

Why Entrepreneurship education and training in Polytechnic of Porto graduated courses? Students' perception

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ABSTRACT

This paper analyses the perception of Polytechnic of Porto (P.PORTO) students about entrepreneurship education in the graduated and training courses. A survey was conducted, supported by a questionnaire followed by researchers' guidance. The perception of entrepreneurship education and training in students' curricula was studied. Statistical analysis was applied using SPSS tool. Due to the diversity of graduated courses in P.PORTO it was possible to analyse the perception of students from different educational areas: Engineering, Health and Social Sciences. The main conclusion was that students from all courses seem to see entrepreneurship education and training as an important issue for their future career. As future work this survey should be applied to other P.PORTO units to have an integrated perception. The results of this study will be presented to courses coordinators to promote future curricula improvements.

Conference Key Areas: Please select three Conference Key Areas

Keywords: Entrepreneurship; Perception; Graduated education; Training; P.PORTO.

INTRODUCTION

In recent decades, and all over the world, there has been a growing interest in promoting entrepreneurship and innovation as there is evidence that entrepreneurship is crucial to economic recovery and growth, job creation, inclusion and poverty reduction, as well as innovation and competitiveness. Currently the political priority of Europe and European Union (EU) Member States is to take measures to incorporate entrepreneurship in the different society domains [1]. In the education field in the EU the importance of entrepreneurship in education was first published in the European Green Paper on Entrepreneurship In Europe [2], followed by the 2006 Recommendation of the European Parliament and Council related with key competences for lifelong learning, where 'sense of initiative and entrepreneurship' were identified as one of the eight key competences necessary for all members of a knowledge-based society [3]. Other important documents were published to promote initiatives across Europe such as the "Small Business Act for Europe in 2008" [4], the "Communication on Rethinking Education" in 2012 [5] and "Entrepreneurship Action Plan 2020" in 2013 [6]. All these documents promoted the implementation of several actions in Member States to incorporate entrepreneurship as competence in school curricula, vocational training and higher education, and to create frameworks and tools to operationalize in educational contexts. However, and after all these actions, there were no consensus about the components of entrepreneurship as competence. New efforts were developed and in 2015 the EU presented a report related with the development of a European Competence Reference Framework for the key competence "*sense of initiative and entrepreneurship*" [1], where entrepreneurship competences were analysed from several case-studies and resumed in larger themes and groups (Fig.1). It was also verified that competences associated with an entrepreneurial subject were related with entrepreneurship definition.

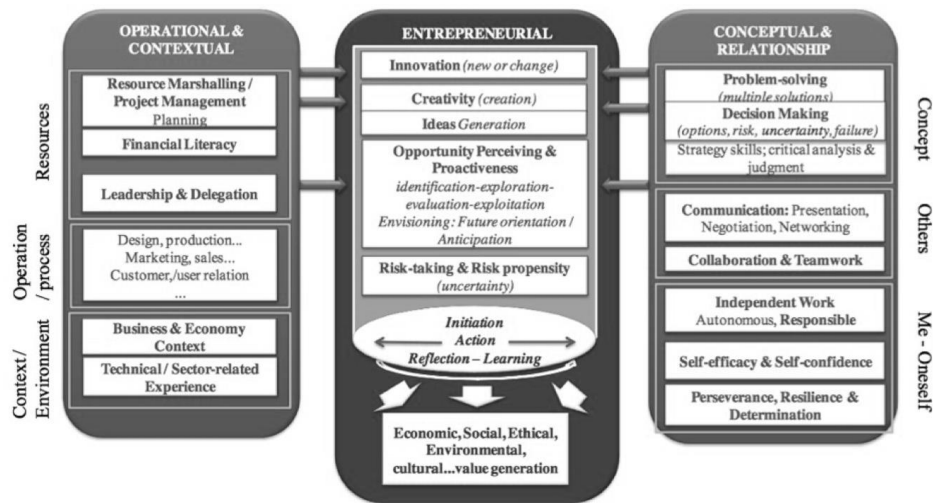


Fig. 1. Entrepreneurship Competences within larger themes and groups [1]

In 2016 The New Skills Agenda was presented to support a shared commitment and to work towards a common vision about the strategic importance of skills for sustaining jobs, growth and competitiveness. This agenda is centred around three main issues: 1) Improving the quality and relevance of skills formation; 2) Making skills and qualifications more visible and comparable; 3) Improving skills intelligence and information for better career choices [7]. The main aim is to promote a set of competences needed for personal development, social inclusion, active citizenship and employment. In this context the Entrepreneurship Competence study (EntreComp) was launched by the Joint Research Centre on behalf of the Directorate Framework to support the development of entrepreneurship competence at European level [8]. This framework consists of three interrelated competence areas: 'Ideas and opportunities', 'Resources' and 'Into action'. Each of the areas have five main competences along an eight-level progression model and proposes a comprehensive framework that can be used as a basis for the development of curricula and learning activities fostering entrepreneurship as a competence.

1 ENTREPRENEURSHIP IN P.PORTO

In the global context of the Academic Entrepreneurship (AE) [9], we have been observing that the Higher Education Institutions (HEIs), particularly Polytechnic Institutes (PI), have been developing, in an integrated way, several activities and initiatives for the development and promotion of innovation, research and entrepreneurship.

Concerning the P.PORTO, we had been participating from 2007 until 2014 on the previously mentioned nationwide initiative – *Poliempreende* – which is an ideas contest with training sessions included on the activities plan. These sessions are oriented for ideation and business plan development. This project emerges as an aggregator and cross-cutting initiative that had reinforced and complemented the different dynamics promoted in the P.PORTO, namely the master programmes and entrepreneurship classes (graduated and master degrees), with the goal to promote the spirit of initiative in students, the entrepreneurial willingness to create their own businesses and generate jobs, exploring the practical and professional character of their training and providing the participants with key skills related to creativity, innovation, planning of a business project, development of a business

plan, setting up a business and its administration and management [10], as well as promote P.Porto AE.

The P.PORTO has promoted this contest for seven years continuously, always with very interesting numbers of effective participation of its community. Simultaneously the P.PORTO schools have been creating a formal entrepreneurship offer: curricular units in the several courses of HEIs; and masters, like Master in Entrepreneurship and Internationalization running in ISCAP of Porto. Since 2016 P.PORTO have been promoting the *Programa de Promoção do Empreendedorismo do P. Porto* (PPEPP), which has the same structure and pursues the same goals of *Poliempreende*.

In this context the main objective of this paper is to analyse the P.PORTO student's perception about entrepreneurship competences given by P.PORTO through the graduated courses and entrepreneurship training courses and programmes.

This paper is organized in four sections. The first one is an introduction contextualising the importance of entrepreneurship education in EU, in Portugal and in P.PORTO, and how it can contribute to fostering entrepreneurship, new companies, consequently more jobs and an increase of the economy of the regions and country. The second section presents in detail the methodology used to gather data and analysis. The third section presents the data treatment results and discussion. Finally, the main conclusions and future research developments are in the fourth section.

2 METODOLOGY

The methodology used is a Case Study which includes a literature review on entrepreneurship education and a survey with the development of a questionnaire (Google Forms platform) applied to several schools of P.PORTO: ISEP, ESS, ISCAP and ESTG. The questionnaire was addressed to students of the last year of graduated courses and master's courses and was developed to answer the main question: "What is the Students' perception about Entrepreneurship education and training in Polytechnic of Porto graduated courses?". Data collected was subject to a Statistical Descriptive Analysis and Exploratory Data Analysis with Principal Component Analysis (PCA) and Factor Analysis (FA).

The construct questionnaire is composed by these six major sections, each one with a set of questions. The first one (S1) to collected data from the respondent: School, course, year, gender and age; The second one (S2) about entrepreneurship fostering factors perception by the student; A third (S3) about the perception of competences given by the graduated courses that students attend; A fourth (S4) about competences given by P.PORTO through training courses and entrepreneurship programmes; A fifth (S5) about the students' perception from P.PORTO programmes; and a sixth (S6) concerning to the entrepreneurship internet platform used. The S2, S3 and S4 questions are based on the recommendations identified from literature [1,8], and a 1-5 Likert scale was used to answer (1-totally disagree, 2-disagree, 3-neither agree or disagree, 4-agree and 5-totally agree) (see *Table 1*).

Table 1. Questions in the survey

Section 2-Factors to fostering entrepreneurship
Q7- Have technical and management skills in the project area
Q8- Have own financial capacity
Q9- Plan my project and define the business model and target market
Q10- Have access to funding/incentives from third parties
Q11- Have appropriate partners
Section 3- Entrepreneurship Competences given by the curricula
Q12- Business Plan and Model
Q13- Project Management
Q14- People Management (employees, shareholders) and Relationships (customers, vendors)
Q15- Notions of Finance
Q16- Notions of Organization Management
Q17- Notions of Marketing
Q18- Notions of Leadership and Communication
Q19- Understanding Legal Issues
Q20- Notions of Entrepreneurship and Innovation
Q21- Understanding Industrial Property (patents, trademarks, logos)
Section 4- Entrepreneurship competences to be given by P.PORTO programmes
Q22-Development of the business plan and business model
Q23- Notions of Finance
Q24- Notions of Marketing
Q25- People Management (employees, shareholders) and Relationships (customers, vendors)
Q26- Notions of Entrepreneurship and Innovation
Q27- Understanding Legal Issues
Q28- Understanding Industrial Property (patents, trademarks, logos)
Q29- Project Management
Section 5- P.PORTO entrepreneurship actions students' perception
Q30- Know the training provided by P. PORTO under the Entrepreneurship and innovation framework programme (POLIEMPREENDE/PPEPP)? Yes or No
Q31- Training actions in P. PORTO about entrepreneurship and innovation are suitable in terms of periodicity
Q32- Training actions in P. PORTO about entrepreneurship and Innovation will meet my needs
Q33- Themes that are addressed in the training sessions are interesting and appropriate for the achievement of my project
Q34- I have the necessary conditions to attend to extra-curricular training
Q35- The training courses on Entrepreneurship and Innovation are a complement to the curriculum of my graduated course
Q36- Instruments/tools are given to facilitate my participation in entrepreneurial projects
Q37- These training courses are an additional weight on my individual training, in terms of time and work
Q38- These training courses and graduated activities are adequately in line.
Q39- These training courses should be performed outside the graduated courses period
Q40- The number of sessions is suitable
Q41- Training courses have appropriate disclosure
Q42- These training courses should be made with the joint participation of students from different Schools to promote synergies
Q43- The existence of the OTIC (Technology Transfer Office) in P. PORTO contributes to support entrepreneurship and innovation actions
Q44- Internet platforms to support entrepreneurship and innovation are important
Section 6- P.PORTO Entrepreneurship Platform INNOENTRE
Q45- Knowledge of the internet platform "INNOENTRE" Yes or No
Q46- The INNOENTRE internet platform used by P. PORTO to support Entrepreneurship and innovation has useful content
Q47- The INNOENTRE internet platform is easy to use ("user friendly")

2.1 Sample and Data collection

The questionnaire was distributed by email, using Moodle platform, to the students in May 2017, and 148 valid responses were obtained from a total of 262 registered students (a responding rate of 56,5%): 51,4% from ESS% (mainly from Pharmacy and Physiotherapy courses), 30,4% from ISEP (from Industrial and Management Engineering degree and Industrial Management engineering master course), 16,9% from ESTG (from Economics Sciences course) and 1,4% from ISCAP (Master course on Entrepreneurship). Concerning the gender, 68,2% of the students are female and 31,8% male. The students' age ranged from 19 to 48 years old, most of them, 70%, between 19-23 years old.

2.2 Statistical Analysis

Statistical analysis was made using IBM SPSS software tool pack, version 24. Descriptive statistical analysis was used for quantitative nature data. Cronbach's alpha was used to measure the internal consistency. For the main questions from S2, S3 and S4, with twenty-three variables respectively, it was used the PCA and FA models. MacCallum *et al.* [12] recommend a minimum sample size of 100 responses and Guadagnoli and Velicer [11] refer a minimum of 100 to 200 observations, which is also recommended by several authors [11, 12, 18]. MacCallum *et al.* [13] define that, as a rule, for the sample size a ratio of valid responses per existing variables should be greater than 5 (6,43 in our case).

PCA and FA are exploratory multivariate analysis techniques that turns a set of correlated variables into a smaller set of independent variables, linear combinations of the original variables, known as components and factors. After performing the Varimax matrix rotation, the PCA becomes FA. If most of the total population variance can be attributed to the first components, then these can replace the original p variables without much loss of information [14]. The principal components are the uncorrelated Z_i which are measuring different dimensions of data, ordered by decreasing variances. The variances of the principal components are the eigenvalues Y_i of the sample of covariance matrix S , or of the correlation matrix R . When doing PCA, there is always hope that the variance of almost of the indices are negligible [15]. Both techniques are usually seen as data reduction methods but, beyond this goal, one of the main advantages of each one is that they allow to reduce the information of multiple correlated variables into one or more independent linear combinations (components or factors), representing most of the information present in the original variables [16,17]. Although PCA is usually applied to quantitative analysis, SPSS has implemented an optimal scaling procedure that assigns a numerical value to each category of ordinal variables and creates a corresponding quantitative variable with metrics properties, enabling PCA to be performed on categorical variables [16].

3 RESULTS AND DISCUSSION

The Cronbach's alpha for our variables was $0,933 > 0,8$, that is considered very good [18]. Descriptive statistical analysis was used for quantitative nature data. For qualitative data, the PCA method and FA model was used. Concerning that until question Q29, there are 148 valid responses. PCA and FA were done according to section 2.2. Five factors with eigenvalue greater than 1 were retained, as well as the five factors that cumulatively explained a 70,8% variance in the original data. To clear data, the Varimax rotation was made (see *Table2*).

Communalities show that all variables have a strong correlation with extracted factors, since common variance of extracted variables is greater than 50%. F1- entrepreneurship Competences given by curricula (41,4%), explained by Q12 to Q21; F2- entrepreneurship competences to be given by P.PORTO (12,4%), explained by Q22 to Q29; F3- factors to fostering entrepreneurship concerning students' skills (7%), explained by Q7 and Q9; F4- Factors to fostering entrepreneurship concerning students' third financial access and appropriated partners (4,6%), explained by Q10 and Q11; F5- Factors to fostering entrepreneurship concerning students' own financial capacity (5,4%), explained by Q8, the others factors with less than 29,2% of variance explained. Concerning to Q12, Q22 and Q26 the allocation to a single factor is unclear, since the value is high for both factors F2 and F3, being higher in F2, where allocated.

Table 2. Rotating matrix of component

Questions	Component					communalities
	1	2	3	4	5	
Q7			,463			,501
Q8					,903	,843
Q9			,793			,721
Q10				,728		,699
Q11				,816		,745
Q12	,632		,434			,615
Q13	,747					,708
Q14	,796					,670
Q15	,771					,778
Q16	,796					,759
Q17	,747					,690
Q18	,742					,590
Q19	,733					,656
Q20	,751					,712
Q21	,743					,629
Q22		,689	,409			,749
Q23		,805				,745
Q24	,353	,718				,702
Q25		,716				,659
Q26		,716	,429			,753
Q27		,842				,822
Q28		,824				,741
Q29		,822				,802
% of variance explained	41,4%	12,4%	6,96%	5,4%	4,6%	
eigenvalues	9,51	2,86	1,601	1,242	1,068	

The Bartlett's sphericity test provided a very significant result ($\chi^2 \approx 2198,216$; $df=253$), featuring a p -value less than 0,001, value by which we reject null hypothesis, concluding that all the variables are significantly correlated. The results obtained have granted legitimacy to the use of the PCA method, showing that the matrix contains a significant correlation between the twenty-three variables. We have a 0,888 Kaiser-Meyer-Olkin measurement (KMO), which is considered good when between 0,8-0,9 value [17].

From questions Q30, only 45 students knew the P.PORTO resources dedicated to support and promotion of entrepreneurship and responded to the remaining questions. Hence, only a quantitative analysis was made (see Table 3). As the median (50% of the students), the mean and the mode (most frequent value) is higher than 3, from which we can conclude that the students find the P.PORTO entrepreneurship programmes suitable with the degree and useful, although (Q37) near 87% of the students find it as an extra weight to their' tasks and duties.

Table 3. Questions follow yes on Q30, Likert scale from 1-5

	N Valid	Missing	Yes	No	(1-2)	3	(4-5)	Mean	Median	Mode	S.Dev
Q30	148	0	30.4%	69.6%							
Q31	45	103			25,6	28,2	46,2	3,27	3,00	4	1,095
Q32	45	103			17,9	33,3	48,8	3,36	3,00	4	0,981
Q33	45	103			10,3	35,9	53,8	3,60	4,00	4	0,963
Q34	45	103			33,3	28,2	38,5	2,98	3,00	3	1,158
Q35	45	103			15,4	35,9	48,7	3,51	4,00	3	1,036
Q36	45	103			23,1	17,9	59	3,51	4,00	4	1,014
Q37	45	103			11,1	22,2	66,7	3,80	4,00	4	1,014
Q38	45	103			23,1	28,2	48,8	3,24	3,00	4	1,171
Q39	45	103			17,9	20,5	61,5	3,62	4,00	4	1,230
Q40	45	103			20,5	30,8	48,7	3,27	3,00	4	0,986
Q41	45	103			35,9	30,8	33,3	2,89	3,00	3	1,210
Q42	45	103			5,1	15,4	79,5	4,16	4,00	5	0,952
Q43	45	103			5,1	46,2	48,7	3,56	3,00	3	0,841
Q44	45	103			5,1	12,8	82,1	4,22	4,00	5	0,927
Q45	148	0	4%	96%							
Q46	6	142			3	33,3	66,7	3,83	4,00	4	0,753
Q47	6	142			0	16,7	83,3	3,83	4,00	4	0,408

4 CONCLUSIONS

The results of a survey carried on P. PORTO is presented with the main goal to analyse students' perception about Entrepreneurship education in graduated and training courses. Students realized that their graduated curricula gave them some entrepreneurship competences but they found that all the competences listed in the questionnaire should be given by P.PORTO in more detail, through complementary training courses or in the graduated courses. The students found that is important to strengthen competences about business plans and economic viability of projects and marketing. In addition, students stress that beyond all the competences that P.PORTO can offer through the curricula or training courses, as technical skills, to have own money or access to incentives from third parties is the main key to be an entrepreneur. Only 30,4% knew about P.PORTO entrepreneurship initiatives or activities, although students found the P.PORTO entrepreneurship programmes suitable with the degree and useful (Q37), nearly 87% of the students find it as an extra weight to their' tasks and duties. Only 4% knew about the InnoEntre platform, a very low value, despite only it being used since this year in P.PORTO .

The results obtained are in agreement with expected results, showing the importance of promoting formal disclosure of information to promote AE initiatives. As a future work the application of the questionnaire in all P.PORTO courses will be stimulated in a more participative way by all schools in order to obtain a more integrated perception and to promote the comparative analysis between different areas of education of the different schools of the P.PORTO. With regard to engineering courses, it is expected to conduct an exhaustive comparative analysis between the various courses taking into account the specific needs of each course. The results from this research will be presented and discuss with courses coordinators to promote future curricula improvements related with Entrepreneurship.

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