

Developing entrepreneurial competencies in higher education: a structural model approach

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Abstract

Purpose – The aim of this article is to propose and test a structural model of relationships between generic and specific competencies and entrepreneurial competencies in order to assess students' learning.

Design/methodology/approach – The study was carried out on a sample of 337 students enrolled on the entrepreneurship specialisation of the final bachelor's degree project course on the Bachelor's Degree in Business Administration and Management at the Universitat Oberta de Catalunya. A questionnaire was designed to gather information on students' perception of their level of acquisition of the different groups of competencies. The partial least squares (PLS) multivariate technique was used to analyse the model.

Findings – The results confirm that there are significant relationships between the different groups of competencies. Specifically, it shows that generic competencies influence specific competencies and that there is a strong relationship between systemic and professional competencies and entrepreneurial competencies. It also shows that the experience variable contributes positively to different competency groups, while the gender and age variables have no effect on the development of entrepreneurial competencies.

Practical implications – The study provides relevant information to the academic world on different factors that affect competency development.

Originality/value – The analysis provides an innovative research and contributes knowledge on entrepreneurial competency acquisition, providing an answer to whether generic and specific competencies influence entrepreneurial competencies.

Keywords Entrepreneurial competencies, Generic competencies, Specific competencies, Higher education, Partial least squares (PLS)

Paper type Research paper

1. Introduction

Contemporary education has undergone a paradigm shift with regard to students, learning and competencies (Brand-Gruwel *et al.*, 2005). In Europe, the European Higher Education Area (EHEA) places the concept of competency at the centre of the learning process and students at the centre of the education model (Alfantookh and Bakry, 2013; Benito, 2009;



Corpas *et al.*, 2007). These changes have led to a new education paradigm with much greater emphasis on competencies over content (Mulder *et al.*, 2005). Incorporating competencies means more than just knowledge transmission; according to the EHEA, it involves a commitment to strengthening the inevitable link between university study programmes and the skills and knowledge required for the professional world. Thus, in this competency-based learning context, academics should ensure that the new EHEA-adapted degrees include the competency profiles prescribed for professional success and achievement (Mir, 2008).

During the last decade, there have been growing interest to highlight the relevance of competence-based education and how it can be designed and implemented (e.g. Biemans *et al.*, 2009; Mulder, 2012; Mulder and Gulikers, 2011; Wesselink *et al.*, 2010). The different approaches aim that education and training programmes will become more practice-oriented and relevant for finding or creating employment.

Mir (2008) points out that incorporating competencies to university degrees is a basic element of training in a changing society that reformulates its demands constantly and that, at the same time, aims to professionalise the university education, bringing the university closer to the society and the workplace.

In order to establish a bridge between the worlds of education and work, 14 years ago, the European Commission identified sense of initiative and entrepreneurship as one of the eight key competencies necessary for a knowledge-based society (Bacigalupo *et al.*, 2016). The development of the entrepreneurial capacity of European citizens and organisations is one of the key policy objectives for the EU and Member States. The EntreComp Framework report (Bacigalupo *et al.*, 2016) builds upon a broad definition of entrepreneurship as a competence that hinges on the creation of cultural, social or economic value. Developing a reference framework with learning outcome descriptors is one of the measures identified by the European Commission to support the promotion of the entrepreneurship competence across the world of education and work.

Within the field of business studies, the scientific literature has extensively discussed how important it is for future business practitioners to acquire entrepreneurial competencies (Carrier, 2009; Lans *et al.*, 2008; Sánchez, 2011; Taatila, 2010).

The literature on entrepreneurship highlights the need for a better understanding of related competencies (Unger *et al.*, 2011). One of the main aims in this field, and one in which universities play a key role, is to develop entrepreneurial competencies, which are especially relevant to company growth and success (Faggian and McCann, 2009; Mitchelmore and Rowley, 2010; Sánchez, 2011) and economic development (Bosma and Kelley, 2019). The issue of measuring entrepreneurial competencies is central to both research and practice. Thus, if the aim is to develop entrepreneurial competencies, then it should be possible to measure them before and after an intervention and prioritise competencies that benefit individual development.

The growth of entrepreneurship education has led to a rise in the number of studies focussing on entrepreneurial competencies with different thematic. For example, Mitchelmore and Rowley (2010) undertake a literature review of research on entrepreneurial competence, Barazandeh *et al.* (2015) investigate the effect of entrepreneurial competencies on business performance, while Morris *et al.* (2013) investigate the competencies necessary for entrepreneurial action, Man and Lau (2000) and Man *et al.* (2002) develop conceptual models in order to link entrepreneurial competencies and small and medium-sized enterprises (SME) performance and competitiveness, Rasmussen *et al.* (2011) and Sánchez (2011) focus on how develop entrepreneurial competencies to create new ventures within an academic environment, and Tounés *et al.* (2014) investigate the effects of business plan on the entrepreneurial competencies of students.

Among the range of studies looking at entrepreneurial competencies in a variety of contexts in recent years, there has been a significant increase in structural model-based analyses (e.g. Lawal *et al.*, 2018; Mamun *et al.*, 2016; Mohsin *et al.*, 2017; Ng and Kee, 2018; Rahman *et al.*, 2016;

Sánchez, 2012; Tehseen *et al.*, 2019; Tehseen *et al.*, 2020; Umar *et al.*, 2018). However, all such studies share a common point: they all focus on the professional environment.

Due to the importance of competencies not only in education but also in society and workplace, it is necessary to deeper analyse them. As López-Bonilla and López-Bonilla (2014) point out, currently, much attention is being paid to the concept of competence in the EU, both in vocational-technical and in higher education and there is a growing academic interest in the nature of competence. But a few of them match in analysing the relationships among competencies, so there is a significant gap in highlighting these relationships and moreover using the PLS methodology. The present study aims to propose and empirically contrast a structural model of relationships among competencies. In this respect, what type of competencies should be studied? A literature review suggests generic and specific competencies.

Although such studies exist in academic environment (e.g. Frasquet *et al.*, 2012; Gómez *et al.*, 2017; López-Bonilla and López-Bonilla, 2014; Villardón-Gallego *et al.*, 2013), none do so in the field of entrepreneurship education. Thus, we have found no model that attempts to understand relationships between academic competencies in entrepreneurship education.

This study aims to establish empirically whether generic and specific competencies influence entrepreneurial competencies. Providing an answer to this question would help fill the limited attention received in the literature and contribute knowledge on entrepreneurial competency acquisition in a context as relevant as entrepreneurship education. The results from the study will also help academics implement strategies to improve the field of entrepreneurship education and foster new projects and company start-ups.

2. Literature review and research model

2.1 Generic and specific competencies

The concept of competency is widely accepted in higher education and has been studied by numerous researchers (e.g. Brockmann *et al.*, 2008; Gallifa and Garriga, 2010; Le Deist and Winterton, 2005; Morris *et al.*, 2013; Mulder *et al.*, 2005; Zawacki-Richter *et al.*, 2011). Competencies integrate aspects of personality and behaviour and are a composite of knowledge, skills, attitudes and personal qualities in a specific professional environment (Frasquet *et al.*, 2012; Lans *et al.*, 2011; Nab *et al.*, 2010). Assessment of competencies acquired during higher education has become a focus of analysis in many countries (Lincoln and Kearney, 2015).

Implementation of the EHEA has imposed the explicit incorporation of competency learning and assessment in curricula. Indeed, in Europe today, universities follow EHEA directives and thus include competencies in their programmes of study to narrow the gap between universities and society and train graduates to meet the needs of the labour market. The EHEA considers degree programmes to be comprehensible and comparable if they provide graduates with similar professional success and academic and professional profiles, and a point of inflection is reached when programmes are designed around professional competencies.

Particularly relevant in Europe is the Tuning Project (González and Wagenaar, 2006), which stresses the need for programmes of study to include the competencies required by future graduates. According to the Tuning Project (González and Wagenaar, 2006, p. 255), “Competencies represent a dynamic combination of cognitive and meta-cognitive skills, knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values. Competencies are developed in all course units and assessed at different stages of a program”.

The Tuning Project distinguishes between two types of competencies: generic and specific. The White Paper on Economics and Business Studies (ANECA, 2005) includes this classification in the reform of university bachelor’s degrees so that these competency groups are differentiated in different degrees (Escudero, 2008).

Generic competencies are interdisciplinary and common to all degree programmes, these competencies must be acquired by the students, regardless of the courses they take. They basically refer to organisational capacity and individuals' relationship with their environment. The White Paper classifies the generic or transversal competencies into three categories: instrumental, interpersonal and systemic. [Villa and Poblete \(2007\)](#) detail the contents of generic competencies:

- (1) Instrumental competencies are a combination of manual skills and cognitive capabilities that facilitate professional competence. They include skills in managing ideas and the environment where people cope, craftsmanship, physical prowess, cognitive understanding, language skill and academic achievements.
- (2) Interpersonal competencies refer to personal and relational skills. They are related to the ability for acting with generosity and sympathy towards others. These skills involve capabilities of objectification, identification and reporting of one's own and others' feelings and emotions, which favour cooperation and social interaction processes.
- (3) Systemic competencies are related to the ability to adopt a global vision and relate and integrate different dimensions. These competencies include ability for planning changes that introduce upgrades in the globally understood systems and for designing new systems. They also require the previous acquisition of instrumental and interpersonal competencies.

Specific competencies relate to the areas of knowledge and professional profile of the degree programme, providing identity and coherence to the programme of study. The specific competencies are the set of scientific, technological and cultural wisdom and resources that the student must achieve ([López-Bonilla and López-Bonilla, 2014](#)). As stated in the White Paper on Economics and Business Studies ([ANECA, 2005](#)), specific competencies can be divided into disciplinary and professional competencies. Disciplinary competencies are based on facts, rules, concepts and theories, while professional competencies basically refer to procedure and involve knowledge of sets of steps, rules and actions aimed at obtaining a result or knowing how to do something.

A few studies have analysed the relationship between different types of competencies, although there is still very little research on the topic. [López-Bonilla and López-Bonilla \(2014\)](#) suggest a structural model for relationships between academic-professional competencies as a means of understanding how generic and specific competencies relate in university studies in the field of tourism. Their results confirm that such a relationship does exist between generic and specific competencies. Moreover, [Villa and Poblete \(2007\)](#) found that instrumental and interpersonal competencies are acquired before systemic competencies. [Gómez et al. \(2017\)](#) in their study construct an empirical model to identify and assess students' generic competencies in social science internships, while [Virtanen and Tynjälä \(2019\)](#) identify what kinds of pedagogical practices are behind the learning of some generic skills.

This type of analysis is yet to be carried out in the field of entrepreneurship education. One question still to be answered is whether different groups of competencies can influence the development of entrepreneurial competencies. Answering this question would extend our knowledge of the factors affecting the acquisition of a group as important as entrepreneurial competencies. Thus more empirical evidence is needed to provide academic tools to develop appropriate strategies for improving the development of the different groups of competencies.

2.2 Entrepreneurial competencies

Currently, in the context of entrepreneurship, entrepreneurial competencies are a particularly relevant research field. As with the concept of generic competency, there is a wide range of definitions in the literature, which gives an idea of the scale of the term.

Due to the heterogeneity in definitions and competence frameworks in the field of entrepreneurship education, literature and practice still illustrate much confusion about what should be taught in academic entrepreneurship courses and which competencies need to be developed (Tittel and Terzidis, 2020). These authors made an in-depth review of entrepreneurial competencies dates back to the year 2008 by Mitchelmore and Rowley by condensing the entrepreneurial competencies mentioned in the literature and developing a list of them. As a result, the study illustrates that the authors Bird (1995), Man *et al.* (2002) and Mitchelmore and Rowley (2010) are identified to be of vital importance not only about the definitions but also for categorization and the listing of entrepreneurial competencies.

The definitions given by these recognized authors are: Entrepreneurial competencies have been identified as a specific group of competencies relevant to the exercise of successful entrepreneurship (Mitchelmore and Rowley, 2010); entrepreneurial competencies are defined as underlying characteristics such as generic and specific knowledge, motive, traits, self-images, social roles and skills which result in venture birth, survival and/or growth (Bird, 1995); entrepreneurial competencies are considered a higher-level characteristic encompassing personality traits, skills and knowledge and therefore can be seen as the total ability of the entrepreneur to perform a job role successfully (Man *et al.*, 2002).

Lans *et al.* (2018) move forward contributing to the debate on the concept of entrepreneurial competence. They propose to cluster entrepreneurial competencies in four competence domains, including a cognition-orientated, function-oriented, social-oriented and meta-oriented domain.

From the policy studies, the EntreComp Framework report (Bacigalupo *et al.*, 2016) defines entrepreneurship as a competence, which applies 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 also to starting up ventures (cultural, social or commercial).

Moreover, entrepreneurial competencies have been recognised as significant factors that lead to improvements in business performance and company growth and success (Bird, 2002; Chandler and Hanks, 1994; Rahman *et al.*, 2016; Van Praag and Versloot, 2007).

One of the key points in entrepreneurship is identifying the competencies required of entrepreneurs. Identifying entrepreneurial competencies is important because it enables both organisations and higher education institutions to develop them and improve their quality. Mitchelmore and Rowley (2010) proposed a list of competencies in order to establish a framework of, or list of key entrepreneurial skills, based on the work of researchers in this field (e.g. Baum and Locke, 2004; Chandler and Hanks, 1994; Man *et al.*, 2002; Smith and Morse, 2005). Their framework categorises the key competencies into four groups: entrepreneurial competencies, business and management competencies, human relations competencies and conceptual and relational competencies. Other authors have proposed different typologies for the competencies required for entrepreneurship. These include skills such as problem-solving, decision-making, teamwork, risk-taking and tolerance of uncertainty, controlling emotions, creativity, results orientation, autonomy, negotiation, communication, perseverance and initiative (Jeffrey and Spinelli, 2007; Kirby, 2004).

More recently, the number of studies examining entrepreneurial competencies has grown considerably. However, these studies mostly focus on the relationship between entrepreneurial competencies and the business world, mainly analysing these relations by constructing causal models. Some of the main themes examined are identifying, validating and comparing competencies required by business owners (Rahman *et al.*, 2016); analysing the role of entrepreneurial competencies in company performance (Mamun *et al.*, 2016; Ng and Knee, 2018) and in organisational capacity and competitiveness (Sánchez, 2012); examining the influence of different dimensions (strategy, ethics and networking) in entrepreneurial competencies on the growth of SME (Tehseen *et al.*, 2019); and researching relationships

between entrepreneurial competencies and innovative performance in SME (Mohsin *et al.*, 2017).

Thus, although the concept of competency is central to the field of entrepreneurship (Loué *et al.*, 2008) and has been identified as an integral part of the dynamic learning process (Lans *et al.*, 2008), its relationship to entrepreneurship teaching has rarely been considered (Lans *et al.*, 2008; Sánchez, 2011). Teaching entrepreneurship provides students with an educational foundation for developing entrepreneurial competencies (Sánchez, 2011) and allows these competencies to emerge (Sitzmann *et al.*, 2010).

As Loué *et al.* (2008) point out the pedagogy implemented to develop these competencies is fundamentally important. Although many different and varied teaching typologies exist (Lautenschläger and Haase, 2011; Pittaway and Edwards, 2012), the most prevalent typology currently in use includes the development of business plans (Carrier, 2009; Honig, 2004). The benefits and effectiveness of this business plan-based pedagogy on developing and improving entrepreneurial competencies have been shown by previous research (Ferrerías-García *et al.*, 2019, 2020a, b; Honig, 2004; Nowiński *et al.*, 2019; Peterman and Kennedy, 2003; Sánchez, 2011; Tounés *et al.*, 2014).

However, to our knowledge, there are no studies identifying and assessing the academic factors, such as other typology of competencies, that could influence students' acquisition of entrepreneurial competencies. Thus, more research is needed on these competencies in the academic university environment to attempt to answer questions that might help generate effective acquisition of this important group of competencies. The framework could be used as a basis for the development of curricula and learning activities fostering entrepreneurial competencies.

2.3 Research model

Our aim is to analyse relationships between different groups of competencies, with special emphasis on relationships between generic and specific competencies and how these impact on entrepreneurial competencies.

Both competence types (generic and specific) are distinguished within the context of the subject of the final bachelor's degree project course on the entrepreneurship specialisation on the Bachelor's Degree in Business Administration and Management at the Universitat Oberta de Catalunya. This is a compulsory subject of the last year of the degree curriculum that treats with various areas of knowledge, such as business, economics, management, human resources, finance and marketing. The methodology of the final bachelor's degree project allows students acquiring the generic and specific competencies expected, moreover due to that this subject is the last developed by students in their degree, the achievement of the competencies is ensured. The final bachelor's degree analysed is specifically a Business Plan project. Which is structured as follows:

Phase 1: Identification and justification of the topic or project.

Phase 2: Analysis of the general and specific environment.

Phase 3: Preliminary design of the business model, following the lean startup methodology.

Phase 4: Marketing plan.

Phase 5: Resource and operations plan.

Phase 6: Financial plan.

Phase 7: Definitive design of the business model. Final memory.

Phase 8: Defence of the project before an evaluation tribunal.

The definition of our model stems from the work by López-Bonilla and López-Bonilla (2014). Similarly, Berdrow and Evers (2011) recognise the hierarchical nature of competencies; hence, from the academic perspective, it makes more sense to assume generic competencies are acquired before specific competencies, bearing in mind that students have yet to finish their studies. In addition, as Villa and Poblete (2007) stated, systemic competencies require prior acquisition of instrumental and interpersonal competencies. We also consider professional knowledge to be part of procedural knowledge. Entrepreneurial competencies refer to the study of specific topics to culminate in producing a business plan; thus, it is our understanding that previous competencies facilitate the development of entrepreneurial competencies. Finally, the model also includes students' experience, as this variable may affect their competency acquisition (Ferrerías-García *et al.*, 2020a; Jansson *et al.*, 2019; Peterman and Kennedy, 2003). Experience is defined as a set of items related to students' prior experience. It is included at the start of the model, as it is a characteristic existing prior to producing the final bachelor's degree project. Previous studies have shown that gender (Kakkonen, 2011; Komulainen *et al.*, 2009; Nowiński *et al.*, 2019; Villasana *et al.*, 2016) and age (Schulz and Starnov, 2010) could affect learning outcomes. So finally, we have included gender and age as control variables in order to analyse if they have any kind of effect over entrepreneurial competencies.

Hence, the following hypotheses are posited:

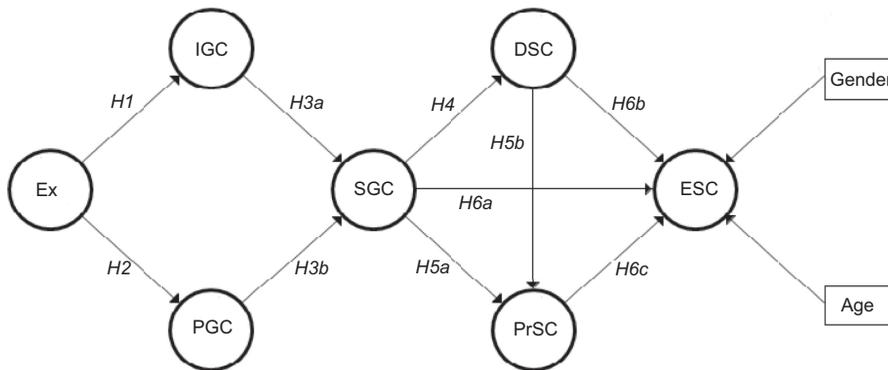
- H1. Experience is positively related to instrumental competencies.
- H2. Experience is positively related to interpersonal competencies.
- H3a. Instrumental competencies are positively related to systemic competencies.
- H3b. Interpersonal competencies are positively related to systemic competencies.
- H4. Systemic competencies are positively related to disciplinary competencies.
- H5a. Systemic competencies are positively related to professional competencies.
- H5b. Disciplinary competencies are positively related to professional competencies.
- H6a. Systemic competencies are positively related to entrepreneurial competencies.
- H6b. Disciplinary competencies are positively related to entrepreneurial competencies.
- H6c. Professional competencies are positively related to entrepreneurial competencies.
- H7a. The relationship between systemic competencies and entrepreneurial competencies is positively mediated by disciplinary competencies.
- H7b. The relationship between systemic competencies and entrepreneurial competencies is positively mediated by professional competencies.
- H7c. The relationship between systemic competencies and entrepreneurial competencies is sequentially and positively mediated by disciplinary and professional competencies.

Figure 1 summarises the research model and hypotheses. The mediating hypotheses are not included in the figure, as they are defined in terms of the mediation by multiple variables.

3. Method

3.1 Sample and data collection

The study was carried out on a sample of 337 students enrolled on the entrepreneurship specialisation of the final bachelor's degree project course on the Bachelor's Degree in



Note(s): Ex, experience; IGC, instrumental generic competencies; PGC, interpersonal generic competencies; SGC, systemic generic competencies; DSC, disciplinary specific competencies; PrSC, professional specific competencies; ESC, entrepreneurial specific competencies

Figure 1. Research model and hypotheses

Business Administration and Management at the Universitat Oberta de Catalunya during the 2017/2018 and 2018/2019 academic years. The sample consisted of 153 women and 184 men with an average age of 35.2 where the younger student is 23 years old and the older is 62 years old.

A questionnaire was designed to gather information on students' perception of their level of acquisition of the different groups of competencies. It was a self-administered questionnaire and was distributed in the classroom at the end of the semester, when students know the extent to which producing the business plan has contributed to acquiring the analysed competencies. The first part of the questionnaire collected information on the sample, such as gender, age, the student's tutor and the semester. The following parts correspond to the generic and specific competencies obtained from the items included in the White Paper on Economics and Business Studies (ANECA, 2005) and the official report on this particular qualification (UOC Bachelor's Degree in Business Administration and Management). These items have been used by previous research focused on assessing the generic and specific competencies of students enrolled on Economics and Business degrees to analyse the effectiveness of different learning tools, such as business simulation games (Fitó-Bertran *et al.*, 2014; Hernández-Lara and Serradell-López, 2018) and business plans (Ferrer-García *et al.*, 2019, 2020a). These studies conducted Cronbach's α tests to evaluate the internal consistency and reliability of generic and specific competencies, obtaining alpha values above 0.7 (Cronbach, 1942).

The final part of the questionnaire includes four questions to assess the previous experience of the students who took part in the course in terms of previous participation in company creation, management experience, familiarity with industry and the market and previous experience in drawing up business plans. The items are related to factors that could affect the results of the acquisition of competencies. All the items are evaluated using a 5-point Likert scale (from 1 "Strongly disagree" to 5 "Strongly agree"), which is widely used in the scientific literature on competency analysis. The competencies and variables related to experience are described in Table 1.

	<i>Instrumental generic competencies</i>
IGC1	Decision-making
IGC2	Drawing conclusions from information obtained and provided
IGC3	Relating information or data
IGC4	Applying theoretical decision-making concepts
IGC5	Time management
IGC6	Deadline-related problem-solving
IGC7	Use of new technologies
IGC8	Using and applying information and communication technologies in professional and academic fields
IGC9	Finding, identifying, organising and using information adequately
IGC10	Organising and planning professional activity optimally
IGC11	Interpreting and assessing information critically and synthetically
IGC12	Correct written and oral communication, in both first and second languages, in the academic and professional environments
	<i>Interpersonal generic competencies</i>
PGC1	Adopting attitudes and behaviours in line with ethical and responsible professional practice
PGC2	Teamwork, in face-to-face and online, in multidisciplinary environments
PGC3	Negotiating in a professional environment
PGC4	Developing the organisational culture management sense needed to guide the company
PGC5	Contracting skills
PGC6	Human relations skills
PGC7	Social skills, networking
PGC8	Interpersonal skills
PGC9	Strategic thinking
PGC10	Mental skill for coordinating activities
PGC11	Logical thinking skills
PGC12	Skills for reaching agreements
PGC13	Commitment skills
	<i>Systemic generic competencies</i>
SGC1	Creativity
SGC2	Entrepreneurial ability
SGC3	Innovative ability
SGC4	Ability to work with uncertainty
SGC5	Delegating skills
SGC6	Ability to motivate other individuals and groups
SGC7	Leadership skills
SGC8	Risk-taking
SGC9	Initiative
SGC10	Focus on results
SGC11	Flexibility and rapid adaptation to change
SGC12	Persistence and perseverance
SGC13	Self-confidence
	<i>Disciplinary specific competencies</i>
DSC1	Understanding management concepts
DSC2	Understanding management theories
DSC3	Understanding the role and function of different economic agents
DSC4	Understanding how the economy works and its agents and institutions, with special emphasis on business behaviour
DSC5	Generating relevant economic knowledge from data, applying appropriate technical instruments
	<i>Professional specific competencies</i>
PrSC1	Risk management
PrSC2	Adopting different business roles
PrSC3	Processing and analysing financial information
PrSC4	Business plan preparation

Table 1.
Competencies and
experience variables

(continued)

PrSC5	Efficient company or organisation management, understanding the competitive and institutional position, and identifying strengths and weaknesses
PrSC6	Efficient performance of administration and management tasks in any company or organisation value area
PrSC7	Critically assessing specific business situations and establishing possible developments in companies and markets
PrSC8	Planning, managing and assessing business projects <i>Entrepreneurial specific competencies</i>
ESC1	Identifying and defining a viable market niche
ESC2	Developing appropriate products and services for the market niche
ESC3	Generating ideas
ESC4	Analysis of the environment
ESC5	Recognising and realising business opportunities
ESC6	Formulating strategies for making the most of opportunities <i>Experience</i>
Ex1	Previous participation in company creation
Ex2	Management experience
Ex3	Familiarity with industry and the market
Ex4	Previous experience in drawing up business plans

Table 1.

3.2 Measures

All scales correspond to the competencies and subcompetencies included in the White Paper on Economics and Business Studies (ANECA, 2005) and the official report on this particular qualification, all of which are involved in the bachelor's degree final project on the entrepreneurship course at the Universitat Oberta de Catalunya. The variables of the model proposed are based on these scales of measurements.

We built a measurement scale for each one of the generic competencies. The instrumental competencies construct consisted of 12 items (from IGC1 to IGC12), while the interpersonal competencies construct consisted of 13 items (from PGC1 to PGC13), as did the systemic competencies construct (from SGC1 to SGC13).

In addition, we also built a measurement scale for each one of the specific competencies. Furthermore, due to the purpose of our research, we specifically separated the group of entrepreneurial competencies, which are part of the specific competencies developed during the business plan, as a variable for analysis. Therefore, the disciplinary competencies construct consisted of five items (from DSC1 to DSC5), the professional competencies construct consisted of eight items (from PrSC1 to PrSC8) and the entrepreneurial competencies construct consisted of six items (from ESC1 to ESC6).

The proposed model also included a variable related exclusively to the student's previous experience. This construct consisted of four indicators (from Ex1 to Ex4) and was included in the beginning of the model because experience is a characteristic that students have before acquiring the competencies developed during the course. The experience variable has been analysed in previous studies, although not as a construct but as a dichotomous variable indicating the presence or absence of prior experience in creating a company.

3.3 Data analysis

The partial least squares (PLS) technique was used to analyse the model, using SmartPLS 3.2.9 software (Ringle *et al.*, 2015). The PLS is a multivariate technique to test structural models and a general method to estimate path models with latent variables measured by many items.

We chose the PLS for several reasons. Firstly, the technique is designed for causal-predictive analysis when the problems being analysed are complex and theoretical

knowledge is lacking. In addition, the fact that our model consists of composites, along with the high number of indicators and types of relationships, justifies the use of the PLS technique (Rigdon *et al.*, 2017; Sarstedt *et al.*, 2016; Roldán and Sánchez-Franco, 2012). Lastly, the PLS has the advantage of permitting simultaneous analysis of various dependent and independent variables in the sample model.

A PLS model analysis is carried out in two stages: assessment of the measurement model followed by assessment of the structural model. This sequence ensures the construct's measures are valid before attempting to draw conclusions on the relationships between constructs (Barclay *et al.*, 1995).

4. Results

4.1 Descriptive analysis

The descriptive analysis of the data shows that all competencies included in the model received a high appreciation from the students (above 3). The generic competencies that were best valued by students were drawing conclusions (IGC2, 4.475), persistence and perseverance (SGC12, 4.454), finding, identifying, organising and using information adequately (IGC9, 4.448) and relating information or data (IGC3, 4.433). While the most remarkable specific competencies were planning, managing and assessing business projects (PrSC8, 4.353), efficient company or organisation management, understanding the competitive and institutional position and identifying strengths and weaknesses (PrSC5, 4.315) and processing and analysing financial information (PrSC3, 4.303). The entrepreneurial competencies best valued were analysis of the environment (ESC4, 4.128), generating ideas (ESC3, 4.074) and identifying and defining a viable market niche (ESC1, 4.024). Data descriptive are detailed in Table 2.

4.2 Measurement model

In this study, competencies are conceptualised as constructs consisting of the sum of various dimensions, formatively associated with their indicator, a measurement that is validated by previous studies (Clemente-Ricolfe and Escribá-Pérez, 2013; Gómez *et al.*, 2017; López-Bonilla and López-Bonilla, 2014).

The measurement model for the formative constructs is assessed at the level of indicators in terms of multicollinearity and the relevance and significance of the weights.

The analysis began by testing potential multicollinearity between the items (Roldán and Sánchez-Franco, 2012). As the maximum variance inflation factor (VIF) value is 3.051 (Table 3), below the recommended level of 3.3 (Roldán and Sánchez-Franco, 2012; Petter *et al.*, 2007), this confirms there are no multicollinearity problems between the manifest variables of each composite.

Next, the magnitude and significance of the formative indicators were verified (Table 3). The weights provide information on how each indicator contributes to its composite (Chin, 1998; Roberts and Thatcher, 2009) and therefore enables the indicators to be sorted by their contribution (Chin, 1998; Henseler *et al.*, 2009). Table 3 shows that previous participation in company creation (Ex1) and management experience (Ex2) are the most important items in the composition of the experience construct. With regard to generic competencies, applying theoretical decision-making concepts (IGC4), communication (IGC12) and decision-making (IGC1) are the key factors in the instrumental competencies; contracting skills (PGC5) and developing organisational culture management sense (PGC4), followed by competencies related to commitment (PGC13), strategic thinking (PGC9) and reaching agreements (PGC12) represent the most important weights in interpersonal competencies; the skills of working with uncertainty (SGC4) and leadership (SGC7) and, to a lesser degree, persistence and

Variables	Mean	Standard deviation
Ex1	2.887	1.254
Ex2	3.522	1.079
Ex3	3.555	1.091
Ex4	3.131	1.164
IGC1	4.344	0.681
IGC2	4.475	0.597
IGC3	4.433	0.613
IGC4	4.264	0.734
IGC5	4.226	0.856
IGC6	4.160	0.814
IGC7	4.030	0.914
IGC8	4.223	0.759
IGC9	4.448	0.657
IGC10	4.377	0.647
IGC11	4.288	0.670
IGC12	4.113	0.826
PGC1	4.223	0.748
PGC2	3.433	1.199
PGC3	3.623	0.997
PGC4	3.961	0.802
PGC5	3.742	0.869
PGC6	4.157	0.772
PGC7	3.926	0.821
PGC8	4.086	0.690
PGC9	4.059	0.756
PGC10	4.193	0.699
PGC11	4.208	0.701
PGC12	4.065	0.711
PGC13	4.332	0.691
SGC1	4.214	0.764
SGC2	4.332	0.732
SGC3	4.181	0.778
SGC4	4.157	0.768
SGC5	3.905	0.791
SGC6	4.122	0.844
SGC7	4.074	0.792
SGC8	3.552	0.887
SGC9	4.214	0.748
SGC10	4.190	0.714
SGC11	4.329	0.686
SGC12	4.454	0.653
SGC13	4.234	0.740
DSC1	4.261	0.687
DSC2	4.101	0.744
DSC3	4.104	0.742
DSC4	4.042	0.701
DSC5	4.166	0.669
PrSC1	3.849	0.839
PrSC2	4.092	0.782
PrSC3	4.303	0.780
PrSC4	3.905	0.853

(continued)

Table 2.
Descriptive statistics of
sample

Table 2.

Variables	Mean	Standard deviation
PrSC5	4.315	0.660
PrSC6	4.228	0.692
PrSC7	4.163	0.735
PrSC8	4.353	0.651
ESC1	4.024	0.762
ESC2	3.970	0.774
ESC3	4.074	0.780
ESC4	4.128	0.713
ESC5	3.914	0.823
ESC6	3.917	0.734

perseverance (SGC12), delegation (SGC5) and creativity (SGC1), are the key factors in the systemic competencies.

With regard to specific competencies, competencies related to generating relevant economic knowledge from data (DSC5), understanding management concepts (DSC1) and understanding how the economy works (DSC4) are the most important items in the composition of the disciplinary competencies construct; business plan preparation (PrSC4) has a considerably greater weight than all other indicators, followed by planning, managing and assessing business projects (PrSC8) and risk management (PrSC1); and, finally, idea generation (ESC3), developing products and services (ESC2) and formulating strategies (ESC6) are the strongest in the entrepreneurial competencies construct.

We demonstrated the significance of the weights through a resampling procedure (bootstrap with 5,000 resamples) to obtain statistical values. Table 3 shows that some indicators are not significant; however, we decided to include them, given that, as Roberts and Thatcher (2009) stated, rejecting them would mean eliminating part of the latent construct composite.

4.3 Structural model

The structural model is assessed in terms of possible collinearity problems, the algebraic sign, magnitude and statistical significance of the path coefficients, the coefficients of determination R^2 , sizes of the effects f^2 and rating the predictive relevance Q^2 (cross-validated redundancy) (Roldán and Sánchez-Franco, 2012).

The presence of multicollinearity between the prior variables for each of the endogenous constructs was rated using the VIF value. Table 4 shows the VIF values for each group of competencies. As can be seen, these values are below the ideal maximum of 3.3. Therefore, it may be stated that our model has no problems of multicollinearity.

Figure 2 and Table 5 show the explained variance (R^2) of the competency variables and the direct effects of our model. To analyse the significance of the direct effects of the path model, we carried out a bootstrapping (5,000 resamples) which provided us with the p -values, t -values and confidence intervals (Chin, 1998; Roldán and Sánchez-Franco, 2012). The results show that most of the hypothesised relationships are supported, as they are positive and significant; furthermore, the f^2 values for the associations exceed the minimum level of 0.02 (Chin, 2010). The only hypothesis that is not supported is the relationship between the disciplinary specific competencies and entrepreneurial competencies (H6b), as the variables have a significant relationship but with a sign contrary to the postulate and f^2 values below 0.02. This indicates that disciplinary competencies do not have a particularly relevant direct effect on the entrepreneurial competencies construct.

On the other hand, the direct effect of systemic on entrepreneurial competencies is significant (Table 5) and all the indirect effects are significant too (Table 6). Consequently, this

Construct/Indicator	Variance inflation factor	Weight	t-statistic	Loading
<i>Experience</i>				
Ex1	1.491	0.540*	4.117	0.877
Ex2	1.889	0.438*	2.919	0.862
Ex3	1.987	0.122	0.737	0.622
Ex4	2.345	0.106	0.659	0.690
<i>Instrumental generic competencies</i>				
IGC1	1.909	0.249*	2.476	0.762
IGC2	2.095	0.147	1.367	0.718
IGC3	1.852	0.089	0.886	0.672
IGC4	1.712	0.334*	3.055	0.786
IGC5	2.562	-0.151	1.209	0.501
IGC6	2.780	0.011	0.090	0.570
IGC7	1.737	0.007	0.070	0.557
IGC8	2.126	0.149	1.549	0.692
IGC9	2.244	-0.048	0.365	0.620
IGC10	2.235	0.151	1.311	0.670
IGC11	1.849	0.119	1.001	0.654
IGC12	1.654	0.271*	2.692	0.721
<i>Interpersonal generic competencies</i>				
PGC1	1.319	0.050	0.878	0.413
PGC2	1.571	0.037	0.739	0.367
PGC3	1.773	0.129*	2.319	0.472
PGC4	1.898	0.223*	3.499	0.765
PGC5	1.955	0.251*	4.374	0.761
PGC6	2.394	0.087	1.394	0.732
PGC7	1.752	-0.055	0.969	0.588
PGC8	2.151	0.045	0.814	0.695
PGC9	2.040	0.157*	2.358	0.752
PGC10	2.072	0.053	0.849	0.702
PGC11	2.141	0.136*	2.239	0.677
PGC12	2.080	0.147*	2.276	0.749
PGC13	1.759	0.171*	2.885	0.716
<i>Systemic generic competencies</i>				
SGC1	2.426	0.162*	2.661	0.675
SGC2	2.364	0.062	1.126	0.608
SGC3	2.910	0.123*	2.004	0.671
SGC4	1.536	0.215*	4.617	0.617
SGC5	1.819	0.163*	3.067	0.643
SGC6	2.093	0.075	1.331	0.603
SGC7	2.262	0.202*	3.213	0.722
SGC8	1.500	0.122*	2.718	0.575
SGC9	2.093	0.052	1.055	0.684
SGC10	1.956	0.146*	2.956	0.683
SGC11	1.696	0.048	0.948	0.595
SGC12	1.582	0.175*	3.963	0.644
SGC13	1.570	-0.011	0.266	0.501
<i>Disciplinary specific competencies</i>				
DSC1	2.304	0.375*	3.458	0.794
DSC2	2.751	0.091	0.745	0.778
DSC3	1.703	0.158	1.544	0.695
DSC4	2.165	0.253*	2.356	0.809

(continued)

Table 3.
Measurement model
results

Construct/Indicator	Variance inflation factor	Weight	t-statistic	Loading
DSC5	1.951	0.377*	3.161	0.841
<i>Professional specific competencies</i>				
PrSC1	1.589	0.176*	3.558	0.829
PrSC2	1.652	0.037	0.818	0.878
PrSC3	1.511	0.054	1.007	0.829
PrSC4	1.201	0.567*	4.296	0.878
PrSC5	1.772	0.061	1.190	0.803
PrSC6	2.052	0.150*	3.040	0.703
PrSC7	2.056	0.050	0.926	0.803
PrSC8	2.018	0.285*	5.192	0.781
<i>Entrepreneurial specific competencies</i>				
ESC1	2.751	0.161*	2.011	0.551
ESC2	3.051	0.279*	3.351	0.812
ESC3	1.663	0.318*	4.665	0.576
ESC4	1.699	0.127	1.878	0.654
ESC5	2.289	0.159*	2.189	0.642
ESC6	1.998	0.191*	2.649	0.734

Table 3.

Note(s): *significant at $p < 0.05$ (2 tails)

Variables	SGC	PrSC	ESC
IGC	1.448		
PGC	1.448		
SGC		1.513	2.746
DSC		1.513	1.903
PrSC			3.296
Gender			1.020
Age			1.035

Table 4.

Full collinearity VIFs

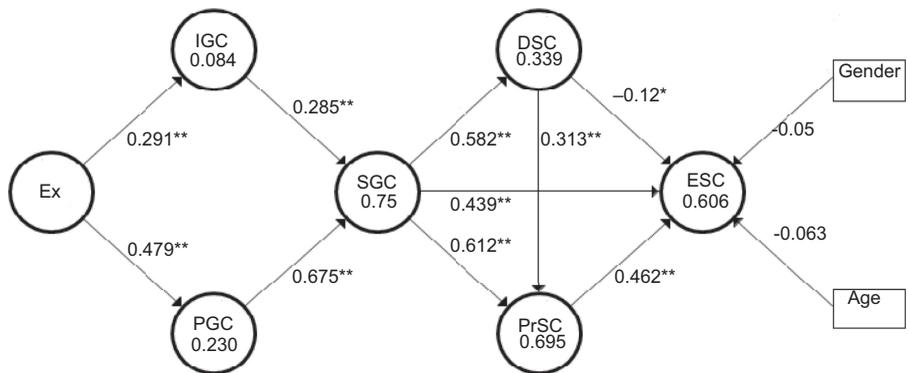


Figure 2.
Structural model
results

Note(s): * $p < 0.05$; ** $p < 0.001$

Hypothesis	Direct effect	<i>p</i> -value	<i>t</i> -value	CI	Support	<i>f</i> ²
IGC						
H1 (+): Ex	0.291	0.000	4.700	[0.217; 0.421]	Yes	0.092
PGC						
H2 (+): Ex	0.479	0.000	9.837	[0.413; 0.573]	Yes	0.298
SGC						
H3a (+): IGC	0.285	0.000	5.561	[0.213; 0.380]	Yes	0.224
H3b (+): PGC	0.675	0.000	14.338	[0.587; 0.741]	Yes	1.257
DSC						
H4 (+): SGC	0.582	0.000	12.710	[0.517; 0.669]	Yes	0.513
PrSC						
H5a (+): SGC	0.612	0.000	13.065	[0.550; 0.704]	Yes	0.812
H5b (+): DSC	0.313	0.000	5.553	[0.200; 0.384]	Yes	0.213
ESC						
H6a (+): SGC	0.439	0.000	6.344	[0.331; 0.559]	Yes	0.178
H6b (+): DSC	-0.120	0.019	2.085	[-0.212; -0.022]	No	0.019
H6c (+): PrSC	0.462	0.000	5.906	[0.329; 0.586]	Yes	0.165
Gender	-0.050	0.145	1.458	[-0.117; 0.020]		0.006
Age	-0.063	0.091	1.688	[-0.141; 0.007]		0.010

Note(s): (1) CI: Percentile confidence interval. Bootstrapping based on *n* = 5,000 subsamples; (2) Hypothesized effects are assessed by applying a one-tailed test for a *t* Student distribution (CI 90%). Effects from control variables are assessed by applying a two-tailed test (CI 95%)

Table 5. Direct effects on endogenous variables

Hypothesis	Indirect effect	<i>p</i> -value	<i>t</i> -value	CI	Support	VAF
ESC						
H7a (+): SGC-DSC	-0.070	0.027	1.931	[-0.132; -0.014]	No	8.0%
H7b (+): SGC-PrSC	0.283	0.000	5.209	[0.201; 0.379]	Yes	32.3%
H7c (+): SGC-DSC-PrSC	0.084	0.000	3.710	[0.047; 0.121]	Yes	9.6%

Note(s): (1) CI: Percentile confidence interval. Bootstrapping based on *n* = 5,000 subsamples; (2) Hypothesized effects are assessed by applying a one-tailed test for a *t* Student distribution (CI 90%)

Table 6. Mediating effects tests

means that H7b and H7c have been supported, while H7a is not supported as the indirect effect is significant but with a sign contrary to the postulate. Thus, professional competencies positively partially mediate the relationship between systemic and entrepreneurial competencies (H7b). Likewise, we find that disciplinary and professional competencies partially and jointly mediate the influence of systemic on entrepreneurial competencies, this means that systemic competencies are positively associated with higher disciplinary and professional competencies, which relates to higher levels of entrepreneurial competencies (H7c). In addition, we calculate the variance accounted for (VAF) value to assess the magnitude for each mediation. Because the total VAF has an outcome between 20 and 80%, this implies an additional argument for a partial mediation.

To sum up, the model shows a strong positive influence of: systemic and professional competencies on entrepreneurial competencies; experience variables on interpersonal competencies; interpersonal competencies on systemic competencies; and systemic competencies on disciplinary and professional competencies. The control variables, gender and age, had no significant influence on entrepreneurial competencies.

To complete the structural analysis, we analysed the coefficients of determination (*R*²), which provide the predictive power of the model and indicate the quantity of variance in a construct which is explained by the predictor variables of this endogenous construct in the

model (Chin, 2010). The results (Table 7) show that the model has adequate predictive power for the criterion variable. Entrepreneurial competencies have an R^2 of 0.606, which is very close to the substantial level (0.67) proposed by Chin (1998). Also notable is the high value for the systemic and professional competencies, with an explained variance of 0.75 and 0.695, respectively, and the moderate value (0.339) for the disciplinary competencies, while the experience variable provides very little explanation of the variance in the instrumental and interpersonal generic competencies (0.084 and 0.230, respectively).

Finally, we applied the PLS predict algorithm to assess the predictive relevance of the theoretical model from the cross-validated redundancy index (Q^2) for dependent variables (Chin, 2010; Hair *et al.*, 2019; Roldán and Sánchez-Franco, 2012). A Q^2 value above 0 means that the model has predictive relevance. In our case, the results indicate that the structural model has relevant predictive values for all groups of competencies (Table 7).

5. Discussion, implications and limitations

5.1 Discussion

The main contribution provided by this study is the development of a structural model that presents the relationship between the different academic competencies and how these influence the development of students' entrepreneurial competencies, bearing in mind the impact of experience, gender and age as factors that can affect the acquisition of competencies.

This study provides a complete and original assessment of high academic value for researchers, as it broadens our knowledge of entrepreneurial competencies. The study takes students' perception of their level of acquisition of competencies developed during the course and uses them as empirical evidence of the relationship between generic and specific competencies and entrepreneurial competencies, conceptualising them as a set of different elements that facilitate their assessment and the identification of the main strengths and weaknesses associated with the different competency groups.

The literature up to now has focused on entrepreneurial competencies, but more from a professional (Mamun *et al.*, 2016; Mohsin *et al.*, 2017; Ng and Knee, 2018; Rahman *et al.*, 2016; Sánchez, 2012; Tehseen *et al.*, 2019) than an educational perspective. Thus, the role played by entrepreneurial competencies in entrepreneurship higher education has been given less attention. However, in recent years, a number of studies have focussed on the development of entrepreneurial competencies (Ferrerías-García *et al.*, 2019; Honig, 2004; Peterman and Kennedy, 2003; Sánchez, 2011; Tounés *et al.*, 2014) and the relationship between entrepreneurial competencies and learning outcomes (Ferrerías-García *et al.*, 2020a), although they do not consider the impacts that competencies can have on each other. López-Bonilla and López-Bonilla (2014) and Gómez *et al.* (2017) present models of relationships between competencies, but in the fields of tourism and social sciences. Our study also includes sociodemographic characteristics (gender and age) and a large sample, which are factors previous studies have proposed as a future line of research (López-Bonilla and López-Bonilla, 2014).

Variables	R^2	Q^2
IGC	0.084	0.05
PGC	0.230	0.19
SGC	0.75	0.152
DSC	0.339	0.051
PrSC	0.695	0.172
ESC	0.606	0.183

Table 7.
Predictive assessment

Our results confirm those of López-Bonilla and López-Bonilla (2014), in finding a relationship between generic and specific competencies. Specifically, our results show that experience influences instrumental and, to a greater extent, interpersonal competencies, both of which influence systemic competencies; systemic competencies influence disciplinary, professional and entrepreneurial specific competencies; disciplinary competencies influence professional but not entrepreneurial competencies; and finally, professional competencies influence entrepreneurial competencies. However, gender and age have no impact on entrepreneurial competencies, confirming the lack of differences in terms of gender and age in the entrepreneurial competency learning process. This result coincides with previous research that found no noticeable differences in entrepreneurial competencies between men and women, nor in relation to students' age (Ferrerías-García *et al.*, 2020a; Kakkonen, 2011).

The model assessed here shows that within the different groups of competencies, some components have more weight than others, with the generic competencies related to decision-making, communication, contracting, organisational culture, working with uncertainty, leadership and creativity, and the specific competencies related to management, economic knowledge, preparing business plans, risk management and entrepreneurship, being particularly relevant. The results of this research partly support the studies by Ferrerías-García *et al.* (2020a), as these authors also confirmed that competencies related to decision-making, innovation, risk management and entrepreneurship have a certain influence on learning outcomes. However our results for competencies related to information technologies, time management, teamwork and ethics differ from those obtained in the study mentioned above, which found them to be relevant, whereas they are not so in our study. Our results also contradict Gómez *et al.* (2017), who confirmed that information technologies, teamwork and ethics contribute to the development of competencies, while communication was not significant.

Thus, programme design should be analysed to impact on competencies that had a less favourable result, such as disciplinary competencies, experience, information technologies, time management, teamwork and ethics, which several authors have suggested are particularly important (Boni and Lozano, 2007; Clemente-Ricolfe and Escribá-Pérez, 2013; Jansson *et al.*, 2019; Schulz and Starnov, 2010; Van Loo and Semeijn, 2004; Villardón-Gallego *et al.*, 2013).

5.2 Implications, limitations and future research

This study makes different contributions to the previous literature, as the results shed light on the question of how different groups of competencies influence entrepreneurial competencies. These relationships between competencies determine the strengths and weaknesses of the current learning system. With all this, it is intended to expand the knowledge on competencies in the specific context of entrepreneurship education.

Training based on competencies is viewed as one of the pillars to advance in the EHEA process. The framework proposed establishes a bridge between the different typologies of competencies in order to foster entrepreneurial learning and in last term the connection between the worlds of education and work as regards entrepreneurship as a competence. This could inspire the design of curricula in the formal education and training sector, the design of practical entrepreneurial experiences and activities in formal learning contexts or the development of tools for students to self-assess their entrepreneurial proficiency. Therefore, this proposal may help control competencies that might be strengthened during the degree in order to assure the development of competency acquisition by students. The use of the PLS methodology allows establishing directional relationships between the variables and, within the limitations and restrictions of the models, establishing cause and effect relationships. In this case, the proposed model allows educators to establish the

importance of certain relationships and the effect they produce on the variable “Entrepreneurial Specific Competencies”. By establishing a weight in the relationships between variables, an assessment of their importance is introduced into the model. Thus, for example, the acceptance of the hypotheses H3b, H4, H5a and H6c makes it possible to establish that the weight of these relationships is greater than that of the other relationships within the model. This result allows educators to establish priorities when working on certain skills.

The results broaden our understanding of the important role of entrepreneurship education in improving university students’ competency acquisition and performance. Additionally, the conclusions will help universities apply tools needed to develop new learning opportunities and promote an entrepreneurial environment that stimulates academic entrepreneurship. Another element to take into account is the responsibility of the universities regarding the economic development of society. This article helps to understand the impact of higher education on the emergence of entrepreneurial intention. In such a way that entrepreneurship-related human capital allows individuals to successfully, discover, identify, exploit and manage entrepreneurial opportunities (Passaro *et al.*, 2018) favouring the creation of companies and economic development.

Existing literature so far does not clarify these aspects, thus our study provides a new line of research and a new perspective for the academic community, while having major implications for improving current knowledge of the different factors that influence entrepreneurial competencies. Useful information for teachers and professionals is provided in our model.

However, the study has a number of limitations that could be corrected in future research. First, our study only considers one subject in the Business Administration and Management degree, whereas an analysis of all degree subjects or an equivalent at another university might strengthen the analysis. Second, analysing teaching tools other than business plans that strengthen the development of entrepreneurial competencies would also help improve understanding of the factors that influence this group of competencies. Third, the study has been analysed from the student perspective, however, it might also be assessed from the perspective of tutors by means of reports that are delivered at the end of the final bachelor’s degree project. The authors are currently designing a new project that includes data obtained from the tutors.

References

- Alfantookh, A. and Bakry, S.H. (2013), “Creativity and innovation in higher education research: problems and solutions”, *International Journal of Knowledge Society Research*, Vol. 4 No. 1, pp. 90-107.
- ANECA [Agencia Nacional de Evaluación de la Calidad y Acreditación] (2005), *Libro Blanco. Título de grado en Economía y empresa*, Agencia Nacional de Evaluación de la Calidad y Acreditación, Madrid.
- Bacigalupo, M., Kampylis, P., Punie, Y. and Van den Brande, G. (2016), *EntreComp: The Entrepreneurship Competence Framework*, Vol. 10, Publication Office of the European Union, Luxembourg, p. 593884.
- Barazandeh, M., Parvizian, K., Alizadeh, M. and Khosravi, S. (2015), “Investigating the effect of entrepreneurial competencies on business performance among early stage entrepreneurs global entrepreneurship monitor (GEM 2010 survey data)”, *Journal of Global Entrepreneurship Research*, Vol. 5 No. 1, pp. 1-12.
- Barclay, D., Higgins, C. and Thompson, R. (1995), “The partial least squares (PLS) approach to causal modelling: personal computer adoption and use as an illustration”, *Technology Studies*, Vol. 2 No. 2, pp. 285-309.

- Baum, J.R. and Locke, E.A. (2004), "The relationship of entrepreneurial traits, skill, and motivation to subsequent venture growth", *Journal of Applied Psychology*, Vol. 89 No. 4, pp. 587-598.
- Benito, D. (2009), "Aprendizaje en el entorno del e-learning: estrategias y figura del e-moderador", *Revista de Universidad y Sociedad del Conocimiento*, Vol. 6 No. 2, pp. 1-8.
- Berdrow, I. and Evers, T. (2011), "Bases of competence: a framework for facilitating reflective learner-centered educational environments", *Journal of Management Education*, Vol. 35 No. 3, pp. 406-427.
- Biemans, H., Wesselink, R., Gulikers, J., Schaafsma, S., Verstegen, J. and Mulder, M. (2009), "Towards competence-based VET: dealing with the pitfalls", *Journal of Vocational Education and Training*, Vol. 61 No. 3, pp. 267-286.
- Bird, B. (1995), "Towards a theory of entrepreneurial competency", *Advances in Entrepreneurship, Firm Emergence and Growth*, Vol. 2 No. 1, pp. 51-72.
- Bird, B. (2002), "Learning entrepreneurship competencies: the self-directed learning approach", *International Journal of Entrepreneurship Education*, Vol. 1 No. 2, pp. 203-227.
- Boni, A. and Lozano, J.F. (2007), "The generic competences: an opportunity for ethical learning in the European convergence in higher education", *Higher Education*, Vol. 54 No. 6, pp. 819-31.
- Bosma, N. and Kelley, D. (2019), "Global entrepreneurship monitor 2018/2019 global report", available at: <https://www.gemconsortium.org/report/50213>.
- Brand-Gruwel, S., Wopereis, I. and Vermetten, Y. (2005), "Information problem solving by experts and novices: analysis of a complex cognitive skill", *Computers in Human Behavior*, Vol. 21 No. 3, pp. 487-508.
- Brockmann, M., Clarke, L. and Winch, C. (2008), "Knowledge, skills, competence: European divergences in vocational education and training (VET): the English, German and Dutch cases", *Oxford Review of Education*, Vol. 34 No. 5, pp. 547-567.
- Carrier, C. (2009), "L'Enseignement de l'Entrepreneuriat: au-delà des Cours Magistraux, des Études de Cas et du Plan d'Affaires", *Revue de l'Entrepreneuriat*, Vol. 8 No. 2, pp. 17-34.
- Chandler, G.N. and Hanks, S.H. (1994), "Founder competence, the environment, and venture performance", *Entrepreneurship: Theory and Practice*, Vol. 18 No. 3, pp. 77-90.
- Chin, W.W. (1998), "The partial least squares approach to structural equation modeling", in Marcoulides, G.A. (Ed.), *Modern Methods for Business Research*, Lawrence Erlbaum Associates, Mahwah, pp. 295-336.
- Chin, W.W. (2010), "How to write up and report PLS analyses", in Esposito Vinzi, V., Chin, W.W., Henseler, J. and Wang, H. (Eds.), *Handbook of Partial Least Squares: Concepts, Methods and Applications*, Springer-Verlag, Berlin, pp. 655-690.
- Clemente-Ricolfe, J.S. and Escribá-Pérez, C. (2013), "Análisis de la percepción de las competencias genéricas adquiridas en la universidad", *Revista de Educación*, Vol. 362, pp. 535-561.
- Cronbach, L.J. (1942), "Studies of acquiescence as a factor in the true-false test", *Journal of Educational Psychology*, Vol. 33 No. 6, p. 401.
- Corpas, G., Bautista, R., Castillo, C., Toledo, C. and Seghiri, M. (2007), "Network learning environments: online tutoring, e-learning and e-moderating for teaching-learning scientific translation", *Theory of Education e-Journal: Education and Culture in the Information Society*, Vol. 8 No. 2, pp. 162-178.
- Escudero, J.M. (2008), "Las competencias profesionales y la formación universitaria: posibilidades y riesgos", *Revista de Docencia Universitaria*, Vol. 6 No. 2, pp. 1-20.
- Faggian, A. and McCann, P. (2009), "Human capital and regional development", in Capello, R. and Nijkamp, P. (Eds.), *Handbook of Regional Growth and Development Theories*, Edward Elgar Publishing, Cheltenham, pp. 133-151.
- Ferreras-García, R., Hernández-Lara, A.B. and Serradell-López, E. (2019), "Entrepreneurial competences in a higher education business plan course", *Education + Training*, Vol. 61 Nos 7/8, pp. 850-869.

- Ferreras-Garcia, R., Hernández-Lara, A.B. and Serradell-López, E. (2020a), "Gender and learning results: a study on their relationship in entrepreneurship education and business plans", *Studies in Higher Education*. doi: [10.1080/03075079.2020.1723525](https://doi.org/10.1080/03075079.2020.1723525).
- Ferreras-Garcia, R., Ribas, C., Sales-Zaguirre, J. and Serradell-López, E. (2020b), "Competencies in business degrees: a face-to-face and online comparative study", *Journal of Education for Business*, Vol. 96 No. 2, pp. 71-81, doi: [10.1080/08832323.2020.1751025](https://doi.org/10.1080/08832323.2020.1751025).
- Fitó-Bertran, À., Hernández-Lara, A.B. and Serradell-López, E. (2014), "Comparing student competences in a face-to-face and online business game", *Computers in Human Behavior*, Vol. 30, pp. 452-459, doi:[10.1016/j.chb.2013.06.023](https://doi.org/10.1016/j.chb.2013.06.023).
- Frasquet, M., Calderón, H. and Cervera, A. (2012), "University-industry collaboration from a relationship marketing perspective: an empirical analysis in a Spanish university", *Higher Education*, Vol. 64 No. 1, pp. 85-98.
- Gallifa, J. and Garriga, J. (2010), "Generic competences in higher education: studying their development in undergraduate social science studies by means of a specific methodology", *Perspectives in Education*, Vol. 28 No. 3, pp. 70-86.
- Gómez, M., Aranda, E. and Santos, J. (2017), "A competency model for higher education: an assessment based on placements", *Studies in Higher Education*, Vol. 42 No. 12, pp. 2195-2215.
- González, J. and Wagenaar, R. (2006), "Tuning educational structures in Europe. Universities' contribution to the bologna process - an introduction", available at: <http://www.deusto-publicaciones.es/deusto/index.php/en/tuning-en/tuning-bolonia-en>.
- Hair, J., Risher, J.J., Sarstedt, M. and Ringle, C. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2-24.
- Henseler, J., Ringle, C.M. and Sinkovics, R.R. (2009), "The use of partial least squares path modeling in international marketing", in Henseler, J., Ringle, C.M. and Sinkovics, R.R. (Eds), *Advances in International Marketing*, Emerald Group Publishing, Bingley, pp. 277-319.
- Hernández-Lara, A.B. and Serradell-López, E. (2018), "Student interactions in online discussion forums: their perception on learning with business simulation games", *Behaviour and Information Technology*, Vol. 37 No. 4, pp. 419-429, doi: [10.1080/0144929X.2018.1441326](https://doi.org/10.1080/0144929X.2018.1441326).
- Honig, B. (2004), "Entrepreneurship education: toward a model of contingency-based business planning", *Academy of Management Learning and Education*, Vol. 3 No. 3, pp. 258-273.
- Jansson, M., Carle, J., Gunnarsson, A. and Ekbrand, H. (2019), "How experience affects assessment: a longitudinal study of assessment of university students' essays", *Studies in Higher Education*, Vol. 44 No. 4, pp. 719-732.
- Jeffrey, T. and Spinelli, S. (2007), *New Venture Creation: Entrepreneurship for the 21st Century*, McGraw-Hill/Irwin, New York.
- Kakkonen, M.L. (2011), "Students' perceptions of their business competences and entrepreneurial intention", *Management*, Vol. 6 No. 3, pp. 25-243.
- Kirby, D.A. (2004), "Entrepreneurship education: can business schools meet the challenge?", *Education + Training*, Vol. 46 Nos 8/9, pp. 510-519.
- Komulainen, K., Korhonen, M. and Rätty, H. (2009), "Risk-taking abilities for everyone? Finnish entrepreneurship education and the enterprising selves imagined by pupils", *Gender and Education*, Vol. 21 No. 6, pp. 631-649.
- Lans, T., Hulsink, W. and Baert, H. (2008), "Entrepreneurship education and training in a small business context: insights from the competence-based approach", *Journal of Enterprising Culture*, Vol. 16 No. 4, pp. 363-383.
- Lans, T., Versteegen, J. and Mulder, M. (2011), "Analysing, pursuing and networking: towards a validated three-factor framework for entrepreneurial competence from a small firm perspective", *International Small Business Journal*, Vol. 29 No. 6, pp. 695-713.

- Lans, T., Baggen, Y. and Ploum, B. (2018), "Towards more synergy in entrepreneurial competence research in entrepreneurship education", in Fayolle, A. (Ed.), *A Research Agenda for Entrepreneurship Education*, Edward Elgar Publishing, Cheltenham, pp. 224-242.
- Lautenschläger, A. and Haase, H. (2011), "The myth of entrepreneurship education: seven arguments against teaching business at universities", *Journal of Entrepreneurship Education*, Vol. 14, pp. 147-161.
- Lawal, F.A., Iyiola, O.O., Adegbuyi, O.A., Ogunnaike, O.O. and Taiwo, A.A. (2018), "Modelling the relationship between entrepreneurial climate and venture performance: the moderating role of entrepreneurial competencies", *Academy of Entrepreneurship Journal*, Vol. 24 No. 1, pp. 1-15.
- Le Deist, F. and Winterton, J. (2005), "What is competence", *Human Resource Development International*, Vol. 8 No. 1, pp. 27-46.
- Lincoln, D. and Kearney, M.L. (2015), "Competence assessment in higher education", *Studies in Higher Education*, Vol. 40 No. 3, pp. 391-392.
- López-Bonilla, J.M. and López-Bonilla, L.M. (2014), "Holistic competence approach in tourism higher education: an exploratory study in Spain", *Current Issues in Tourism*, Vol. 17 No. 4, pp. 312-326.
- Loué, C., Laviolette, E.-M. and Bonnafous-Boucher, M. (2008), "L'entrepreneur à l'épreuve de ses compétences: éléments de construction d'un référentiel en situation d'incubation", *Revue de l'Entrepreneuriat*, Vol. 7 No. 1, pp. 63-83.
- Mamun, A.A., Subramaniam, P., Nawi, C.N. and Zainol, N.R. (2016), "Entrepreneurial competencies and performance of informal micro-enterprises in Malaysia", *Mediterranean Journal of Social Science*, Vol. 7 No. 3, pp. 273-281.
- Man, T.W. and Lau, T. (2000), "Entrepreneurial competencies of SME owner/managers in the Hong Kong services sector: a qualitative analysis", *Journal of Enterprising Culture*, Vol. 8 No. 3, pp. 235-254.
- Man, T.W., Lau, T. and Chan, K.F. (2002), "The competitiveness of small and medium enterprises: a conceptualisation with focus on entrepreneurial competencies", *Journal of Business Venturing*, Vol. 17 No. 2, pp. 123-142.
- Mir, A. (2008), "Las competencias transversales en la Universidad Pompeu Fabra. La visión de los docentes y estudiantes de segundo ciclo", *Revista de Docencia Universitaria*, Vol. 6 No. 1, pp. 1-16.
- Mitchelmore, S. and Rowley, J. (2010), "Entrepreneurial competencies: a literature review and development agenda", *International Journal of Entrepreneurial Behavior and Research*, Vol. 16 No. 2, pp. 92-111.
- Mohsin, A.M.B.A., Halim, H.A. and Farhana, N. (2017), "Assessing the role of entrepreneurial competencies on innovation performance: a partial least squares (PLS) approach", *The Journal of Business Inquiry*, Vol. 16, pp. 88-101.
- Morris, M.H., Webb, J.W., Fu, J. and Singhal, S. (2013), "A competency-based perspective on entrepreneurship education: disciplinary and empirical insights", *Journal of Small Business Management*, Vol. 51 No. 3, pp. 352-369.
- Mulder, M. (2012), "Competence-based education and training", *The Journal of Agricultural Education and Extension*, Vol. 18 No. 3, pp. 305-314.
- Mulder, M. and Gulikers, J. (2011), "Workplace learning in east Africa: a case study", in *The SAGE Handbook of Workplace Learning*, pp. 307-318.
- Mulder, M., Wesselink, R. and Bruijstens, H.C.J. (2005), "Job profile research for the purchasing profession", *International Journal of Training and Development*, Vol. 9 No. 3, pp. 185-204.
- Nab, J., Pilot, A., Brinkkemper, S. and Ten Berge, H. (2010), "Authentic competence-based learning in university in entrepreneurship", *International Journal of Entrepreneurship and Small Business*, Vol. 9 No. 1, pp. 20-35.

- Ng, H.S. and Kee, D.M.H. (2018), "The core competence of successful owner-managed SMEs", *Management Decision*, Vol. 56 No. 1, pp. 252-272.
- Nowiński, W., Haddoud, M.Y., Lančarić, D., Egerová, D. and Czeglédi, C. (2019), "The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries", *Studies in Higher Education*, Vol. 44 No. 2, pp. 361-379.
- Passaro, R., Quinto, I. and Thomas, A. (2018), "The impact of higher education on entrepreneurial intention and human capital", *Journal of Intellectual Capital*, Vol. 19 No. 1, pp. 135-156.
- Peterman, N.E. and Kennedy, J. (2003), "Enterprise education: influencing students' perceptions of entrepreneurship", *Entrepreneurship Theory and Practice*, Vol. 28 No. 2, pp. 129-144.
- Petter, S., Straub, D.W. and Rai, A. (2007), "Specifying formative constructs in information systems research", *MIS Quarterly*, Vol. 31 No. 4, pp. 623-656.
- Pittaway, L. and Edwards, C. (2012), "Assessment: examining practice in entrepreneurship education", *Education + Training*, Vol. 54 Nos 8/9, pp. 778-800.
- Rahman, S.A., Ahmad, N.H. and Taghizadeh, S.K. (2016), "Entrepreneurial competencies of BoP entrepreneurs in Bangladesh to achieve business success", *Journal of General Management*, Vol. 42 No. 1, pp. 45-63.
- Rasmussen, E., Mosey, S. and Wright, M. (2011), "The evolution of entrepreneurial competencies: a longitudinal study of university spin-off venture emergence", *Journal of Management Studies*, Vol. 48 No. 6, pp. 1314-1345.
- Rigdon, E.E., Sarstedt, M. and Ringle, C.M. (2017), "On comparing results from CB-SEM and PLS-SEM: five perspectives and five recommendations", *Marketing ZFP*, Vol. 39 No. 3, pp. 4-16, doi: [10.15358/0344-1369-2017-3-4](https://doi.org/10.15358/0344-1369-2017-3-4).
- Ringle, C.M., Wende, S. and Becker, J.M. (2015), "SmartPLS 3", *SmartPLS GmbH*, Boenningstedt, available at: <http://www.smartpls.com>.
- Roberts, N. and Thatcher, J.B. (2009), "Disciplinaryizing and testing formative constructs: tutorial and annotated example", *The Data Base for Advances in Information Systems*, Vol. 40 No. 3, pp. 9-39.
- Roldán, J.L. and Sánchez-Franco, M.J. (2012), "Variance-based structural equation modeling: guidelines for using partial least squares in information systems research", in Mora, M., Gelman, O., Steenkamp, A. and Raisinghani, M. (Eds), *Research Methodologies, Innovations and Philosophies in Software Systems Engineering and Information Systems*, IGI Global, Hershey, pp. 193-221.
- Sánchez, J.C. (2011), "University training for entrepreneurial competencies: its impact on intention of venture creation", *International Entrepreneurship and Management Journal*, Vol. 7 No. 2, pp. 239-254.
- Sánchez, J. (2012), "The influence of entrepreneurial competencies on small firm performance", *Revista Latinoamericana de Psicología*, Vol. 44 No. 2, pp. 165-177.
- Sarstedt, M., Hair, J.F., Ringle, C.M., Thiele, K.O. and Gudergan, S.P. (2016), "Estimation issues with PLS and CBSEM: where the bias lies!", *Journal of Business Research*, Vol. 69 No. 10, pp. 3998-4010, doi: [10.1016/j.jbusres.2016.06.007](https://doi.org/10.1016/j.jbusres.2016.06.007).
- Schulz, M. and Starnov, C. (2010), "Informal workplace learning: an exploration of age differences in learning competence", *Learning and Instruction*, Vol. 20 No. 5, pp. 383-399.
- Sitzmann, T., Ely, K., Brown, K.G. and Bauer, K.N. (2010), "Self-assessment of knowledge: a cognitive learning or affective measure?", *Academy of Management Learning and Education*, Vol. 9 No. 2, pp. 169-191.
- Smith, B. and Morse, E. (2005), *Entrepreneurial Competencies: Literature Review and Best Practices*, Small Business Policy Branch, Industry Canada, Ottawa.

-
- Taatila, V.P. (2010), "Learning entrepreneurship in higher education", *Education + Training*, Vol. 52 No. 1, pp. 48-61.
- Tehseen, S., Ahmed, F.U., Qureshi, Z.H. and Uddin, M.J. (2019), "Entrepreneurial competencies and SMEs' growth: the mediating role of network competence", *Asia-Pacific Journal of Business Administration*, Vol. 11 No. 1, pp. 2-29.
- Tehseen, S., Qureshi, Z.H., Johara, F. and Ramayah, T. (2020), "Assessing dimensions of entrepreneurial competencies: a type II (Reflective-Formative) measurement approach using PLS-SEM", *Journal of Sustainability Science and Management*, Vol. 15 No. 2, pp. 108-145.
- Tittel, A. and Terzidis, O. (2020), "Entrepreneurial competences revised: developing a consolidated and categorized list of entrepreneurial competences", *Entrepreneurship Education*, Vol. 3 No. 1, pp. 1-35.
- Tounés, A., Lassas-Clerc, N. and Fayolle, A. (2014), "Perceived entrepreneurial competences tested by business plan pedagogies", *International Journal of Entrepreneurship and Small Business*, Vol. 21 No. 14, pp. 541-557.
- Umar, A., Omar, C.M.Z.C., Hamzah, M.S.G. and Hashim, A. (2018), "The mediating effect of innovation on entrepreneurial competencies and business success in Malaysian SMEs", *International Business Research*, Vol. 11 No. 8, pp. 142-153.
- Unger, J.M., Rauch, A., Frese, M. and Rosenbusch, N. (2011), "Human capital and entrepreneurial success: a meta-analytical review", *Journal of Business Venturing*, Vol. 26 No. 3, pp. 341-358.
- Van Loo, J. and Semeijn, J. (2004), "Defining and measuring competences: an application to graduate surveys", *Quality and Quantity*, Vol. 38 No. 3, pp. 331-349.
- Van Praag, C.M. and Versloot, P.H. (2007), "What is the value of entrepreneurship? A review of recent research", *Small Business Economics*, Vol. 29 No. 4, pp. 351-382.
- Villa, A. and Poblete, M. (2007), *Aprendizaje basado en competencias*, Universidad de Deusto, Ediciones Mensajero, Bilbao.
- Villardón-Gallego, L., Yániz, C., Achurra, C., Iraurgi, I. and Aguilar, M.C. (2013), "Learning competence in university: development and structural validation of a scale to measure", *Revista de Psicodidáctica*, Vol. 18 No. 2, pp. 357-374.
- Villasana, M., Alcaraz-Rodríguez, R. and Álvarez, M.M. (2016), "Examining entrepreneurial attributes of Latin American female university students", *Gender and Education*, Vol. 28 No. 1, pp. 148-166.
- Virtanen, A. and Tynjälä, P. (2019), "Factors explaining the learning of generic skills: a study of university students' experiences", *Teaching in Higher Education*, Vol. 24 No. 7, pp. 880-894.
- Wesselink, R., de Jong, C. and Biemans, H.J. (2010), "Aspects of competence-based education as footholds to improve the connectivity between learning in school and in the workplace", *Vocations and Learning*, Vol. 3 No. 1, pp. 19-38.
- Zawacki-Richter, O., Hanft, A. and Bäcker, E.M. (2011), "Validation of competencies in e-portfolios: a qualitative analysis", *International Review of Research in Open and Distance Learning*, Vol. 12 No. 1, pp. 42-60.

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