

INTEGRATION OF ENTREPRENEURSHIP WITH ICT COMPETENCIES INTO HIGHER EDUCATION INSTITUTIONS CURRICULA: A PROPOSAL

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ABSTRACT

Entrepreneurship is a key driver of today's economy. This observation emphasizes the necessity of assuring of an adequate entrepreneurship education on the labour market. The role of this educational strand is to educate students in order to understand the activity of entrepreneurship, to develop their entrepreneurial meaning attitudes and intention to lead a business. One important aspect of students' entrepreneurial preparation refers to the competencies in Information and Communication Technologies (ICT) that must be shaped in accordance with the specificity of the 21st century digital economy. This paper shapes the framework of an Entrepreneurship Curriculum, emphasizing the importance of the ICT component. Ten subjects are proposed, along with their generic and specific competencies. This work is part of the results developed through the program „Designing a Curriculum for Entrepreneurship: a case-workshop of a Community of Creation”, organized by Kemi-Tornio University of Applied Sciences.

Keywords: Entrepreneurship, Entrepreneurship educational program, ICT competencies

1. INTRODUCTION

1. New enterprises and a higher degree of innovation is what Europe needs in order to obtain sustainable growth and the ability to provide more and better jobs. This requires an increase in the number of start-ups and individuals interested in self-employment. In this matter, according to Eurobarometer on Entrepreneurship, it seems that only 45% EU citizens were inquiring to become self-employed in 2009, decreasing in 2010-2012 to 37%. In Romania, the score was above average in 2012, registering a value of 48%. The causes for the decrease and for the low number are presented in several European studies [6], [7],[8]:

- Fear of bankruptcy and irregular income;
- Considerable differences between countries;
- Lack of available financial support;
- High level of bureaucracy;
- Difficulty in obtaining information on how to start a business.

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The European Union is struggling to fight off the global economic downturn, the consequences of the financial crisis and the effects of fast changing technologies. Many companies have gone into bankruptcy, unemployment has risen substantially and investments have come to a nearly standstill. New ventures are needed to start the recovery of economic potential and go beyond to explore new opportunities to secure sustainable growth. The additional challenges of fast changing technologies will hamper the possibilities to exploit the opportunities strongly. These tendencies will force these companies to focus on high levels of innovation and a readiness to adapt to these changes rapidly. When companies want to be able to follow these developments their work force (human capital) need to be educated to higher levels of competency. Better jobs, better but different education than before [21][22][23].

To cover the loss of employment an increase of start-ups is therefore needed. That means that more individuals should become interested to be self-employed. According to Eurobarometer on Entrepreneurship only 45% of EU citizens are interested to become self-employed in 2009. This number decreased in the period 2010-2012 to 37%. In Romania, the score was above the European average. It registered a value of 48%. An explanation for this higher value might be that entrepreneurship is the only source for maintaining a decent standard of living [24][27].

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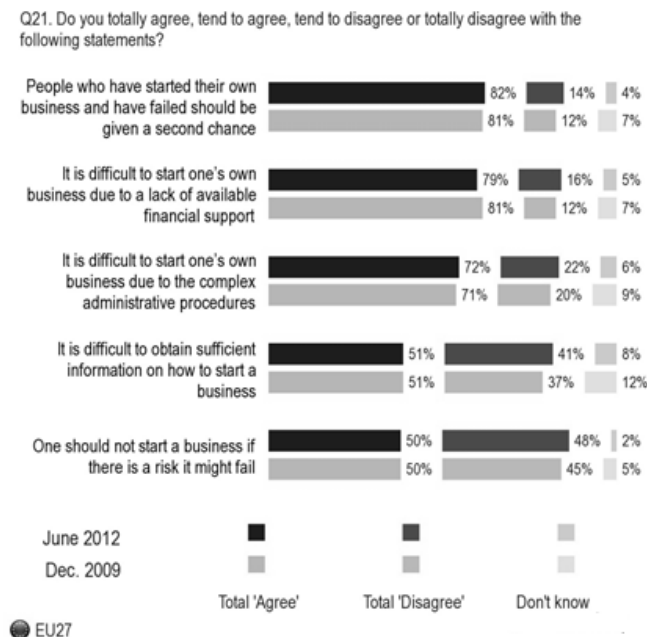


Chart 1: Causes for self-employment percentage drop, Source: [6]

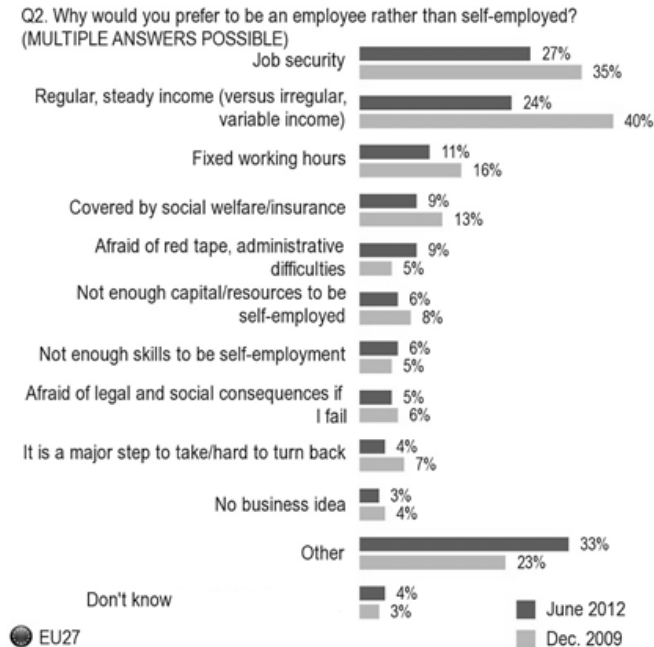


Chart 2: Reasons against self-employments, Source: [6]

- It is important to understand the drive for starting a business:
- Personal independence (self-fulfilment);
- Setting own place and time of work;
- Better income prospects;

Meeting an opportunity (50%)/ out of necessity (29%) /taking over a family business (15%).

In antithesis, the reasons for choosing against self-employment are presented in chart 2.

European enterprises should be competitive on the global market and that requires managing the costs by keeping up with the latest changes in technology. The evolution of ICT draws unpredictable paths for the labour market and the business world, requiring that nowadays companies qualify as adaptable, proactive and tolerant to failure.

European companies need to be highly competitive in global markets. Cost effectiveness and efficiency can be obtained while keeping up with the latest developments in technology. To keep labor costs at a controllable level -on the labor market through collective negotiations and in business through lean production strategies- companies need to qualify themselves as adaptive, proactive and tolerant to failure.

As response, entrepreneurship education, along with creativity and innovation became highlights in Small Business Act for Europe, Programme for the Competitiveness of enterprise and SMEs 2014 – 2020, EU 2020 strategy and in its main initiatives, such as “Youth on the move”, “An agenda for new skills and jobs” and “Innovation Union”. Thus, building a curriculum and frameworks for programs on Entrepreneurship with ICT competencies is of great importance in Europe’s present business climate.

There have been a variety of definitions regarding Entrepreneurship, some being recalled in scientific literature from Stanford Technology Venture Program, Harvard Business School and European Reports and Programmes[5][7][6]. Summarizing, Entrepreneurship is a style of management and leadership centred on pursuing opportunities, regardless of resources currently controlled, but balanced, with the purpose of creating value (e.g. new business, new ventures) [26, 19] By creativity, innovation, risk taking and planning, an individual or a team has to possess the ability of turning ideas into action.

European reports [6][7][8] state that education, in this respect, has a positive impact in the development of the entrepreneurs by improving the mindset of young people, their self-confidence and their employability. There is also a value increase of their role in society and in the economy. In the market, innovative business start-ups are encouraged, thus increasing competition, quality and productivity.

Along with Entrepreneurship education, forming ICT competencies is mandatory, as better inclusion of the current economy in e-Society is inherent and expected by EU directives. Although there is not a clear definition of ICT sector, ICT skills and ICT related professions there are possibilities for determining competencies and building a proper curriculum framework by using the European ICT Profile Family Tree, e-Competence Framework (e-CF), along with other proposed models for profiling professions and competencies in ICT for Entrepreneurship. According to Key Competences for LifeLong Learning, "digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet."

The following chapters will present a proposal for an Entrepreneurship curriculum with accents on the National and European directives and requirements.

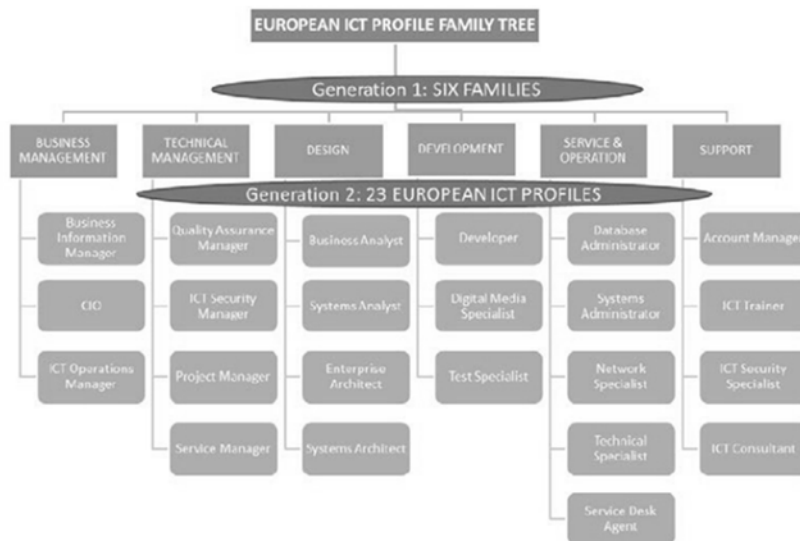


Illustration 1: European ICT Profile Family Tree.

Source: CEN Workshop Agreement "European ICT Professional Profiles" (May 2012)

2. FRAMEWORK FOR AN ENTREPRENEURSHIP CURRICULUM

In literature "entrepreneurship" is described as the ability to introduce "new combinations" – new products, production methods, markets, sources of supply, or industrial combinations, or so [25]. Entrepreneurship is the "alertness" to profit opportunities. It means innovation, means assuming the courage to lead a business.

An Entrepreneurship educational program has to stimulate the entrepreneurial behaviour of applicants, to develop their entrepreneurial competencies, including the attitudes, the skills and knowledge needed to lead a business. In other words, the applicants should become entrepreneurial thinkers, having the skills and tools to start and lead their own businesses.

Although Entrepreneurship Curriculums may vary widely in content and approach, after graduation, the applicants should be able to apply basic and specific economic principles, to write a business plan, to use marketing techniques, to apply accounting principles, HR management principals, to manage risk, to identify valuable ideas, ethical opportunities and legitimate sources of capital [11][12][13].

In [10], the authors divide the elements of an Entrepreneurship Curriculums into four categories:

1. Managing existing resources;
2. Acquiring new resources;
3. Identifying existing opportunities and creating new ones;
4. Bearing uncertainty, exercising alertness, fostering technological or organizational innovation, and adjusting to change.

In order to shape the entrepreneurial competencies in applicants' baggage, most Entrepreneurship programs include subjects that fundament students' preparation in entrepreneurship. In [14], the core courses are split into five groups:

1. Founding;
2. Strategy;
3. Operations;
4. Leadership;
5. Practice.

The strength of the connection between the core courses and the practical activity ("Life as an Entrepreneur") [20] may decide on the success of the Entrepreneurship program. In general, the core courses include specific subjects such are [15][16][17]:

- entrepreneurship,
- marketing,
- business communication,
- business administration,
- economic accounting,
- financial accounting and logistics.

In the approach to form entrepreneurs able to develop a competitive and sustainable business in the 21st century e-economy, the opportunities that this new economy offers should not be ignored. The ICT play a key role in innovative thinking, in spawning new ideas, methods, processes, products and organizational change, in direct linkage with entrepreneurship. The more so as, in many cases, ICT is the source for new venture creation. With these in mind, the development algorithm included six steps [1]:

1. Synchronization of perspectives, expectations and opinions. In this stage, cultural and concrete personal perspectives, expectations and opinions were identified, along with their impact on the curricula. Moreover, working teams were established and contributions were linked to the overall success of the model.
2. Three Force-Field Analysis. The process consists of identifying, describing and evaluating key stakeholders within Entrepreneurship, Education and Labour Markets and their impacts and shaping of the model.
3. The demands of the Force-Fields required to learn to identify the demands that key stakeholders have for Entrepreneurship Education/Labour markets. Also, this is the point where to determine logic and consistent combinations of demands. Next, a set of logic and consistent combinations to fence off the educational playground must be sketched and determine common grounds to construct the educational framework.
4. Scanning the curriculum playground. On this step, functional and behavioural components were determined and a logical framework was created.
5. Constructing the curriculum.
6. Forms and Formats – design course layouts, monitoring processes and assessment formats.

With regard to these observations, the Entrepreneurship Curriculum will include a set of subjects meant to enrich the student’ baggage with specific ICT competencies in entrepreneurship.

3. ICT RELATED SUBJECTS IN THE ENTREPRENEURSHIP CURRICULUM

The framework this paper proposes includes ten ICT subjects related to entrepreneurship. They are presented in the table below, including a short description of every discipline, and two types of competencies: main and secondary.

<i>No.</i>	<i>Discipline</i>	<i>Short description</i>	<i>Main Competencies</i>	<i>Secondary competencies</i>
1.	e-Entrepreneurship (incl. social entrep.)	<ul style="list-style-type: none"> • To analyze ICT and social entrepreneurship innovative models and encourage critical thinking for generating new ideas for electronic entrepreneur forms and formats. • Computer tools and technologies for online environments will be used. 	<ul style="list-style-type: none"> • Innovation orientation • Working with tools and technologies • Computer skills 	<ul style="list-style-type: none"> • Analytical skills • Active learning • Entrepreneurial spirit • Market orientation • Holistic business understanding

<i>No.</i>	<i>Discipline</i>	<i>Short description</i>	<i>Main Competencies</i>	<i>Secondary competencies</i>
2.	Finance and funding instruments	<ul style="list-style-type: none"> • To understand and use funding tools and concepts useful in the New Economy; Concepts: crowd-funding, funding finder software, multifunding banking grades, online lending (SoMoLend), micro loans, Bitcoin s.o. • To understand the main features of public and private debt instruments. • To learn the main commercial, financial and structural advantages and drawbacks from an issuer's and an investor's perspective of emitting or investing in a bond. The subject will be presented in contrast with other forms of capital (e.g. bank debt, private placement, asset securitization, convertible bonds, and hybrid instruments). • To identify issuer characteristics by understanding the purpose of capital markets funding in an entity's capital structure and the required credit profile of potential issuers. 	<ul style="list-style-type: none"> • Analytical skills • Judgment skill • Working with tools and technologies 	<ul style="list-style-type: none"> • Analysis, synthesis, critical thinking • How to deal with a problem
3.	Metrics and evaluation of systems and services	<ul style="list-style-type: none"> • To assess systems and services and describe and generate indicators for evaluation. • Be able to recruit representative users for testing, surveys, and the like. • Be able to create and interpret tests, surveys and the like. 	<ul style="list-style-type: none"> • Analytical skills • Judgment skill • Working with tools and technologies 	<ul style="list-style-type: none"> • Analysis, synthesis, critical thinking • Knowledge transfer into practice • How to deal with a problem • Computer skills
4.	Customer relationships systems	<ul style="list-style-type: none"> • To use technology to describe and use appropriate software systems (the use of cases). • To integrate customer data in order to understand customer needs better and maintain long long-term customer relationships. • To be able to pursue a strategy of Relationship Marketing. 	<ul style="list-style-type: none"> • Client orientation • Working with tools and technologies • Analysis, synthesis, critical thinking 	<ul style="list-style-type: none"> • Judgment skill • Adaptability/flexibility • Creative thinking • Performance oriented • Knowledge transfer into practice • How to deal with a problem • Computer skills • Research skills • Influencing decision making • Market orientation • Planning and organizing

<i>No.</i>	<i>Discipline</i>	<i>Short description</i>	<i>Main Competencies</i>	<i>Secondary competencies</i>
5.	Applied project management	<ul style="list-style-type: none"> • To gain knowledge and skills involved in designing managing and undertaking a project. • Identify project topics and develop the objectives. <p>Understanding of business and project objectives and articulation of these into the project requirements.</p> <ul style="list-style-type: none"> • To structure the project proposal and creating a work breakdown structure of the focuses required to achieve the objectives. • To understand the research and project process for developing a business plan or achieving project goals. • To develop the project structure. • To plan and demonstrate how scope, time, cost, quality, risk, human resources, communication and procurement, achieve project objectives. • To develop documentation of these into a project process. • To monitor the achievement of the project plan and report on this in an appropriate report. 	<ul style="list-style-type: none"> • Performance oriented • Team work • Planning and organizing 	<ul style="list-style-type: none"> • Analytical skills • Judgment skill • Adaptability/flexibility • Knowledge transfer into practice • How to deal with a problem • Computer skills • Result driven or goals oriented • Organizational commitment • Market orientation • Innovation orientation • Work discipline and progress management
6.	Outsourcing and e-HR Management	<ul style="list-style-type: none"> • To identify principles of strategic human resource management: acquiring, rewarding, motivating, using, and generally managing its people effectively. • Students will be able to assess practices and techniques for evaluating performance, organizing teams, coaching and mentoring, and performing various other people related duties of a manager in today's increasingly complex workplace. • Be able to apply a business model to a specific situation. • Be able to evaluate which processes are suitable and which are not suitable for offshore outsourcing. • Be able to evaluate IT functions suitable for offshore outsourcing. • Have gained international experience as part of the student's information technology education. 	<ul style="list-style-type: none"> • Work discipline and progress management • Adaptability/flexibility • Interpersonal skills 	<ul style="list-style-type: none"> • Judgment skill • Professionalism • Analysis, synthesis, critical thinking • Performance oriented • How to deal with a problem • Working with tools and technologies • Computer skills • Influencing decision making • Result driven or goals oriented • Organizational commitment • Planning and organizing

<i>No.</i>	<i>Discipline</i>	<i>Short description</i>	<i>Main Competencies</i>	<i>Secondary competencies</i>
7.	Intellectual property and patent fundamentals & know how transfer	<ul style="list-style-type: none"> • To identify and understand intellectual property and patents concepts. • To understand rules and techniques needed for investigating the background of an invention (“prior art”) and drafting a description of the invention (a “claim”). • To understand the strategies and methodology for drafting a patent specification and the rules for working with the Patent Office. • To be able to structure and write a draft patent application for their invention, including the claims. 	<ul style="list-style-type: none"> • Client orientation • Judgment skill • Research skills 	<ul style="list-style-type: none"> • Mental adulthood • Interpersonal skills • Professionalism • Analysis, synthesis, critical thinking • Performance oriented • Written techniques • Ability to operate in an international context
8.	Risk Management	<ul style="list-style-type: none"> • To learn how to better quantify the risk, as entrepreneurs are not risk taker, but risk managers. • To identify, assess, manage & monitor risks will be presented to the attendants, so they will be able to imagine, plan and implement identified risk management actions using different techniques. It is important for students to gain knowledge about risk management on all levels of the organization, including : (1) Enterprise risk management, (2) Operational risk management, (3) Project risk management, (4) Security risk management, (5) Safety risk management, (6) Environmental risk management, (7) Supply chain risk management. • To learn how to apply probabilistic models and use risk management software instruments, ACCESS based or web-based. • To learn practical simulations using software tools will be provided: students will have to evaluate the risk in a concrete situation, to define a strategy to accept the risk, to avoid it, to reduce or share it, and to determine the activities related to the risk. Then, depending on the risk appetite, cost/benefit analysis and other criteria, they will define the actions. • To monitor risk will be constantly developed, using automatically generated and real-time risk statistics. 	<ul style="list-style-type: none"> • Performance oriented • Influencing decision making • Analytical skills 	<ul style="list-style-type: none"> • Adaptability/flexibility • Creative thinking • Analysis, synthesis, critical thinking • How to deal with a problem • Computer skills

<i>No.</i>	<i>Discipline</i>	<i>Short description</i>	<i>Main Competencies</i>	<i>Secondary competencies</i>
9.	Decision making scenarios	<ul style="list-style-type: none"> • The Decision making scenarios subject introduces to students different techniques for comparable analysis, integrating simulation and scenario analysis. It can be included here: cash flow analysis, Monte Carlo simulation, contingent-claims analysis, decision trees, and real options, decision making and optimization techniques. • To learn about the theory in decision making scenarios and the technologies implied. 	<ul style="list-style-type: none"> • Influencing decision making • Working with tools and technologies • Analysis, synthesis, critical thinking 	<ul style="list-style-type: none"> • Adaptability/flexibility • Creative thinking • Performance oriented • Knowledge transfer into practice • How to deal with a problem • Computer skills • Research skills • Result driven or goals oriented • Planning and organizing • Time management
10.	Decision Support Systems	<ul style="list-style-type: none"> • To present to students the processes of decision-making and provides them a set of dedicated software tools. • To learn about the theory in decision making, the technologies and processes implied. • To challenge students to analyse - individual or in groups- business decision processes within real systems. In this respect, students will use specific tools to model and analyze business data, in order to and structure decision process and to identify decision opportunities. 	<ul style="list-style-type: none"> • Influencing decision making • Working with tools and technologies • Analysis, synthesis, critical thinking 	<ul style="list-style-type: none"> • Adaptability/flexibility • Creative thinking • Performance oriented • Knowledge transfer into practice • How to deal with a problem • Computer skills • Research skills • Result driven or goals oriented • Planning and organizing • Time management

4. CONCLUSION

Europe's future is dependable on the evolutionary development of its business environments. Therefore, current European strategies require that universities update their entrepreneurship education programs in order to provide a deep understanding of the meaning of entrepreneurship in society, to create a learning context for entrepreneurship skills and competences (the vocational aspect: for entrepreneurship) and the advancement of the theory of entrepreneurship (about entrepreneurship). The practice could be the binding aspect (through entrepreneurship)

The proposed framework is based on three forces: the world of the entrepreneurs, the contemporary ideology of university and the world of the students. In order to have a successful curriculum, the needs and expectations of all three key stakeholders must reach common ground [18][20].

Future research will add forms and formats to the model, along with other improvements, as to result a viable University Master program with accents on Entrepreneurship.

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6. REFERENCES

- [1] Hans Zwaga. Designing a Curriculum for Entrepreneurship. Hans Zwaga Competency Development Center Geneva.
- [2] Key Competences for Lifelong Learning – A European Framework, published 2006.
- [3] The OECD Guide to Measuring the Information Society 2011.
- [4] The CEN Workshop Agreement European ICT Professional Profiles, published by the European Committee for Standardization 2012.
- [5] Fostering Entrepreneurship Education at the University, Stanford Technology Venture Program, http://stvp.stanford.edu/documents/about/presentations/TSeelig-New_Mexico.pdf
- [6] European Commission. Effects and impact of entrepreneurship programmes in higher education, http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/files/education/effects_impact_high_edu_final_report_en.pdf
- [7] European Commission. Memo - 37% of Europeans would like to be their own boss, http://europa.eu/rapid/press-release_MEMO-13-7_en.htm
- [8] European Commission. Eurobarometer Survey on Entrepreneurship. http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/eurobarometer/index_en.htm
- [9] European e-Competence Framework, <http://www.ecompetences.eu/>
- [10] Flavia Anghel, Bogdan Glăvan. Entrepreneurial Activity versus Entrepreneurship Education. Romanian Economic and Business Review – Vol. 4, No. 1, pp. 59-64, 2009.
- [11] Thomas N. Duening, Five Minds for the Entrepreneurial Future Cognitive Skills as the Intellectual Foundation for Next Generation Entrepreneurship Curricula. The Journal of Entrepreneurship: Arts and Humanities in Higher Education, pp. 122-137, 2013.
- [12] Carlos A. Alborno. Toward a Set of Trainable Content on Entrepreneurship Education: A Review of Entrepreneurship Research from an Educational Perspective. Journal of Technology Management & Innovation © Jotmi Research Group, 2008, Volume 3, Special Issue 1, pp. 86-98, 2008.
- [13] Jaana Seikkula Leino. The implementation of entrepreneurship education through curriculum reform in Finnish comprehensive schools. Journal of Curriculum Studies, Volume 43, Issue 1, pp. 69-85, 2011.
- [14] Creating an Entrepreneurial Culture. <https://www-ssl.intel.com/content/www/us/en/education/university/entrepreneurship-curriculum-asset-detail-page.html>.
- [15] UCLA Anderson - School of Management - MBA Curriculum. <http://www.anderson.ucla.edu/centers/price-center-for-entrepreneurial-studies/mba-students/mba-curriculum>.
- [16] Consortium for Entrepreneurship Education. National Content Standards for Entrepreneurship Education. <http://www.entre-ed.org>.
- [17] Saskatchewan Learning . Entrepreneurship 30 Curriculum Guide - A Practical and Applied Art. 2004
- [18] Coaldrake, P. (2001) , Responding to Changing Student Expectations. Higher Education Management Vol.13, No. 2. OECD 2001.
- [19] Drucker, P. (1985), Innovation and Entrepreneurship. Butterworth-Heinemann, Oxford OX2, UK.
- [20] Hindle, K. (2007) , Teaching entrepreneurship at university: from the wrong building to the right philosophy. In Fayolle, A. Handbook of Research in Entrepreneurship Education. Volume 1, A General Perspective, pag. 104-126, 2007.

- [21] Hjorth, D. & Johannisson, B. (2007) , Learning as an entrepreneurial process. In: Fayolle, A. Handbook of Research in Entrepreneurship Education. Volume 1, A General Perspective, pag. 46-66, 2007.
- [22] Penaluna, A. & Penaluna, K. (2008) Entrepreneurial capacity? Entrepreneurial intent? Assessing creativity: drawing from experience of the UK's creative industries, paper presented at IntEnt 2008, Miami University, Oxford, OH.
- [23] Rae, D. (2010), Universities and enterprise education: responding to the challenges of a new era. Journal of Small Business and Enterprise Development, Vol.17 No. 4 2010, pp 591-606.
- [24] Reynolds, P.D., Camp, M.S. , Bygrave,W.D., Autio, E. & Hay, M. (2001), Global Entrepreneurship Monitor Summary 2001.
- [25] Schumpeter, J. (1934), The Theory of Economic Development. Harvard University Press, Cambridge, MA.
- [26] Stevenson, H.H. & Jarillo, J.C. (1990), "A paradigm of entrepreneurship: entrepreneurial management", Strategic Management Journal, Vol. 11 No. 5, 1990, pp. 17-27.
- [27] Thurik, A.R., Carree, M.A., van Stel, A.J. & Audretsch, D.B. (2008) , Does self-employment reduce unemployment? Journal of Business Venturing, Vol. 23, Issue 6, November 2008, pages 673-686 .