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Entrepreneurial competences in economical engineering curriculum in Romania

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Abstract

Since 2014, when the entrepreneurship education became a strategic direction for the EU policies in education, the EU has been providing increasing support to national policymakers in education, to universities and schools, in order to improve their approaches in entrepreneurship education. In 2016, the EntreComp Framework was launched, being not only a landmark for the public authorities but also a tool for analyzing the entrepreneurial orientation of various curricula. This paper aims to make an analysis of the current curriculum for bachelor degree from a faculty, from the perspective of the EntreComp framework, through a comparative method. The intention is to point out the gap between what is already being taught and what should be taught regarding entrepreneurship as a transversal competence and to question the framework's level that the faculty should aim for through its curriculum.

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1. Introduction

During the last decades, research has proven that there is a strong, positive, relation, on one hand, between the development and the dynamics of the SMEs' sector and the sustainability and competitiveness of the national,

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European and international economy (Keskin et al., 2010), and, on the other hand, between the entrepreneurial competencies of the business owners, manager and employees and the success of an SME (Tehseen and Ramayah, 2015).

Following this relation, several policies were developed at EU level in the fields of SMEs and education, both in initial training and in long-life learning.

Entrepreneurship is as an individual's ability to turn ideas into action, to be innovative, to take the initiative, to take risks, to plan and manage projects with a view to achieving objectives. By definition, entrepreneurial competencies should be learnt by all the people, regardless of their current position in business or their professional prospects if they are still studying, as entrepreneurial competencies are crucial for the success of any kind of activity.

Entrepreneurial education must be considered nowadays an important instrument to address the challenges of the 21st Century. The European Commission has been focusing on promoting the learning about entrepreneurship from primary school through to university and considers that the success of the European Union in meeting the challenges of competitiveness and economic growth depends on dynamic entrepreneurship (Soare, 2016). In this respect, young people to entrepreneurship develops their initiative and helps them to be more creative and self-confident in whatever they undertake and to act in a socially responsible way (EU, 2004). Moreover, since 2006, entrepreneurship has been one of the eight key-competencies for lifelong learning in the modern, knowledge-based society, starting to be included by the Member States in their policies in the field of education.

The Commission recommendations include the necessity for Member States to develop more systematic strategies to promote entrepreneurship training through: a) a coherent framework; b) support for schools; c) fostering entrepreneurship in higher education; d) support for teachers; e) participation by external actors and businesses; f) practical experience (EU 2006).

Furthermore, in 2016 EU developed Entrepreneurship Competence Framework, also known as *EntreComp*, which offers a tool to improve the entrepreneurial capacity of European citizens and organizations. The framework aims to build consensus around a common understanding of entrepreneurship competence by defining 3 competence areas, a list of 15 competences, learning out-comes and proficiency levels, which current and future initiatives can refer to (EU, 2016). *EntreComp* could be considered as additional support provided by the EU to public authorities (including universities) and private actors to improve their guidance, training and mentoring services for young people and job seekers, and at the same time further an entrepreneurial mindset among citizens. (EU, 2016).

This paper aims to make an analysis of the current curriculum of faculty for bachelor degree from the perspective of the *EntreComp* framework, through a comparative method, to point out the gap between what is already being taught and what should be taught regarding entrepreneurship as a transversal competence and to question the framework's level that the faculty should aim for through its curriculum.

2. *EntreCom* framework

The framework describes entrepreneurship as a transversal competence, which can be applied by citizens to all spheres of life, from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures of any kind, cultural, social or commercial (EU, 2016).

The conceptual model of the framework consists of two main dimensions: the 3 competence areas and the 15 competencies.

The 3 competencies areas are: Ideas & Opportunities, Resources and Into Action. The interconnections between the 3 areas reflects the definition of entrepreneurship. They were integrated in the framework to stress entrepreneurship competence as the ability to transform ideas and opportunities into action by attracting and using resources.

The 15 competencies, are named and briefly explained through descriptors in the *EntreComp Conceptual Model*. Each competence is divided in 3 up to 6 threads and then each thread explained in dynamics on 4 levels of proficiency in the *EntreComp Progression Model*. In the *Full EntreComp Framework*, the threads of the 15 competences are detailed in 442 learning outcomes on 8 levels.

Anyway, the EntreComp framework is an exhaustive theoretical tool, presented as a reference framework for organizations that can be used to adapt their purposes and curriculum to the groups they work with, as not any citizen has to develop all the entrepreneurial competencies at the maximum level.

Considering university education in the field of engineering and management, the minimum level of proficiency that a student should achieve in each of the 15 competencies could be *Intermediate* which focuses on building independence by turning ideas into action in ‘real life’, and on taking some shared responsibility for this. As the minimum level is *Intermediate*, the optimal level could be *Advanced* which focuses on taking responsibility by working with others, using the knowledge that the student has gained, in order to generate value, dealing with increasingly complex challenges. The analysis of the faculty curriculum takes into consideration the *Intermediate – Advanced* levels’ range as desirable.

As important as the proficiency level is the number of threads that a competence has covered by any of the professional and/or transversal competences from the faculty curriculum.

3. The Analysis

3.1. Bachelor degree curriculum – case study

Aiming to describe a bachelor degree curriculum and to compare it with the EntreComp framework, we used two wide spread research methods: *document analysis* and *comparative analysis*. We preferred these methods because:

- They are efficient: they require data selection, instead of data collection, so they are less time-consuming;
- They are cost-effective as they are less time-consuming, comparing to any other quantitative methods
- Many documents are available in the public domain, especially on the Internet, and are obtainable without the authors’ permission; (Bowen, 2009)

As higher education provider, The Faculty MPT from Politehnica University Timisoara, Romania (as a case study), delivers 4 study programs at bachelor level, all of them being part of *Engineering and Management* study field, and we analyzed further the Industrial Economical Engineering (IEE).

We analyzed the documentation that the faculty sent to the national authority for accreditations on higher education and through which MPT obtained the accreditations for each of the 4 study programs.

Considering the purpose of this paper, we chose to make the further deeper analysis and comparison based on *The Full EntreComp Framework*, available for IEE program. The summary consists of two sections: *Professional Competences* (PC) and *Transversal Competences* (TC). While professional competences are specific to each of the 4 study programs, the transversal competences are the same, which underlines the importance of the transversal competences for a successful professional life, regardless the field of work.

Transversal competences (TC) of IEE curriculum are the following:

- CT1. Responsibly applying the principles, norms and values of professional ethics when carrying out professional tasks and when identifying the objectives to be achieved, the available resources, the working steps, the execution times, the related implementation deadlines and the related risks.
- CT2. Identifying the roles and responsibilities in a multidisciplinary team and applying effective relationship and work techniques within the team.
- CT3. Identifying opportunities for continuous training and efficient use of the assisted professional training resources and information (Internet portals, specialized software applications, databases, on-line courses, etc.) in their own language and in an international language, for their own development.

There are 6 professional competences in IEE curriculum, each of the detailed through 5 level descriptors. All of the can be consulted in *The Summary of Qualification Reference*.

3.2. Curriculum comparative analysis

Synthetic description of the Table 1:

- Column 1 – area of the EntreComp Framework
- Column 2 – competence as in EntreComp Framework

- Column 3 – hint about the competence as in EntreComp Framework
- Column 4 – TC and the descriptors of PC of IEE curriculum, related to the Entrepreneurship Competences and their level according to EntreComp Framework.

Table 1. Curriculum analysis.

Area	Competences of EntreComp Framework (EU, 2016)		Level of each competency in MPT curriculum according to EntreComp Framework – Industrial Economical Engineering (IEE)
	Competences	Hints	
1. Ideas and opportunities	1.1 Spotting opportunities	Use your imagination and abilities to identify opportunities for creating value	N/A
	1.2 Creativity	Develop creative and purposeful ideas	PC1.5 – L7 – Define problems PC2.5 – L7 – Design value PC3.5 – L3 – Develop ideas PC4.4 – L3 – Develop ideas PC6.5 – L5 - Design value
	1.3 Vision	Work towards your vision of the future	PC2.5 – L7 – Think strategically PC6.5 – L7 – Imagine
	1.4 Valuing ideas	Make the most of ideas and opportunities	PC2.5 – L7 – Recognize the value of ideas PC6.5 – L7 – Recognize the value of ideas
	1.5 Ethical and sustainable thinking	Assess the consequences and impact of ideas, opportunities and actions	TC1 – L6 – Behave ethically TC1 – L6 – Think sustainably TC1 – L4 – Assess impact TC1 – L5 – Be accountable
2. Resources	2.1 Self-awareness and self-efficacy	Believe in yourself and keep developing	TC3 – L6 - Shape your future TC3 – L3 – Identify your strengths and weaknesses
	2.2 Motivation and perseverance	Stay focused and don't give up	TC2 – L7 – Focus on what keeps you motivated TC2 – L7 – Be determined
	2.3 Mobilizing resources	Gather and manage the resources you need	TC1 – L5 – Manage material and non-material resources TC1 – L7 – Use resources responsibly TC1 – L7 – Make the most of your time PC5.4 – L4 - Manage material and non-material resources PC5.5 – L7 - Manage material and non-material resources
	2.4 Financial and economic literacy	Develop financial and economic know how	PC1.2 – L5 – Understand economic and financial concepts PC2.2 – L4 – Budget PC4.1 – L7 - Understand economic and financial concepts PC4.3 – L7 - Understand economic and financial concepts
	2.5 Mobilizing others	Inspire, enthuse and get others on board	TC2 – L3 – Communicate effectively
3. Into action	3.1 Taking the initiative	Go for it	TC1 – L2 – Take responsibility PC5.3 – L1 – Take action
	3.2 Planning and management	Prioritize, organize and follow-up	TC1 – L5 – Define goals PC4.1 – L5 – Plan and organize PC6.3 – L6 – Plan and organize PC2.5 – L5 – Develop sustainable business plan PC6.5 – L5 – Develop sustainable business plan PC4.3 – L5 – Monitor your progress
	3.3 Coping with uncertainty	Make decisions dealing with uncertainty, ambiguity and risk	TC1 – L4 – Manage risk
	3.4 Working with others	Team up, collaborate and network	TC2 – L5 – Work together
	3.5 Learning through experience	Learn by doing	TC3 – L2 - Learning to learn TC3 – L2 – Learning through experience

By analyzing column 4, based on the EntreComp framework's threads and on the 8 levels of proficiency that are detailed through descriptors, we can estimate the extent in which the IEE curriculum covers each of the 15 entrepreneurship competences. As table 1 shows, a thread of an entrepreneurial competence can be covered at different levels by multiple PCs and/or TCs from the IEE curriculum. For example, the thread called *Design value*, associated with *Creativity*, is covered by PC2.5 up to Proficiency Level 7, and by PC6.5 up to Proficiency Level 5.

The first entrepreneurial competence, called *Spotting Opportunities*, is totally uncovered by the IEE curriculum in all of its 4 threads: *Identify, create and seize opportunities*, *Focus on challenges*, *Uncover needs* and *Analyze the context*. It could be one of the areas where MPT may look for improvements through its curriculum.

The second entrepreneurial competence, called *Creativity*, is covered by the IEE curriculum in 3 out of 5 threads: *Define problems* (Level 7), *Develop ideas* (Level 3) and *Design value* (Level 7). The 2 uncovered threads are *Be curious and opened* and *Be innovative*.

The third entrepreneurial competence, called *Vision*, is covered by the IEE curriculum in 2 out of 3 threads: *Imagine* (Level 7) and *Think strategically* (Level 7). The only uncovered thread of this competence is *Guide action*.

The fourth entrepreneurial competence, called *Valuing Ideas*, is covered by the IEE curriculum in 1 out of 2 threads: *Recognize the value of ideas* (Level 7).

The fifth entrepreneurial competence, called *Ethical and sustainable thinking*, is covered by IEE curriculum in all of its 4 threads: *Behave ethically* (Level 6), *Think sustainably* (Level 6), *Assess impact* (Level 4) and *Be accountable* (Level 5).

The sixth entrepreneurial competence, called *Self-awareness and self-efficacy*, is covered by the IEE curriculum in 2 out of 4 threads: *Identify your strengths and weaknesses* (Level 3) and *Shape your future* (Level 6). The other 2 threads, *Follow your aspirations* and *Believe in your ability*, are not covered at all.

The seventh entrepreneurial competence, called *Motivation and perseverance*, is covered by the IEE curriculum in 2 out of 5 threads: *Be determined* (Level 7) and *Focus on what keeps you motivated* (Level 7). The other 3 threads, *Stay driven*, *Be resilient* and *Don't give up*, are not covered at all, therefore this could be another area in which MPT may look for improvements through its curriculum.

The eighth entrepreneurial competence, called *Mobilizing resources*, is covered by the IEE curriculum in 3 out of 4 threads: *Manage material and non-material resources* (Level 7), *Use resources responsibly* (Level 7) and *Make the most out of your time* (Level 7). The other thread of this competence, called *Get support*, is not covered at all.

The ninth entrepreneurial competence, called *Financial and economic literacy*, is covered by the IEE curriculum in 2 out of 4 threads: *Understand economic and financial concepts* (Level 7) and *Budget* (Level 4). The other 2 threads, *Finding funding* and *Understand taxation*, are not covered at all by the IEE curriculum.

The tenth entrepreneurial competence, called *Mobilizing others*, is covered by the IEE curriculum in only 1 out of 4 threads: *Communicate effectively* (Level 3). The other 3 threads, *Inspire and get inspired*, *Persuade* and *Use media effectively*, are not covered at all, therefore this could be another area in which MPT may look for improvements through its curriculum.

The eleventh entrepreneurial competence, called *Taking initiative*, is covered by IEE curriculum in 2 out of 3 threads: *Taking responsibility* (Level 2) and *Taking action* (Level 1). The other thread, *Work independently*, is not covered at all by IEE curriculum.

The twelfth entrepreneurial competence, called *Planning and management*, is covered by the IEE curriculum in 4 out of 6 threads: *Define goals* (Level 5), *Plan and organize* (Level 6), *Develop sustainable business plan* (Level 5), *Monitor your progress* (Level 5). The other 2 threads, *Define priorities* and *Be flexible and adapt to change*, are not covered at all by the IEE curriculum.

The thirtieth entrepreneurial competence, called *Coping with uncertainty, ambiguity and risk*, is covered by the IEE curriculum in 1 out of 3 threads: *Manage risk* (Level 4). The other 2 threads, *Cope with uncertainty and ambiguity* and *Calculate risk*, are not covered at all by the IEE curriculum, therefore this could be another area in which MPT may look for improvements through its curriculum.

The fourteenth entrepreneurial competence, called *Working with others*, is covered by the IEE curriculum in 1 out of 6 threads: *Work together* (Level 5). The other 5 threads, *Accept diversity*, *Develop emotional intelligence*, *Listen actively*, *Team up* and *Expand your network*, are not covered by the IEE curriculum at all, therefore this could be another area in which MPT may look for improvements through its curriculum.

The fifteenth entrepreneurial competence, called *Learning through experience*, is totally uncovered by the IEE curriculum in all of its 3 threads: *Reflect*, *Learn to learn* and *Learn from experience*. It could be one of the areas where MPT may look for improvements through its curriculum.

4. Conclusions

Considering the field of studies, 10 out of 15 entrepreneurial competences are optimally covered by the IEE curriculum, in at least half of their threads. The other 5 entrepreneurial competences: *Spotting Opportunities*, *Motivation and perseverance*, *Mobilizing others*, *Coping with uncertainty, ambiguity and risk* and *Working with others*, are totally uncovered or covered in less than half of their threads.

Based on the result of this comparison, we recommend MPT curriculum to be revised aiming to add a new competence to cover the 5 entrepreneurial competences that are totally uncovered or covered in less than half of their threads. The new competence could be the following: Identifying a need on a specific market and satisfying it putting efforts and resources, persuading, involving, inspiring and working others, identifying and coping with the specific risks.

This research shows how MPT curriculum covers 10 out of 15 entrepreneurial competences described by EntreComp Framework. The 5 uncovered competences could be covered by a new transversal competence if the MPT curriculum would be revised.

Further research could be focus on the effectiveness of the content and the methods used in various teaching subjects aiming to develop students' entrepreneurial competences, as well as on new approaches to increase the effectiveness of the entrepreneurial learning.

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