An experiential learning program for entrepreneurship education

Laura Castaldi*

Department of Economics,
University of Campania Luigi Vanvitelli,
Corso Gran Priorato di Malta, Capua, 81043, Italy
Email: laura.castaldi@unicampania.it
*Corresponding author

Enrica Sepe

Department of Economics, Management, Institutions,
University of Naples Federico II,
Monte Sant'Angelo, Via Cinthia, 26, Naples, 80126, Italy
Email: enrica.sepe@unina.it

Claudio Turi

Department of Economics,
University of Campania Luigi Vanvitelli,
Corso Gran Priorato di Malta, Capua, 81043, Italy
Email: claudio.turi@unicampania.it

Valentina Iscaro

Department of Management, Marketing and Logistics,
Alabama A&M University, USA
Email: valentina.iscaro@aamu.edu

Abstract: Despite extensive research into entrepreneurship education (e.g., Collins et al., 2004; Pittaway and Cope, 2007; Solomon, 2007; Blenker et al., 2014), many studies focus upon pedagogical 'good practice', rather than establishing its effectiveness. As well as achieving the social goals of any curriculum in terms of enabling students to fulfil their potential and ultimately to obtain gainful employment, entrepreneurship can also potentially be evaluated to establish whether it meets its desired objectives or learning outcomes. Our aim, therefore, is to conduct a critical appraisal of how experiential approaches can enhance the achievement of learning outcomes in entrepreneurship education. A partial least square path modelling (PLS-PM) was used to test the relationships involved in the research model.

Keywords: entrepreneurship education; entrepreneurial learning and outcomes; partial least square path-modelling.

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Biographical notes: Laura Castaldi is an Assistant Professor of Business Economics and Management at the Department of Economics of University of Campania Luigi Vanvitelli. She graduated Cum Laude in Business Economics from the University Federico II of Naples and received her PhD in Entrepreneurship and Innovation from the Second University of Naples. She was a Visiting Scholar in 2004 and Visiting Research Scholar in 2015 at the Snider Entrepreneurial Research Center, Wharton School. She teaches innovation management at the Department of Economics, University of Campania Luigi Vanvitelli. Her main research areas are knowledge management, inter-organisational collaborations, growth dynamics of firms operating in innovative industries, entrepreneurship and firm creation, entrepreneurship education, and servitisation.

Enrica Sepe is a PhD Fellow at the Department of Economics, Management and Institutions of University of Naples Federico II, Monte Sant'Angelo. Her research activity falls primarily within two areas, one focused on entrepreneurship and the other on quantitative methodology, in order to generate an interaction between different theoretical and applicative perspectives. She holds a PhD in Management with backgrounds in Entrepreneurship and Innovation. During the year 2015, she participated in the ESU doctoral program and the IES (innovation and society statistical methods for services assessment) international conference. She was a Visiting Scholar in 2016 at the EMLYON Business School.

Claudio Turi received his PhD in Entrepreneurship and Innovation from the Second University of Naples. He was a Visiting Scholar at the Snider Entrepreneurial Research Center of the Wharton School, University of Pennsylvania, USA and an Adjunct Professor in Organisation and Management of International Business, Department of Economics, Second University of Naples. His research interests include alliance capability, inter-organisational relationships, international business and non-profit management.

Valentina Iscaro is a Visiting Professor of Entrepreneurship at Alabama A&M University and an Adjunct Professor of Social Media Marketing at the University of Alabama Huntsville and a coach for entrepreneurial teams. She holds a PhD in Entrepreneurship and Innovation with backgrounds in management, marketing and business communication. She was Visiting Scholar in 2014 and Visiting Researcher in 2015 at the Snider Entrepreneurial Research Center, Wharton Business School, University of Pennsylvania. She is an active member of the Start up Lab, the acceleration laboratory of the University of Campania Luigi Vanvitelli supporting students in the start-upping process. She has been a marketing and brand management consultant on projects for Italian and international companies.

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1 Introduction

Given the prominent role of entrepreneurship in supporting the economy worldwide, it is not surprising, as stated in numerous studies, that entrepreneurship education is becoming increasingly important everywhere in the world, while research in entrepreneurship is growing and gaining legitimacy in the scientific communities (Jack and Anderson, 1998; Honig, 2004; Lee and Wong, 2007; Fayolle and Gailly, 2008; Nabi et al., 2017). As entrepreneurship is a skill, it can be developed through education (Souitaris et al., 2007; Curley and Formica, 2013), providing an innovative learning environment, thus helping students develop entrepreneurial competencies (European Commission, 2011).

The role entrepreneurship can play in taking on important societal challenges (Rae, 2010) has positioned entrepreneurial education as a means of empowering people and organisations to create social value for the public good (Volkmann and Tokarski, 2009).

Jones and Iredale (2010) suggest that entrepreneurship education requires experiential learning styles, creative problem solving and learning by doing in order to engage students.

Many traditional models of education use 'transmission' as the primary approach to delivering knowledge, based on a mechanism whereby the teacher deposits knowledge into the open repositories of students' minds. According to these traditional models, students' ability to memorise the deposited information is the principal indicator of knowledge acquisition and academic success (Breunig, 2017).

Wahid et al. (2017) argue that there should be a shift from transmission models (learning 'about') to experiential learning (learning 'for') in order to provide students with techniques that can be applied in the real world. Education 'for entrepreneurship' is connected with real entrepreneurial activity, and wishing students to get 'near entrepreneurial experience' (Levie, 1999). It is practise-oriented and involves 'teaching entrepreneurship as a method', thus helping students understand, develop, and practice the skills and techniques necessary for productive entrepreneurship (Neck and Greene, 2011).

Innovating in entrepreneurship education is important, as it necessitates the adoption of approaches that are different from traditional teaching. There is a need for more interactive learning approaches, whereby teachers should act as mentors in a cooperative and interdisciplinary learning process characterised by creativity, meaning making and interactivity (Lackéus, 2015) and where specific business skills and knowledge of how to start a company and run it are successfully transmitted (Wahid et al., 2017).

Indeed, the effectiveness of entrepreneurship education is largely related to the teacher's knowledge of using different teaching methods (Cheng et al., 2009).

In this vein, in an attempt to provide a contribution to the studies that aim to boost entrepreneurship education and the entrepreneurial activity of universities, basing on the results of a preliminary investigation conducted on a sample of 75 students (Iscaro et al., 2018), we further analyse if and how experiential methods can enhance the achievement of learning outcomes in entrepreneurship education. In particular, we conduct a critical appraisal of the impact of an experimental lab[1], the ExperimentaLab, a virtual platform to support entrepreneurial training programs through an experiential learning process that simulates the progression from idea to start-up, helping students acquire entrepreneurial competencies.

The work is organised as follows. The first section presents the literature review. We then propose the theoretical framework, arguing that the ExperimentaLab could be a

valid educational tool potentially implementable by entrepreneurial universities. Subsequently, we describe the methodology and sample. Following this, we analyse the results. Finally, we draw conclusions and discuss some major implications for future research.

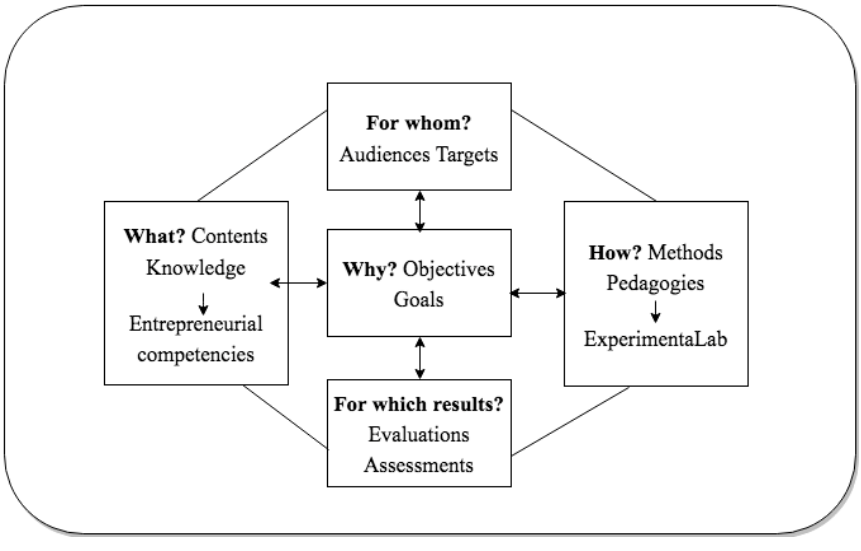
2 Literature review

Entrepreneurship education (EE) aims to increase the awareness of entrepreneurship as a career option, and enhances the understanding of the process involved in initiating and managing a new business enterprise (Lee and Wong, 2007). Entrepreneurship education can help students see a possible career option in new venture creation, develop positive and favourable attitudes towards entrepreneurial situations and also offer new career prospects for part or all of one's professional life. The objectives of entrepreneurship education could be classified into three categories: raising awareness, teaching techniques and tools, and how to handle situations and support project bearers (Fayolle, 2007).

Although the key to successful entrepreneurship education is to establish the most effective way to manage the teachable skills and identify the best match between student needs and teaching techniques, there is no universal pedagogical recipe to teach entrepreneurship, and the choice of techniques and methods depends mainly on the objectives, contents and constraints imposed by the institutional context (Arasti et al., 2012).

Fayolle (2013), at a didactical level, analyses the basic questions of entrepreneurship education in terms of: what, how, for whom, why and for which results the entrepreneurship education program is designed (Jones and Matlay, 2011) (Figure 1).

Figure 1 A teaching model in entrepreneurship education



Source: Adapted from Fayolle (2013)

In particular, the 'what' can be analysed at two levels of learning: content and knowledge (Fayolle, 2013). The contents are often based on the most popular textbooks in entrepreneurship and tend to reflect the nature (opportunity-centred) and dynamics of the entrepreneurial process (opportunity identification, evaluation and exploitation) (Shane, 2003). As regards knowledge, pride of place is given to the business planning approach and the functional knowledge supporting the new venture creation process (Honig, 2004). However, Edelman et al. (2008) highlight the existence of a gap between what we teach in entrepreneurship and what entrepreneurs do (Fayolle, 2013). Researching the 'what' question is thus still of considerable importance.

The 'how' can be managed with different methods and approaches. Much of the literature on entrepreneurship education emphasises the importance of active, experiential learning by doing and 'real-world' pedagogies. The main focus is on active pedagogies, but little evidence is provided regarding the match between the methods used and audience specificities, methods and contents, and so on. Similarly, few studies have set out to compare the effectiveness and efficiency of different teaching methods used with same-profile students or with the same types of objectives. Hence, it is only possible to list the best practices for entrepreneurship educators: experiential learning rather than transmission of knowledge, the learner's active participation, etc., highlighting that the 'how' question also still requires research.

The question 'for whom' regards the audiences. Research in EE offers insights into a great variety of audiences: secondary and upper-secondary pupils and students; students engaged in a range of disciplines, from various socio-demographic backgrounds and with different levels of motivation and different aspirations towards entrepreneurship (Fayolle, 2013).

The question 'why' describes the objectives for entrepreneurship education programs that can be at both the pedagogical and socio-economic levels. Finally, the question 'for which results' regards the evaluation of EE programs. Little research is available concerning the assessment and measurement of entrepreneurship education programs and courses. However, entrepreneurial outcomes and, more generally, the effectiveness of entrepreneurship education, are key issues for both policy-makers and educators (Fayolle, 2013).

This work focuses on the 'what' and 'how' didactical areas of entrepreneurship education – those which are widely considered to still lack the necessary attention (Pittaway and Cope, 2007; Solomon, 2007; Fayolle and Gailly, 2008; Mwasalwiba, 2010). Thus, we study entrepreneurial learning, which has emerged as an important area of enquiry in relation to both the academic study of entrepreneurship and the practical development of new entrepreneurs (Rae, 2005).

As regularly reported over the past years, there has been increasing interest in the research field of entrepreneurial learning (Harmeling and Sarasvathy, 2013). Some studies argue that part of this increase in interest lies in the fact that the current provision of entrepreneurship education does not fully reflect a demand-led approach that values how entrepreneurs learn (Pittaway and Thorpe, 2012). Since entrepreneurship courses were first provided in conventional business education (Kuratko, 2005), much research has focused on exploring the programs already provided (Vesper and Gartner, 1997). Only later did interest emerge in exploring the learner's side that aimed to understand how real-life entrepreneurs learn and acquire entrepreneurial competencies (Morris et al., 2013; Sirelkhatim and Gangi, 2015).

Competencies have been gaining considerable attention in recent years across diverse fields (Sánchez, 2013). Generally speaking, competency includes the knowledge, skills, attitudes and behaviours needed to complete an activity successfully (Morris et al., 2013; Sánchez, 2013; Sirelkhatim and Gangi, 2015). Entrepreneurial competencies include, amongst many other things, opportunity recognition, opportunity assessment, risk management, creative problem solving, value creation, and building and using networks (Morris et al., 2013). Entrepreneurial learning focuses on exploring how entrepreneurs acquire the previously mentioned entrepreneurial competencies (Cope, 2005). Many articles on entrepreneurial learning have drawn on the literature from relevant fields such as individual learning and adult learning (Cope, 2005; Pittaway and Thorpe, 2012).

The concept of entrepreneurial learning has been mainly defined from an entrepreneurship theory perspective. For instance, Minniti and Bygrave (2001) define entrepreneurship as a learning process, where entrepreneurial learning is described as being generated, at least in part, by the reinforcement of the belief in certain actions due to their positive outcomes. Similarly, Politis (2005) describes entrepreneurial learning as a process that facilitates the development of necessary knowledge for being effective in starting up and managing new ventures. His study highlights entrepreneurial learning as an experiential process where enterprising individuals continuously develop their entrepreneurial knowledge throughout their professional lives (Politis, 2005).

From these definitions, we can assume a strong relationship between the entrepreneurial process and learning. It has been observed that education should be brought to life through practical experiential learning models and experience of real-world entrepreneurs (Fayolle and Gailly, 2008; Iscaro et al., 2018). Experiential learning theory (ELT) provides a holistic model of the learning process and a multi-linear model of adult development. The term 'experiential' emphasises the central role of experience in the learning process that characterises this theory, distinguishing it both from cognitive learning theories (which emphasise cognition over affect) and behavioural learning theories (which deny any role for subjective experience in the learning process) (Kolb et al., 2001). ELT has its roots in Dewey's philosophical pragmatism, Lewin's social psychology and Piaget's cognitive-developmental genetic epistemology, which represent a unique perspective on experiential learning (Kolb, 1984). This provides a conceptual foundation for a model of entrepreneurial learning, which accommodates social participation and human action as well as cognition, enabling learning theory to be applied to entrepreneurship (Rae, 2005).

The discussion in entrepreneurial learning is centred on the idea of gaining entrepreneurial competencies through experience that entrepreneurs obtain from 'learning by doing' (Cope and Watts, 2000), routinised activities (Cope, 2005), contingencies, non-continuous events (Harmeling and Sarasvathy, 2013), failure (Minniti and Bygrave, 2001) and reflecting (Cope, 2005) from experience gained through such life events.

As Rae (2009) suggests, learning should be relational, authentic, relevant, useful and productively shared. Kolb (1984) describes entrepreneurial learning as an experiential process, during which entrepreneurs acquire knowledge through different learning abilities: experiencing, reflecting, thinking and acting (Moustaghfir and Sirca, 2010; Moustaghfir and Secundo, 2016).

Several authors consider entrepreneurial learning as a process by which people develop knowledge (Moustaghfir and Secundo, 2016). It is the outcome of social – cognitive, behavioural, affective and holistic – processes (Cope, 2005) and involves

transforming experience and knowledge into functional learning outcomes based on a dynamic process of awareness, reflection, association and application (Rae, 2006).

Similarly, the entrepreneur's career experience, in terms of start-up, management and industry-specific experience, is positively related to the development of entrepreneurial knowledge (Politis, 2005) that facilitates decision-making about entrepreneurial opportunities under uncertainty and time pressure (Sarasvathy, 2001). Sarasvathy (2001) introduces two kinds of reasoning:

1 causal reasoning, which is based on techniques of analysis and estimation to explore and exploit existing markets

2 effectual reasoning, which deals with imagination to create new markets that do not already exist.

Rae (2006) identifies three main dimensions of entrepreneurial learning:

1 personal and social emergence of the entrepreneur, which – according to Liang and Dunn (2008) – highlights the importance of optimism vs. realism

2 contextual learning, which leads to the identification and exploitation of opportunities in specific situations

3 the negotiated enterprise, which includes processes of participation and joint enterprise, changing roles over time, and engagement in networks of external relationships.

3 Theoretical framework

Pedagogical research highlights how the evaluation of impact should be a key dimension of any teaching program and therefore needs to be considered at the program design stage (Fayolle and Gailly, 2008; Nabi et al., 2017). As described by Nabi et al. (2017) the impact of entrepreneurship education programs on attitudes and behaviour is ambiguous, as studies suggest both positive and negative outcomes (Fayolle 2013; Martin et al., 2013).

In this regard, this work joins that part of literature on entrepreneurship education that emphasises the importance of 'active', 'experiential', 'learning by doing' and 'real-world' pedagogies, which, as Alain Fayolle (2013) suggests, is not currently well addressed by the entrepreneurship education research.

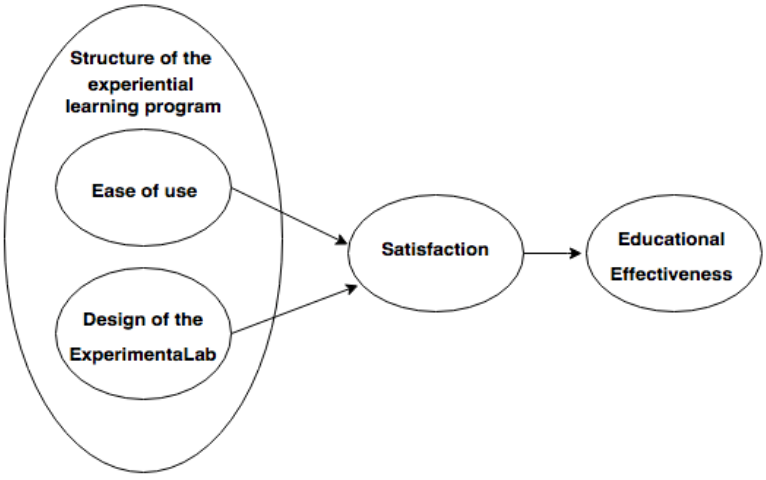
In this work, we analyse the impact of the adoption of the virtual platform ExperimentaLab (guiding the progression from idea to start-up) on the acquisition of entrepreneurial competencies by students.

As already mentioned, we focus on the 'what' and 'how' of entrepreneurship education, mentioned by many researchers as areas that have received scant attention in literature (Solomon, 2007; Pittaway and Cope, 2007; Fayolle and Gailly, 2008; Mwasalwiba, 2010). This research thus aims to contribute to an area — course contents and methods of teaching entrepreneurship (Solomon, 2007) – which needs further in-depth description in order to contribute to efforts to extract best entrepreneurship education program practices (Jones and Matlay, 2011).

This study combines literature on entrepreneurship education and learning, to conduct a critical appraisal of how an experiential learning program can enhance the achievement

of learning outcomes in entrepreneurship education. It is possible to represent the theoretical framework as illustrated in the following Figure 2.

Figure 2 EE learning and outcomes in the ExperimentaLab: theoretical framework



As shown in Figure 2, we claim that the 'Educational Effectiveness', meant as the acquisition of entrepreneurial competencies by means of an EE program, is fostered by students' satisfaction, which in turn is determined by the structure of the ExperimentaLab experiential learning program. The latter includes two elements: the design of the ExperimentaLab and its ease of use. As argued by Adobor and Daneshfar (2006) ease of use associated with simulation should positively affect learning as it positively impacts on participants' interest in the program and reduces students' wasted time, allowing them to make relevant decisions.

The design of the ExperimentaLab was built on:

1 the elements that Klabbers (2009) intends as constituting gaming-simulation (i.e., actors, rules and resources)

2 suggestions emerging from a focus group with experts, who were asked to address gaps in the literature

3 data stemming from a first simulation (Iscaro et al., 2017a).[2]

Going to the satisfaction dimension, it can be observed that the satisfaction concept was recently extended to the context of higher education, while several definitions already exist in the services and consumer marketing literature (Gruber et al., 2010).

Consumer satisfaction can be defined as pleasurable fulfilment, which means that consumers perceive that 'consumption fulfils some need, desire, goal, or so forth and that this fulfilment is pleasurable' (Oliver, 1999). Satisfaction can be viewed as the result of a comparison between expectancy and perceived service with pleasure or displeasure (Oliver, 1980; 1999; Wu et. al., 2015). The learning satisfaction theory is originated from the customer satisfaction theory and is based on the assumption that students are the consumers of education products with the right of selecting any learning institute they prefer (Wu et. al., 2015). Adopting Oliver and DeSarbo's (1989) definition of

satisfaction, Elliott and Shin (2002) define student satisfaction as 'the favourability of a student's subjective evaluation of the various outcomes and experiences associated with education'. In summary, learning satisfaction is the impact of the processes taking place during the teaching and learning sessions participated by the students (Wu et al., 2015). Besides, student satisfaction also has a positive impact on student motivation (Elliott and Shin, 2002), which in learning programs based on simulations (such as the ExperimentaLab) is increased by active participation, thus enhancing participants' self-efficacy (Sherrel and Burns, 1982). Motivation and learning processes have a strong and deep connection. The students' level of motivation reflects on their engagement and contribution in the learning environment, being crucial to succeed in educational matters (Gopalan et al., 2017). Moreover, satisfaction has been identified in higher education as a predictor of learning outcomes (Carter, 2014). Thus, basing on aforementioned activity of literature review, it could be hypothesised that the design structure of the ExperimentaLab supports the acquisition of entrepreneurial competencies by students (thus revealing educational effectiveness) by means of a process that stimulates players' satisfaction. In this vein – in opposition to the preliminary results of our previous research (Iscaro et al., 2018) – we invert the direction of the causal nexus linking players' satisfaction and educational effectiveness. Indeed, we believe the reduced number of observations could have affected the outcome of previous exploratory activity, representing one of its most constraining limitations (thus justifying the need for new simulations consistently enlarging the sample).

Finally, as to the Educational Effectiveness, though the evaluation of education programs appears to be a complex issue (Ng and Feldman, 2009), and there are numerous types, objectives and methods of evaluation (Fayolle and Gailly, 2015)[3], the analysis for this study is based on the 'acquisition' dimension proposed by Kirkpatrick (1994) to evaluate training programs, meant as the evaluation of the acquisition of entrepreneurial competencies by participants, surveyed at the conclusion of the program (simulation) (Iscaro et al., 2018).

In our work, the analysis was carried out through an empirical study (simulation by role play) that was conducted on a sample of university students. At the end of the simulation period, the sample students filled in a questionnaire.

Although aware of the various questionnaires used in the field (Autio et al., 2001; Kirby, 2007; Fayolle and Gailly, 2015; Gruber-Muecke and Kailer, 2015), we structured the part of the questionnaire regarding entrepreneurial competencies influenced by the entrepreneurship education guidelines of the European Union (European Commission, 2012, 2013), based on the conceptual model previously illustrated (see Figure 2). The European Community defines entrepreneurial competencies as "a composition of an entrepreneurial attitude, entrepreneurial skills and knowledge of entrepreneurship" (Antonaci et al., 2014). The entrepreneurial attitude implies 'learning to become entrepreneurial', i.e., the development of an entrepreneurial mind-set to help the future entrepreneur act and assume the responsibilities required of the role. Entrepreneurial skills entail 'learning to become an entrepreneur', i.e., the acquisition of the knowledge and useful skills to turn ideas into action. We may distinguish between soft skills (communicative, social, etc.) and hard skills (more technical, such as the ability to draw up a business plan). Knowledge of entrepreneurship refers to 'learning to understand entrepreneurship' i.e., is the understanding of the concept of entrepreneurship itself and others related to it (e.g., identify opportunities, understand the context in which to live and work, learn topics related to ethical enterprises, etc.) (Antonaci et al., 2014).

4 Methodology and sample

4.1 Methodology

Structural models as applied in the social sciences only began appearing in the 1970s (Bollen, 1989; Jöreskog, 1978), with their increasing application paralleling the availability of software (Jöreskog and Sörbom, 1996), all of which executed CB-SEM (Hair et al., 2015). While Herman Wold – who was also the academic advisor of Karl Jöreskog, one of the LISREL CB-SEM software package developers – designed variance-based SEM in the 1970s (Wold, 1973, 1975), software packages executing PLS-SEM were developed much later (e.g., SmartPLS) (Ringle et al., 2005). Jöreskog and Wold (1982) viewed CB-SEM and PLS-SEM as complementary rather than competitive statistical methods.

The method, known as PLS for SEM (SEM-PLS) or as PLS-path modelling (PLS-PM), is distribution-free, and was developed as a flexible technique aimed at the casual predictive analysis in the presence of high complexity and scant theoretical information.

We used the PLS approach, for the following reasons: it is variance-based, i.e., strongly prevision oriented, allowing us to obtain the scores of the latent variables for predicted purposes without using the model to explain the covariation of all the indicators. In addition, the PLS does not require items following a multivariate normal distribution, and adopts both formative and reflective indicators and works on medium samples properly.

Partial least squares (PLS) path modelling (PM) can be used to study the data presented in the form of q-th blocks made of Pq variables observed on the same subjects. In PLS path modelling, it is usually assumed that each block of variables can be summarised by a single latent variable and that linear relations exist between latent variables.

4.2 Sample

The simulations involved 179 students (98 male and 81 female) from master degree courses at the Department of Economics of the University of Campania Luigi Vanvitelli. Students played the role of aspiring entrepreneurs. Academically, 63% had an average university score in all exams of between 27–30 given a max score of 30 per exam – 22% fell between 23–26 and 15% fell between 18–22. They were almost equally distributed in terms of previous work experience: 53% were completely devoid of experience while 47% had had some work experience.

Students spontaneously formed groups after a business idea competition, during which some of them presented their entrepreneurial ideas. Each group consisted of students playing the role of aspiring entrepreneurs, while mentors (i.e., course professors and university/affiliated tutors) played the roles of venture sitters and human resources.

The overall aim was to evaluate the impact of the adoption of the virtual platform ExperimentaLab (guiding the progression from idea to start-up) on the acquisition of entrepreneurial competencies by students. At the end of the simulation, the students involved in the platform filled in a questionnaire, which was structured into 33 questions

collected under four different dimensions made up of variables measured on a semantic scale from 1 to 7 (where 1 represented the lowest score and 7 the highest)[4]:

- The dimension 'ease of use' is measured by using four items: the ease of access to the platform services, the ease of platform navigation, the comprehensibility of platform language and the clarity of rules.
- The dimension 'design of the ExperimentaLab' is measured by using eleven items: the simplicity of the form Idea in Progress, the clarity of the form rules, the clarity of the difference between a stage and a gate, the clarity of the Stage&Gate contents, some items related to the suitability of the Stage&Gate for the simulation goal and to the functionality of the different stages of the adopted Stage&Gate model, the impact of skilled human resources, the importance of venture sitter and the level of collaboration with other human resources external to the ExperimentaLab network.
- The dimension 'players' satisfaction' includes four items: the overall satisfaction of players, the match with expectations, the propensity to suggest to others that they should participate in the program and the level of commitment.
- Finally the 'educational effectiveness' is formed by ten items: increase in risk propensity, the growth of the entrepreneurial spirit, the increase in ambition, the increase in failure tolerance, the usefulness of the platform for determining personal goals, self-efficacy, effectiveness of the platform compared to traditional learning methods, the feasibility of the business idea, the propensity to invest in the idea and identification with the role played during the simulation.

5 Results

The reliability test of the questionnaire allowed us to verify the consistency of the findings and internal reliability of the scales of measurement (multi-item scales).

The test was conducted using Cronbach's alpha reliability measure. The internally consistent scales acceptable for a questionnaire design is when the Cronbach's alpha (α) is above 0.70 (Nunnally, 1978).

Table 1 Block unidimensionality

Dimension	*Mode*	*MVs*	*C.alpha*	*DG.rho*	*eig.1st*	*eig.2nd*
Ease of use	A	4	0.875	0.915	2.91	0.489
Design of the ExperimentaLab	A	11	0.902	0.920	5.76	1.494
Satisfaction	A	3	0.843	0.905	2.28	0.403
Educational effectiveness	A	10	0.883	0.906	4.95	1.131

Table 2 Bootstrap validation for loading coefficients

Weights	*Original*	*Mean.Boot*	*Std.Error*	*perc.025*	*perc.975*
ease-ease.of.access.to.the.platform.services	0.2581	0.2559	0.01690	0.2208	0.285
ease-easy.of.platform.navigation	0.2840	0.2823	0.01321	0.2541	0.307
ease-comprehensibility.of.platform.language	0.2961	0.2998	0.02095	0.2626	0.351
ease-clarity.of.rules	0.3340	0.3346	0.01862	0.3061	0.377
Experimentalab-simplicity.of.the.Idea.in.progress.form	0.1403	0.1386	0.00944	0.1221	0.157
Experimentalab-clarity.of.the.form.rules	0.1583	0.1581	0.00932	0.1460	0.178
Experimentalab-clarity.of.difference.between.a.stage.and.a.gate	0.1198	0.1196	0.01089	0.0974	0.136
Experimentalab-clarity.of.the.Stage.Gate.contents	0.1436	0.1425	0.00927	0.1277	0.164
Experimentalab-suitability.of.the.Stage.Gate.for.the.simulation.goal	0.1474	0.1469	0.00890	0.1331	0.164
Experimentalab-functionality.of.the.S.G.build.a.business.case	0.1327	0.1326	0.00766	0.1181	0.147
Experimentalab-functionality.of.the.S.G.development	0.1259	0.1260	0.00942	0.1082	0.145
Experimentalab-functionality.of.the.S.G.scoping	0.1234	0.1240	0.01150	0.1030	0.144
Experimentalab-impact.of.skilled.human.resource	0.0901	0.0886	0.01556	0.0612	0.114
Experimentalab-importance.of.venture.sitter	0.0866	0.0849	0.01229	0.0628	0.106
Experimentalab-level.of.collaboration.with.other.Human.Resource	0.0974	0.0976	0.01434	0.0719	0.124
satisfaction-Overall.satisfaction.y1	0.4234	0.4262	0.02232	0.3840	0.470
satisfaction-would.you.suggest.to.participate.to.this.program.	0.3786	0.3827	0.01741	0.3543	0.416
satisfaction-level.of.commitment	0.3423	0.3378	0.02265	0.2895	0.376
effectiveness-Growth.of.the.entrepreneurial.spirit	0.1594	0.1596	0.01082	0.1394	0.180
effectiveness-usefulness.of.the.platform.for.the.determination.of.personal.goals	0.1754	0.1732	0.01120	0.1526	0.193
effectiveness-increase.of.ambition	0.1468	0.1451	0.01318	0.1218	0.167
effectiveness-increase.of.failure.tolerance	0.0948	0.0924	0.01911	0.0560	0.129
effectiveness-support.for.learning.theoretical.notions	0.1668	0.1655	0.01595	0.1367	0.196
effectiveness-Feasibility.of.business.idea	0.1594	0.1582	0.01079	0.1368	0.178
effectiveness-propensity.to.invest.in.the.idea	0.0998	0.1007	0.01604	0.0731	0.131
effectiveness-identification.with.the.role.played	0.1298	0.1300	0.01506	0.1042	0.157
effectiveness-self.efficacy	0.1032	0.1058	0.02055	0.0665	0.144
effectiveness-effectiveness.of.the.platform.compared.to.traditional.learning.methods	0.1681	0.1671	0.01489	0.1352	0.190
ease-ease.of.access.to.the.platform.services	0.2581	0.2559	0.01690	0.2208	0.285
ease-easy.of.platform.navigation	0.2840	0.2823	0.01321	0.2541	0.307
ease-comprehensibility.of.platform.language	0.2961	0.2998	0.02095	0.2626	0.351
ease-clarity.of.rules	0.3340	0.3346	0.01862	0.3061	0.377
Experimentalab-simplicity.of.the.Idea.in.progress.form	0.1403	0.1386	0.00944	0.1221	0.157

Another test utilised for the reliability was the Dillon-Goldstein's rho (DG) as proposed by Chin (1998). Chin (1998) established that DG should be higher than 0.70. DG is a better reliability measurement than Cronbach's alpha (α) in SEM because it is based on the loadings rather than the correlations between the observed variables (Demo et al., 2012). Moreover, Nunnally (1978) established the α level at 0.70 or higher for the reliability coefficient.

The sectional reliability tests of the questionnaires used for data collection are presented in Table 1.

Table 1 shows that Cronbach's reliability requisite of 0.70 or higher was achieved for all constructs. Moreover, the DG reliability requisite of 0.70 or higher was achieved for all constructs, with satisfactory DG values between 0.905 and 0.920 recorded. Internally consistent scales are therefore assumed. Furthermore, the first eigenvalue also confirms the block unidimensionality, being the first eigenvalue much larger than 1 (Sànchez, 2013).

Subsequently, the inner model (see Table 2) was applied to consider the relationships between latent variables (LVs), which are assumed to be linearly interconnected according to a causal-effect relationship model.

The present study aims to verify, from an explorative and non-confirmative view point, the existence of positive and significant relationships between the following LVs:

1 ease of use and players' satisfaction

2 design of the ExperimentaLab and players' satisfaction

3 players' satisfaction and educational effectiveness of the EE program.

The bootstrap results are useful for assessing the significance of the inner and outer model parameters, and in particular, it is essential to check whether or not the constructed interval with the percentile bootstrap contains a zero.

For the outer model, the signs of the loadings and the weights are the same for each variable. As is evident from Table 2, for the loadings, they all have positive and significant values.

As regards the significance of the path coefficients, Table 3 shows that all the links are significant.

Table 3 Path coefficients

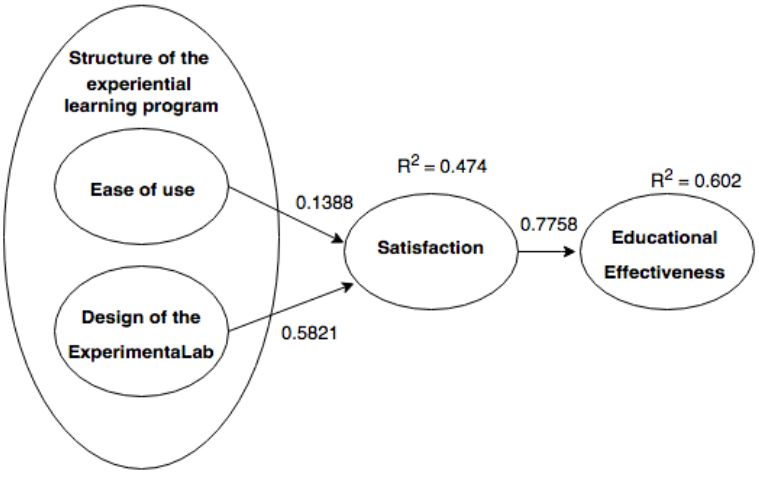
	Original	*Mean.Boot*	*Std.Error*	*perc.025*	*perc.975*
Ease of use → Experimentalab	0.717	0.720	0.0432	0.628	0.804
Ease of use → Satisfaction	0.139	0.115	0.1175	0.100	0.687
Experimentalab → Satisfaction	0.582	0.611	0.1153	0.382	0.790
Satisfaction → Effectiveness	0.776	0.777	0.0335	0.694	0.526

The quality of the inner model is evaluated by considering the goodness of fit (GoF) statistic. GoF values greater than 0.7 are considered as 'very good' within the PLS community' (Sànchez et al., 2015).

In our case, the GoF index for the whole model is 0.62, which is very close to the suggested cut-off of 0.70.

The specification of the inner model with the indication of the bootstrap results is shown in Figure 3.

Figure 3 Path diagram



The relationships highlighted through the structural equation model allow a cause-effect relationship among items to be hypothesised. In particular, it appears that the structure of the ExperimentaLab in its double components of the design of the ExperimentaLab and ease of use may foster participants' satisfaction, thus positively impacting on the acquisition of entrepreneurial competencies by students, and demonstrating the educational effectiveness of the experiential learning program by means of the ExperimentaLab. Focusing on the structure of the experiential learning program, results show that the ease of use of the platform in its daily dynamics allows players to focus on the designed process of idea development (design of the ExperimentaLab).

6 Discussion and implications

As was discussed, the literature has proposed different programs for entrepreneurship education over the past years, although most of the tools and techniques have not always been empirically investigated for their impact on student learning.

Although the literature regarding entrepreneurship education is still far from a unanimous vision of methods, procedures and objects, it is amply recognised that traditional educational approaches have resulted in a mismatch between what is taught to the students and what the industry needs. As such, many institutions are moving towards problem-based learning as a solution for producing students who are creative, and think critically and analytically (Wahid et al., 2017).

In the attempt to contribute to the studies that aim to boost entrepreneurship education and the entrepreneurial activity of universities, this research tests and analyses the ExperimentaLab, an entrepreneurship education program based on experiential learning. The ExperimentaLab offers students a learning experience based on a simulation (by role play) of the progression from an idea to a real start-up.

This study aims to test the program's effectiveness, meant as the acquisition of entrepreneurial competencies. The findings suggest that various characteristics of the

'ExperimentaLab' EE program sustain its educational effectiveness. This work shows very detailed first-hand insights into the program and participants' feedback from a survey on which further inquiries can be based.

The results support the literature's argument that experiential learning positively impacts entrepreneurial learning (acquisition of entrepreneurial competencies).

The results also show that satisfaction, motivating participants to learn, enhances the educational effectiveness of an EE program.

Finally, data demonstrate that the ease of use of the platform supporting the simulation positively impacts participants' interest in the program (satisfaction), thus enhancing learning.

From a theoretical point of view, we contribute to the literature dealing with the 'what' and 'how' of the EE. Regarding the 'what', Edelman et al. (2008) highlighted the existence of a gap between what we teach in entrepreneurship and what entrepreneurs do (Fayolle, 2013). The ExperimentaLab fills this gap by teaching the progression from an embryonical idea to a real start-up. During the entire learning experience, students deal with real challenges and are required to solve issues that go from the offer and demand analyses to marketing and production decisions by actively interacting with the external economic environment. On the other hand, we argue that the experiential learning of the simulation by role play can be an effective 'how' of the EE if based on the design, procedures and rules of the ExperimentaLab. Indeed, results show that the ExperimentaLab can be an effective method for teaching entrepreneurship, as it supports the acquisition of entrepreneurial competencies by students.

From a practical point of view, the work presents a concrete and implementable tool for EE, which is effective in supporting the acquisition of entrepreneurial competencies as it seeks to educate students by stimulating them to practise the managerial and entrepreneurial functions of new venture creation. In so doing, the ExperimentaLab training process concretely supports the third mission of the university, i.e., to promote economic and social development (Etzkowitz, 2004). Again, the localised nature of the observations represents one of the most constraining limitations of this research. For this reason, it might be useful to make a cross-country comparison.

Looking towards the future, we would like to broaden our theoretical model by adding an analysis of the relationship between entrepreneurship education and entrepreneurial intent, as there is a strong link between the two issues, as highlighted in the literature (Liñán, 2004).

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Notes

1 Experimental labs are networks of individuals 'federated' from universities, research labs, financial markets and business partners, who become part of an innovative ecosystem by means of a virtual platform, rather than relying only on their capabilities (Andersson et al., 2010). As observed by Ferraris et al. (2016), innovation ecosystems foster the interaction of actors and the sharing of knowledge assets, thus sustaining the development of innovation.

2 See Iscaro et al. (2017b) on the design of the ExperimentaLab and its comparison with incubators and accelerators.

3 Indeed, evaluation of entrepreneurship education cannot be totally disconnected from its pedagogical engineering, both at the design level and at the program implementation level (Bechard and Gregoire, 2005).

4 This scale was adopted for the relative ease and immediacy of implementation, despite awareness of the possible mechanisms of distortion potentially triggered in the respondents' answers (e.g., response set).