs’ and students’ opinions. Entrepreneurs, on one hand, consider that ambition is the most important competency when embarking on an entrepreneurial venture, whereas students are prefer interpersonal skills and team working. Critical & Analytical Thinking Communication: Listening & Speaking, willingness to learn, interpersonal skills and team working, dependability & reliability, initiative, adaptability, take risks, integrity, professionalism, Writing, Science & Technology, ethics, Reading, Mathematics are the next most important competencies for entrepreneurship according to the entrepreneurs’ perspective (table 2). On the other hand, ambition, ethics, adaptability & flexibility, willingness to learn, Critical & Analytical Thinking, integrity, dependability & reliability, Communication: Listening & Speaking, Science & Technology, professionalism, take risks, Writing, initiative, Reading and Mathematics are regarded by students as the next most frequently cited as important to success (table 2).

| NO | Competencies | Entrepreneurs | Competencies | Students |
|----|--------------|---------------|--------------|----------|

Table 2 importance of entrepreneurial competencies entrepreneurs’ and students’ opinions
When the Chi-square test was run on the data from the entrepreneurs’ opinions, eight competencies were significant at the 0.05 level. These competencies were: initiative, ambition, willingness to learn, dependability & reliability, Reading, Science & Technology, Communication: Listening &Speaking, Critical &Analytical Thinking (table 2). Similarly, when performing the Chi-square test on the data based on the students’ opinions, sixteen competencies were significant at the 0.05 level.

Out of them, eight were demonstrated to be of high importance. (Initiative, ambition, willingness to learn, dependability & reliability, Reading, Science & Technology, Communication: Listening & Speaking and Critical &Analytical Thinking). Finally, to examine whether statistical differences may exist among respondents on each of two groups (Entrepreneurs and students), the t test was performed. By doing so, three out of eight (initiative, ambition, Critical &Analytical Thinking) of the competencies were significant at the 0.05 level (table 3).

| Rank | Competency                          | Average | Competency                          | Average |
|------|-------------------------------------|---------|-------------------------------------|---------|
| 1    | Ambition                            | 4.86*   | Interpersonal skills & teamwork     | 4.34*   |
| 2    | Critical & Analytical Thinking      | 4.31*   | Ambition                            | 4.17*   |
| 3    | Communication : Listening &Speaking | 4.30*   | Ethics                              | 4.05*   |
| 4    | Willingness to Learn                | 4.18*   | Adaptability & Flexibility          | 4*      |
| 5    | Interpersonal skills & teamwork     | 4.13    | Willingness to Learn                | 3.95*   |
| 6    | Dependability & Reliability         | 4.09*   | Critical & Analytical Thinking      | 3.90*   |
| 7    | Initiative                          | 4.04*   | Integrity                           | 3.88*   |
| 8    | Adaptability & Flexibility          | 4       | Dependability & Reliability         | 3.8*    |
| 9    | Take Risks                          | 3.95    | Communication : Listening &Speaking | 3.76*   |
| 10   | Integrity                           | 3.86    | Science & Technology                | 3.64*   |
| 11   | Professionalism                     | 3.84    | Professionalism                     | 3.60*   |
| 12   | Writing                             | 3.77    | Take Risks                          | 3.57*   |
| 13   | Science & Technology                | 3.59*   | Writing                             | 3.55*   |
| 14   | Ethics                              | 3.36    | Initiative                          | 3.51*   |
| 15   | Reading                             | 3.31*   | Reading                             | 3.42*   |
| 16   | Mathematics                         | 2.63    | Mathematics                         | 3*      |

n=27 Entrepreneurs
n= 65 Students
*P<0.05
In qualitative method 27 were identifying entrepreneurship education subject headings with competencies approach for Information Technology students in B. A. level (table 4)

| Competencies group | Competency | subject headings                                                                 | educational level | Average |
|--------------------|------------|----------------------------------------------------------------------------------|--------------------|---------|
|                    |            | Interpersonal skills and team working                                           | Entrepreneurs      |         |
|                    |            | Negotiation Techniques                                                           | 4                  | 3       |
|                    |            | Interaction in cyberspace                                                        | 4                  | 3       |
|                    |            | Team work                                                                        | 4                  | 3       |
|                    | Initiative| Identify and evaluate business opportunities in the field of information technology| 4                  | 3       |
|                    | Initiative| Introduction to problem solving decision-making procedures                      | 4                  | 3       |
|                    | Initiative| Innovation Development & Idea Creation                                           | 4                  | 3       |
|                    | Ambition   | Concepts of success and personal development                                    | 4                  | 3       |
|                    | Adaptability & flexibility          | Decision in the variables environment                                           | 3                  | 3       |
|                    | Take risks        | Identify and assess risks in different business areas based on information technology| 3                  | 3       |
|                    | Take risks        | Simulation of risk in the form of case                                           | 3                  | 3       |
|                    | Willingness to learn | Learning models introduced                                                      | 3                  | 3       |
|                    | Reading & Writing | The way of writing the contract                                                 | 3                  | 3       |
|                    | Reading & Writing | introduction to IT specialized terms                                             | 3                  | 3       |

Academic competencies

- Initiative
- Ambition
- Critical & Analytical Thinking

P < 0.05
### Document reading and summarizing

| Mathematics | Introduction to cost-benefit literature in entrepreneurship | 3 |
|            | Model with the help of mathematics models | 3 |
|            | The application of mathematics in entrepreneurship | 3 |

| Science & Technology | Introduction to sociology and psychology science (to have a better communication with audiences) | 3 |
|                      | Introduction to science and technologies related to IT | 3 |
|                      | Introduction to network area and maintaining servers | 3 |
|                      | Introduction to technologies of the day in the field of programming (such as .net and platform) | 3 |

| Communication: Listening & Speaking | Introduction to the ways of quick analysis of information | 4 |
|                                     | Defining audio and verbal communications and their application | 4 |

| Critical & Analytical Thinking | Teaching self-evaluation and others-evaluation | 4 |
|                                | Critical and analytical thinking tools | 4 |
|                                | The ways of applying critical and analytical thinking | 4 |
|                                | Teaching the ways of criticizing and evaluating an idea | 4 |

---

**I. Conclusions and suggestions for future research**

In this study, Entrepreneurship education subject headings with competencies approach for Information Technology students in B.A. degree have been identified. One of our research limitations is the examination according to entrepreneurs and students’ opinions. It is possible for experts to have other opinions. Therefore it is suggested that the subject be studied from their perspectives as well. Since the research is conducted for information technology students, it is suggested that entrepreneurship education rubrics with competencies approach are also recognized in other fields (e.g. agriculture, medicine, …)
References:

Adamson, C., Dilamarter, D., & White, M. (2006). Developing Information Literacy Skills in Engineering Entrepreneurs: A Collaborative Approach.

Descy, P., & Tessaring, M. (2001). Training and learning for competence (Report). Luxembourg: Official Publications of the European Communities.

Gillies, A., & Howard, J. (2003). Managing change in process and people: combining a maturity model with a competency-based approach [Journal]. TQM & BUSINESS EXCELLENCE, 14(7), 779-787.

Izquierdo, E. E. (2008). Intervention Based on the Constructivist Paradigm on the Development of Entrepreneurial Competencies in University Students Ghent University, Ghent, Belgium.

Labor, E. A. T. A. U. S. D. o. (2010). Entrepreneurship Competency Model. from www.doleta.gov

Miller, R., K. (2007). Beyond Study Abroad: Preparing Engineers for the New Global Economy. 1-8.

Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: A literature review and development agenda. [Journal Article]. International Journal of Entrepreneurial Behaviour & Research, 16(7), 779-787.

Mulder, M., Gulikers, J., Biemans, Harm, & Wesselink, R. (2009). The new competence concept in higher education: error or enrichment? [Research paper]. Journal of European Industrial Training, 33(8/9), 755-770.

Onstenk, J. (2003). Entrepreneurship and Vocational Education. [Journal]. European Educational Research Journal, 2(1), 74-89.

Papayannakis, L., Kastelli, I., Damigos, D., & Mavrotas, G. (2008). Fostering entrepreneurship education education in engineering curricula in Greece: Experience and challenges for a Technical University European Journal of Engineering Education, 33(2), 199-210.

Rasmussen, E. A., & Sorheim, R. (2006). Action-based entrepreneurship education. [Journal]. Technovation, 26, 185-194.

Sanchez, J. C. (2010). University training for entrepreneurial competencies: Its impact on intention of creation. Springer Science+Business Media.

Solomon, G., & Tarabishy, A. (2005). Entrepreneurship Education in the United States: A Preliminary Report in the United States. Washington, D.C: The George Washington University.

Wen Wu, W. (2009). A Competency-based model for the success of an entrepreneurial start-up. [Journal Article]. WSEAS TRANSACTIONS ON BUSINESS and ECONOMICS, 6(6), 279-291.

Woolacott, L. C. (2009). Taxonomies of Engineering competencies and Quality Assurance in Engineering Education. Springer Science+Business Media, 257-295.