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Research Article

Evaluating the Effect of Entrepreneurial Programs Elements on Students: A Scale Development

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ABSTRACT

Entrepreneurship education is an approach that universities employ to attempt to produce more ventures. Currently, entrepreneurship education programs do not capture the perceived progress of their students because they lack such a method. In this study, we develop an instrument that measures students' perceptions. We perform exploratory and confirmatory factor analyses based on the responses of 304 college students to identify the main factors that students consider in an entrepreneurship education program. The results show a measurement scale constituted by the following dimensions: learning, resources, instructor role, and a new dimension called the meaning of life. This new construct reflects the importance of factors beyond education or university resources and highlights individual perceptions. This study contributes to our understanding of the value that entrepreneurship education programs offer to their participants and provides insights into future adjustments to these programs.

Keywords: entrepreneurship education; entrepreneurial program; university program

JEL Code: L26

INTRODUCTION

In 1947, Harvard introduced the Management of New Enterprises course, the first entrepreneurial course offered by a university (Katz, 2003). Seventy years later, universities are commonly offering different entrepreneurial courses to their students, from the high school level to doctoral programs. Universities' primary objective in this area is to teach students how to develop a business idea and create new ventures by starting new services or products that generate economic growth or have a social effect. Moreover, entrepreneurial programs offered by universities provide useful business skills for future independent entrepreneurs and intrapreneurial individuals. To achieve this goal, institutions also build infrastructure and provide resources to students and faculty to ensure an excellent educational environment.

These schools must measure the success of such programs. Entrepreneurial programs change according to the perceptions of each generation of students and the dynamism of the environment. Different scholars suggested that an entrepreneurial program is measured through the entrepreneurial intention that student derives from a course (Liñán & Chen, 2009). Other academicians refer to the effect that universities have on students regarding this subject, especially in terms of motivations and skills (Oosterbeek, Van Praag, & Ijsselstein, 2010).

The effects of university programs on students can vary. Some authors suggested that they have a positive effect on entrepreneurial intention and activity (Charney & Libecap, 2000; Honig, 2004). Other scholars' research studies show insignificant or adverse effects (Oosterbeek et al., 2010). Moreover, for some authors, a gap exists between the needs of entrepreneurship education and the academic curricula regarding skills, knowledge, and attitudes (Matlay, 2008). This gap may be the result of programs not adjusting as quickly to changes in the business environment.

Given the potential effect of programs on entrepreneurial activity and the lack of subjective outcome measures (Nabi, Liñán, Fayolle, Krueger, & Walmsley, 2017), we develop an instrument that considers important attributes that help principals adjust the programs that they offer according to students' perceptions. The purpose of this study is to contribute to the literature on entrepreneurial education by developing an instrument in Spanish and a new construct that can assess the attributes perceived by students when they enroll in an entrepreneurial course.

This instrument can assist principals in better understanding the value of the subjects offered. The instrument is developed in Spanish because of the importance of applying it in Spanish speaking environments, which have experienced significant growth in the inclusion of entrepreneurial programs during recent years (e.g., Kantis, 2008). In particular, some countries such as Mexico and Colombia have developed initiatives to strengthen the field of entrepreneurship in the academic curricula (Sánchez García, Ward, Hernández, & Florez, 2017). For example, Mexico has many educational programs that teach students about consolidating enterprises (Torres, 2010).

Additionally, this scale contributes to the research on the effect of entrepreneurial programs on entrepreneurial behavior through an instrument that contemplates an integrated frame. We

obtained an instrument that includes dimensions from previous research, such as learning, resources, and instructor role, and a new dimension called the meaning of life, as factors that measure perceptions of entrepreneurial programs.

This study proceeds as follows. First, we review the literature on entrepreneurial education and entrepreneurial instruments. Then, we present the methodology developed to achieve our goal. In the third section, the study results for measuring the perception of entrepreneurial programs are described. Finally, we present the conclusion, a discussion, and the research limitations.

THEORETICAL CONTEXT

Entrepreneurship education

Entrepreneurship represents a significant activity for the economy and social development. Understanding the phenomenon is important for several reasons; one of the most important for academia is how to initiate the entrepreneurial intention to start a business and how to make this process more efficient. Studies on entrepreneurial intentions comprise entrepreneurs' traits (Leutner, Ahmetoglu, Akhtar, & Chamorro-Premuzic, 2014; Pillis & Reardon, 2007), situation or contextual environment (Gupta et al., 2014; Manolova, Eunni, & Gyoshev, 2008), or entrepreneur background (Phan, Wong, & Wang, 2002; Zellweger, Sieger, & Halter, 2011), among others.

In recent decades, the implementation of business programs focused on business plan development (Honig, 2004) to create new ventures. According to these approaches, universities have fueled a new perspective in this discipline: entrepreneurial education. Studies on entrepreneurial education focused on linking education to attitudes, intentions, or entrepreneurial actions that individuals take after taking a course or specific program. As defined by Rideout and Gray (2013), these courses or programs include activities that teach — in a university setting — entrepreneurial management, strategy, innovation, and venture development.

Some academics interested in understanding the effect of these programs on an individual's behavior found a positive relationship between the entrepreneurial education taken and the individual self-reported to start a business (Honig, 2004). Unfortunately, other scholars in the area did not find a major significant effect of entrepreneurial education on entrepreneurial intention or the development of entrepreneurial skills (Chen et al., 2015; Oosterbeek et al., 2010). Nabi, Walmsley, Liñán, Akhtar, and Neame (2018) suggested that the effect of entrepreneurial education can be mixed, with the positive side enhancing individuals with additional business skills and inspiration to get involved in entrepreneurial activities. A more recent study by Ahmed, Chandran, Klobas, Liñán, and Kokkalis (2020) suggested that entrepreneurial education positively affects the entrepreneurial intention. However, some studies did not find positive outcomes because they did not consider the context wherein students are involved in the development of entrepreneurial ideas after taking a course.

Focusing on Latin American countries, Jiménez, Matos, Palmero-Cámara, and Ragland (2017) indicated that entrepreneurship education has a stronger effect on secondary rather than higher education. The authors suggest that Latin American countries should focus on providing more practical and inspirational content in programs to strengthen the students' entrepreneurial intention. Similarly, Sánchez García, Ward, Hernández, and Flores (2017) highlighted the importance of continuous improvement effort to achieve a high level of quality education, particularly in Latin American countries. Policymakers are encouraged to develop an entrepreneurial context wherein universities can actively participate.

Harmonizing previous findings is essential when considering the current instrument measures. Some studies consider the type of course attended by an individual or the assistance to a particular program as indicators of entrepreneurial behavior, leaving aside the opinion or expectations of participants (Barba-Sánchez & Atienza-Sahuquillo, 2018; Chen et al., 2015; Hallam, Vina, Leffel, & Agrawal, 2014; Maritz, Koch, & Schmidt, 2016; Nabi, Walmsley, Liñán, Akhtar, & Neame, 2018; Oosterbeek et al., 2010; Wilson, Kickul, & Marlino, 2007). Table 1 provides some of the results of entrepreneurial program studies and their approaches that illustrate the developmental stage of this topic.

Table 1

Entrepreneurial programs research

Authors	Purpose	Method	Entrepreneurial program measures	Findings
Hayter (2016)	Investigate the role of knowledge intermediaries and their effect on the development of university spin-offs	Case study	Mediators of entrepreneurial education as faculty research, students, advisors	The importance of intermediaries in supporting academic entrepreneurship
Maritz, Koch, and Schmidt (2016)	Explore the integration and results of entrepreneurship education programs within national systems of entrepreneurship and entrepreneurship ecosystems	Case study	Program characteristics through students and college attributes	The authors proposed a conceptual framework of entrepreneurial programs and ecosystems
Chen et al. (2015)	Understand whether an entrepreneurship course can improve entrepreneurial intentions	Experiments	Learning satisfaction; learning efficacy	Entrepreneurial education cannot improve entrepreneurial intentions
Oosterbeek, Van Praag, and Ijsselstein (2010)	Analyze the effect of an entrepreneurship education program for students	Survey	Take a program/Type of program	The program does not have significant effects
Souitaris, Zerbinati, and Al-Laham (2007)	Test the effect of entrepreneurship programs on the entrepreneurial attitudes and intentions of science and engineering students	Survey	Development of a scale with the following dimensions: learning, inspiration, and incubation resources	Programs raise some attitudes and overall entrepreneurial intentions
Hallam, Vina, Leffel, and Agrawal (2014)	Discuss the implications of a pedagogical construct, accelerating collegiate entrepreneurship (ACE)	Case study	Not included	The structure of this program will help entrepreneurial activity and intentions

Research on entrepreneurial programs reveals an evident purpose: the creation of business ideas by developing more entrepreneurs. The questions that emerge on this theme refer to how entrepreneurial programs execute this task. Additionally, how could entrepreneurial programs be measured? A critical issue regarding the measurement of entrepreneurial programs is related to each educational institution that offers an entrepreneurial program. Universities need to measure their programs to adjust them to the needs of each generation of students and the dynamic immersion environment. Scholars suggested that the way to measure an entrepreneurial program is by measuring the success of the entrepreneurial intention of each student (Liñán & Chen, 2009). Others referred to the effects of universities on students in this subject, especially regarding motivations and skills (Oosterbeek et al., 2010). Still, most of them failed to recognize students' perceptions.

Despite the number of studies on entrepreneurial education and programs, scholars are called to more quantitative research that combines some variables, such as cognitive skills, knowledge, and context, and to test them using statistical tools such as structural equation modeling (SEM) (Souitaris, Zerbinati, & Al-Laham, 2007).

Measurements of entrepreneurial programs

The call for more research aims to understand the reasons and factors behind entrepreneurial behavior and the essential role of education. For some authors, the discussion focuses on the efficiency of these programs (Scott, Klandt, & Rosa, 2018). Therefore, no clear consensus exists on the effect of education on entrepreneurial behavior and investigating the attributes of education is a way to explore that effect. According to the literature reviewed on entrepreneurial courses and educational instruments, we identify three principal characteristics related to measures of entrepreneurial courses and entrepreneurial education in general. First, learning is a vital attribute commonly used in research on education. This concept refers to the degree of knowledge acquired. In entrepreneurial education, learning includes the entrepreneurship knowledge that students acquire during a particular program (Souitaris et al., 2007) and relates to important attributes for education performance, such as satisfaction and efficacy. Learning efficacy refers to the success expected of students and their self-efficacy in achieving their expectations (Srivastava, Babu, & Shetye, 2019). Similarly, learning satisfaction refers to students' perceived learning – a perception of students' learning (Bray, Aoki, & Dlugosh, 2008; Marks, Sibley, & Arbaugh, 2005). Learning indicators show the impression of a program's design, a teacher's performance, and a program's effectiveness (Chen et al., 2015).

Second, we found that resources are considered an important attribute for measuring programs because they facilitate the development of an entrepreneurial idea and knowledge. Our revision found different types of resources. Some resources comprise measures related to internal aspects, such as meeting partners, the availability of technology, and having different advisors. Other resources include external elements, such as participation at events and access to and information on financial resources and infrastructure. According to Souitaris et al. (2007), these types of elements can help measure the pool of benefits that students obtain from the program and raise entrepreneurial intention. Since the early studies on the field, identification and exploitation

resources have been concepts linked to entrepreneurial activity. Not surprisingly, infrastructure and universities' environments play a vital role in the performance of entrepreneurship education.

Third, we identify the instructor role as essential when evaluating a program. According to Fiet (2001), professors of entrepreneurial programs have a challenging role because students may perceive instructors of entrepreneurial courses as boring. Therefore, professors need to focus on the teaching process and use innovative learning activities and interactions with students. Professors may also be role models for students' attitudes and behavior toward the entrepreneurial field and may represent a driver to improve students' entrepreneurial intentions (Sobel & King, 2008). Previous research showed a positive relationship between learning satisfaction and professor performance (Bray et al., 2008). Additionally, many studies outside and inside universities researched the role of mentors on an entrepreneurial venture; these studies highlight the importance of education and instructors to entrepreneurial education (Ahsan, Zheng, DeNoble, & Musteen, 2018; Lefebvre & Redien-Collot, 2013).

In addition to the described elements, the meaning of life theme has emerged from the literature review and qualitative analysis. This theme refers to the direction of one's life or a personal desire to pursue such a direction (Ryff & Singer, 1998). Some scholars (e.g., Bonebright, Clay, & Ankenmann, 2000; Chamberlain & Zika, 1988), primarily in the psychological environment, note that people may feel fulfilled in life when their work activities are associated with their life goals. Typically, entrepreneurial programs have focused on creating businesses and all of the elements that surround this activity, leaving aside the purpose of life as a factor for achieving a positive effect on students during a program.

Figure 1 illustrates elements of entrepreneurial programs and their effects on entrepreneurial behavior according to previous research, integrating the results from the education and entrepreneurial literature and forming the base for the rest of this study to build a scale for measuring entrepreneurial programs. Our research focuses on developing measures of entrepreneurial programs. In congruence with previous research, we propose that several factors of entrepreneurial programs affect entrepreneurial behavior and self-perception of motivation and learning.

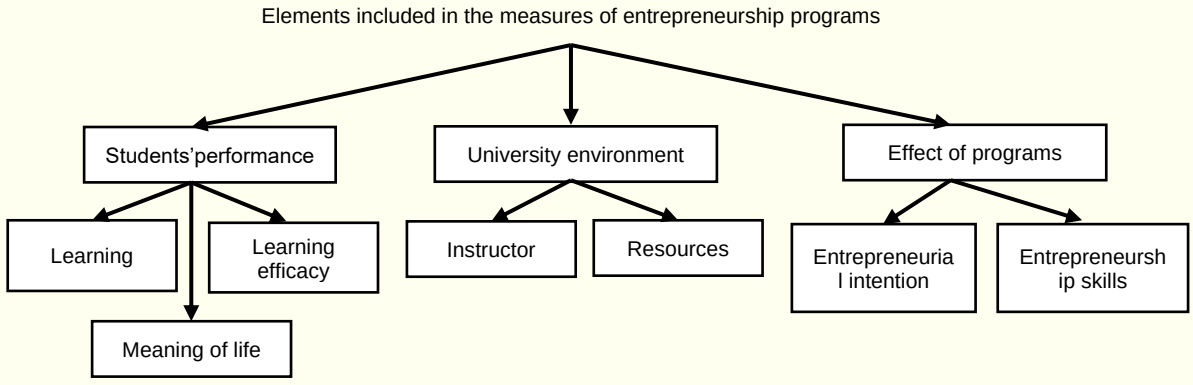

Figure 1. Measures of entrepreneurial programs

In summary, based on the literature review, we found that the way to measure the success of an entrepreneurial program is through participants' intentions regarding the creation of a new venture. Progress on this subject has not captured students' perceptions of the program and the factors that affect their entrepreneurial behavior after taking such a program. Based on these findings, we propose an instrument that captures different variables from the education and entrepreneurial literature and a new construct for evaluating entrepreneurial programs.

METHODS

We follow a three-step process to build our instrument using previous studies that developed measurement scales (Bolton & Lane, 2012; Moura & Bellini, 2019). First, we conduct a scale construction based on the literature review and qualitative research to obtain an initial scale to pivot. Second, we select the sample and data collection. Third, we perform a scale assessment.

Stage one: scale construction

Literature review

The first step to develop the scale is to perform an extensive literature review of the subject. We conducted a literature review that followed prior methodological designs to identify relevant publications related to entrepreneurial programs (e.g., Galvão, Ferreira, & Marques, 2018; Vallaster, Kraus, Lindahl, & Nielsen, 2019). First, we defined the search criteria for entrepreneurship education and entrepreneurial program. Keyword phrases including 'entrepreneurship education' and 'entrepreneurial program' were selected, and synonyms such as 'courses' and 'curricula' were included. Second, we limited the document type to articles and reviews, excluding books, book chapters, conference papers, reports, and notes. Third, we determined the scope of including publications up to 2019. The Scopus database was used to obtain the articles for this phase of the research. A total of 128 articles were obtained to analyze in the initial exploration. The papers were filtered for those that included analyses and measures of entrepreneurial programs, resulting in 26 articles. Results reveal a significant concentration of *Education + Training* manuscripts, the *Journal of Small Business Management*, and *The International Journal of Management Education*, with most papers originating from the US, Canada, the UK, and Spain.

We identified the dimensions of existing scales on measuring educational and entrepreneurial programs at universities. For example, to evaluate entrepreneurial courses, students' intentions to create a new venture are usually estimated. For regular courses, the emphasis is on the teaching method or the teacher's skills. We combined both perspectives to develop our scale: learning and education methods for regular programs and entrepreneurial education. Thus, we obtained four dimensions related to proper training methods — learning, learning efficacy, learning satisfaction, and instructor; one aspect related to entrepreneurial education — resources; and one dimension referent to personal motivation — the meaning of life.

Qualitative research

Following the literature review, questions were extracted and subsequently used in five in-depth interviews with teachers and students, lasting between thirty minutes and one hour. The interviewees were currently taking or teaching an entrepreneurial course at a university. Moreover, one of the main goals of those courses was the development of new entrepreneurial ventures. Students studied diverse subjects. The main intent of the interviews was to confirm the dimensions extracted from the literature and to explore new ones to avoid critical themes. We included questions based on the literature review, including the following: What is the design used in the program? What is the role of the professor? Could you mention some university resources and their importance to the program? What are the principal expectations of the program? Is this a mandatory program? These questions were adapted for both teachers and students to cover the same items from two points of view. The interviews were recorded, and the contents were analyzed to confirm our dimensions and obtain new findings.

The results confirmed the importance of the professor's role for students; for example, they mentioned that some teachers could inspire them to be entrepreneurs. Additionally, as derived from the interviews, the use of resources is considered essential in this process. Students and professors described that building networks and having the adequate infrastructure to develop their ideas are necessary for the courses. Students highlighted the importance of accessing financial support and participating in entrepreneurial events because these elements are valuable to the entrepreneurial class. As a result of these interviews, the concept of meaning arises. Professors and students referred to the notion that the courses and students' interests need to be aligned. Students mentioned that the desire to be an entrepreneur is important to enjoy and learn during the class and that this type of program can help them find their vocations. Dimensions that also arose from the interviews are linked to learning, resources, and professor skills.

Initial scale

We obtained an initial questionnaire with seven dimensions and seventy-three statements. Items were measured using a seven-point Likert scale following the same scale as the original instruments (1 = strongly disagree to 7 = strongly agree). We followed the same scale from the original items. Our initial questionnaire was shared with an expert panel composed of two teachers and one entrepreneurship expert to receive feedback on the content, edition, and understanding. This review confirmed and validated our definition of entrepreneurial program attributes. We used a back-translation method to translate our questionnaire from English to Spanish for items based on the previous literature. The questions related to the meaning of life dimension were written in Spanish. We also implemented a pretest with 20 students in entrepreneurship programs with a similar goal. Subsequently, we modified or removed some items and added one item to the resources dimension. The final questionnaire had the same seven dimensions but thirty-nine statements.

Stage two: sample and data collection

We emailed online surveys and distributed paper surveys at three Mexican universities to students currently enrolled in an entrepreneurship program. We selected the universities based on the term and experience offering the entrepreneurial program as part of their curricula. We also considered whether the course was mandatory and its contents. The three Mexican universities follow similar program designs based on developing an entrepreneurial idea during the course. Therefore, the students followed similar steps to develop a new company idea. We compared the curricula of the programs and found a similar process: ideation, prototyping, and tests.

Students took the reviewed survey to measure their impressions of entrepreneurship programs and their characteristics. Additionally, they responded to demographic questions. We obtained an initial sample of 316 and a similar response rate of 86% from the three universities. We removed incomplete entries from the online surveys and unreadable entries from the paper-based survey and ended up with 304 surveys from the three universities. We used χ^2 tests of independence to analyze the significant differences between the respondent groups for the colleges and between the online and paper-based surveys. We also followed the rule of thumb of Tinsley and Tinsley (1987), who suggested a ratio of 1:5 to 1:10 subjects per item.

Stage three: scale assessment

First, exploratory factor analysis with principal component analysis using varimax rotation was applied to obtain each dimension's measures and complete questionnaire development. Second, we conducted a confirmatory analysis and used Cronbach's alpha to assess internal consistency. Then, we used SEM, a measurement model, to obtain a confirmatory analysis. Statistical analysis to evaluate entrepreneurial programs with our validated scale was also applied. A score index to compare gender effects across different dimensions was developed. Finally, a linear regression analysis was conducted to explore the impact of some constructs on learning efficacy as a dependent variable.

RESULTS

Table 2 provides our instrument translated in English before the analysis (in the appendices, the original instrument is provided in Spanish). This scale contains seven dimensions and thirty-nine statements.

Table 2

Measures of entrepreneurial programs included in instrument

Measure	Dimension	Item code	Sources
Increase your understanding of the attitudes, values, and motivations of entrepreneurs	Learning	Learn 1	Based on Marsh (1982) and Souitaris et al. (2007)

Continues

Table 2 (continued)

Increase your understanding of the actions someone has to take to start a business		Learn 2	
Enhance your practice management skills to start a business		Learn 3	
Enhance your ability to develop networks		Learn 4	
Enhance your ability to identify an opportunity		Learn 5	
Your interest in the subject has increased as a consequence of this course		Learn 6	
You have learned and understood the subject materials in this course		Learn 7	
This course teaches me how to be an entrepreneur	Learning efficacy	Learnef 1	Based on Okudan and Rzasa (2006) and Chen et al. (2015)
This course improves my entrepreneurial competencies		Learnef 2	
I feel satisfied with the learning of this course		Learnef 3	
After this course, I may become an entrepreneur		Learnef 4	
After this course, I can make independent decisions		Learnef 5	
After this course, I am more willing to take risks		Learnef 6	
After this course, I can tackle entrepreneurship challenges		Learnef 7	
After this course, I better understand the possible challenges at the beginning of entrepreneurial career		Learnef 8	
The teaching method satisfies my learning style		Learnef 9	
I can easily complete a business plan		Learnef 10	
Instructor's style of presentation held your interest during class	Instructor	Instructor 1	Based on Marsh (1982)
Instructor's explanations were clear		Instructor 2	
The instructor made students feel welcome in seeking help/advice in or outside of class		Instructor 3	
Does the teacher show a genuine interest in individual students?		Instructor 4	
The instructor presented the background or origin of ideas/concepts developed in class		Instructor 5	
A pool of entrepreneurial-minded classmates for building a team	Resources	Resources 1	Based on Souitaris et al. (2007)
A pool of university technology		Resources 2	
Advice from faculty		Resources 3	
Advice from classmates		Resources 4	
Advice from tech-transfer officers		Resources 5	
Research resources (library/web)		Resources 6	
Networking events		Resources 7	
Physical space for meetings		Resources 8	
Business plan competitions (testing ground for the idea)		Resources 9	
Seed funding from university		Resources 10	
Referrals to investors		Resources 11	
Financing alternatives		Resources 12	
This course allowed me to align my professional aspirations with personal ones	Meaning of life	Life 1	Proposed
This course allowed me to discover my real passion		Meaning of life 2	
I am clear at the end of the course about how I want to invest most of my time		Meaning of life 3	
This course allowed me to discover my qualities and where I can apply them		Meaning of life 4	
My interest in the subject has increased as a result of this course		Meaning of life 5	

Exploratory factor analysis

The exploratory factor analysis sample consists of 304 students who were taking an entrepreneurial course at the time of the study, 99% ranged from 18 to 24 years of age, 45% were female, 55% were male, 46% were studying for a type of engineering career, and 43% were studying for a business career. The questionnaire was composed of the dimensions obtained from

the content analysis performed during the qualitative stage and consisted of the following dimensions: instructor, resources, learning, learning satisfaction, and meaning of life.

Table 3

Total variance explained

Component	Initial eigenvalues			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	13.56	35.70	35.70	5.973	15.72	15.72
2	3.89	10.24	45.94	4.068	10.71	26.43
3	3.13	.0825	54.19	3.866	10.17	36.60
4	1.77	.0466	58.85	3.854	10.14	46.74
5	1.46	.0385	62.70	3.694	9.73	56.46
6	1.27	.0336	66.06	3.644	9.59	66.06

As a result of the analysis, learning efficacy and learning satisfaction dimensions were removed and grouped into one factor, and we obtained two factors for the resources dimension. Following these changes, we conducted an exploratory factor analysis using again a varimax rotation. The results showed six factors with eigenvalues greater than 1. The total variance explained with these six factors was 66%; see Table 3. Table 4 describes the results of the factor loadings, each factor's percentage of variation, and the accumulated variance.

As previously mentioned, in this analysis, the resources dimension was divided into two dimensions. The first items refer to the intangible resources that universities offer through advising experts. The rest of the items refer to resources that the university attracts from outside networks, such as investors, finance alternatives, networking events, and others. The items elicited strong contributions to each dimension, ranging from .6 to .8674. Items with less charge were eliminated to improve the scale. Table 4 presents details on the results of this phase.

Table 4

Factor analysis for final six factors with final items

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
Learn1					0.6622	
Learn2					0.7331	
Learn3					0.7572	
Learn4					0.7006	
Learn5					0.6086	
Learn6						
Learn7						
LearnSa1						
LearnSa2	0.6141					
LearnSa3	0.6767					
LearnSa4	0.6486					

Continues

Table 4 (continued)

LearnSa5	0.6918				
LearnEf1	0.6582				
LearnEf2	0.7844				
LearnEf3	0.8105				
LearnEf4	0.7287				
LearnEf5	0.8129				
Meaning of life 1					0.6388
Meaning of life 2					0.6949
Meaning of life 3					0.7773
Meaning of life 4					0.7168
Instructor1				0.7651	
Instructor2				0.8594	
Instructor3				0.858	
Instructor4				0.8374	
Instructor5				0.8674	
Resources1					
Resources2		0.7175			
Resources3		0.7822			
Resources4		0.7842			
Resources5		0.7177			
Resources6					
Resources7			0.6048		
Resources8					
Resources9			0.6437		
Resources10			0.7445		
Resources11			0.8419		
Resources12			0.8063		

Note. Extraction method: principal component analysis. Rotation method: varimax with Kaiser normalization. Rotation converged in six iterations.

Results of Cronbach's alpha

A commonly used tool to test the reliability of the scales is the Cronbach's alpha coefficient (Cronbach, 1951). This coefficient evaluates the internal consistency of the questionnaire. One of the rules used to assess the reliability result of the coefficient given is provided by George and Mallery (2013), who described that $\alpha > 0.9$ is excellent, $\alpha > 0.8$ is right, $\alpha > 0.7$ is acceptable, $\alpha > 0.6$ is questionable, $\alpha > 0.5$ is poor, and $\alpha < 0.5$ is unacceptable. A scale reliability coefficient of .9398 was obtained. Table 5 shows the Cronbach's alpha from our study. All of the dimensions are higher than 0.8, which is considered good regarding reliability.

Table 5

Reliability of dimensions using Cronbach's alpha

Factor	Cronbach's alpha	No of items
Learning	0.8720	5
Learning efficacy	0.9232	9
Meaning of life	0.8973	4
Instructor	0.9006	5
Resources 1	0.8695	4
Resources 2	0.8772	5

Confirmatory factor analysis

Subsequently, we performed a confirmatory factor analysis (CFA) to assist in confirming the relationships in the exploratory factor analysis (DeVellis, 2016). Estimations of the six dimensions were analyzed in a model developed in Stata software version 14 using the maximum likelihood estimation. Figure 2 describes the SEM used to test the model. The results from our final model show acceptable fit indexes of X^2 = 1256.51 and df = 449, p-value = 0.00. Table 6 provides the result of the various performed tests for the model fit — all of the results passed the tests.

Table 6

Test for the model fit

Statistical test	Outcome	Parameter	Source
Chi square	χ^2 = 1256.51 P = 0.000	P < .05	
RMSEA Root mean square residual	RMSEA = .077 PCLOSE = .00	RMSEA < .1	Browne and Cudeck (1993)
CMIN Minimum value of the discrepancy	CMIN = 2.8	CMIN > 2	Byrne (1989, p. 55)
CFI Comparative fit index	CFI = .878	CFI = 0 to 1 A value close to 1 indicates a perfect fit	McDonald and Marsh (1990)

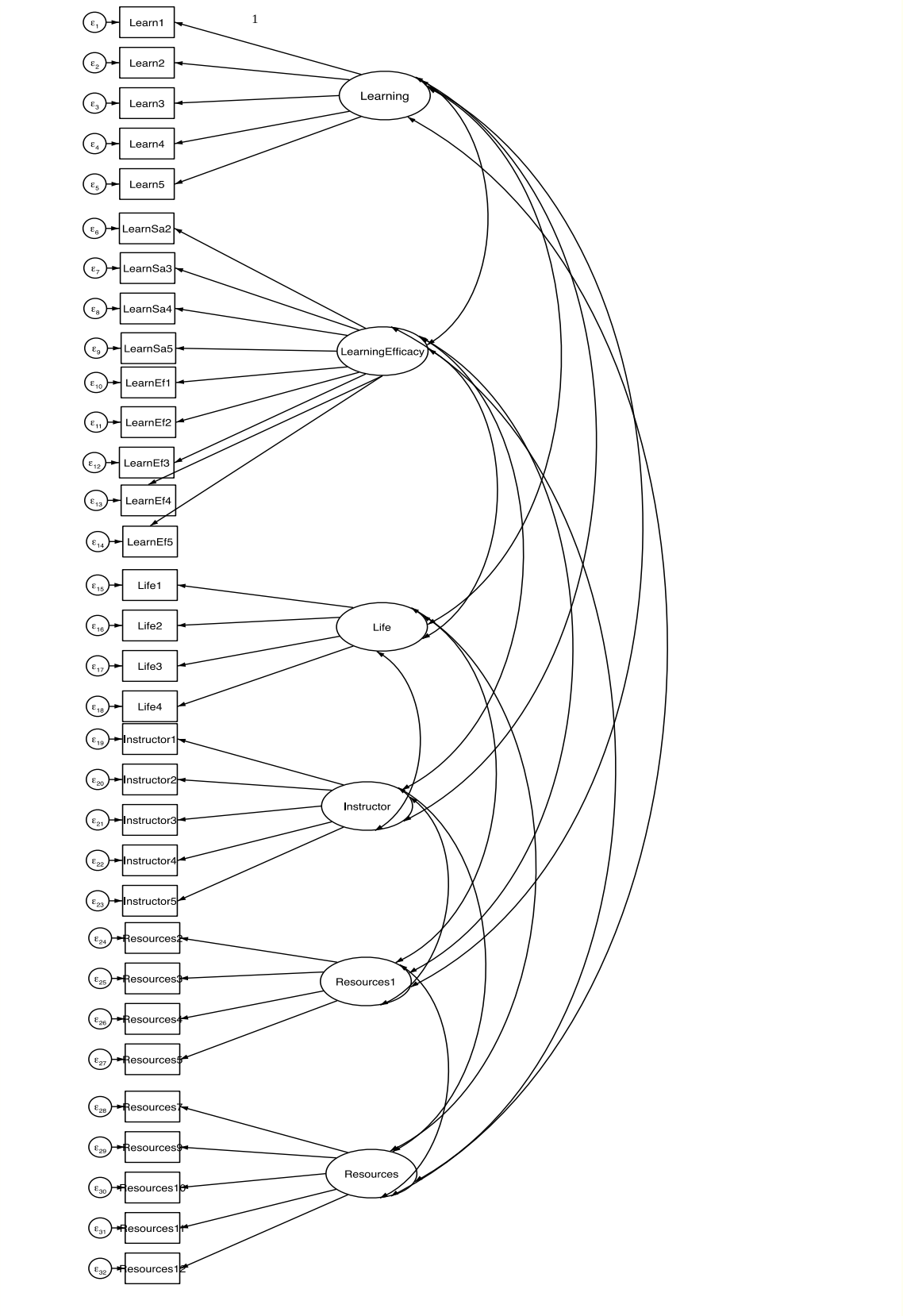

Figure 2. Measurement model for scales of entrepreneurial programs

Convergent and discriminant validity

For convergent and discriminant validity, the average variance extracted (AVE) for each dimension was calculated. The AVE values exceeded 0.5, indicating that the explained variance is higher than the variance from errors (Fornell & Larcker, 1981). The composite reliability was also calculated, which needs to be higher than 0.6 in exploratory studies (Raykov, 2004). In our case, the results from each dimension are higher than the value dictated by this rule. We checked the discriminant validity to analyze whether the AVE is higher than the squared correlations of each dimension. Our results confirmed discriminant validity. Table 7 provides a summary of the results. Finally, Table 8 provides the validated scale, each dimension, and their items.

Table 7

Convergent and discriminant validity

	AVE	Rho	LEARN	LEARNEF	INST	LIFE	REC1	REC2
LEARN	0.604	0.885	1					
LEARNEF	0.610	0.925	0.70	1				
INST	0.666	0.908	0.61	0.76	1			
LIFE	0.677	0.896	0.14	0.17	0.04	1		
REC1	0.657	0.884	0.54	0.46	0.50	0.16	1	
REC2	0.612	0.888	0.57	0.46	0.41	0.23	0.58	1

Note. Correlations shown are squared (for comparison purposes with AVE).

Table 8

Measures of entrepreneurial programs included in final instrument

Measure	Dimension	Item code
Increase your understanding of the attitudes, values, and motivation of entrepreneurs	Learning	Learn 1
Increase your understanding of the actions someone has to take to start a business		Learn 2
Enhance your practice management skills to start a business		Learn 3
Enhance your ability to develop networks		Learn 4
Enhance your ability to identify an opportunity		Learn 5
This course teaches me how to be an entrepreneur	Learning efficacy	Learnef 1
This course improves my entrepreneurial competencies		Learnef 2
I feel satisfied with the learning of this course		Learnef 3
I can easily complete a business plan		Learnef 4
After this course, I may become an entrepreneur		Learnef 5
After this course, I can make independent decisions		Learnef 6
After this course, I am more willing to take risks		Learnef 7
After this course, I can tackle entrepreneurship challenges		Learnef 8
After this course I better understand the possible challenges faced at the beginning of the entrepreneurial career		Learnef9
Instructor's style of presentation held your interest during class	Instructor	Instructor 1
Instructor's explanations were clear		Instructor 2
The instructor made students feel welcome in seeking help/advice in or outside of class		Instructor 3
Does the teacher show a genuine interest in individual students?		Instructor 4
The instructor presented the background or origin of ideas/concepts developed in class		Instructor 5
A pool of entrepreneurial-minded classmates for building a team	Resources 1	Resources 1
Advice from faculty		Resources 2
Advice from classmates		Resources 3
Advice from tech-transfer officers		Resources 4
Research resources (library/web)		Resources 5
Networking events	Resources 2	Resources 7
Business plan competitions (testing ground for the idea)		Resources 9

Continues

Table 8 (continued)

Seed funding from university		Resources 10
Referrals to investors		Resources 11
Financing alternatives		Resources 12
This course allowed me to align my professional aspirations with personal ones	Meaning of life	Meaning of life 1
This course allowed me to discover my real passion		Meaning of life 2
I am clear at the end of the course about how I want to invest most of my time		Meaning of life 3
This course allowed me to discover my qualities and where I can apply them		Meaning of life 4
Your interest in the subject has increased as a result of this course		Meaning of life 5

Evaluating entrepreneurial programs

Finally, analyses were established to evaluate entrepreneurial programs with our validated scale to explore our data. To examine causal effect, we investigated how different factors affect perceptions of learning efficacy through a linear regression. We found that when students have a favorable rating of learning and meaning of life, the learning efficacy ratio increases, consistent with previous research (Chen et al., 2015). We also extend this exploration to the instructor role, finding that a favorable instructor rating appears to have a significant impact on female entrepreneurial students' learning efficacy. Our results highlight the importance of differentiating the types of resources available (see table 9).

Table 9

Regression models of learning efficacy

Variable	**Coef.**
Dependent variable Learning efficacy	
Learning	0.3852*
Meaning of life	0.3603*
Instructor	0.0901*
Resources 1	−0.0784*
Resources 2	.00410
Constant	−.0019
R2	.7961
ΔR2	.7922

Note. * denotes p < 0.05, N = 304.

DISCUSSION AND CONCLUSION

In this paper, we propose and empirically test a model to measure the attributes of entrepreneurial programs based on the perceptions of students who are currently taking a course. The identified factors highlight the importance of considering variables that are not regularly addressed in the education field but require special consideration in entrepreneurship education. As previously indicated, the included variables were from studies in the fields of education and entrepreneurship (Chen et al., 2015; Marsh, 1982; Okudan & Rzasa, 2006; Souitaris et al., 2007). This paper contributes to theory by producing an empirical validation of a measurement scale following robust methods that include the scale's reliability and validity. The study also provides

additional analyses by examining the effect of entrepreneurial programs' elements on learning efficacy.

This paper offers important implications. First, an initial qualitative analysis with experts in the field of entrepreneurship allowed an exploration of the possible factors that are currently needed in entrepreneurial education. Consequently, the resultant entrepreneurial scale includes a new dimension called the meaning of life. Previous program assessments failed to recognize that this element is essential to any entrepreneurial program (Chen et al., 2015; Souitaris et al., 2007). This dimension highlights the importance of program design that considers students' goals and desires, a concept that was explored previously in contexts related to labor environments (Bonebright et al., 2000). Additionally, this consideration may be inspirational for students. Considering the meaning of life as a dimension helps integrate an essential perspective into entrepreneurial education and may be applied to guide further research into entrepreneurial education, particularly by considering the personal goals of each student.

Second, this research facilitates an understanding of the dimensions that entrepreneurial programs must include, and that might encourage students to create new ventures. Therefore, we emphasize the importance of resources as attributes of entrepreneurial education; this finding coincides with that of Souitaris et al. (2007), who emphasized that having resources is highly beneficial for students.

The results of the structural analysis of this study also suggest the distinction between two types of resources. This division indicates that are differences in perceived resources. For the first group of resources, we identify facilitators and environments that universities provide to develop students' entrepreneurial education, such as professors, libraries, and classmates. Based on these findings, establishing an environment that offers support for entrepreneurial initiatives may be one of the most important aspects that universities must consider. In contrast, the other resources group includes linking students to investors and events where they can present their projects. These activities may be inspirational for students who intend to pursue their ideas. We consider that the first group is more related to close contact with the student and the second one includes extern services and people from other areas and institutions.

Our findings confirm the inclusion of learning as a dimension of entrepreneurial programs. We identified two dimensions related to learning: learning and learning efficacy. The first dimension is from the education field, which mainly refers to the development of business skills, whereas the second dimension is about the effectiveness and satisfaction perceived by students regarding the entrepreneurship course. Previous research from the education field highlights the importance of learning for education performance (Souitaris et al., 2007), for evaluating the performance of entrepreneurial education programs. This measure is important for future research.

An interesting aspect of this study is related to the role of the instructor. Consequently, some items were adapted from the educational field (Fiet, 2001). This dimension is recognized as essential to students, making it an important measure for consideration in any educational

assessment and encouraging universities to develop training programs to help teachers in their educational roles. We also explore instructors' perceptions on the effect of learning and learning efficacy. Exploratory results provide bases to highlight the professors' impact on perceptions of entrepreneurial program performance. This result is consistent with previous entrepreneurial research that explores the positive impact of mentors and professional support on entrepreneurs (Delanoë, 2013; Gimmon, 2014).

The developed instrument also offers practical implications for educational program designers because, as stated, it can be used to evaluate and determine the resources that students may require to develop their entrepreneurial projects. This assessment may also be useful for universities that are considering the inclusion of entrepreneurial subjects as part of their curricula and are interested in the personalization of education because it considers students' personal goals. Additionally, an instrument in Spanish is useful for exploring entrepreneurial education in Spanish-speaking environments, especially in Latin American countries in which the activity seems to be continuously growing (Bosma et al., 2020).

Limitations and future research

A limitation of this study is the random sample; we used convenience sampling from different universities. Our analysis required students who were enrolled in the entrepreneurial program when they filled out the survey. Therefore, our sample is limited to specific groups of students. The meaning of life was a new construct, and we used the items that we proposed. Exploring these items in other entrepreneurial contexts and replicating them is necessary to confirm our recommendations.

For future research, we recommend more dimensions related to entrepreneurial intentions and actions. Additionally, more empirical work is needed to assess its relationship to different measures given the number of ideas generated by students' intentions toward the entrepreneurial activity. Moreover, additional research is needed to support the relationship between the instrument and entrepreneurial programs' performance, such as orientation and learning efficacy. In addition, we suggest exploring the resources dimension to understand better the distinction between different kinds of resources and their impact on the students.

We developed an instrument suited for testing different entrepreneurial variables in Spanish. This instrument allows comparison between countries — for example, European and Latin American —, an important step to extend entrepreneurial research in the Latin American context. Our study also opens research to analyze entrepreneurial programs and students' perceptions. Future studies can address the relationships between some factors of entrepreneurial intention to further compare the defined attributes that affect specific cultures more.

In summary, this instrument provides empirical evidence for a set of dimensions related to entrepreneurial education. Specifically, the research is grounded on five sets of variables that highlight students' perceptions of entrepreneurial programs. This instrument is used in a sample of students taking entrepreneurial courses at the time of this study. We believe that this study's

results offer a legitimate path for developing a reliable measure of university entrepreneurial programs, particularly as the instrument considers students' perceptions.

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2nd author: conceptualization (equal), data curation (equal), formal analysis (equal), funding acquisition (equal), investigation (equal), methodology (equal), project administration (equal), resources (equal), software (equal), supervision (equal), validation (equal), visualization (equal), writing-original draft (equal), writing-review & editing (equal)

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APPENDIX

Table A1

Instrument items (Spanish version)

Item	Dimension
Incrementar tu entendimiento sobre actitudes, valores y motivación de los emprendedores. Incrementar tu entendimiento sobre las acciones que alguien tiene que hacer para iniciar un negocio. Mejorar tus habilidades prácticas administrativas para iniciar un negocio. Mejorar tus habilidades para desarrollar una red de contactos. Mejorar tus habilidades para identificar una oportunidad. Tu interés sobre el tema se ha incrementado como consecuencia de este curso. Has aprendido y entendido los materiales del tema en el curso.	Learning
El método de enseñanza del curso se alineó con mi estilo de aprendizaje. Puedo fácilmente desarrollar un plan de negocios. Este curso me enseña cómo ser un emprendedor. Este curso mejora mis competencias emprendedoras. Me siento satisfecho (a) con el aprendizaje de este curso. Después del curso, entiendo mejor los posibles retos y dificultades enfrentados al inicio de la carrera emprendedora. Después de este curso, podría llegar a ser un emprendedor. Después de este curso, puedo tomar decisiones de forma independiente. Después de este curso, estoy más dispuesto a tomar riesgos. Después de este curso, soy capaz de enfrentar los desafíos del emprendimiento.	Learning efficacy
El estilo de presentación del instructor mantuvo tu interés durante la clase. Las explicaciones del instructor fueron claras. El instructor hizo sentir a los estudiantes bienvenidos en la búsqueda de ayuda dentro y fuera de la clase. ¿Crees que el profesor muestra interés por el desarrollo de sus estudiantes? El instructor presentó los antecedentes o los orígenes de las ideas o conceptos desarrollados en la clase.	Instructor
Un grupo de compañeros con espíritu emprendedor para formar un equipo. Un conjunto de tecnologías. Consejos de la escuela. Consejos de los compañeros. Consejos de los encargados de transferencia de tecnología. Recursos de investigación (biblioteca/red) Eventos de networking. Espacio para reuniones. Competencia sobre plan de negocios. Financiamiento de incubación de la universidad. Contactos con inversionistas. Fuentes de financiamiento alternas.	Resources
Este curso me permitió alinear mis aspiraciones profesionales con las personales. Este curso me permitió descubrir lo que realmente me apasiona. Me queda claro al finalizar del curso, cómo quiero invertir la mayor parte de mi tiempo. El curso me permitió descubrir mis cualidades y en qué actividades puedo aplicarlas. Este curso me permitió alinear mis aspiraciones profesionales con las personales.	Meaning of life

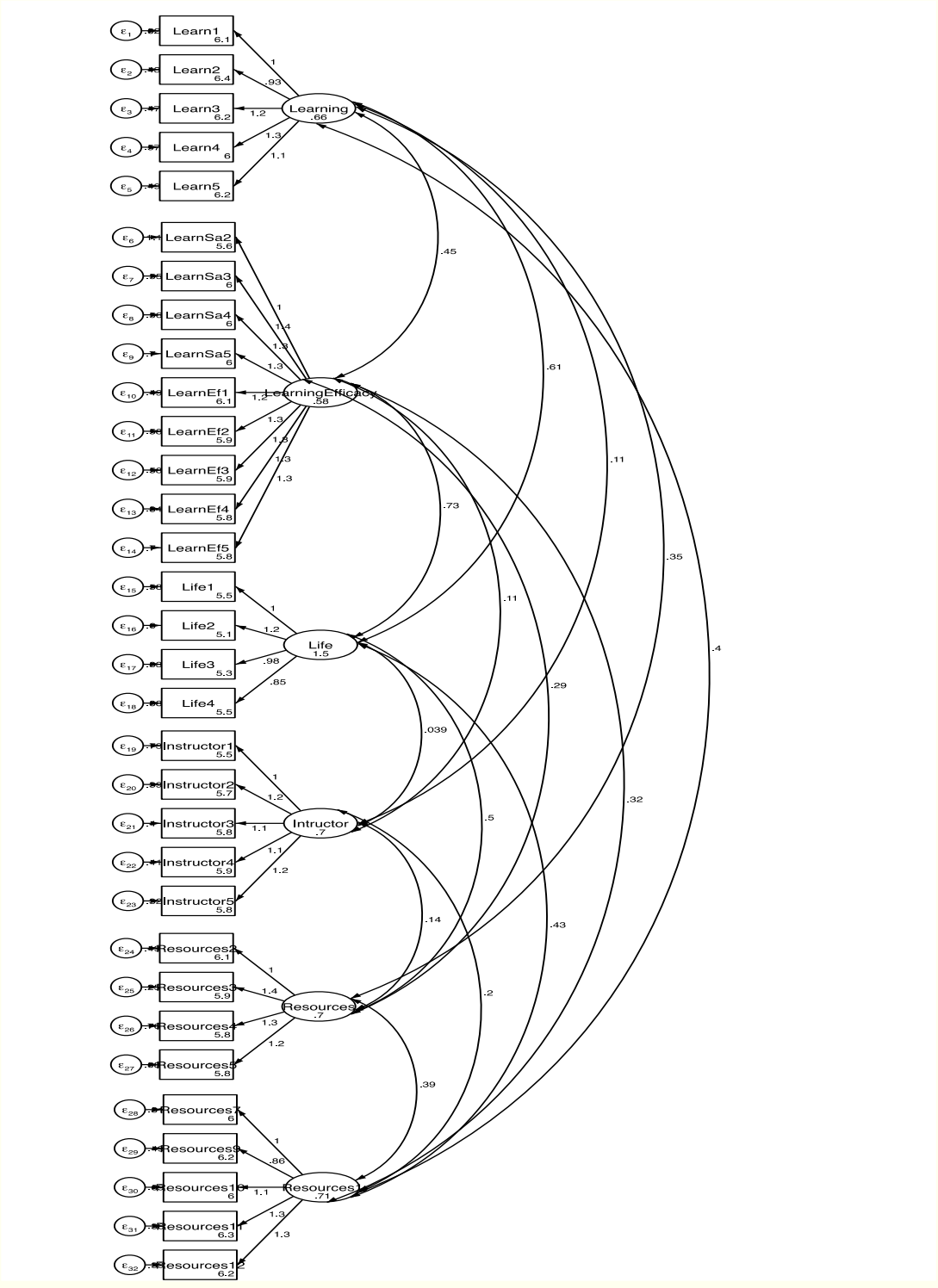

Figure A1. SEM model