

## 1. Introduction

Entrepreneurship is a concept that does not have a consensual definition in the literature. Three schools of thought can be found. First, theories arise that frame the concept in terms of its economic relevance. Second, theories can be found, in which the fundamental focus is the individual. These theories explore the role of personality in entrepreneurship. Finally, theories emerge that conceptualize entrepreneurship from a behavioral perspective.

Based on the previous models, it becomes possible to highlight that the act of entrepreneurship reveals itself in a dynamic and critical attitude towards reality. For this reason, Bessant and Tidd [1] associate entrepreneurship with innovation, since an entrepreneur tends to carry out his/her actions in a different way to obtain differentiating results. In this innovation process, an entrepreneur is deconstructing reality to recreate new dynamics.

An entrepreneur is an individual, who takes risks when facing ambiguous situations in an optimistic way and looking for new business possibilities. A situation of failure is not viewed negatively by an entrepreneur, but is a learning process in which new business opportunities can be found. Entrepreneurs constantly seek new solutions and products, introduce innovative production methods, and implement competitive strategies. Therefore, Salamzadeh et al. [2] state that an entrepreneur is an individual, able to put theoretical concepts into practice and to stimulate colleagues that accompany him/her, with an attitude of permanent challenge and willingness to overcome indifference.

Studies, carried out by Beattie [3] and Karabulut [4], show that the personality traits, most linked to the behavior of entrepreneurs, are the ability to innovate, since it is essential to be open to seek new ways of acting and approach the market; tolerance to risk, since entrepreneurs run personal and financial risks; affability, which is related to the ability to establish interpersonal relationships; perseverance, by the ability not to give up in the face of difficulties throughout this process; planning ability, to have the ability to create plans, define their actions and prioritize them within the business. Khosia and Gupta [5] also point out that an entrepreneur must have both a dreamy and a concrete spirit. He/she should be an individual with leadership skills that allow him/her to manage and delegate skills, activities, and responsibilities.

The interdisciplinary characteristics of entrepreneurship have led to different perceptions of the concept, which can be observed in some determining factors of entrepreneurship, classified as individual, environmental, or organizational [6]. In the individual approach, entrepreneurs have unique values and at-

## ASSESSING THE DEVELOPMENT OF ENTREPRENEURIAL COMPETENCIES

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**Abstract:** Entrepreneurship can be perceived as an individual's ability to identify opportunities, and to develop solutions that create innovative solutions for society. It can be a business, a project or even a movement that generates real change and impact on people's daily lives. What defines an entrepreneur is his/her behavior and attitudes and not personality traits or any other innate characteristics. It is not possible to predict which individuals have an entrepreneurial profile, but we can work on developing the skills that are necessary to become an entrepreneur. Therefore, this view assumes that entrepreneurial skills can be developed through education and life experiences. The teaching of entrepreneurship is a theme that has generated considerable interest in higher education institutions. Several programs have been proposed. Currently, it is necessary to evaluate their effectiveness, considering multiple perspectives. Only through the evaluation of the performance of these courses we can ensure that students are properly prepared for the challenges they will encounter in the labor market, whether through the launch of a start-up or in the management of a company or project. This study uses the EntreComp framework to assess the development of entrepreneurial skills and to identify the factors that influence their performance.

This study offers both theoretical and practical contributions. In the conceptual component, a framework that has a multidisciplinary view of the entrepreneurial skills has been developed. On a practical level, it can be applied within a course of entrepreneurship, which will enable its replication to various educational institutions.

**Keywords:** entrepreneurship, entrepreneurial competencies, innovation, higher education, approach, multidisciplinary.

titudes. Therefore, their personal characteristics and experiences determine entrepreneurship. In the environmental approach, an entrepreneur is strongly conditioned by the cultural characteristics of society, since culture, qualification levels, family and friends are determining elements in the personality of the entrepreneur. Finally, in the organizational approach, entrepreneurship is not considered the mere act of creating a start-up. Equally important is the continuity and development of businesses that are determined by the characteristics of entrepreneurs.

The impact, entrepreneurship has on higher education institutions, is undeniable. Several specific programs for the teaching of entrepreneurship have been developed particularly with students in the area of management, particularly as specific postgraduate courses in innovation and entrepreneurship and as a complement to traditional Master Business Administration (MBA) degrees. These models have progressively included other areas of training, both in engineering and social sciences. Currently, it is already possible to find in several universities subjects of entrepreneurship, in

which the content is taught in the development of a business plan, marketing plan, financial plan, investment attraction, etc. In these training courses, complementary ways of teaching have also been used, such as group work, gambling, serious games, virtual and augmented reality, among others [7]. Nevertheless, one of the main problems that persist in this area is the identification of ways, in which we can evaluate the development of entrepreneurial skills among students. In this sense, this study aims to conceptualize and demonstrate the use of the EntreComp framework to assess the development of entrepreneurial skills among students. This work intends to serve as a support element to higher education institutions that intend to develop in students an entrepreneurial attitude that decreases the risks of their integration in the labor market.

## 2. Materials and Methods

The EntreComp framework was adopted in the context of a polytechnic higher education institution in Portugal to assess the development of entrepreneurial skills of students from two courses (i. e., management, and computer science). These two courses were selected because they have in their curriculum structure a specific discipline of entrepreneurship. In this discipline, students are challenged to create their own company in the information technology sector in a simulated environment. Each group has between 7-8 students from these two courses. The proposed challenge follows the recommendation of Almeida and Amaral [8] who stipulate the relevance of an

entrepreneurship course to be attended by students with multi-disciplinary skills.

The EntreComp framework aims conceptually to define the key competencies that an individual entrepreneur should possess and also to develop learning outcomes, fundamental to a European citizen [9]. This vision highlights simultaneously that an entrepreneurial individual should be an agent of change in society and should possess skills that allow him/her to create his/her own company, but also be an individual, who promotes innovation within an incumbent company. The EntreComp framework is composed of three dimensions (i.e., ideas & opportunities, resources, and into action) and fifteen skills (e.g., mobilizing others, planning & management, learning through experience, creativity, etc.).

The framework was implemented over three school years (between 2017 and 2019). For each school year, two assessment moments were carried out (i.e., one at the beginning of the semester; the other at the end of the semester). The objective is to understand the impact of the entrepreneurship course on the development of the fifteen skills, considered in the EntreComp framework. A quantitative analysis was adopted from the survey, launched to students, that evaluates the development of each competence using a Likert scale of five levels. The data obtained were later analyzed in the SPSS, using descriptive statistical analysis and an analysis of variance (ANOVA).

### 3. Results

First, a description of the students' profile is shown in **Table 1**. For this purpose, the course of origin and the number of years of professional experience of the students were characterized. The data were grouped independently of the school year. A total of 138 students were considered, with approximately 65 % being from the computer science course. Nearly 60 % of the students have some professional experience.

**Table 1**  
Students profile

Variable	Absolute Frequency	Relative Frequency
<i>Course (CS)</i>		
Management	49	0.3551
Computer Science	89	0.6449
<i>Professional experience (PE)</i>		
No professional experience	58	0.4203
Up to 3 years	33	0.2391
More than 3 years	47	0.3406

The statistical analysis of the data for each variable in the EntreComp framework was then performed in **Table 2**. In the descriptive analysis, we consider the difference in means (DM) and the difference in standard deviations (SDD). After that, the information in **Table 2** was complemented with an ANOVA analysis of the significance of the behavior, observed for each variable according to the course (CS) and professional experience (PE). For this purpose, the study assumed a significance level of 5 % ( $\alpha=0.05$ ). The variables with the most significant evolution were: (i) valuing ideas; (ii) working with others; and (iii) mobilizing others. Professional experience emerges as a more discriminating factor in students' behavior than the course of origin. In 9 of the 15 variables, the professional experience of the students was a discriminating factor.

**Table 2**  
Performance of students

Variable	DM	DSTD	Sig. (CS)	Sig. (PE)
<i>Ideas and opportunities</i>				
Spotting opportunities	0.782	0.380	0.007	<1.10 <sup>-3</sup>
Creativity	0.155	0.085	0.474	0.233
Vision	0.259	0.062	0.289	0.276
Valuing ideas	1.190	0.297	0.082	<1.10 <sup>-3</sup>
Ethical and sustainable thinking	0.235	0.069	0.328	0.106
<i>Resources</i>				
Self-awareness and self-efficacy	0.278	0.085	0.570	0.388
Motivation and perseverance	0.245	0.055	0.282	0.321
Mobilizing resources	0.890	0.089	0.125	0.107
Financial and economic literacy	0.758	0.120	<1.10 <sup>-3</sup>	<1.10 <sup>-3</sup>
Mobilizing others	1.093	0.135	0.344	<1.10 <sup>-3</sup>
<i>Into action</i>				
Taking the initiative	0.347	0.121	0.158	<1.10 <sup>-3</sup>
Planning and management	0.855	0.075	0.120	<1.10 <sup>-3</sup>
Coping with uncertainty, ambiguity and risk	0.454	0.195	0.286	<1.10 <sup>-3</sup>
Working with others	1.155	0.183	0.178	<1.10 <sup>-3</sup>
Learning through experience	0.459	0.107	0.322	<1.10 <sup>-3</sup>

### 4. Discussion

The recognition of an idea's potential was considered to be the skill that students have most evolved. The great challenge for the students, and one that immediately poses an initial resistance, is to have the ability to assess the potential and feasibility of a business idea. Many groups have difficulties in understanding how the business idea they suggest may be different from those on the market. Moreover, it is not enough to think only of the national market. It is essential, that students think about the potential of the business on a global scale from the outset. Several challenges are faced for a business to be scalable on a global scale, namely the positioning in the value chain, the logistical management of operations and the cultural differences, posed by destination markets [10].

Working with others is an equally important challenge. The curricular structure of each course does not provide many common subjects. Consequently, the interaction between students of different courses is limited. However, knowing how to work as a team and accept the difference is very important in managing a startup. Offering this possibility in class is an enriching experience for students. Furthermore, it becomes relevant to mobilize others and know how to delegate. Centralization is one of the biggest problems that managers face. Felix et al. [11] state that delegating tasks efficiently is one of the greatest skills that an entrepreneur can have.

The course of origin of the students is a factor with low importance in the performance of the students in the entrepreneurship course. Only in two variables were significant oscillations observed: (i) spotting opportunities; and (ii) financial and economic literacy. Computer science students showed greater ability to propose new business ideas in the area of computer science because of their greater technical knowledge in the area; while management students have greater financial and economic

literacy because they addressed this topic in the context of other subjects. Despite the difference, found in this group of students, it does not invalidate the fact that the participation of students from different areas is equally relevant. As Fiore et al. [12] emphasize, entrepreneurial education must reach the educational contexts through learner-centered, multidisciplinary pedagogical models, based on experiential approaches to the process.

Professional experience is a discriminating factor in student performance. In the “into action” dimension, significant differences in all variables were noted. Students with more experience in the market have less difficulty in going to the market and performing activities that involve mobilizing teams and envi-

ronments with greater uncertainty. The students’ professional experience has allowed them to have greater planning and management skills. Similarly, and based on their experience, they have a greater ability to find new business opportunities and assess their potential. These results are pertinent and are in line with the findings, obtained by Buzay and Almeida [13], who have already found similar results in the adoption of a business simulation in the classroom. As future work, it becomes relevant to explore the role of other dimensions in student performance (e. g., age, gender, previous experience as entrepreneurs) and also to study the correlation between academic performance and students’ entrepreneurial potential.

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